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VISION

The vision of the journals is to provide an academic platform to scholars all over the world to publish their novel, original, empirical and high quality research work. It propose to encourage research relating to latest trends and practices in international business, finance, banking, service marketing, human resource management, corporate governance, social responsibility and emerging paradigms in allied areas of management. It intends to reach the researcher's with plethora of knowledge to generate a pool of research content and propose problem solving models to address the current and emerging issues at the national and international level. Further, it aims to share and disseminate the empirical research findings with academia, industry, policy makers, and consultants with an approach to incorporate the research recommendations for the benefit of one and all.

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IS IT POSSIBLE TO LEARN ENGLISH BY SELF-STUDY

Ziyod Yunusov*

*Senior Teacher,
Fergana Polytechnic Institute,
Fergana City, UZBEKISTAN

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ABSTRACT

The article reveals in details the difficulties of learning English by self-study. It also advises important and useful ways how to involve in learning the language and prevent daunting condition in front of grammar. It could be very helpful for beginner learners how to structure their learning strategies of the language. It talks about not only the issues and challenges of learning but also gives obvious and clear solutions. With that, every reader of the article will have a strong tool and a weapon on hands in the battlefield named self-study, where every item of knowledge is vital and essential.

KEYWORDS: *Self-Study, Learning, Achieving, Abilities, Possibilities, Impossibilities, Learning Process, Result, Dictionaries, Longman, Oxford, Cambridge, Webster, Collins, Macmillan, Raymond Murphy, Text-Book, Professional, Goal, Principles, Techniques, Skills, Expressions, Constructions, Pronunciation, Grammar, Speech.*

INTRODUCTION

For over the years of independence the Republic of Uzbekistan has carried out fundamental, structural and substantive reforms that have encompassed all levels of education system and its components, which were aimed at ensuring its compliance with the long-term objectives and interests of the country, modern requirements, as well as international standards. The appropriate legal framework reforming this sector was created, which defined as a priority the growth of investment, as well as the investments in human capital, training of educated and intellectually developed generation, which is the crucial asset and a decisive force in the achievement of democratic development, modernization and renewal, ensuring stable and sustainable growth of the economy.[1]

We need to teach students how to learn for life, and for that the teacher must be capable of continuous updating of techniques to work with the new generation, to fit in a constantly changing environment, encourage students in their creative approach to the subject, using a variety of non-traditional forms and methods of teaching , innovative technologies.[2]

Particular emphasis is placed on student-oriented technologies - cooperative learning, project-based learning, technology individualization and differentiation, multilevel training. Individualization technology is widely used in conducting training courses with course design, graduation design. Students' progress in the protection course or research projects show performance. Collective learning technology is used during the lessons in the form of workshops,

talks, discussions, dialogues as a result of which is the solution of the problem situation to a student, for example, on the railways. [3]

MAIN PART

Learning English on your own is both a difficult and interesting task, especially for those people who are used to achieving their goals in life. If you organize your classes correctly, choose the appropriate methodology and purchase the necessary dictionaries and textbooks, learning will not only be effective, but can also turn into pleasant entertainment. This is the very case when the goal set justifies the means, because along with the knowledge of the language, a person gains many more bonuses: expanding the circle of communication, the ability to read the classics in the original and navigate in an English-speaking country without the help of a translator, as well as many other advantages. [4]

What prevents language learning?

Most people are convinced that it is impossible to learn English on their own, or at least slightly advance in its knowledge. In addition, the reason for this is stereotypes. Yes! It is the beliefs of others that make us abandon our dreams and they sound something like this:

- Learning English on your own is a daunting task.
- The learning process to a certain level of knowledge (for example, advanced) takes years.
- Everyone who studies a language at home does not achieve the desired result.
- Learning English requires immersion in a language environment.

In fact, not all these statements are without foundation and they mean only one thing: learning English on your own is a rather difficult and thorny path. Moreover, how long it will be depends directly on what goals and means are used in the learning process.

What do you need for those who are learning English on their own?

Self-study guide of the English language - performs an important function - it provides information in a clearly structured form with a sequential presentation from simple material to more complex. A good self-study guide is a study guide that pays attention to every aspect of the language being studied: grammar, reading, pronunciation, listening, and writing. An equally important point when choosing a self-instruction manual for the English language should be the ease of use and accessibility of presentation, the availability of practical exercises, a phonetic course and additional audio materials. Self-study English will only give results if the classes are interesting to you, and the teaching aids cause positive emotions.[5]

The English-Russian dictionary is necessary for your studies. It is best to have an option in which the meaning of the new words is explained by simpler English words. The most popular are Longman, Cambridge, Oxford, and Webster, Collins and Macmillan, but they are all very similar to each other. Longman has more comparison articles, it is simpler and more convenient, Oxford is bright and memorable, and Cambridge has simple and understandable explanations. Which one you choose for yourself is up to you.[6]

The grammar textbook is another aspect, without which independent learning English will be simply incomplete. It belongs to the ageless classics, and therefore it is impossible to replace it with anything at the moment. Many experts believe that Raymond Murphy's grammar textbook

has proven its worth over the years. It is quite functional and easy to understand and still occupies a leading position among educational materials. Murphy's textbook is presented in the form of a grammar reference with reinforcement exercises. It is completely unnecessary to study in a certain sequence; you can finish in one place, and start completely from another.[7]

Without what, independent learning of the English language is impossible?

Interest is an important driving force of human activity, and it is almost impossible to overestimate its importance in learning English. It is on this aspect that the concentration of attention, the richness of associations and the perception of new material depend, because everything that gives pleasure is given easily and naturally. A person who is engaged in inner motivation is able to achieve much greater results than the one who was charged with it.

Desire is the second powerful factor that motivates learning. If it goes in tandem with an interest in the language or with a professional need, it gives very good results.

For desire to turn into action, a well-defined goal is required. First of all, decide for yourself why you need English and to what extent you should know it, and also determine for yourself the period during which you will achieve a certain result.[8]

Now imagine what opportunities you have to achieve this goal. These may include trips to English-speaking countries, live or virtual communication with native speakers, new techniques and modern teaching materials.

How do you define a goal?

Set a goal by asking yourself leading questions:

- Why do you need English?
- Want to read the classics in the original?
- Do you want to participate in international conferences?
- Maybe you need to correspond with business partners in English.
- Or do you want to communicate via Skype with foreign friends?
- Or maybe you are going to work abroad?

Define the most important principles for self-study English for yourself:

- Motivation (this requires a strong desire to learn the language).
- The learning process (depends on the purpose for which knowledge is needed).
- Correct technique (you need to choose the best option that suits your temperament).
- Positive attitude (it just doesn't hurt).
- What is required for self-study English to be successful?

Reading is the mother of learning

Reading allows you to create a picture in your imagination; it activates brain activity and helps to better absorb the educational material. Comprehending what you read, you will have to analyze

and understand the author's point of view, this will allow you to better assimilate the material presented.[9]

Read only those texts that you understand, otherwise you will very quickly lose interest in reading.

Pay attention to new words in the text. A large number of unfamiliar expressions in the text suggests that the level of presentation of the material is too high and, perhaps, you should choose something simpler.

Try to write out all the new words that appear in the text. Mark them as you read, try to guess their meaning and, at the end of the process, enter them into your dictionary.

It is reading that becomes the standard of literate writing. Each text contains the correct structure of expressions and constructions of sentences; this will allow you to subsequently use them correctly in the letter.

Read regularly. Try to read a little, but every day. Better to read 15 minutes a day than two hours on Sunday.

Watching movies in English is a good combination of business and pleasure

Everyone knows that watching a movie is a real pleasure. To learn English on your own, try to choose films that are familiar to you. Better if they are with subtitles. For each of them, create your own dictionary and, as you browse, enter into it unfamiliar words and expressions.

Talk, talk and talk

First of all, you need to learn to speak the language. The biggest problem an English learner faces is fear. Fear of not succeeding, fear of not knowing and fear of looking stupid when pronouncing certain English words. Therefore, many students, devoting a lot of time to grammar and reading, prefer not to speak English at all. And completely in vain! Any training is useless without practice, which is why you need to work on your pronunciation every day.

Correct pronunciation is the key to success

Pronunciation is the main component of any foreign language; it depends on the correct perception of foreign language sounds. Any defects in pronunciation make a person's speech difficult to understand. To learn how to pronounce the sounds of the English language correctly, you need constant training during the first months of training. Pronunciation rules can be learned by comparing them with the rules of the Russian language. The pronunciation of the most difficult sounds requires special attention, but do not forget about the small rules. In English, stress and intonation are important, and therefore do not forget to pay attention to these aspects.[10]

Don't forget about grammar

The grammar of the English language is a whole system, without the knowledge of which it is simply impossible to fully master the language. For this, it is most important to know its basics, rather than superficially familiarize yourself with many secondary phenomena. Try to understand how and why a particular grammatical rule is used in a sentence, as well as memorize examples of its use.

What are the pitfalls of learning English on your own?

Almost each of us dreamed of learning English on our own, but few have achieved success in this field. Why is this happening? The first and foremost problem with self-directed learning is the lack of control. Anything can distract from classes - a phone call, an interesting movie or an invitation to a walk. To prevent this from happening, you will have to draw up a clear schedule for yourself and strictly follow it, using common sense and willpower.

Another problem of learning English on your own is mistakes that later become your habits. To learn a language correctly, you need to be very strict and attentive to yourself. Studying with a teacher, you will not be afraid of mistakes, because he will correct you in a timely manner. If you are left alone with the language, then the uncorrected mistake turns into an incorrect construction, which will gradually take root in your speech and writing. Remember - retraining is much more difficult than learning from scratch!**[11]**

All in your hands

So, you are determined to learn English on your own and are ready to start learning it. One of the best techniques for successful learning is to surround yourself with an English-speaking environment. Read original books, make notes in English, listen to English-language radio, and watch movies and news in English. **[12]**

CONCLUSION

The more material there is around you, the faster and more natural the learning process will flow. An equally important aspect is speaking; it is it that most often lags behind those who study English on their own. In fact, communication with native speakers and those who study it is not a problem today. It is enough just to register on sites where participants practice pronunciation and find interlocutors. Remember that everything depends only on you.

REFERENCES:

1. Voinova MG. Pedagogical Technologies and Pedagogical Skills: Textbook. - Tashkent, 2005.
2. Mavlonova R. et al. Pedagogy: A Textbook for Students of Faculties of Primary Education Methods of Higher Education, Students of Pedagogical Lyceums and Colleges. Tashkent, "Teacher", 2001.
3. Salomov G. Language And Translation. Tashkent: Fan, 1966.
4. Salomov G. Fundamentals Of Translation Theory. Tashkent: Teacher, 1983.
5. Mahmudov N. Linguistic Research. Tashkent: A Classic Word. 2017.
6. Abdurakhmonova MM, Uglimirzayev MA, Karimov UU, Karimova, GY. Information Culture and Ethical Education in the Globalization Century. The American Journal of Social Science and Education Innovations, 2021;3(03):384-388.
7. Karimov, U., & Abdurakhmon, A. Innovative Information Technology In Education. Форум Молодых Ученых, 2017;(5):9-12.

8. Karimov UU. Scientific And Theoretical Foundations Of The Formation Of The Social Environment In The Family. Oriental Journal Of Social Sciences, 2021;37-40.
9. Karimov UU, Karimova GY. The Importance Of Innovative Technologies In Achieving Educational Effectiveness. Журнал Естественных Наук, 2021;1(1).
10. Kuzibaevna OG. Technologies of Developing The Ecological Culture of Students In The Process Of Learning A Foreign Languages In Higher Educational Institutions. Solidstatetechnology, 2020;63(1s):1816-1825.
11. Yuldashev IA. Pedagogical Bases of Formation of Social Activity in Pedagogical Sciences. Теория И Практика Современной Науки, 2020;(5):67-69.
12. Bozarov DM, Karimova GY. Role Of The Self-Organization Model In Complex Social Systems. Oriental Journal Of Social Sciences, 2021;1-9.

A CRITICAL REVIEW OF POWDER METALLURGY TITANIUM MECHANICAL PROPERTIES

Bhagwan*

*Assistant Professor,
Department of Mechanical Engineering,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- Bhagwan.engineering@tmu.ac.in

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ABSTRACT

In the development and use of powder metallurgy (PM) titanium and its alloys, mechanical characteristics are the most important consideration. The mechanical characteristics of PM titanium are examined by comparing it to ingot metallurgy (IM) and analyzing the mechanical qualities' reliance on the microstructures that are unique to PM titanium. The impacts of the most important variables on mechanical characteristics (porosity, oxygen content, and microstructure) are addressed. PM Ti refers to PM titanium and titanium alloys in general throughout this study. Ingot metallurgy titanium and titanium alloys are covered under IM Ti. The static and dynamic characteristics of PM Ti are investigated to show the difficulties as well as the possibilities. The mechanical characteristics of a few current PM Ti technologies are also evaluated.

KEYWORDS:*Ingot Metallurgy, Mechanical Strength, Mechanical Properties, Powder Metallurgy, Titanium.*

1. INTRODUCTION

Combination of high strength, light weight, and corrosion resistance, titanium is an ideal material for a wide range of applications. However, owing to its high inherent cost, practical uses have been severely restricted, especially in cost-sensitive consumer applications such as cars. As a result, cost reduction is a key driving factor in particulate titanium production and processing research and development[1]. Because of its near-net-shape capabilities, PM is a feasible option for lowering the cost of titanium components. As a result, it has been the focus of R&D across the globe for the last three decades. During the 1980s and 1990s, a large body of data on the mechanical characteristics of PM Ti was published and collected, demonstrating that PM is a feasible method for producing low-cost high-performance goods. There are many thorough studies on the mechanical characteristics of PM Ti and their reliance on processing[2]. Despite long-term efforts and accessible data, worries about PM Ti's mechanical characteristics remain, particularly in aerospace applications where components must have mechanical attributes and performance similar to IM parts.

Critical characteristics, such as fatigue strength, cannot differ from those of IM Ti. Based on the processing method, PM Ti is divided into two categories: blended elemental (BE) and pre alloy (PA). BE components have a low cost advantage, but their mechanical characteristics are often inferior to those of IM parts[3]. PA components, on the other hand, often have acceptable properties but are considerably more expensive than BE parts, limiting competitiveness in terms of cost reduction. As a result, the issue is balancing cost and performance. Either decrease the cost of PA components or improve the performance of BE parts is an option. Based on recent events, the latter seems to be the more promising option. The mechanical characteristics of PM Ti are updated and critically assessed in this study, with an emphasis on the variables that influence these features[4]. In addition, the evolution of titanium generated by sophisticated particle techniques during the past decade is discussed. Mechanical characteristics are typically evaluated from two perspectives: static and dynamic properties. Yield strength, tensile strength, and ductility elongation upon fracture or percentage decrease in area are all static characteristics. Fatigue characteristics are often referred to as dynamic properties.

Mechanical characteristics for Ti-6Al-4V are presented based on accessible literature. The tensile strength of PM Ti-6Al-4V as a function of ductility, incorporating material generated through several processing methods[5]. For comparison, ASTM Standard B348 for IM is provided on pages. The majority of the material was released in the 1980s and 1990s. Data from the literature after 2000 are labeled individually for comparison. Data from current advanced/developing technologies, such as the Armstrong process's sintering of titanium powder, powder injection molding and direct sintering of TiH₂. The data scatters across a wide range in both dimensions. Tensile strength ranges between 900 and 1,100 MPa, with elongation ranging from 4% to 30%. Differences in porosity and microstructure in the PM alloy are to blame for these variances, particularly in ductility.

At 96 percent of the pore-free density, the elongation of Ti-6Al-4V BE components was 6%. Sun et al.[18], on the other hand, found that a near-fully dense BE Ti-6Al-4V alloy sheet (>99 percent pore-free density) with a uniform fine equiaxed microstructure had an appealing combination of tensile strength (1,104 MPa) and elongation (19.7 percent). Furthermore, Ti-6Al-4V PA components had a high tensile elongation (22 percent), which they ascribed to the fine and completely equiaxed alpha-phase microstructure[6]. PM Ti-6Al-4V achieves equivalent or greater tensile strength than wrought materials (ASTM B348), however the ductility is typically lower than what is needed. It may be inferred from data in the literature after 2000 that there is a tendency toward better strength/ductility combinations. In summary, PM Ti-6Al-4V has overall static characteristics that meet or exceed those required in ASTM B348. The dynamic (S-N) characteristics of PM Ti-6Al-4V, based on the original chart by Froes et al.[1,2]. The BE and PA Ti-6Al-4V alloys' fatigue life ranges are compared to those of IM Ti-6Al-4V. The fatigue behaviour of the PA alloy is similar to that of the IM Ti-6Al-4V alloy.

In comparison to the PA and IM alloys, the BE alloy has lower fatigue strength and life. The BE alloy's poor fatigue characteristics are due to residual porosity and/or impurities in the sintered alloy[7]. Because fatigue fractures are known to start from pores on the surface of the specimen, both porosity[8, 37, 42] and contaminants are known to be harmful to fatigue performance. As a result, employing powder with a low chloride-contaminant level may enhance the fatigue performance of BE alloy parts[8]. The dispersion in both static and dynamic property data is a common characteristic. Inconsistencies in the data are due to the use of various powders and

processing methods. Because mechanical properties are functions of microstructure, and microstructure is determined by processing history, it is reasonable to assume that differences in powders, sintering conditions, consolidation processes, hot working, and post-sintering heat treatments all contribute to microstructure diversity, resulting in mechanical property variations. Processing has an impact on two additional factors: porosity and oxygen content, in addition to microstructure[9]. In PM Ti, both are very essential. One of the most significant variables influencing IM Ti and PM Ti is oxygen concentration, which is especially relevant in PM Ti due to the small particles involved[10].

2. DISCUSSION

Despite the fact that these variables porosity, oxygen, and microstructure are important and have an impact on mechanical characteristics, there has been no concerted attempt to the authors' knowledge to compile a thorough review. The first difference between PM Ti and IM Ti is the importance of porosity. The impact of porosity on static characteristics such as yield strength, tensile strength, and elongation, based on data collected from various sources. As can be observed, static characteristics increase almost linearly with increasing relative density, as one would anticipate. To obtain comparable static property levels as IM Ti, PM Ti products must have a relative density >98%, according to ASTM B348. The dynamic response is more susceptible to residual porosity than static characteristics. How even 1.0 v/o porosity 99 percent relative density may reduce fatigue strength substantially. As a result, only completely dense PM Ti fulfills the fatigue strength criterion on par with IM Ti. The amount of residual holes is generally determined by the kind of powder utilized as well as the following process parameters. When using PA, full densification is generally accomplished, but when using BE, porosity is always present, particularly if the powder has a high residual chlorine concentration. The residual chlorine concentration (0.120.15% w/o) has a significant impact on sintered density, according to many studies. Chlorine volatilizes during consolidation, forming holes containing insoluble gas bubbles inside the material; these pores are impossible to remove, even after secondary pressing following sintering. As a result, low-chlorine powders are required to achieve high-density PM Ti products. Sintered density is also affected by consolidation procedures.

The standard press-and-sinter method may produce sintered densities of 95 percent to 99 percent of pore-free density. After sintering, further treatment with hot isostatic pressing may result in densities as high as 99.8% of the pore-free level. After sintering, additional treatments such as hot forging, hot rolling, and heat treatment have been utilized to enhance PM Ti characteristics, particularly fatigue qualities. When the PA method is employed, HIPing is also the most popular consolidation process for producing completely dense PM Ti components. The initial green density is another factor that influences porosity. Green density is typically determined by particle size and compaction pressure. According to studies, employing high compaction pressures under comparable sintering circumstances may substantially increase sintered density. Higher compaction pressures result in higher green density and, as a result, higher sintered density. Particle size has an impact on green density. A high green density and, as a result, a high sintered density may be achieved by controlling the particle size distribution. Cold isostatic pressing is also efficient in increasing green density and density uniformity in green compacts. In conclusion, porosity has a substantial and essential impact on the mechanical characteristics of PM Ti, particularly fatigue resistance. Employing high-purity low-chlorine powders, boosting green density, and using suitable sintering cycles, followed by subsequent processing treatments,

may all help to reduce porosity. The amount of oxygen in sintered PM Ti products is determined by a variety of variables.

Because of variations in the production processes, the microstructures of PM Ti and IM Ti are fundamentally different. If post-sintering thermal and mechanical treatment procedures are intended to do so, the microstructures of PM Ti may be tuned to be comparable to those of IM Ti. Because microstructure is influenced by both composition and processing history, the following discussion will concentrate on the microstructures of Ti-6Al-4V generated by various methods, as this alloy has been researched the most. In order to ensure particle bonding and compositional uniformity when using the BE method, the sintering temperature should be greater than the beta transus temperature. This is because many alloying elements' diffusivities, including titanium's self-diffusivity, are greater in the beta phase than in the alpha phase. As a consequence, an alpha plate colony structure beta-transformed microstructure is a typical as-sintered microstructure of the alpha+beta alloys. The size of the lenticular alpha plates and the aspect ratio of the plates are two features of this microstructure that influence mechanical performance. Small lenticular alpha plates have been found to improve both tensile and fatigue strength in studies. For improved fatigue-crack resistance, a low aspect ratio of alpha equiaxed alpha morphology is recommended.

As a result, sintering processes and post-sintering heat treatments are often intended to refine the alpha phase and decrease the alpha phase's aspect ratio. The beta phase boundaries, for example, have a significant impact on the beta-transformed microstructure. The sintering process must be designed to prevent beta-phase grain development, resulting in a beta grain size that is minimal during sintering and an alpha structure with a low aspect ratio. Furthermore, fast cooling following sintering has been found to refine the alpha lamellae. Microstructures of PA material generated by HIPing are often referred to as as-HIPed microstructures. Unlike sintering of BE materials, HIPing of Ti-6Al-4V is often done below the beta transus temperature (1,020°C). A recent research found that HIPing Ti-6Al-4V at 930°C resulted in a better balance of mechanical characteristics than HIPing at higher or lower temperatures. The typical as-HIPed Ti-6Al-4V microstructure comprises of alpha plates in a beta matrix. Because of the manufacturing process, PA powders frequently include a martensitic microstructure inside the particles, for example, PREP.

As a result, the HIPed microstructure of PA powders reflects the phase transition from martensite to alpha+beta, resulting in a fine microstructure in which the size of the alpha plates is dependent on the HIPing temperature. During HIPing, the microstructure coarsens with increasing temperature or time, as shown. When the temperature was near to the beta transus, significant coarsening was seen. The quantity of strain energy in the particles determines the aspect ratio of the alpha plates primarily. Higher strain energy stored in powders may lead to a smaller alpha-plate aspect ratio, which is preferable for improved mechanical characteristics, particularly fatigue strength. Deforming the powder before compaction or applying high pressure during HIPing may also increase strain energy. Recent study has established the existence of equiaxed alpha grains in the as-HIPed microstructure, in addition to lamellar alpha. At particle-particle contacts, where significant local deformation occurred, causing recrystallization, the equiaxed alpha grains developed. Heat treatment may change the microstructure of both as-sintered and as-HIPed microstructures.

The most effective heat treatment for PM Ti-6Al-4V is the "broken-up structure (BUS)" treatment, in which the alloy is exposed to prolonged annealing at low temperatures in the alpha+beta phase field, such as at 850oC, following beta quenching. The BUS treatment results in a refined broken-up alpha phase in the beta matrix. These microstructures are advantageous in terms of tensile and fatigue characteristics. The BUS therapy resulted in improved fatigue strength. Thermo hydrogen processing (THP) is a common titanium material treatment. The idea is to improve the microstructure by using hydrogen as a transient alloying ingredient. The alloying of titanium with hydrogen allows for the modification of phase compositions, the creation of metastable phases, and the control of phase transitions. THP usually entails hydrogenation, beta solution treatment at a high temperature, eutectoid breakdown at a moderate temperature, and lastly vacuum dehydrogenation. Each step corresponds to the previous one.

These phase shifts may be utilized to increase the process ability of PM Ti and IM Ti, as well as modify the microstructure and improve mechanical characteristics. THP is especially well suited for enhancing the microstructure of net-shape goods since no mechanical effort is needed. The THP concept has also been utilized to improve compactibility and sinterability by utilizing hydrogenated-titanium powder and the HDH method to create titanium powder. The THP details. Thermomechanical processing (TMP) is the most popular technique for improving the microstructure and mechanical characteristics of IM Ti, and the technology may be utilized to directly alter microstructures and improve PM Ti qualities. Cold and/or hot working, followed by annealing, are common TMP treatments.

TMP's effects on titanium microstructures and characteristics have been reported in a number of publications^{2, 84–86}, therefore they will not be discussed here. One aspect worth mentioning is that thermomechanical processing of PM Ti not only refines the microstructure but also aids in the elimination of residual porosity,⁵⁰ resulting in substantial improvements in tensile and fatigue characteristics. Because of the cost–performance trade-off, producing low-cost titanium powder has been a significant issue for PM Ti. The Armstrong method has received the most attention and has made the greatest progress toward commercialization of the thirty various novel technologies for producing titanium powders discovered during the last 10 years. The reduction of TiCl₄ by sodium is used to make Armstrong powders in a continuous process. It's comparable to the conventional Hunter method, except that it's a batch method. With small particle sizes of 10 m, Armstrong powders have a three-dimensional fine dendritic network.

This dendritic coral-like shape is thought to be advantageous for creating tiny microstructures, although it may be difficult to compress cold or hot. Despite the fact that the Armstrong process was launched over a decade ago as a low-cost titanium-powder manufacturing technique, there are just a few papers that provide data on sintered Armstrong powder mechanical characteristics. Tensile characteristics of press-and-sinter Ti-6Al-4V Armstrong powder were recently reported. The mechanical property results, which show that up to 96.4 percent of the pore-free density was obtained. The alloy's strength is adequate when compared to ASTM B348, but its ductility is too low, which may be due to porosity and/or oxygen in the sintered state. Yet another case of Armstrong powder sintering. Rapid heating and short-hold vacuum hot pressing compressed commercially pure (CP) titanium powder to produce a tiny grain size 2 to 3 m. The chemistry was similar to CP Ti ASTM grade 2, however the result had considerably greater strength, which was ascribed to the fine microstructure.

3. CONCLUSION

This paper provides a critical assessment of the current state of knowledge regarding the mechanical properties of PM Ti and their relationship to porosity, oxygen, and sintered microstructures. In order for PM Ti to achieve static strength and ductility comparable to IM Ti, it must have a relative density greater than 98 percent. Porosity has a greater impact on the dynamic characteristics of PM Ti. Only completely densified PM Ti can match IM Ti's fatigue resistance. When it comes to the ductility of PM Ti, oxygen is crucial. To avoid a significant reduction in ductility, the oxygen content in PM Ti-6Al-4V should be kept below 0.3 w/o. The effects of microstructure on the mechanical properties of PM Ti-6Al-4V are primarily determined by the size and aspect ratio of the lenticular alpha plates. The tensile and fatigue properties of PM Ti-6Al-4V are improved by refining the alpha grain size and lowering the aspect ratio of the alpha phase. Finescale microstructures may be produced via sintering cycle optimization, post-sintering heat treatments, or thermomechanical processing. Finally, it is shown that novel PM Ti methods have the potential to reduce the cost of PM Ti while also enhancing its characteristics.

REFERENCES:

1. Hagiwara M, Kaieda Y, Kawabe Y, Miura S. Fatigue Property Enhancement of α - β Titanium Alloys by Blended Elemental P/M Approach. ISIJ Int., 1991, doi: 10.2355/isijinternational.31.922.
2. Andersen PJ, Svoyatytsky VM, Froes FH, Mahajan Y, Eylon D. Fracture behavior of blended elemental p/m titanium alloys. 1981.
3. Neumann G and Tuijn C. Self Diffusion and Impurity diffusion in pure metals. 2017.
4. Chanani GR, Highberger WT, Kelto C, Petersen VC, Scarich GV. Application of titanium powder metallurgy for manufacture of a large and complex naval aircraft component. 1980.
5. Bolzoni L, Ruiz-Navas EM, Gordo E. Understanding the properties of low-cost iron-containing powder metallurgy titanium alloys. Mater. Des., 2016;110: 317-323. doi: 10.1016/j.matdes.2016.08.010.
6. Froes FH, Eylon D. Powder metallurgy of titanium alloys. Int. Mater. Rev., 1990;35(10): 162-184. doi: 10.1179/095066090790323984.
7. Bolzoni L, Herraiz E, Ruiz-Navas EM, Gordo E. Study of the properties of low-cost powder metallurgy titanium alloys by 430 stainless steel addition. Mater. Des., 2014; 110:317–323. doi: 10.1016/j.matdes.2014.04.019.
8. Liu Y, Chen LF, Tang HP, Liu CT, Liu B, Huang BY. Design of powder metallurgy titanium alloys and composites. Mater. Sci. Eng. A, 2006, doi: 10.1016/j.msea.2005.10.057.
9. Liu Y, Chen L, Wei W, Tang H, Liu B, Huang B. Improvement of ductility of powder metallurgy titanium alloys by addition of rare earth element. J. Mater. Sci. Technol., 2006;22(4): 465-469.
10. Ivasishin OM, Anokhin VM, Demidik AN, Sawakin DG. Cost-effective blended elemental powder metallurgy of titanium alloys for transportation application. Key Eng. Mater., 2000, doi: 10.4028/www.scientific.net/kem.188.55.

EFFECTS OF SOCIAL MEDIA ON YOUNG PEOPLE

Dr. Shambhu Bhardwaj*

*Assistant Professor,
Department of Computer Engineering
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id-shambhu.bhardwaj@gmail.com

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ABSTRACT

New kinds of media have developed during the last few decades. The lives of young people are becoming more significant, with many challenges and opportunities. Social media makes a major contribution to the online world by connecting a group of people who communicate and share information. Facebook, Wikipedia, Twitter, WhatsApp, Pinterest, LinkedIn, Instagram, and Reddit are some of the most widely used social media sites. These aren't simply social networking sites; they're also places where individuals may share their personal information with their friends and community. Owners of businesses will also be able to sell their products on social media and make money via crowd-funding. Data analytics collects and analyzes data from social media sites to help corporations and businesses make informed decisions. Social media also has a significant effect on students and youth's perceptions of human nature, leading to greed and fanaticism. As a result, social media is being used for the building and deconstruction of individuals from all walks of life.

KEYWORDS: *Sampathirao, Deceptive Postings, Communications, Sensitive Information, Improved Communication, Social Connections, and Technical Abilities.*

1. INTRODUCTION

The review focuses on the effects of social media on young people. Technology and innovation are seen as being of critical significance to human existence, and we must understand how to deal with them appropriately. Teaching young people how to utilize social media to enhance their professions and self-improvement is critical [1]. Technology has made inroads into our bodies, brains, and even emotions.

How does social media affect youth? According to Sampathirao, social media is like a coin, having both a positive and bad impact on young people [2]. It both motivates kids to achieve and discourages them from doing so, but children must remain vigilant. Youth interact with a wide range of people and support themselves in their chosen fields. Youth may use social media to express their opinions with others.

Deceptive postings, communications, and pictures are promoted on social media, resulting in disputes amongst users. The alliances and ties between countries are worsening as a result of such postings [3]. Because children are immature, they are vulnerable to cyberbullying. This has

an effect on the emotional and physical health of young people, as well as the risk of depression and self-harm. Because social media platforms lack confidentiality and security, it is conceivable that sensitive information may be misused by a third party. Children and adolescents gain from improved communication, social connections, and technical abilities, according to studies. In today's society, social media is a critical component. In general, social media is defined as any interactive medium or program that allows people to connect digitally. It differs from traditional media (such as television) in that users may both access and create content. Websites and apps like Facebook, WhatsApp, SnapChat, TikTok, instant messaging applications, mobile gaming tools, YouTube, and other forms of social media fall under this wide definition[4].

The increased use of social media is linked to a variety of mental health concerns, including anxiety, self-image issues, eating disorders, and other challenges. Furthermore, the findings of these research have been mixed, with some pointing to a minor but significant detrimental impact of social media usage on mental health. Certain mental health problems, such as depression and suicide, have become more common among adolescents in recent years, with suicide rates among young people aged 10 to 24 increasing by 56% between 2007 and 2017. Body dissatisfaction is a rising issue that has piqued the attention of young people. Low self-esteem refers to unwanted and negative ideas and emotions regarding one's appearance that are on the increase among contemporary youth. Because it may be linked to virtually all forms of mass media, social networking promotes the idea of a flawless physique. Height, weight, body size, and physical shape have all become intricate aspects of this ideal, with most women being average.

The objectives of these ideal physique pictures and advertisements. Many of the films depict thin breathing and bone suction, resulting in low weight and a physique with protruding collarbones, spines, and ribs, which is also a major cause of anorexia. On the other hand, a positive trend can frequently be observed on social media, which serves as motivation for people to maintain a healthy and fit physique.

Researchers who spent more time on Facebook's social media site were more likely to endorse starting to feel jealousy or worrying that others on their social media platform were better than they were, according to two cross-section studies of US and German school pupils. Fear of missing out, or "FOMO" has been linked to increased stress connected with Facebook usage [5]. "FOMO" has been characterized as "a persistent worry that others may have lucrative reviews of which one is absent."

The usage of social media has been linked to body image problems and disordered eating, according to a comprehensive review of studies. In a randomized study, girls reported being more irritable after only 10 minutes of reading their Facebook page than those who had visited the personality-neutral website exploitation [6]. Furthermore, as compared to individuals who were surfing the control website, participants who were over-evaluated seemed to make an elevated choice to enhance the appearance of their face, hair, or skin after spending time on Facebook. An observational study found that spending several hours per week on electronic media was inversely related to self-reported satisfaction, life pleasure, and self-esteem, whereas time spent on off-screen sports (in-character social relationships, recreational activities or exercise, traditional media, homework, religious services, paid work) was undeniably related to mental wrath. Other research has linked spending more than 2 hours per afternoon on social media platforms and personalized digital devices to increased suicide rates and depressive

symptoms among teenage girls, even though young people who have experienced high levels of face-to-face socialization have been particularly affected by the negative effects of spending even more time on-line.

The usage of digital displays before sleep was shown to be beneficial in a 14-day longitudinal cross-over study with controlled circumstances. Longer sleep duration and decreased tiredness throughout the night, lower melatonin production, circadian clock delay, reduced quantity of fast-moving sleep in the eye, and diminished attentiveness the following morning have all been found to disturb sleep. The use of social media was associated with decreased duration and improved sleep quality, as well as extended sleep during the daytime hours, according to a comprehensive evaluation and semantic analysis that supported studies on the allegiance among compact display screen-primarily dependent electronic gadgets and sleep implications. The mere presence of portable screen-based electronic devices in the bedroom has been reported to disturb sleep.

2. DISCUSSION

Despite the disruption caused by the study, the kids are establishing pleasant and social connections with the community. One of the most important implications of these platforms is students' academic performance, and numerous longitudinal studies have shown that spending too much time on social media without being creative has a negative impact on students' degrees. According to the findings, 82.6 percent of young people think social media has a significant impact on their social conduct [7]. Many young people use the internet before or after doing anything, do not interact with their peers, and instead communicate with their social pals, becoming less sociable. Social media is mostly used by young people for social rather than educational purposes. Young people's language is influenced by social networking sites to some extent. Sixty-five percent say social media allows them to interact with their socially connected friends, and thirty-three percent think social media sites are useful. The majority of young people utilize social media before or after every activity they participate in; they do not engage with their peers but instead speak with their social pals, and they are getting less sociable.

Adolescent social media networking has a critical role in the onset and progression of psychopathology. Significant risk factors for mental health problems have been identified in online community social interactions. Users of social media are constantly bombarded with idealized self-portraits. This puts young people at risk of seeming shallow, although the negative impact may be dependent on a kind of social media engagement.

2.1. Potential Risks

Youth who actively keep up-to-date (i.e. self-directed use of social media) may also work to obtain favorable feedback and seek affirmation, resulting in higher vanity, whereas young people who primarily view and respond to various posts (i.e. other-oriented use of social media) are exposed to these idealized displays, even if they no longer receive positive feedback [8]. Cyber victimization, or the fear of being a victim of cyber peer abuse, has been linked to higher rates of self-harm and suicide conduct, as well as stress-related problems. Other types of peer interactions on social media, such as social isolation and online squabbles, may put young people in danger. According to a study, 41% of adolescents admit to using their phone while sleeping, while 36% admit to getting up in the middle of the night to check their phone.

2.2. Depression and Self-Harm In Adolescents

Although population-based research suggests a link between social media usage and academic dissatisfaction among adolescents, the impact of such technologies may vary significantly across individuals and may even have a significantly reduced risk of damage, as shown by an increasing body of experimental studies. Girls prefer to spend more time on social media than boys, are more aware of cyberbullying, and are more likely to enjoy health benefits, which is consistent with recent epidemiological results that show depressed symptoms, self-harm, and suicide ideation have all risen in young girls [9].

2.3. Friendships, Teens, and Social Media:

Friendship and social skills are two more areas where social media has a good and bad effect on kids. According to the Pew Research Center study, 81 percent of adolescents said social media helps them feel more connected to their friends' lives. Furthermore, two-thirds of adolescents stated that these platforms help them feel like they have friends who would support them through difficult times.

There's a distinction to be made between a teen's social media buddies and their real-life friends. According to the Pew study, 60% of adolescents say they spend daily or almost daily time online with their friends, while just 24% say they spend as much time with their friends in person. These figures show how internet ties don't always convert into real-life partnerships.

Furthermore, cyberbullying has risen tremendously; according to a study by the group, hate speech among adolescents and teenagers has surged by 70% across communication channels on social media and prominent chat forums. More time spent online gives you a better understanding of both the positive and negative impacts of social media on teenagers.

2.4. Benefits of Using Social Media

There are a number of potential benefits. Opportunities for entertainment, personality development, and creative expression are all linked to the usage of social media. Social contact is one of the most often mentioned benefits of social media usage, with 81 percent of adolescents saying that it makes them feel at ease [10]. It may also offer resources for certain young people seeking online social assistance, particularly access to peer groups with comparable interests.

One may share or connect with others via a social media platform. It enables a person on one side of the globe to interact and discuss issues with someone on the other side. This isn't only a fun way to pass the time; it's also effective. This is something that should be taken advantage of in order to obtain the best possible educational results.

Users of social media have access to a place where they may develop their ideas. Internal effectiveness, or confidence in political officials' and organizations' accountability to citizens' demands, and outward effectiveness, or confidence in political officials' and organizations' accountability to citizens' demands.

Social media should be used by students to develop social awareness and compassion. Young individuals may use social networking sites to connect with their friends. Young people are encouraged to live their lives undisturbed by social networking platforms.

In fact, many groups have created their own Facebook pages to share information with a large number of people. Furthermore, its impact on recruitment has been growing. Businesses seek appropriate candidates for open jobs in their organization by establishing profile pages on social networking sites such as LinkedIn, Facebook, and Twitter, as well as the company's website.

2.5. Making Social Media To Use In A Better And Safe Way:

Encourage families to be proactive in limiting their children's and teens' use of smartphones and other mobile devices can still be beneficial. Because social media use becomes more complex when it exceeds one to two hours per day, open debate centered on high-quality interaction and directing is presumably excellent for reducing internet-related risks. It is important to educate parents that they link smartphone use with their own behavior; a retrospective analysis has revealed that heavy parental mobile phone use has resulted in a negative relationship with their children. Parents and children may be motivated to limit their usage of mobile phones and social media. This should include things like using social media only during certain hours of the day, and keeping the house's corridors and drawing room spaces as accessible as possible. Another motivating reason might be to look at research showing that cellphones have a negative impact on learning and that putting phones away when analyzing, ideally in a different location, has a positive impact on instructional outcomes.

A motivational questioning approach may be beneficial in assisting young people in maintaining their online activity habit. Adolescents who seem to have poor self-control with their use of social media or phones may benefit from cognitive therapy, which has been shown to be helpful for young people with opiate addiction. This approach should include an open, nonjudgmental assessment of all aspects of a teenager's virtual existence. Any adolescent may benefit from habit reversal education to deal with obsessive use, which includes daily "on screen time" that can be gradually increased. Reporting evidence showing individuals assigned to no longer use Facebook reported substantially higher "lifestyles satisfaction" and strong emotions one week later, compared to controls who were instructed to continue using the website as normal, may be helpful in the conduct of business. Young people should be able to inform their friends that they will be taking a break or will be in some other circumstance that will prevent them from using social media. Talking with kids about better ways to communicate, such as meeting in person or engaging without pausing with the use of mobile phones, may aid in the development of strategies to bridge the social media chasm, backed up by evidence showing in-person contact improves academic fitness.

More broadly, public-focused efforts should educate the public about the dangers of sloppy use of new technologies and promote better behavior in this area. Several social media platforms have implemented self-harm-related post bans and rules. While children valued equality, a comparative study of sixty-six children's awareness-raising businesses found that while children respected equality.

2.6. Recommendations and Future Work:

To advise that social media users should be aware of the purpose of using social media and be educated about the usage of informative sites, as well as the data privacy concerns that arise while using apps. Teenagers should use their time on social media effectively to enhance social connection rather than wasting it on casual conversations and postings on WhatsApp, Twitter,

Facebook, and YouTube. Teachers and parents should look for what they are really doing to guarantee the future of children.

To instill the habit of utilizing social media for academic reasons, teachers must offer new methods that enable students to get assistance from instructional platforms for their exams and tutorials.

Young people's time spent on mobile phones and surfing the Internet may be decreased by making goals for their daily life. This is something that parents or guardians must undertake to safeguard their children from social media abuse. Educational possibilities should not be regulated by academic institutions.

Influence and fixation on social media are much worse than tobacco addiction. Young people, who are the most frequent users of social media, struggle with anxiety, low self-esteem, and depression, and they are afraid of being emotionally abused, criticized, or even ignored if they interact with others, so they spend most of their time on smartphones and browsing through various public contact platforms.

3. CONCLUSION

Over the past several decades, new forms of media have emerged. Young people's lives are becoming more important, with many problems and possibilities. As the influence of new media grows, it will be critical to create evidence-based strategies for promoting and improving young people's usage of social media. Given the importance of attractive teenagers in preventing social networking harm, a preventative strategy will be ineffective. Indeed, for today's youth, who can't imagine a world without social networking sites, digital interactions are the norm, with the future benefits of online access to efficient analytical medical information along with digital exposure, imagination, self-consciousness, a sense of identity, and civic participation. It cannot be disregarded since it is confined to channels such as emergency lines and Internet speech therapies. Nonetheless, in contrast to the past tradition of policy proposals aimed at addressing social, cultural, and monetary issues, today's young people could benefit from validated character and systemic interventions to help them resolve the challenges of using social media and digital media, to protect themselves from harm, and to use social networking sites in a way that supports their mental wellbeing, young people today could benefit from validated character and systemic interventions to help them resolve the challenges of using social media and digital media, to shield themselves from damage, and to use.

REFERENCES

1. Singh MM, Amiri M, Sabbarwal S. Social media usage: positive and negative effects on the life style of Indian youth. Iran. J. Soc. Sci. Humanit. Res. UCT. J. Soc. Scien. Human. Resear., 2017; 5(4): 39–44.
2. Prabhakararao S. Overuse of Social Media Affects the Mental Health of Adolescents and Early Youth. Int. J. Indian Psychol., 2016; 3 (2). doi: 10.25215/0302.135.
3. Siddiqui S. Singh T. Social Media its Impact with Positive and Negative Aspects. Int. J. Comput. Appl. Technol. Res., 2016;5(2):71-75. doi: 10.7753/ijcatr0502.1006.
4. Obar JA, Wildman SS. Social Media Definition and the Governance Challenge - An Introduction to the Special Issue. SSRN Electron. J., 2018, doi: 10.2139/ssrn.2663153.

5. Hetz PR, Dawson CL, Cullen TA. Social Media Use and the Fear of Missing Out (FoMO) While Studying Abroad. *J. Res. Technol. Educ.*, 2015;47(5): 259-272. doi: 10.1080/15391523.2015.1080585.
6. Handyside S, Ringrose J. Snapchat memory and youth digital sexual cultures: mediated temporality, duration and affect. *J. Gend. Stud.*, 2017;6(3): 347-360. doi: 10.1080/09589236.2017.1280384.
7. Ghazali S, Ghani NM. Perception of female students towards social media-related crimes. *Pertanika J. Soc. Sci. Humanit.*, 2018; 26(2):769-786.
8. Khan GF, Swar B, Lee SK. Social Media Risks and Benefits: A Public Sector Perspective. *Soc. Sci. Comput. Rev.*, 2014;23(5):606-627. doi: 10.1177/0894439314524701.
9. Wirz CD, Xenos MA, Brossard D, Scheufele D, Chung JH, Massarani L. Rethinking Social Amplification of Risk: Social Media and Zika in Three Languages. *Risk Anal.*, 2018 Dec;38(12):2599-2624. doi: 10.1111/risa.13228.
10. Odoom R, Anning-Dorson T, Acheampong G. Antecedents of social media usage and performance benefits in small- and medium-sized enterprises (SMEs). *J. Enterp. Inf. Manag.*, 2017;30(3). doi: 10.1108/JEIM-04-2016-0088.

A BRIEF DESCRIPTION ON ROBOTIC SURGERY

Dr. Shilpa Patrick*; Dr. Ajay Kumar**

*Associate Professor,
Department of Pharmacology,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- drshilpapatrick@gmail.com;

**Professor
Department of General Medicine
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email id: ajaynagar35@yahoo.co.in

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ABSTRACT

Robotic surgery research has been going on for over 25 years. During that time, a limited number of businesses were established to capitalize on this research, and clinical studies on patients were conducted. However, the amount of research effort has resulted in much fewer clinical applications than might be anticipated. This article proposes a variety of explanations for this, many of which is unrelated to technology and is instead a result of the clinical and commercial contexts. Recommendations are made in the hopes of increasing the number of clinical systems used. Some projections for the future are offered, with the goal of increasing the number of commercial systems and therefore improving patient outcomes.

KEYWORDS: *Computer Assisted Surgery, Pre-Operative Plan, Post-Operative Measures, Robotic Surgery, Robot Sensors.*

1. INTRODUCTION

The author used a robot named Probot for prostate resection in April 1991. This was the first time a special-purpose robot has been developed and used in a therapeutic setting to extract tissue from a human patient. Since then, numerous robotic surgical research projects have been completed, with a limited number of firms producing systems that have been used in clinical settings. However, it's astonishing how few robotic operations have been tried in the clinic. This will be the subject of this article, with an effort to provide explanations and recommendations for how we should continue in the future. To this reason, attempting to provide a résumé of research initiatives and clinical treatments would be improper. Several outstanding publications, including those by Paula Gomes and Rosen, Hannaford & Satava, have lately addressed these issues. Review articles have a narrower scope and are more focused on a single topic[1]–[3]. Figure 1 shows the surgical robot.



Figure 1: Illustrates the surgical robot[4].

1.1 Perceived benefits of Surgical Robots:

One of the most often cited advantages of robot surgery is its ability to do precise minimally invasive surgery while actively constraining the surgeon within a safe area. Complex trajectories may be completed, especially when snakelike flexible arms are used to reach places that would otherwise be inaccessible. Multiple, repetitive movements may be performed without becoming fatigued, and they can compensate for organ motion caused by pulse or respiration. Special-purpose robots may perform surgery inside the confines of an x-ray or MR scanner's small bore. The materials used in the latter instance must meet MRI specifications. The capacity to hold and move instruments inside a radiation field, such as an X-ray c-arm, is very useful in reducing surgeon radiation exposure. Given the broad range of advantages that surgical robots may provide, it's somewhat surprising that they haven't been used more extensively in clinical settings. This is mainly due to concerns about the systems' cost-effectiveness, as described in the next section[5]–[9].

1.2 Potential Challenges for Surgical Robots:

i. Costs:

Traditionally, robotic systems have been costly, especially if they are big and utilized in a variety of applications, and this expense must be justified against the efficacy of the robotic process. Robot capital expenditures, like navigation systems, are not only determined by hardware; they must also factor in marketing, training, and technical support, as well as insurance, patents, and litigation. System prices, not to be confused with expenses, vary widely and are heavily influenced by special offers. Customers who implanted more than 35 of the company's patient-specific unicondylar knee implants each year received the author's ACROBOT orthopedic surgery system for free. The MAKO orthopedic robot profited from the high-cost prosthesis sales as well. A MAKO Rio robot has an average capital cost of approximately \$700,000. The NAVIO orthopedic system, which is much less complicated, costs about \$400,000. The extremely sophisticated da Vinci equipment is estimated to cost approximately \$1.5 million in construction and around \$2, 000 each operation for drapes and replacement tools[10].

ii. Intuitive Surgical and Cost Effectiveness:

The company's most commercially successful medical robot is the Intuitive Surgical da Vinci robot, which is used mainly for soft tissue surgery. The bulk of the surgeries were for radical prostatectomy. A meta-analysis of 400 trials of retropubic RP (ORP), laparoscopic RP (LRP), and robot aided LRP (RALP) from 2000 to 2010 found that RALP is at least equal to ORP or LRP in terms of margin rates and that RALP has certain benefits, particularly in terms of fewer adverse events. However, this study's shortcomings were the absence of randomized controlled trials, the use of margin status as an indication of oncologic control, and the inability to conduct cost comparisons. In a recent 120-patient trial, robot-assisted radical prostatectomy provided better functional results in terms of continence and potency than laparoscopic radical prostatectomy, with no negative perioperative, pathologic, or oncologic outcomes. However, more research is needed to confirm the findings.

iii. Evidence-based Medicine:

Another source of worry regarding efficacy is the growing emphasis on evidence-based medicine, which requires novel treatments to be supported by demonstrable clinical and patient advantages. However, in an environment where the traditional surgeon says, "I always do it properly," this is impossible to accomplish. Even in the field of orthopedic joint replacement surgery, where one would think that dealing with hard bone is simpler to demonstrate than dealing with soft tissue, better results are difficult to demonstrate, especially over time.

A better knowledge of the issue has lately led to the realization of the significant benefits of robotic treatments. Another issue with multi-year research is that the robotic system's design is usually fixed for the duration of the study. This is often at an early stage in the development of the equipment, which may have significantly improved by the conclusion of the research, making the findings useless. It's worth noting that this isn't a new occurrence; it happens in all sophisticated equipment testing. Another factor that is seldom addressed is that the thousands of cases in a traditional research are typically carried out over a period of years, during which time the procedures and basic instruments have developed, especially when data is collected from several locations.

iv. Patents:

Another issue facing the introduction of new surgical robots is patent infringement lawsuits, which has become a major issue as big corporations have amassed a vast portfolio of patents. This has caused worry, especially in Europe, where government-funded research has resulted in tiny spin-off businesses unable to get funding for first-in-man clinical trials. This is because they are afraid of being sued for patent infringement. Such accusations are often unjustified, but proving that there is no case to answer in court, especially in the United States, will take a significant amount of money. The author's ACROBOT technology was the subject of an MAKO lawsuit, which ended in MAKO purchasing the business for a nominal fee, and the Stryker case against the new company Blue Belt with its "Navio" orthopedic robot.

V. Regulatory Standards:

Because, unlike industrial robots, robotic surgery cannot be walled off from humans, the necessity for regulatory norms is often addressed. The issue of "how safe is safe" remains unanswered. In the assumption that software-dependent motion of many axes was not

sufficiently secure, the author's PROBOT robot was developed with a mechanically oriented tool remote centre-of-rotation. This viewpoint has progressively faded, and surgical robots today use a software-controlled center-of-rotation. However, the issue has never been addressed, prompting current demands for worldwide robotic surgical standards. Patient safety in robotic surgery was the focus of a European-funded study named SAFROS, which produced some helpful early suggestions. A combined working group of the International Standardization Organization (ISO) and the International Electrotechnical Commission (IEC) is working hard to create a new collateral standard for medical robot safety, known as JW9. This is based on more broad work in the field of medical electrical equipment and systems that use robotic technology.

However, caution is advised, since bigger robot firms would naturally guarantee that their delegates prefer systems that are compatible with their own products, while smaller companies may find it difficult to sustain long, sometimes laborious, discussions. However, it is evident that, in the meantime, risk reduction may be given by having the surgeon present at the site, guaranteeing safety in the case of complications.

1.3 The Importance of the Integration of all the Elements into a total System:

While the robots perform the surgical intervention and deploy the surgical instruments, the whole system is frequently considered to be the most beneficial in surgery, with the robot playing just a small part in the cutting process. Patient-specific imaging, such as preoperative MRI or CT, intraoperative X-ray "C" arm, or ultrasound, is part of integrated systems. Patient pictures are used to create a procedure plan and to mimic the operation; partially for training and partly to verify the planned treatment is free of possible issues. The patient is put on the operating table and the robotic system is docked or "registered" to the patient after the plan and simulation have been authorized. The procedure of registering the robot with the patient and the preoperative plan is critical and one of the most common causes of mistake.

Sensors and measurements are starting to reveal that knee surgery is much more complicated than previously believed, requiring consideration of a variety of factors including the patella, meniscus, soft tissue balance, and ligament condition. Thus we see the gradual evolution of clinical procedures brought about by the use of Computer Assisted Surgery.

1.4 Alternatives to Robots in Surgery:

It is essential to weigh the advantages of employing a robot versus alternatives that may be much less expensive. The employment of a navigation system, which may be a camera-based tracking system or a passive arm with encoded joints, has traditionally been the primary option. Because it does not use motors, it will always be less expensive than a robot. Although robot treatments are more accurate than navigation, the difference may not help the patient. Smart medical equipment and instruments, which include some level of sensing and localized decision-making, are a more modern alternative to robots. A sensor-based cochleostomy drill, for example, utilizes a combination of torque and axial force sensing to predict impending bone breakthrough in ear surgery, even when the thickness of the bone is unknown. Magnetic systems, in which devices may be precisely controlled using external magnetic fields to regulate the orientation and position for interventional or diagnostic purposes, are an alternative external power source for very tiny devices that are too small to include a motor drive system.

1.5 The Intervention Process:

The interventional device is another area where there has been a lot of development. Cutting was done using scalpels, burrs, or saws in early robot systems, and the resultant forces had to be resisted by the robot. More recently, energy-based techniques, such as laser or high intensity focused ultrasound (HIFU), have been utilized for interventions, resulting in smaller and simpler robots that do not generate response forces that must be resisted. Lasers are becoming more widely utilized, and they are now being used in orthopedic surgery to accurately cut bone without causing heat damage that may lead to necrosis.

2. DISCUSSION

Robotic surgery, also known as robot-assisted surgery, enables physicians to conduct a wide range of difficult operations with more accuracy, flexibility, and control than traditional methods allow. Minimally invasive surgery, or treatments done via small incisions, is often linked with robotic surgery. Your surgeon manipulates the tools with master controls during a Robotic-assisted surgery, and the instruments convert your surgeon's actions into precise movements within your body. Your surgeon is in complete control during the procedure, and the surgical system follows his instructions. Overall, robotic-assisted surgery is safe and successful. Any surgical procedure has some level of risk. Even the most basic operation may have unintended effects like bleeding or infection. Your surgeon, on the other hand, weighs the potential dangers of surgery against the potential benefits. If robot structures do not have to resist significant cutting response forces, they may be made smaller, allowing for the use of lasers or HIFU. Alternatively, when employing cutting burrs in a tiny robot, incorrect roughing cuts may be made while allowing the robot to deflect, then exquisite precision cuts can be made. Nanostructures, in combination with 3D printing, are enabling smaller, lower-cost systems to be created for specialized applications with a limited number of processes.

3. CONCLUSION

Existing sophisticated and costly robots have recently needed to boost their sales by finding new therapeutic uses, despite the fact that the cost-benefit rationale is often inadequate. If the robot is no longer utilized for heart surgery, capital costs may not be a problem if it is deployed in a different field, but this will have minimal impact on the company's cash flow. Because of the high expenses of developing and implementing sophisticated and costly robots that can perform a broad variety of activities, research into such systems has waned. Fear of patent lawsuits from big corporations exacerbates the situation. Instead, the emphasis of research is shifting to simpler, low-cost, sensor-rich systems intended for a limited number of applications where patents are less of an issue. The regulatory requirements have grown significantly since the author's initial surgical robot, making the first-in-man application a significant cost and time delay, and it is doubtful that this trend will be reversed in the future.

The surgical profession has always been conservative, and only now do computer-literate doctors anticipate computer-assisted surgical equipment to be accessible, eliminating a source of customary apprehension. Following the success of bigger complicated systems in the previous decade, it is likely that development in the following decade will be gradual rather than revolutionary, resulting in a plethora of smaller basic robotic systems for a variety of purposes. As a result, robotic surgery is likely to take a different path, but it will become more therapeutically useful.

REFERENCES:

1. Hensell MG. Instrumentation for Robotic Surgery,” Perioperative Nursing Clinics. 2010, doi: 10.1016/j.cpen.2009.12.002.
2. Kambaroudis A. Robotic surgery. Surgical Chronicles. 2008 Jun;4(2):114-20. doi: 10.5206/uwomj.v8i2.4578.
3. Tateya I, Ito J. Robotic surgery in otolaryngology. Practica Oto-Rhino-Laryngologica. 2015, doi: 10.5631/jibirin.108.1.
4. Schreuder HWR, Verheijen RHM. Robotic surgery. BJOG: An International Journal of Obstetrics and Gynaecology, 2009;116(2): 198–213. doi: 10.1111/j.1471-0528.2008.02038.x.
5. Dobbs RW, Sofer L, Crivellaro S. Starting a robotic surgery program. In Practical Tips in Urology, 2016.
6. Ohuchida K and Hashizume M. Robotic surgery for cancer. Cancer Journal (United States). 2013;19(2):130-2. doi: 10.1097/PPO.0b013e31828da251.
7. Šváb J. Robotic surgery. Casopis Lekarů Ceských. 2006, doi: 10.1016/s0039-6109(20)30007-4.
8. Kumar R and Hemal AK. The ‘scrubbed surgeon’ in robotic surgery. World Journal of Urology. 2006;24,(2):144–147. doi: 10.1007/s00345-006-0068-0.
9. Vaninetti M, Lo J, and Valovska A. Anesthesia for robotic surgery. In Essential Clinical Anesthesia Review: Keywords, Questions and Answers for the Boards, 2015.
10. Kossovich MA. The modular training program for robotic surgery. Clin. Exp. Surg., 2015;1: 66–69.

A STUDY OF SOCIAL MEDIA'S POSITIVE AND NEGATIVE EFFECTS ON SOCIETY

Ramesh Chandra Tripathi*

*Professor,
Department of Computer Engineering,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- tripathi.computers@tmu.ac.in

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ABSTRACT

Social media provides a forum for people all over the world to express their concerns and views. Before learning about the many elements of social media, individuals must first understand what social media is. The interaction between groups or people in which they create, share, and occasionally trade ideas, pictures, videos, and other material via the internet and in virtual communities is referred to as social media. Children are growing up in a world of mobile devices and interactive social networking sites like Twitter, My Space, and Facebook, as well as Orkut, which has made social media a crucial part of their lives. The way young people interact with their parents and classmates, as well as how they utilize technology, is changing as a result of social media. Social networking has two distinct impacts. On the plus side, social media sites may be very useful tools for professionals. They do so by helping young professionals in marketing their talents and looking for business possibilities. Social networking platforms may also be utilized to effectively network. On the negative side, there are a number of dangers connected with online communities on the internet. One of the dangers is cyberbullying, which is defined as harassment carried out via the use of modern technology. We address every element of social media, including its good and bad impacts, in this paper. The focus is on a certain area, such as health, business, education, society, or youth. We shall discuss how these media will have a wide impact on society in this paper.

KEYWORDS: *Business, Cyber Bullying, Education, Mobile Devices, Social Media.*

4. INTRODUCTION

A social media platform is an online platform that individuals use to create social networks or relationships with others that have similar personal or professional interests, hobbies, backgrounds, or real-life connections [1]. Social media has a huge effect on young people. It's becoming apparent that social media has become an integral component of people's life. Many teenagers check Tweets and status updates from their friends and family on their laptops, tablet computers, and smart phones. People are being pushed to adopt new lifestyles as a result of technological advancements. Social networking platforms may help young individuals improve their social skills. Social media is a kind of data communication that takes place via the internet.

Users may conduct discussions, exchange information, and produce online content on social networking sites. Blogs, microblogs, wikis, social networking sites, photo-sharing sites, instant messaging, video-sharing sites, podcasts, widgets, virtual worlds, and other kinds of social media exist [2]. Hundreds of millions of individuals use social media to exchange knowledge and establish relationships all around the globe. On a personal level, social media allows us to connect with friends and family, learn new things, pursue our passions, and be amused. On a professional level, we may utilize social media to develop or extend our expertise in a certain area, as well as build our professional network by interacting with other industry experts. At the company level, social media enables us to engage with our audience, get feedback from customers, and enhance our brand.

Social media is a ground-breaking concept with enormous potential for growth. Many businesses are using social media to improve their operations as a result of its development. We can promote or communicate more effectively with the help of social networking. People also don't have to depend on the media or television to receive their daily dose of news; anything can be found on a social networking site. People can monitor or get data from anywhere on the planet.

4.1. Popular Social Media Sites:

- **Twitter:**

We may believe that limiting our postings to 140 characters is an ineffective method to promote our company, but we'll be surprised to learn that this social media platform has over 320 million monthly active users who may make use of the 140 character restriction to communicate information [3]. Businesses may use Twitter to engage with potential customers, answer inquiries, and provide the latest news while also targeting advertising to particular audiences. Twitter was established on March 21, 2006, in San Francisco, California, and is headquartered there.

- **Facebook:**

This is the Internet's biggest social media network, both in terms of overall subscribers and brand awareness. Since its inception on February 4, 2004, Facebook has grown to over 1.59 billion monthly active users, making it one of the greatest platforms for connecting people from all over the globe with your company [3]. More than 1 million small and medium-sized companies utilize the site to promote their company, which is unsurprising.

- **Google+:**

Google+ is one of the most widely used social networking platforms nowadays. It is a must-have tool for every small company because of its SEO worth [4]. Google+ was launched on December 15, 2011, and it has since grown to become one of the most popular social media platforms, with 418 million active users as of December 2015.

- **Pinterest:**

Pinterest is a relatively newcomer to the world of internet networking. This stage consists of electronic announcement sheets on which businesses may paste their content. Pinterest announced in September 2015 that it has reached a milestone of 100 million users [5]. Pinterest should be used by private enterprises whose target interest group is mostly made up of women, since the majority of its visitors are women.

- **YouTube:**

YouTube was founded on February 14, 2005, by three former PayPal employees and is the largest and most well-known video-based online networking service [6]. It was subsequently acquired by Google for \$1.65 billion in November 2006. YouTube has over 1 billion monthly visitors and is the second most popular internet search engine behind Google.

- **Instagram:**

Instagram is a visual social media platform. Facebook owns the site, which has more than 400 million active users. It is used by a large number of its customers to publish information on travel, fashion, food, craftsmanship, and other similar topics [3]. The stage is also known for its incredible channels, as well as video and picture modifying features. Approximately 95% of Instagram users also have a Facebook account.

- **Flickr:**

Flickr, formerly known as "Glint," is an online photo and video sharing platform that was founded by Ludicorp, a Vancouver-based company, on February 10, 2004 and subsequently acquired by Yahoo in 2005 [7]. Clients who exchange and install pictures are familiar with the stage. Flickr has over 112 million users and a global presence in over 63 countries. Every day, millions of photos are shared on Flickr.

- **Tumblr:**

Tumblr is a standout among the most difficult to use informal communication platforms, but it's also one of the most interesting places. The platform supports a variety of post types, including citation posts, discussion posts, video and picture posts, and sound posts, so you're never limited in terms of what you may contribute. Reblogging, which is more akin to retweeting than Twitter, is quick and easy. David Karp founded the long-range informal communication network in February 2007 and it now has over 200 million users.

- **Reddit:**

This is a social news and excitement organizing platform where registered users may publish material such as coordinate connections and content postings [8]. Clients may also organize and choose their position on the site's pages by voting up or down on entries. The best categorization or main page displays the entries with the most votes.

- **WhatsApp:**

WhatsApp Messenger is a cross-platform instant messaging app for phones, tablets, and computers. To transmit pictures, texts, documents, audio, and video messages to other users who have the app loaded on their devices, the software requires an Internet connection. WhatsApp Inc. was founded in January 2010 and was acquired by Facebook on February 19, 2014 for \$19.3 billion [9]. Today, over 1 billion people utilize the service to communicate with their friends, family, and even customers.

- **Snapchat:**

When Reggie Brown, Evan Spiegel, and Bobby Murphy were undergraduates at Stanford University, they created Snapchat, an image-sharing application training item [3]. The application was officially launched in September 2011, and in a short period of time, it has accumulated a massive following, with an average of 100 million daily active customers as of May 2015. Snapchat is used by more than 18% of all social media clients.

- **Delicious:**

In 2003, Peter Gadjokov and Joshua Schachter founded this site, which Yahoo acquired in 2005 [10]. Delicious claimed to have bookmarked 180 million URLs and had more than 5.3 million users by the end of 2008. Delicious Media announced in January that it had acquired the administration.

- **BizSugar:**

BizSugar is a stage and specialized asset for entrepreneurs, company visionaries, and directors to communicate with one another. DBH Communications, Inc., a provider of award-winning business publications, created the site in 2007, and Small Business Trends LLC acquired it in 2009. Clients may use the platform to share recordings, essays, blog posts, and podcasts, among other things. It also allows users to see and vote on entries submitted by other people.

5. DISCUSSION

5.1. Impact of Social Media on Medical and Health:

Health Care Professionals may use social media to disseminate information and encourage healthy habits, connect with the public, and educate and communicate with patients, students, and colleagues. HCPs may utilize social media to enhance health outcomes, build a professional network, raise personal knowledge of news and discoveries, encourage patients, and offer community health information.

Physicians often use internet services to read news items, listen to experts, study medical breakthroughs, discuss patient problems with peers, and network. They may brainstorm and exchange ideas, talk about practice management issues, refer patients, distribute research, advertise their practices, and participate in health advocacy. A significant number of doctors utilize social media to communicate directly with patients in order to improve clinical treatment. It is undeniable that social media has a significant effect on healthcare systems, and that this impact is felt in both developed and poor countries. Healthcare consultants help a greater number of people get better treatment, while clients may utilize it to empower themselves, their families, and their communities.

5.2. Impact of Social Media on Business:

Social Media is the newest buzzword in marketing, including businesses, associations, and brands that use it to spread news, influence partners, form relationships, and form groups. Businesses use web-based social networking to improve their organization's performance in a variety of ways, such as achieving corporate goals and increasing annual offerings. Web-based social networking has the benefit of serving as a communication platform that promotes two-way contact between a company and its stockholders. Different long-distance informal communication destinations may be used to promote business. A significant portion of the company promotes their business by promoting it on social media with the aim of attracting the

most customers. Clients may use internet networking to connect and interact with businesses on a more personal basis. Many businesses may create a plan to promote their business by using social media.

5.3. Social media's Impact on Education:

Social networking technologies enable people to share their thoughts with others. It allows a guy on one side of the globe to communicate and exchange ideas with a man on the other side. Students may readily interact or share information with one another via social media sites such as Facebook, Orkut, and Instagram, among others.

Making friends and socializing is an essential aspect of growing up. What is the significance of this? It's because it enables the kids to share their thoughts and learn new things. This would inevitably lead to them gaining greater self-assurance in their daily lives. It allows students to communicate their knowledge in a simple and efficient manner. Students may easily access the data, analyze it, modify it (if necessary), and share it. As a result, the flow of information becomes more fluid.

5.4. Social Media's Influence on Society:

Social Media's Influence on Society: Some social media sites have altered the way people communicate and socialize online. Individuals may reconnect with former friends, lovers, and matches via person to person communication sites. Individuals may reconnect with former companions, lovers, and mates via person to person contact sites. It also encourages people to make new friends and to exchange material, like as images, sounds, and recordings, with them. Furthermore, web-based social networking alters society's lifestyle.

5.5. Social Media's Impact on Children and Teens:

Today's media has a significant impact on adolescents. It has a tremendous effect on all areas of a teen's life, whether it's television, computers, video games, or social networking sites. With the media, things aren't that terrible. Media, when utilized correctly, has the potential to change the lives of young people for the better. This study examines the good and negative effects of media on teenagers.

5.6. Social Media's Influence on Children and Adolescents:

Here are some strategies for dealing with social media's effect on teenagers:

- Our teenagers may easily view YouTube videos on their phones, and we may not be aware of what he is seeing. Parents should attempt to keep an eye on what their adolescent is viewing on TV or the internet, and set some boundaries and guidelines.
- Examine your child's favorite music, movies, TV programs, games, and celebrities. We can identify the images and messages that are affecting people once we know what interests them.
- Talking about messaging is one of the greatest methods to help adolescents manage the media's effects. For example, if the adolescent is interested in females, we may discuss female friendships, life choices, self-esteem, and sexuality with them.
- We should also opt to prohibit the use of certain applications, programs, and games. Please explain why we're doing this.

- Monitoring a teen's media consumption does not imply that we prohibit them from doing so. It's just educating them about the harmful effects.
- We may do the same with the role model our adolescent has. Encourage our adolescent to ask questions such, "Why do you admire that celebrity?" "Do you follow him in real life?" "What values of the celebrity interest our teens?"
- We may also help our adolescent to understand media by posing some questions for them to consider. Pick a TV commercial or a magazine and ask the adolescent questions like who's behind it, what motivates them, how it makes them feel, what they need from it, and so on.

6. CONCLUSION

As technology advances, web-based social networking has become the norm for every single person, family, and organization. For students, online networking has improved the quality and speed of coordinated effort. Corporate utilizes internet networking to improve an organization's performance in a variety of ways, such as meeting business objectives and extending the company's annual offerings. Every day, young people come into touch with various media. Social media offers many advantages, but it also has certain drawbacks that have a negative impact on people. False data can lead to disappointment in the training framework; in organizations, the wrong promotion can affect productivity; online networking can abuse the general public by compromising individuals' security; and some useless websites can influence youth, causing them to become plainly savage and engage in a few inappropriate activities. Last but not least, all people are encouraged to embrace the good elements of social media while avoiding the bad ones in order to reap the advantages of these new and developing technologies.

REFERENCES

1. Khan GF, Swar B, Lee SK. Social Media Risks and Benefits: A Public Sector Perspective. Soc. Sci. Comput. Rev., 2014;32(5):606-627. doi: 10.1177/0894439314524701.
2. Uhls YT, Ellison NB, Subrahmanyam K. Benefits and costs of social media in adolescence. Pediatrics, 2017 Nov;140(Suppl 2):S67-S70. doi: 10.1542/peds.2016-1758E.
3. Alhabash S, Ma M. A Tale of Four Platforms: Motivations and Uses of Facebook, Twitter, Instagram, and Snapchat Among College Students? Soc. Media Soc., 2017;3((1). doi: 10.1177/2056305117691544.
4. Alsahafi RM. Case study of comparing security features of facebook and google plus. Int. J. Sci. Technol. Res., 2018; 7(12):255-261.
5. Provost T. An Interest in Pinterest. CFO, 2012.
6. Lee HS. Social Media and Youtube As An Attractive Marketing Tool. J. Am. Bus. Rev. Cambridge., 2013.
7. Hausmann A. et al . Social Media Data Can Be Used to Understand Tourists' Preferences for Nature-Based Experiences in Protected Areas. Conservation Letters. 2018;11(1): e12343. doi: 10.1111/conl.12343.
8. Robards B. Totally straight': Contested sexual identities on social media site reddit.

Sexualities, 2018;2(1-2): 49-67. doi: 10.1177/1363460716678563.

9. Marleni L, Asilestari P. The Effect of Using Social Media : Whatsapp Toward the. J. English Lang. Educ., 2018.
10. Bastos MT. Shares, Pins, and Tweets. Journal. Stud., 2015;16(3):305-325. doi: 10.1080/1461670x.2014.891857.

REVIEW ON MECHANICAL FINISHING PROCESS

Bhagwan*

*Assistant Professor,
Department of Mechanical Engineering,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- Bhagwan.engineering@tmu.ac.in

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ABSTRACT

One of the most significant aspects of precision devices is surface quality. Engineering items with poor surface quality have a variety of issues during operation, including malfunctioning, excessive wear, geometric inaccuracy, and so on. The majority of a product's surface quality is established throughout the manufacturing process. Finishing small precision devices using the typical finishing method is not a versatile or cost-effective alternative. One of the most important needs in varied, finished components is the needed finish/texture, which can be achieved using traditional machining operations such as grinding, lapping, polishing, and super finishing. After the components are machined, industries spend a lot of money to acquire the desired finish and texture. This will necessitate the use of advanced non-traditional finishing techniques. Abrasive Flow Machining (AFM) is a non-traditional finishing method that uses a semi-solid medium made up of a visco-elastic polymer and abrasive particles that are blended in a certain proportion. Magnetorheological fluid assisted finishing techniques are one type of finishing procedure that offers more control over the process and allows for fine tolerances and no damage to the surface topography.

KEYWORDS: Abrasive Media, Machining, Magneto Rheological Finishing Processes, Non-Conventional Machining, Precision Finishing.

1. INTRODUCTION

Rapid advancements in engineering and technology necessitate tiny products with high accuracy and precision[1]. In the automotive, aerospace, and biomedical industries, product surface quality is critical[2]. Small burrs or scratches can result in significant losses, such as energy loss in engines, failure of aeronautical equipment, component malfunction, and so on. Industries are putting in a lot of effort and investing a lot of money to create burr-free and cutting-mark-free components.

From the past four decades industries are using the traditional type of finishing processes[3] like grinding, lapping and honing etc. to get the required finish on the machined components. Traditional finishing procedures, on the other hand, are limited to specific geometries and cannot be used to complicated geometries and intricate profiles to machine to a high level finish as necessary during component operation. Because of the limitations of traditional finishing processes,

advanced finishing processes such as Abrasive Flow Machining (AFM)[4] have been developed to machine difficult-to-machine internal features in engineering materials such as non-ferrous alloys, superalloys, ceramics, refractory materials, carbides, semiconductors, quartz, composites, and so on.

The goal of this method is to get a nano-level finish on machined components, which is in high demand at the moment. The AFM concept was created by the Extrude Hone Corporation of the United States in the 1960s to finish aerospace components to the needed accuracy. Abrasive flow machining is now widely regarded as one of the most effective methods for completing complex geometries that are inaccessible to traditional finishing equipment. Many academics are continually working to improve the AFM process's performance. In recent decades, advancements in advanced finishing technologies such as EDM, ECM, USM, AJM,[5] and others have resulted in the easing of tool hardness requirements. Finishing complicated geometries is hampered by predefined relative motion of the cutting edge with regard to the workpiece surface.

To get around this limitation, certain loosely attached materials include several cutting blades that are instructed to follow the complicated geometries to be finished. However, due to a lack of control over the finishing forces, they are limited in their ability to finish complex geometry, and they can also be dangerous. To address these challenges, a number of advanced finishing methods have been created. Magnetorheological fluid[6] assisted finishing techniques are one type of finishing procedure that offers more control over the process and allows for fine tolerances and no damage to the surface topography. Magnetorheological fluid (MR fluid) is used in many newly developed Magnetorheological fluid assisted finishing procedures to externally control the finishing forces on abrasive particles. This review article provides an insight into the recent developments in the experimental setups, abrasive media, modeling and optimization and promising application areas.

2. DISCUSSION

2.1 Magneto Rheological Finishing (MRF):

MRF[7] is a magnetic field assisted precision finishing process developed and commercialized by QED Technologies Inc. (Kordonski and Jacobs 1996; Jacobs, Kordonski et al. 2000). MRF is a precision technology that may produce surface accuracy on the order of 30 nm peak to valley and surface micro-roughness less than 10 Å rms (Kordonski and Jacobs 1996). MRF can be used for variety of materials ranging from optical glasses to hard crystals. The MRF fluid is made up of carbonyl iron particles (CIPs) and very thin abrasives dispersed in a carrier fluid that has a unique reversible change in rheological properties when an external magnetic field is applied and removed. The magnetic dipole moment of the carbonyl iron particles is proportional to field strength, and they aggregate into an interconnected chain-like columnar structure oriented in the field direction, with non-magnetic abrasive particles embedded between or within. In the presence of CIPs and a magnetic field, the rheological properties and good adhesion gained by abrasive particles play a crucial role in MRF activity. QED Technologies created an MR Finishing tool with a wheel. During the MRF process, the magneto rheological polishing fluid was continually circulated. The fluid sticks to the wheel's periphery magnetic field produced. Wheel speed, magnetic field intensity, spacing between work piece and wheel, and fluid flow rate all influence the form of the fluid (Schinhaerl, Smith et al.

2008). Researchers have experimented with many wheel-type MRF variations, including the use of permanent magnets and electromagnets. Because to the lack of a space.

2.2 Magneto Rheological Fluid:

All magneto rheological finishing techniques rely on the magneto rheological effect of carbonyl iron particles and abrasive particles in a non-magnetic carrier medium for their performance. In MRF processes, the magnetorheological fluid and its composition are critical. Magnetorheological fluids are smart fluids that respond to an applied magnetic field in their rheological behavior, first discovered by Rabinow in 1948. (Rabinow 1948). MR fluids are viscoelastic suspensions of micron-sized magnetic particles in a viscoelastic base media like water, glycerol, silicone oil, or paraffin oil, together with some additives. These fluids display non Newtonian behavior in the absence of a magnetic field, i.e. weak Bingham behaviour. These fluids stiffen when exposed to a magnetic field, necessitating a strong shear force to get them to flow. Magnetic saturation limits the maximal strength of MR fluid. The temperature ranges in which the MR fluid can be used are determined by the carrier liquid. Despite the fact that silicone oil is the most commonly utilized carrier liquid, hydrocarbon oil offers some advantages due to its low viscosity, improved lubricating qualities, and appropriateness for high shear-rate applications. Furthermore, a hydrocarbon oil-based MR fluid has a lower zero field viscosity than a silicone oil-based MR fluid, which is around 0.6 times lower. A water-based MR fluid, on the other hand, can reduce waste disposal issues and allow particles to be easily recycled from the material.

2.3 Abrasive Flow Machining (AFM) Process:

The machine, tooling, and abrasive media are the main components of an abrasive flow machine [1]. Elastic deformation, plastic deformation or plugging, and micro cutting of material are three deformation modes used in the material removal method. The amplitude of cutting forces acting on an individual abrasive grain and the depth of abrasive indentation in the work piece are both important factors in determining these deformation modes [2]. The material removal mechanism of the AFM procedure is depicted.

AFM is a slow technique, according to researchers, because the overall time to reach the requisite finish is longer and the material removal rate is lower. Many researchers have created hybrid machining methods that combine multiple machining processes with AFM to obtain greater MRR and needed surface polish in less time. This section discusses some of the most recent advancements in hybrid AFM procedures.

2.3.1 Abrasive Media:

The main component of the AFM process is abrasive medium[8]. The medium is made up of a viscoelastic polymer that has been reinforced with abrasive particles. In this case, the viscoelastic polymer serves as a carrier medium, while the abrasive particles serve as a cutting tool, removing the material from the work piece. Polyborosiloxane and silicone rubber are popular polymer media, and silicon carbide, aluminum oxide, boron carbide, and polycrystalline among are common abrasives. To satisfy their needs and examine media characterization, many researchers have attempted to build alternative AFM media in addition to commercially available media from Extrude Hone Corporation and Kennametals.

2.4. Modeling and Optimization:

To grasp the process' complexity, a mathematical or simulation model must be built to investigate the impact of various process parameters on the output responses – surface finish and material removal rate (MRR)[9]. In general, the model includes information that provides insight into the nature of the phenomena that occurs in real world situations. The primary research findings on modeling and optimization of process parameters are mentioned below in this area.

To estimate the impacts of a set of process factors on surface polish, Petri et al. developed predictive process modeling. It is made up of a group of neural network models that anticipate the behavior of the process. Workpiece parameters, media characteristics, machining parameters, technical specification, and process objectives are the five categories of process parameters. This approach primarily minimizes the time it takes to design new applications for the process and provides data on the impact of input factors on output parameters. To assess the stresses and forces created during the machining process, Jain et al. constructed a Finite Element Model (FEM [10]. The research also proposes a theoretical approach for estimating MRR and surface quality throughout the machining process.

The theoretical conclusions are compared to the extant literature on experiments, and they are found to be in good agreement. With reference to the abrasive size and concentration. To determine the relative relevance of AFM parameters, the anticipated and RSM outcomes are compared. Jain et al. established a model based on five major parameters to calculate the specific energy and tangential forces operating on the AFM process: grain size, applied pressure, workpiece hardness, number of active grains, and number of cycles. One dimensional heat transfer analysis was used to determine the change in temperature of the workpiece by considering the heat fluxes to the work piece and medium. Jain et al. constructed a FEM for assessing the flow of viscoelastic polymer, and the results were used to calculate the MRR and roughness values. Theoretical findings are compared to experimental findings. To limit the number of experiments, the central composite rotatable design is utilized to plan the experiments. The notion of stochastic technique, which creates and statistically analyses the interaction between the abrasive grains and the workpiece surface, was proposed by Jain et al. for prediction of the active grain density. They discovered that as mesh size and abrasive concentration rise, grain density increases.

2.5 Application of AFM:

The various researchers are applied AFM technique for finishing various components used in-MEMS, industrial and biomedical to the required level of accuracy. The various applications of AFM process are presented in this section.

2.5.1 Machining of MEMS Component:

Micro channels are the fundamental components of microfluidic technology. Electron discharge machining is a standard method for creating tiny channels; however it also creates a recast layer in the cut area. They concluded that the AFM method enhances channel quality by removing burrs, straightness, and recast layer, among other things, at a cheap cost and with high efficiency. Fuel injectors, micro filters, ink-jet printer nozzles, and micro pumps all have micro bores with diameters less than 500 micrometers in various sensors. An inner wall polishing technique is required to achieve high quality micro bores, which is accomplished via AFM.

2.5.2 Machining of Industrial Component:

Bevel gear is utilized in a wide range of applications, including vehicle differential drives, rotorcraft drive systems, locomotives, marine applications, and railway tracks. These gears are usually made using traditional gear cutting or casting techniques. They determined that using AFM technology to remove cross whole burrs, reduce stress concentration, and improve part reliability improves the surface integrity of non-linear tube runners.

2.5.3 Machining Of Bio-Medical Component:

Biomedical, aerospace, turbine blades, car, and optical components all require freeform surfaces. Rapid prototyping, casting, and advanced CNC machines[11] are often used to create these surfaces. Finishing these surfaces to a higher degree after machining is a tough undertaking, and numerous researchers have devised several sorts of finishing processes.

3. CONCLUSION

The Abrasive Flow Machining (AFM) procedure involves extruding a semi-solid medium made up of visco-elastic polymer reinforced with abrasive particles through or over the surface to be completed under pressure. The purpose of this article is to review the published technical papers on the AFM process. The papers are divided into four categories: experimental setups, abrasive media, modelling and optimization, and AFM process applications. From the aforementioned analysis, the following conclusions can be inferred. The paper describes some of the experimental setups produced by diverse scholars. o Magneto Abrasive Flow Machining (MAFM); Magnetorheological Abrasive Flow Finishing (MRAFF); Centrifugal Force Assisted Abrasive Flow Machining (CFAAFM); Electro-Chemical Assisted Abrasive Flow Machining (ECAFM); Drill Bit Guided-Abrasive Flow Finishing (DBG-AFF); Rotational-Abrasive Flow Finishing (R-AFF); Ultras (R-MRAFF) Polyborosiloxane and silicone rubber are typically used polymer media, whereas silicon carbide, aluminum oxide, boron carbide, and polycrystalline diamond are commonly used abrasives. To analyses the output responses- MRR and Surface finish- modelling and optimization approaches are created and employed. ANOVA, Taguchi, Central composite design, neural network, GMDH and pare tobase optimization approaches, Mathematical, and FEM techniques are the most often utilized techniques. This method has been successfully utilized to finish components with complex profiles, which are commonly found in the automotive, aerospace, and biomedical industries.

REFERENCES:

1. Kroft L, Hnatík J, BícováK.The effect of the strategy of finishing on dimensional accuracy. 2017, doi: 10.2507/28th.daaam.proceedings.081.
2. LunneyM.Critical thinking and accuracy of nurses' diagnoses. Part II: Application of cognitive skills and guidelines for self-development. Rev. Esc. Enferm. USP., 2003;37(3). doi: 10.1590/s0080-62342003000300013.
3. Zhou CE, wai KanC.Review of Antibacterial Finishing Processes with Plasma for Cotton.Research Journal of Textile and Apparel. 2013, doi: 10.1108/RJTA-17-04-2013-B002.
4. Cheema MS, Venkatesh G, Dvivedi A, Sharma AK.Developments in abrasive flow

- machining: A review on experimental investigations using abrasive flow machining variants and medi. Proceedings of the Institution of Mechanical Engineers, Part B: Journal of Engineering Manufacture. 2012, doi: 10.1177/0954405412462000.
5. Sheikh-Ahmad JY. Conventional Machining of FRPs. In Machining of Polymer Composites, 2009.
 6. Yang Y, Huang SG, Kang BS. Research on circular plate MR fluids brake. J. Cent. South Univ. Technol. (English Ed., 2007, doi: 10.1007/s11771-007-0258-y.
 7. Wang J, Chen W, Han F. Study on the magnetorheological finishing method for the WEDMed pierced die cavity. Int. J. Adv. Manuf. Technol., 2015, doi: 10.1007/s00170-014-6402-6.
 8. Radhika N, Raghu R. Effect of abrasive medium on wear behavior of Al/AlB₂ functionally graded metal matrix composite. Tribol. Online, 2016; 11(3):487-493. doi: 10.2474/trol.11.487.
 9. Pujara JM, Kothari KD, Gohil AV. An investigation of material removal rate and kerf on WEDM through grey relational analysis. J. Mech. Eng. Sci., 2018, doi: 10.15282/jmes.12.2.2018.10.0322.
 10. Jayalakshmi S., Raghukanth STG. Finite element models to represent seismic activity of the Indian plate. Geosci. Front., 2017, doi: 10.1016/j.gsf.2015.12.004.
 11. Kim S, Son S, Lee D. Development of sustainable production technology of free-form concrete panels using a multi-point press CNC machine. Sustain., 2021; 13(4):1990. doi: 10.3390/su13041990.

PEDAGOGICAL BASES OF FORMATION OF PHYSICAL CULTURE AND SOCIAL CULTURE IN YOUTH

Ikromjon Yuldashov*; Oybek Parpiev; Adkhamjon Makhmutaliev***;
Ismatulla Tukhtanazarov****; Karimov Ulmasbek Umaralievich*******

*PhD,
Head of the Department,
Fergana State University, UZBEKISTAN

**Lecturer,
Fergana State University, UZBEKISTAN

***Lecturer,
Fergana State University, UZBEKISTAN

****Lecturer,
Fergana State University, UZBEKISTAN

*****Lecturer,
Fergana State University, UZBEKISTAN

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ABSTRACT

As we know, at present, changes are taking place in all material and spiritual spheres of our society, people strive for specific goals and serve to ensure sustainable development by creating important economic and spiritual conditions for themselves. One of the pressing problems of building a democratic society is the transformation of human thinking and spirituality. The emergence of new thinking, the perception of the role and role of man in today's development has become an important factor in the development of society on the basis of democratic principles. The main wealth of each state is a person. It follows from this that the main way to increase the wealth and power of the state is the formation of intellektual culture in young people.

KEYWORDS:*Culture, Education, Innovation, Intellektual Culture, Physical Culture, Society, Educational Effectiveness, Healthy Lifestyle.*

INTRODUCTION

The human being is wounded, the development continues. The processes from the primitive to the present day, in which science has evolved, proof of our thoughts.

The power of any country is determined by its intellectual potential. And this directly depends on the quality of education. Thanks to independence, a huge turn took place in our spiritual life. Independence has opened the opportunity to form a rich and thoughtful way of thinking of our national and cultural values. As a result, our national values serve as a powerful educational

foundation in accelerating the development of our society, educating young people spiritually and educating them in the spirit of national pride.[1]

Each period will have its own grief, demand and needs. Independence has put on the agenda a number of problems of our spirituality, with the unraveling of so many puzzles that depend on the fate of people and society. Especially important were the issues of morality. We will not be able to continue reforms at a high pace and successfully without adapting our youth's vision to the requirements of independence and the current challenges of the era in which information technology is rapidly entering all spheres of life and the principles of globalisation all over the world. Only in a free and independent, critical thinking person becomes an ideological immune faster than ignorance, fanaticism, all sorts of destructive ideas. Only such a mentality acquires patriotism, humanism, firmness and social maturity. The laws adopted and adopted in our country, the legal and normative documents, the successes achieved are increasingly approaching our main goal, that is, our country takes a place among the developed democratic countries of the world. [2]

MAIN PART

The general education system, which is being formed in our country, allows students to open their spiritual and moral opportunities, to train in accordance with their abilities and opportunities, to be able to grow talented young people, to help them choose the right and conscious way in the future, to provide students with adaptation to the changing requirements of the labor market and educational[3]

Rapid intellectual development, deepening knowledge and obtaining specialized education in the universities and professional colleges-contribute to the comprehensive development of the student personality. [4]

The intellectual culture of a person is determined mainly by his way of life, his independent mind, his work activity. Therefore, the human intellectual culture is associated not only with his physical and spiritual qualities, but also with his material well-being. Through his intellectual culture, a person is increasingly exploring himself deeper, more accurately, on the basis of how he reflects reality and deepens his thoughts about it. That is, the potential of man - intellectual will first be aimed at understanding his own.[5]

During the past years of our independence, we have been mobilizing all our forces and opportunities to ensure that our people are no less than anyone else in the world, that our children live stronger, more educated, wiser and happier than us, spiritual education is undoubtedly of great importance in this regard. If we lose our vigilance and sensitivity, perseverance and responsibility in the matter of spiritual upbringing, if we leave this extremely important work to its state, to selfishness, we can get out of our spirituality, which is permeated and fed up with our sacred values, lost our historical memory and eventually get out of the way of universal development that we sought.[6]

Spiritual and moral education is a process of upbringing aimed at the formation of high spiritual and moral qualities. At the same time, spirituality is the most impressive weapon of upbringing and its consequence. The core of morality. Morality first of all, a sense of kindness and justice, faith, honesty mean it by virtue. About the education of our ancient ancestors, Kamil, developed a whole complex of moral requirements, the sharkana code of ethics, which we can say in

modern language. Based on the criteria of morality and spirituality in the spiritual and moral education, attention is paid to the influence for the formation and development, improvement of spirituality and morality in a person.[7]

In the spiritual education of our youth, carelessness and apathy reign, when the most pressing issues are abandoned to selfishness, then spirituality becomes the most vulnerable and vulnerable point there. Or rather, where sympathy and vivacity, high intelligence and contemplation prevail, then spirituality becomes a powerful force.

The leadership of our country correctly realizes that spirituality is the most powerful and indestructible power, pays special attention to the work of strengthening the faithfulness of our young people, strengthening their will, educating them as harmonious people who have an independent opinion.

"In the 21st century in which we live, science, human potential, has become a criterion of development and is increasingly moving to a higher level. In the future, as tools for the development of individual culture, we can get new inventions, achievements and all knowledge points in the field of computer technology, the existing material and technical base of education, modern innovative and pedagogical technologies, art, artistic and scientific-educational literature, science"[8].

New cooperation relations, called globalisation and informatization of humanity, have been established and these relations have reached a new stage of development, which is rapidly increasing. As a result, the concepts of "globalism" and "informatization" have become a concept that covers not only economic, but also socio-political, spiritual and educational, as well as universal processes in almost all other spheres. In particular, the words "information", "informatization" and "globalisation" are so combined that the fate of the next world, the peoples of the world, has become dependent on this combination, that is, the processes of information globalisation and informatization. Therefore, in the current globalisation process, changes in the sphere of information in our country have a great impact on the renewal of the world outlook. [9]

Today, it is impossible to find a single sphere of human activity that is not related to physical activity, since Physical Culture and sport in general are the recognized material and spiritual values of society and everyone.

One of the important tasks in the harmonious development of the physical and mental resources of young people, especially the wide use of the opportunities of the foundations of physical culture, physical education and physical development. This article provides theoretical information on the basics of Physical Culture, physical education and physical development.

"Physical culture, physical education and sports are an important factor in not only physical but also spiritual perfection. He purifies the will, teaches to strive towards a clear goal, to withstand difficulties and to cope with endurance. It nurtures confidence, pride and pride in victory in the human heart"[10].

Physical culture, person, it is time to develop the "technique" of implementing it in practice and to understand the decisive concept in the physical culture and education of the younger generation, it is necessary to purposefully formulate and strengthen and constantly take care of consciousness based on deep knowledge and beliefs. The peculiarity of physical education as a

social phenomenon is that it is able to serve mainly as a means of developing human physical abilities in society and at the same time has a strong influence on its spiritual perfection. This feature is a private sign that physical education is used by all times in general. But in the Real life of society, there is no physical education beyond concrete historical conditions.

"The task of physical education is solved so successfully that if the participants consciously understand the physical exercises or they are interested in sports training and take an initiative and creative approach, they will have to rely on general special knowledge for the correct formation of the skills of movement in the body, the development of their functional abilities"[3]

One of the problems of modernization of relations of the market economy in the current period is the circle of mutual application of the societal culture with the level of cultural culture of our people, mainly individual, which is considered one of the problems of modernization of relations of the market economy, research of the features of interaction with each other in socio-philosophical and cultural

CONCLUSION

In conclusion, it should be said that the quality of Physical Culture and physical education classes will increase if the students-youth are effectively used to all-round physical development, improvement of sports skills, further improvement of the performance of teachers-coaches, as well as the forms of Health Improvement carried out on the agenda in educational institutions. The result is the formation of physical development.

In particular, positive work is carried out in educational institutions on the development of young people's social culture. All modern conditions were created on the basis of state educational standards.

REFERENCES:

1. Karimov U, Abdurakhmon A. Innovative Information Technology in Education. Форум Молодых Ученых, 2017; (5):9-12.
2. Mehmonov R, Parpiev O. The Processes of Organization of General and Special Training of Athletes. Теория И Практика Современной Науки, 2020; (5):38-40.
3. Mehmonov R, Parpiev O. Pedagogical Requirements for Physical Education Teachers. Theoretical & Applied Science, 2020; (5):758-761.
4. Abdurakhmonov SK. The Importance of a Healthy Lifestyle in Achieving Physical Perfection. The American Journal of Applied Sciences, 2021; 3(03):42-47.
5. Yuldashev IA. Pedagogical Bases of Formation of Social Activity in Pedagogical Sciences. Теория И Практика Современной Науки, 2020; (5):67-69.
6. Tuxtanzarov IU, Maxmutaliev AM. Socio-Pedagogical Function of Sport in the Spiritual Perfection of Youth. Scientific Bulletin of Namangan State University, 2020; 2(1):367-372.
7. Rayimov AA, Karimova, GY. Social Aspects of the Formation of Social Activity in Youth. Oriental Journal of Social Sciences, 2021;29-32.
8. Tuxtanzarov IU, Maxmutaliyev AM. Scientific and Methodological Problems of Wrestling Development. Theoretical & Applied Science, 2020; (1):781-785.

9. Kuzibaevna OG. Technologies of Developing the Ecological Culture of Students In The Process Of Learning a Foreign Languages in Higher Educational Institutions. Solid State Technology, 2020;63(1s):1816-1825.
10. Bozarov DM, Karimova GY. Role of the Self-Organization Model in Complex Social Systems. Oriental Journal of Social Sciences, 20201; 1-9.
11. Yuldashov I, Goynazarov G. A Need to Improve the Institutional System for Increasing the Social Activity of Young People at the Stage of Development. Интернаука, 2021; (12-3): 18-19.

BASIC PRINCIPLES THAT APPLY TO THE USE OF MARINE CURRENT TURBINES FOR ENERGY GENERATION

Bhagwan*

*Assistant Professor,
Department of Mechanical Engineering,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- Bhagwan.engineering@tmu.ac.in

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ABSTRACT

The potential for generating electricity from tidal currents in the ocean is tremendous. Tidal currents are becoming recognized as a resource that may be used to generate electricity in a sustainable manner. Marine currents are especially appealing for power production and beneficial when compared to other renewable because of the high load factors resulting from fluid features and predictable resource characteristics. In this new field of study, there is a scarcity of knowledge on many important elements of system design. Despite important work on ship propellers, wind turbines, and hydro turbines, almost little work has been done to identify the properties of turbines operating on water for kinetic energy conversion. There are gaps in the level of knowledge since none of these three well-established fields of technology fully intersect with this new sector. This article examines the basic problems that are expected to play a significant role in MCT system deployment. It also identifies study topics that will be faced in this new field. The hostile maritime environment, the phenomena of cavitation's, and the enormous loads experienced by such structures are expected to play a significant part in the work presently being done in this area, according to the study.

KEYWORDS:Energy, Hydro, Marine Current, Scarcity, Turbine.

1. INTRODUCTION

Tidal currents are becoming recognized as a resource that may be used to generate electricity in a sustainable manner. Because of the large load factors caused by the fluid properties, Marine currents are especially appealing for power production because of their ties and predictable resource features. When compared to other renewable, these two characteristics make power production from maritime currents considerably more attractive. Installations of marine current turbines (MCTs) might potentially supply base grid power, particularly if two different arrays had peak flow times that were offset. This feature debunks the misconception that renewable energy production is inappropriate for large-scale deployment. In order to fight global warming, a greater dependence on renewable energy generation will be required. This is especially critical in the case of power production, which is presently largely dependent on fossil fuels. Both the UK government and the EU have pledged to participate in globally negotiated climate change

accords. Large-scale increases in energy production from renewable resources will be needed to meet the targets established by such agreements[1].

Marine currents have the potential to provide a large portion of the world's future energy requirements. A study of 106 potential tidal turbine locations in the EU found that these areas might produce electricity on the order of 50. If this resource is effectively exploited, the necessary technology may serve as the foundation for a significant new industry producing clean electricity for the twenty-first century[2].

Although the energy in marine currents is distributed across the ocean, it is concentrated in a few locations. Tidal races in the UK, for example, are well-known among sailors for their fast-flowing waves and dangerous whirlpools in the seas surrounding the Channel Islands and the 'Sounds' off the Scottish west coast. The energy density at such locations is considerable, and arrays of turbines may produce up to 3000 MW during the spring tides. Despite the benefits provided by MCTs, it is remarkable that the technology has gotten so little attention in terms of research and development. Many basic research problems and many important elements of system design would need study. To accelerate the use of marine current kinetic energy converters, a significant amount of research is required. Despite important work on wind turbines, high-speed ship propellers, and hydro turbines, almost little work has been done to establish the properties of turbines operating on water for power production. There are gaps in the level of knowledge since none of these three well-established fields of technology fully intersect with this new sector. This paper examines the basic problems that are expected to play a significant role in MCT system deployment. It also discusses research topics that will be faced in this new field, like the harsh maritime environment, cavitation, and the enormous forces that such structures must withstand[3].

Because the resource is based on the movement of the tide, unlike most other renewable, the future supply of electricity can be predicted and prepared for. The resource has significant potential and can be utilized with little environmental effect, making it one of the least environmentally harmful techniques for large-scale power production. In saltwater, a tidal current turbine rated at 2–3 m/s may provide four times the energy per year/m² of rotor swept area as a wind turbine with a comparable rated power. Although obtaining tidal stream energy may be expensive, the high energy availability will more than compensate for the higher expenses if it is used. The output power of a marine current turbine is controlled by the same equation that governs the output power of a wind turbine: the proportion of power that can be taken from the fluid stream, taking into account Betz's law losses as well as those attributed to the turbine's internal mechanics. The power coefficient, abbreviated as CP, has a typical value of about 0.3 for a machine with minimal mechanical losses[4].

The power output as well as the size of an MCT turbine is very promising when compared to the biggest wind turbines (rated power 2 MW) currently in operation. Wind turbine yearly power production is determined by annual wind speed variation, which typically follows a Weibull distribution. When a 7 m/s yearly average wind speed is applied to a 2 MW rated turbine with a 60 m blade diameter, the average output is on the order of 600 kW. Even in the worst-case scenario, assuming a marine current location with a mean velocity of 2 m/s and a maximum variability of 10%, the yearly average velocity would be 1.8 m/s. This equates to a 24 m rotor diameter generating the same rated power as the wind turbine example. Furthermore, with

continuous or highly predictable maritime currents, an MCT may not only compete with the biggest wind turbines in terms of size, but also in terms of power generation.

Optimized turbines, on the other hand, will be required to utilize marine current resources. Turbines like this are required to convert rotational energy into electrical energy that can be securely transferred to land while working in the hostile maritime environment. Marine current turbines are a relatively new technology that requires further development to provide long-term operation with little maintenance when immersed in saltwater. As a result, research into the different possibilities for using suitable technology that is designed and optimized to operate underwater must be conducted. Some of the 2208 A.S. Bahaj, L.E. Myers / Renewable Energy 28 (2003) 2205–2211 problems expected to play a role in such development are addressed in the following sections. The goal is to provide a broad overview of the research and development direction in this new area of "windmills" that operate in a water environment.

The maritime environment is much harsher than the low-level air conditions that wind turbines must contend with. There will be a rusting issue as well. Because seawater is a salty solution, all metallic components must be shielded from it. The turbine nacelle will need to be properly sealed, and exterior parts like the blades and tower may need to be coated, galvanized, or made of non-corroding materials. Despite its proclivity towards corrosion, steel is often utilized in maritime constructions. To counteract any corrosion losses, one typical technique of preventing structural deterioration is to increase the thickness of steel material throughout the manufacturing and building stages. This is often a more cost-effective option than steel coating. It's conceivable that the MCT towers will use this method. Untreated steel is unlikely to be used in turbine blades owing to the extra surface roughness caused by corrosion[5].

Turbine blade damage may also occur as a result of debris transported by the marine current. Because many abandoned man-made items are semi-submersible, the blade tips may be the most vulnerable to harm. Telemetry that transmits performance data may be useful to detect blade damage. In this manner, repairs may be made quickly if the damage resulted in the structure being overloaded or unevenly loaded. Maritime growth is a byproduct of operating in a marine environment. Seaweed and other filamentous plants may clog the blades, increasing drag and, as a result, lowering performance. Due to the greater blade speed towards the tip, it is expected that such materials would be displaced or pushed to shatter at an early stage of their development[6].

2. DISCUSSION

MCT maintenance and repair would require the use of a ship and, like with wind turbines, might be difficult and dangerous. However, a variety of design considerations may be made to minimize the frequency and complexity of maintenance operations. Servicing may be done from a platform or an ocean-going vessel if the turbine unit could be raised above the water. All of the turbine's critical components might be located in the nacelle, with just power and telemetry cables running down the tower. Enough slack will readily allow the turbine to be raised from the water. The frequency of regular maintenance will be reduced thanks to tenacious lubricants, high-quality seals and bearings, and robust blades. For safe and fast maintenance, calm seas and excellent weather are required.

2.1. Axially High Stresses:

Because saltwater has a density of about 1025 kg/m³, the axial force on a turbine and its structure will be significant. Thrust is the force produced in the direction of flow as a consequence of the turbine extracting energy. The change in energy of a fluid stream manifests itself as a decrease in velocity on each side of the turbine blades, and is basically the flow's change in momentum. To avoid failure, a turbine and its anchoring structure must be able to withstand this force. The thrust at maximum flow conditions, T_{max} , is of importance from a design standpoint and is provided by the following relationship:

According to, the maximum axial force for a 60 m diameter wind turbine is about 60 tones. The thrust for similarly rated MCTs at a velocity of 3 m/s is roughly three times this amount, according to the comparative study mentioned previously. The maritime building sector, on the other hand, has constructed structures in some of the toughest marine conditions known to man (e.g. North Sea). Although resisting such pressures is likely to require a significant portion of building expenditures, the knowledge is in place to design and install MCT technology to withstand extreme marine current loadings. Certain operational challenges will arise when the size of marine current energy collecting equipment grows. The phenomena of cavitation are one of them. Low pressures in pumps and on ship propellers are typical examples of this potentially harmful impact. The effects of cavitation will have to be resisted or minimized to prevent significant functional limitations, and energy sources will not be jeopardized.

Where P_{abs} (= P_{hyd} + P_{atm}) denotes absolute pressure, P_{hyd} denotes hydrostatic pressure, and P_{atm} denotes atmospheric pressure (= 10.3 m of water), P_v denotes the vapour pressure of 0.15 m of water at 15 °C, and V is the reference velocity (m/s). Because it is a dimensionless word, K_f is often referred to as the cavitation number. The higher the value of K_f , the lower the chance of cavitation. K_f is a function of pressure and velocity, as can be shown. K_f changes with velocity and pressure, as can be seen in [7]. The lowest K_f values are obtained when a fast blade speed is combined with low pressure. As a result, when the blade tips are near the peak of their rotation, they are most vulnerable to cavitation.

The Parameter of Inception K_i is a metric for the circumstances under which cavitation will begin to form at any given location. As a result, K_i will fluctuate at different locations on the item. Because of the complicated nature of fluid movement, K_i is dependent on numerous factors and cannot be determined for most items. Physical modeling of objects in wind or water tunnels provides the best estimate of K_i at the moment 2210 A.S. Bahaj, L.E. Myers / Renewable Energy 28 (2003) 2205–2211. Cavitation will happen if $K_f < K_i$. The start of cavitation does not stay consistent at given circumstances, according to experiment. A hysteresis effect, along with the difficulty of identifying incipient circumstances, is believed to be the cause for this.

Tidal energy has the potential to provide power in the future, despite its lack of widespread usage. The wind and the sun are less reliable than the tides. Tidal energy has historically had a high cost and restricted availability of locations with sufficiently large tidal ranges or flow velocities, limiting its overall availability among renewable energy sources. However, many recent technological advancements and improvements, both in design (e.g., dynamic tidal power, tidal lagoons) and turbine technology (e.g., new axial turbines, cross flow turbines), suggest that total tidal power availability may be much higher than previously assumed, and that economic and environmental costs may be brought down to competitive levels.

Tide mills have been utilized in Europe and along the Atlantic coast of North America in the past. The incoming water was stored in huge storage ponds, and when the tide recedes, it spins waterwheels that generate mill grain using mechanical power. The first instances may be traced back to the middle Ages or possibly to Roman times. In the nineteenth century, the method of generating electricity by utilizing falling water and rotating turbines was developed in the United States and Europe. The amount of electricity generated by maritime technology grew by around 16 percent in 2018 and by about 13 percent in 2019. To accomplish additional cost reductions and large-scale development, policies supporting R&D are required. The Rance Tidal Power Station in France, which began operations in 1966, was the world's first large-scale tidal power plant. Until August 2011, when the Sihwa Lake Tidal Power Plant in South Korea opened, it was the world's biggest tidal power station in terms of production. The Sihwa station employs sea wall defensive barriers and ten turbines with a combined capacity of 254 MW.

3. CONCLUSION

Cavitation and operating in a hostile maritime environment are two of the most severe issues that MCTs face. Cavitation may be prevented by doing a thorough analysis of the resource, and steps to protect the MCT from its impacts may be implemented at the design stage. In terms of performance and cost, both options have advantages and disadvantages. Other elements of turbine development will need to be investigated in addition to the aforementioned. The following are the main points: Analytical models based on current knowledge of wind and hydroelectric turbines will be required. Data from experimental regimes may be used to enhance and improve these models. Such models will enable in-depth research into the flow interaction with marine current turbine systems. The theoretical predictions may then be refined using iteration and feedback methods. The use of computational fluid dynamics (CFD) is expected to assist development and enable ideas to be evaluated before committing to expensive testing[8].

This kind of research may start with wind turbine rotor design methods and then be tweaked to account for water phenomena. Cavitation, various degrees of turbulence, and the positioning of a rotor near to the flow limits of the surface and the seabed are some of the issues that need to be addressed in both modeling and testing. A study of these forces and loading transients must be conducted in order to quantify the forces that are expected to be encountered by MCT. Such a research should take into account a wide range of flow conditions and be connected to an investigation of rotor dynamics and loads when yawing a rotor in relation to the current, as well as stresses caused by the usage of variable pitch rotor blades. Examine the impact of blockage on conversion efficiency, as well as wake spread and development, in twin or multiple rotors with tight lateral spacing. The assessment of the electrical performance of model turbines is another important element. The optimal design for the generators, as well as their control methods, is issues that must be addressed[9].

To summarize, full-scale tidal current turbine technology will be developed not only because the moment has come, but also because there is a broad commitment to fight global warming, which will need a massive increase in renewable energy production. Although there are common factors with both wind turbines and hydro turbines operating with a head of water, there are also many important factors unique to the marine current resource that must be investigated via a process of model testing and technology[10].

REFERENCES:

1. Kowalik Z, Marchenko A, Brazhnikov D, Marchenko N. Tidal currents in the western Svalbard Fjords. *Oceanologia*, 2015;57(4): 318-327.
2. Uihlein A, Magagna D. Wave and tidal current energy - A review of the current state of research beyond technology. *Renewable and Sustainable Energy Reviews*. 2016;58:1070-1081.
3. Bryden IG, Couch SJ, Owen A, Melville G. Tidal current resource assessment. *Proc. Inst. Mech. Eng. Part A J. Power Energy*, 2007; 221(2).
4. Chen YH, Shaw PT, Wolcott TG. Enhancing estuarine retention of planktonic larvae by tidal currents. *Estuar. Coast. Shelf Sci.*, 1997;45(4): 525–533..
5. Vindenes H, Orvik KA, Søliland H, Wehde H. Analysis of tidal currents in the North Sea from shipboard acoustic Doppler current profiler data. *Cont. Shelf Res.*, 2018.
6. hee Jo C, young Yim J, hee Lee K, ho Rho Y. Performance of horizontal axis tidal current turbine by blade configuration. *Renew. Energy*, 2012; 42(C):195-206.
7. Li W, Zhou H, Liu H, Lin Y, Xu Q. Review on the blade design technologies of tidal current turbine. *Renewable and Sustainable Energy Reviews*. 2016; 63:414-422.
8. Lin J, Lin B, Sun J, Chen Y. Numerical model simulation of island-headland induced eddies in a site for tidal current energy extraction. *Renew. Energy*, 2017; 101:204-213.
9. Alldredge AL, Hamner WM. Recurring aggregation of Zooplankton by a tidal current. *Estuar. Coast. Mar. Sci.*, 1980;10(1): 31-37.
10. Sheng Q, Jing F, Zhang L, Zhou N, Wang S, Zhang Z. Study of the hydrodynamic derivatives of vertical-axis tidal current turbines in surge motion. *Renew. Energy*, 2016;96: 366-376.

CARDIOVASCULAR EFFECTS OF AIR POLLUTION: A REVIEW

Dr. Vipin Jain*

*Professor,
Department of Finance & Account,
Teerthanker Mahaveer Institute of Management and Technology,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- vipin555@rediffmail.com

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ABSTRACT

Particulate matter (PM) and gaseous pollutants like nitrogen dioxide and ozone make up air pollution. Coarse particles (PM₁₀), fine particles (PM_{2.5}), and ultrafine particles (PM₁₀₀) are the three sizes of PM. We want to offer a unique overview of the scientific data from epidemiological and experimental research looking at the impact of outdoor air pollution on the cardiovascular system. According to a meta-analysis of epidemiological research, a 10g/m³ increase in long-term PM_{2.5} exposure was linked to an 11% increase in cardiovascular death. Long-term and short-term nitrogen dioxide exposure were both linked to an increase in cardiovascular mortality. As shown by early aortic and coronary calcification, exposure to air pollution and road traffic was linked to an elevated risk of arteriosclerosis. Increases in air pollution were linked to an increased risk of myocardial infarction, stroke, and acute heart failure in the short term. Even when pollutant concentrations were below European limits, the danger was raised. Numerous experimental investigations have shown that air pollution induces a systemic vascular oxidative stress response, corroborating the findings from epidemiological studies.

KEYWORDS: Air Pollution, Cardiovascular, Gaseous, Illness, Pollutants.

1. INTRODUCTION

Endothelial dysfunction, monocyte activation, and certain proatherogenic alterations in lipoproteins are all caused by reactive oxygen species, which lead to plaque development. Furthermore, because of a rise in coagulation factors and platelet activation, air pollution promotes thrombus formation. Experiments have also shown that certain pollutants, such as combustion-derived PM_{2.5} and ultrafine particles, have greater detrimental cardiovascular effects. Cardiovascular disorders are exacerbated by air pollution. Promoting better air quality seems to be a new issue in the prevention of cardiovascular disease[1].

Air pollution is a significant public health problem that causes millions of deaths prematurely across the globe. Cardiovascular diseases are responsible for 60–80% of fatalities caused by air pollution. We conducted a study of publications reporting on the cardiovascular consequences of

air pollution in order to support the European Society of Cardiology's campaign, which seeks to "increase awareness of the harmful impact that the environment may have on the heart"[2]–[5].

We focused our study on outdoor air pollution since both indoor and outdoor air pollution have a significant effect on cardiovascular illnesses. We start with certain definitions and sources of air pollution, which are necessary for presenting data from long- and short-term epidemiological research. Following that, we provide some pathophysiology data and offer a schematic summary of the molecular pathways that connect air pollution exposure to clinical outcomes. We also provide current statistics on the benefits of mitigation strategies, as well as potential future possibilities for overcoming environmental research constraints.

1.1 The Fundamentals Of Air Pollution:

1.1.1 Definition:

Particulate matter (PM) and gaseous components make up air pollution. Coarse particles (diameter 10 μ m, 2.5 μ m), fine particles (diameter 2.5 μ m, 0.1 μ m), and ultrafine particles (diameter 0.1 μ m) are the three types of PM. Depending on the source, PM has a varied makeup. Carbonaceous particles come from combustion sources like traffic emissions or home heating, while inorganic particles come from sources like desert dust and agricultural mineral dust. Carbonaceous particles are carbon-based, but they also include organic compounds like polycyclic aromatic hydrocarbons and reactive metals on their surfaces. Nitrogen oxides, such as nitrogen dioxide (NO₂) and nitric oxide (NO), ozone, sulphur dioxide (SO₂), volatile organic compounds, and carbon monoxide are examples of gaseous pollutants (CO). SO₂ and nitrogen oxides contribute to particle production via complicated atmospheric photochemical processes including ammonia from agriculture, in addition to their inherent toxicity. Secondary particles are formed because of gaseous transition and are mostly comprised of inorganic chemicals such as ammonia, sulphates, and nitrates. Ozone is a secondary gaseous pollutant that results from a photochemical interaction between sunlight and gaseous precursors like nitrogen oxides or volatile organic compounds[6].

1.1.2 Sources Of Outdoor Air Pollution

Agriculture is a significant generator of PM_{2.5} in Europe. Agricultural particles, on the other hand, are mostly inorganic particles, which are generally thought to be less hazardous than carbonaceous particles from combustion sources like road traffic. Road traffic and home heating, assuming this difference in toxicity, have the greatest effect on outdoor air pollution-related mortality in Europe. In North America, industry and fossil-fuel-based electricity production are also significant producers of PM. Natural causes of pollution in Africa, such as desert dust and biomass burning (natural or man-made fires), account for a significant portion of ambient air pollution levels. In Asia, the major sources of particles in both outdoor and indoor emissions are home heating and cooking[7].

Aside from variations across nations and continents, there are significant disparities among the major sources of pollutants within a single country, depending on local sources.

Road traffic in big cities is a significant source of worldwide pollution emissions, as well as the primary source of NO₂, which comes mostly from diesel cars. Road traffic, for example, contributes for 30% of PM emissions in Paris, almost as much as the residential sector, and almost 60% of nitrogen oxide emissions. SO₂ is mostly produced by industrial emissions and maritime transport, although its contribution to air pollution has been decreasing over time.

1.1.3 Pollution Of The Air Within The Home:

In 2010, air pollution caused 7 million premature deaths globally, with both indoor and outdoor air pollution contributing equally. Indoor air pollution, on the other hand, is more diverse, with significant differences in contaminants and sources between nations. Second hand smoking is a significant cause of indoor air pollution all around the world. In Asia, solid-fuel cooking and heating are the primary causes of interior air pollution, while in Europe, a variety of sources contribute to indoor pollution, including volatile organic compounds from organic solvents, household goods, and particulates from cooking and wood burning. Nonetheless, a recent European research found that outdoor PM_{2.5} penetrating inside through air exchange is responsible for 60% of the worldwide burden of indoor air pollution-related illness[8]. As a result, reducing the illness burden caused by indoor air pollution necessitates interventions that influence interior air pollution sources, ventilation, and outdoor air filtering.

1.1.4 Evidence From Epidemiology

Long-term exposure research looked at the cardiovascular consequences of air pollution following yearly changes in pollutant concentrations, while short-term exposure studies mostly looked at daily or hourly changes in pollutant concentrations. The majority of the research inferred the amount of person exposure to air pollution based on background pollutant concentrations or traffic exposure at the residence[9].

1.2 Cardiovascular Mortality And Air Pollution:

1.2.1 Long-Term Exposure:

According to a 2013 meta-analysis, a 10g/m³ increase in yearly PM_{2.5} concentrations was linked with an 11 percent increase in cardiovascular mortality. The strongest links were seen for coronary artery disease-related mortality, which remained after controlling for cardiovascular variables and socioeconomic status. Among other research, however, PM_{2.5} harmful effects were shown to be greater in those with the lowest education, which was likely due to a lack of antioxidants due to a lack of fruit consumption. When compared to coarse particles, fine and ultrafine particles had the greatest effect on cardiovascular mortality[10].

Furthermore, the composition of PM is an essential factor to consider, with some research indicating that carbonaceous particles from combustion-derived sources, such as road traffic,

fossil fuels, and wood burning, have a greater cardiovascular toxicity. NO₂ is mostly produced by combustion sources. According to a meta-analysis of the cardiovascular consequences of long-term NO₂ exposure, a 10g/m³ rise in yearly NO₂ concentrations resulted with a 13 percent increase in cardiovascular mortality. Ozone's impact seems to be less significant, with some long-term exposure studies showing a modest increase in cardiopulmonary causes of mortality, although this was only seen during the warm season and not in a yearlong study. This may be explained by the fact that, unlike NO₂, ozone pollution is more common on hot, sunny days because it needs photochemical interactions with sunlight to produce. Long-term SO₂ exposure has been linked to increased respiratory mortality, but the effect on cardiovascular mortality is unknown.

Long-term exposure to road traffic has been significantly related to cardiovascular mortality, regardless of air pollutant background concentrations. Living within 50 meters of a major highway raised the risk of sudden cardiac death by 38% compared to living 500 meters away, according to a large-scale prospective research in women. This impact persisted after controlling for possible confounders and cardiovascular risk factors.

1.2.2 Exposure For A Limited Time

In a recent meta-analysis, a daily increase in PM_{2.5} exposures of 10g/m³ was linked to a 0.84 percent increase in cardiovascular mortality. A study of short-term changes in NO₂ found a 0.4—0.88 percent increase in cardiovascular mortality for a 10g/m³ daily rise in NO₂.

The consequences of short-term ozone fluctuations on cardiovascular mortality are still being studied.

1.3 Coronary Artery Disease And Air Pollution:

1.3.1 Exposure For A Long Time:

Several studies have shown a significant link between long-term air pollution exposure and acute myocardial infarction. Annual increases of 10g/m³ in PM₁₀ and 5g/m³ in PM_{2.5} were linked to higher risks of myocardial infarction of 12 percent and 13 percent, respectively, in a large-scale prospective European research. Above importantly, these beneficial correlations were found despite air pollution concentrations being below current European policy recommendations. Long-term exposure to PM_{2.5} has been linked to the development of early arteriosclerosis in many studies. Exposure to PM_{2.5} and traffic-related air pollution were shown to be substantially associated with an elevated coronary artery calcium score in a prospective cohort study.

A similar finding was found in the case of road traffic exposure, with higher chances of a high coronary artery calcium score of 63 percent and 34 percent, respectively, for individuals living within 50 meters and 50—100 meters of a major road, compared to people living 200 meters away.

1.4 Other Cardiovascular Consequences Of Air Pollution:

1.4.1 Sudden Death And Arrhythmia:

The link between air pollution and arrhythmia is still being debated. Daily fluctuations in PM_{2.5} or NO₂ concentrations, on the other hand, have been linked to an increased risk of hospitalization for arrhythmia in many studies. Several studies have shown links between short- and long-term exposure to particle air pollution and decreased heart rate variability, which is a marker of autonomic nervous system imbalance and a risk factor for cardiovascular mortality. There was also a link between long-term exposure to PM and QT prolongation in individuals without cardiovascular illness. Studies on patients with implanted defibrillators have also shown links between air pollution and malignant arrhythmia, and short-term changes in PM_{2.5} and ozone have been linked to out-of-hospital cardiac arrest.

1.4.2 Insufficiency Of The Heart

A meta-analysis found a link between short-term increases in PM and gaseous components (NO₂, SO₂, CO) and an increased risk of congestive heart failure hospitalization or death, with the greatest correlations occurring on the day of exposure and more lasting effects for PM_{2.5}.

1.4.3 Stroke

According to data from the Global Burden of Diseases 2013, which was gathered in 188 countries between 1990 and 2013, air pollution was responsible for 29 percent of the burden of stroke. Several studies have shown a link between long- and short-term air pollution exposure and stroke incidence and death. A prospective European research discovered that a 5g/m³ rise in yearly PM_{2.5} was linked with a 19% higher risk of stroke, with the greatest associations observed among individuals who had never smoked. The risk of myocardial infarction was still elevated at pollution levels below current European air quality regulations, as previously reported. Road traffic exposure significantly raised the risk of stroke, with substantial correlations with ischemic stroke seen in those who lived within 75 meters of a major road. Changes in pollutant concentrations over time, whether hourly or daily, were linked to an increased risk of stroke and stroke death, with a significant link between ultrafine particles and stroke mortality. Increases in gaseous chemicals such as NO₂, SO₂, and CO enhanced the risk of stroke in the short term. In the case of ozone, some studies found an increased risk of stroke after a short-term rise in ozone, while others found no link.

1.4.4 Hypertension:

Several recent studies have shown that exposure to air pollution, particularly traffic-related pollutants, increases the incidence of hypertension. There is a link between air pollution and oxidative stress and inflammatory indicators.

Long-term exposure to PM_{2.5}, particularly to the polycyclic aromatic hydrocarbons found on the surface of traffic-related PM, was linked to a higher level of 8-hydroxy-2-deoxyguanosine, a stable and reliable biomarker of oxidative DNA damage, in exposed individuals such as street

cops, bus drivers, and garage workers. Similarly, the presence of etheno-DNA adducts in diesel engine employees was twice as high as in non-diesel engine workers. Several studies have linked air pollution to higher levels of oxidized low-density lipoprotein, homocysteine, inflammatory markers (interleukin-1, interleukin-6, tumor necrosis factor-, C-reactive protein), and fibrinogen in the blood. Increased intercellular adhesion molecule-1 and vascular cell adhesion molecule-1 concentrations have recently been linked to air pollution exposure. According to research, air pollution may promote the production of inflammatory genes.

2. DISCUSSION

The author has discussed about the, cardiovascular effects of air pollution. The three sizes of PM are coarse particles (PM₁₀), particles (PM_{2.5}), and microbeads (PM₁₀₀). We aim to provide a one-of-a-kind review of the scientific evidence from experimental and clinical studies on the effects of outdoor air pollution on the arteries. A 10g/m³ decrease in long-term PM_{2.5} exposure was related to an 11 percent increase in cardiovascular mortality, according to a meta-analysis of epidemiological studies. Both long-term and short-term nitrogen dioxide ingestion were related to a higher risk of cardiovascular death. Exposure to air pollution and vehicle traffic has been related to an increased risk of arteriosclerosis, as shown by early aortic and coronary calcification. In the short term, increasing air pollution has been associated to a greater cardiovascular events, stroke, and abrupt heart failure.

3. CONCLUSION

The author has concluded about the, cardiovascular effects of air pollution According to epidemiological research, air pollution raises long- and short-term cardiovascular mortality through increasing myocardial infarction, stroke, and heart failure occurrences. Despite the fact that cardiovascular risk rises with exposure amount and time, all investigations found that there is no safe threshold beyond which no impact occurs. Interventional controlled studies may provide light on the processes at work.

Air pollution, especially diesel exhaust, causes a significant rise in reactive oxygen species (ROS) production, which inhibits nitric oxide-mediated vasodilation and increases vascular inflammation. Air pollution has been shown to have acute functional effects in myocardial and pulmonary blood flow control, as well as coagulation function. Because of their tiny size (ultrafine particles) and the polycyclic aromatic hydrocarbons and metals that they carry on their surface, combustion-derived particles have significant negative impacts. While ultrafine particles have a significant cardiovascular impact, current standards and tests greatly underestimate their amounts in ambient air. Furthermore, transportation is a major source of NO₂, which has recently been linked to an increased risk of ST-segment elevation myocardial infarction in metropolitan settings. The existing scientific data supports the proposal that efforts to decrease exposure to air pollution should be immediately increased and backed by suitable and effective legislation, as recently approved by the European Society of Cardiology.

REFERENCES

1. Bourdrel T, Bind MA, Béjot Y, Morel O, Argacha JF. Cardiovascular effects of air pollution. *Archives of Cardiovascular Diseases*. 2017 Nov;110(11):634-642. doi: 10.1016/j.acvd.2017.05.003.
2. Rembiesa J, Ruzgas T, Engblom J, Holefors A. The Impact of Pollution on Skin and Proper Efficacy Testing for Anti-Pollution Claims. *Cosmetics*. 2018; 5(1):4.
3. Chae Y, An Y J Current research trends on plastic pollution and ecological impacts on the soil ecosystem: A review. *Environmental Pollution*. 2018;240: 387-395. doi: 10.1016/j.envpol.2018.05.008.
4. Lee KK, Miller MR, Shah ASV. Air pollution and stroke. *Journal of Stroke*. 2018;20(1):2-11. doi: 10.5853/jos.2017.02894.
5. Maduna K, Tomašić V. Air pollution engineering. *Phys. Sci. Rev.*, 2017, doi: 10.1515/psr-2016-0122.
6. Aunan K, Hansen MH, Wang S. Introduction: Air Pollution in China. *China Quarterly*. 2018; 234:279-298. doi: 10.1017/S0305741017001369.
7. Rajé F, Tight M, Pope FD. Traffic pollution: A search for solutions for a city like Nairobi. *Cities*, 2018; 82: 100-107. doi: 10.1016/j.cities.2018.05.008.
8. Villarrubia-Gómez P, Cornell SE, Fabres J. Marine plastic pollution as a planetary boundary threat – The drifting piece in the sustainability puzzle. *Mar. Policy*, 2018;96: 213-220. doi: 10.1016/j.marpol.2017.11.035.
9. Ierodiakonou D. et al. Ambient air pollution. *J. Allergy Clin. Immunol.*, 2016 Feb;137(2):390-9. doi: 10.1016/j.jaci.2015.05.028.
10. Karlsson TM, Arneborg L, Broström G, Almroth BC, Gipperth L, Hassellöv M. The unaccountability case of plastic pellet pollution. *Mar. Pollut. Bull.*, 2018 Apr;129(1):52-60. doi: 10.1016/j.marpolbul.2018.01.041.

THE IMPACT OF POLLUTION ON SKIN AND PROPER EFFICACY TESTING FOR ANTI-POLLUTION CLAIMS

Mohit Rastogi*

*Assistant Professor,
Department of Finance,
Teerthanker Mahaveer Institute of Management and Technology,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- mohit.management@tmu.ac.in

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ABSTRACT

Pollution exposure may lead to oxidative stress, accelerated aging, inflammation, and illnesses. Because most of us are exposed to pollution, it is essential to take precautions. This may be accomplished via the use of skin protection as well as dietary and supplement protection. There are several items on the market that claim to be anti-pollution. It is critical, however, that these claims be fully verified via appropriate effectiveness testing. Changes in lipid composition, lipid and protein oxidation, pH, sebum secretion rate, oxidative stress, inflammatory indicators, and collagen and elastin levels may all be seen when skin cells are exposed to pollution causes. These may be measured and used as indicators to validate claims of anti-pollution. We outline some of the most significant in vitro and in vivo tests used to evaluate whether a chemical or formulation has anti-pollution effectiveness in this study.

KEYWORDS: *Contaminants, Environment, Hydrocarbons, Monoxide, Pollution.*

1. INTRODUCTION

Air pollution levels are steadily rising throughout the globe, creating significant worries and health issues. According to a 2016 WHO study, over 3 million people die each year as a result of pollution, and about 90% of people live in areas that do not meet WHO Air Quality Guidelines. Particulate matter, polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), nitrogen and Sulphur oxides, carbon monoxide, ozone, and heavy metals are the major causes of pollution. These are mostly produced by industry and automobile exhaust. The quality of indoor air is also critical. North Americans spend almost all of their time inside, where they are exposed to pollutants such as carbon monoxide, nitrogen dioxide, and volatile organic compounds (VOCs) from cigarette smoke, paints, varnishes, and air deodorizers. Indoor air quality is also influenced by dust, fungus, pets, and insect allergies. Environmental contaminants are well-known to have a detrimental effect on human health[1]–[4].

Excessive pollution exposure may cause a variety of health issues, including cardiovascular and pulmonary illnesses, as well as an increased risk of microbial and viral infections. The skin, which is the biggest organ in the human body and one of the most significant barriers against

pollution, is also affected by environmental pollutants. Contaminants may cause accelerated aging of the skin, pigmentation patches, and acne. More severe dermatological problems, such as atopic dermatitis, psoriasis, and even skin cancer, may develop as a result of exposure. Pollutants may also cause systemic toxicity in other organs by weakening the skin barrier function and penetrating through the skin[5]–[7].

In recent years, there has been a surge in interest in products that protect us from the harmful effects of pollutants while also assisting in the restoration of the skin's barrier function. For these types of medicines, adequate effectiveness testing is critical, and most of the current techniques have yet to be standardized. The goal of this review paper is to summarize the current in vitro and in vivo studies for anti-pollution claims related to skin harm pathways.

1.1 Pollutant Effects on the Skin and Mechanisms of Action:

Pollution has a significant effect on skin cells. The negative effect is seen on the skin's surface, the stratum corneum, which is usually inhabited by leftover bacteria. The skin microbiome alters in the presence of pollution, favouring pathogenic microorganisms. Furthermore, pollution increases the formation of reactive oxygen species (ROS), which depletes the antioxidant capacity of the skin. This disrupts the redox equilibrium, putting the cells under stress. Some contaminants get through the stratum corneum and into the deeper layers of the skin. They bind to the Aryl hydrocarbon receptor (AhR), which plays a role in mediating the harmful effects of contaminants. The production of an inflammatory cascade in the skin is caused by changes in microbiota, oxidative stress, and AhR activation. Increased production of pro-inflammatory cytokines like interleukin 1 or interleukin 8 has a significant effect on cell biological activity, resulting in skin lesions and degradation of skin appearance. Other skin characteristics that are required for healthy skin function and health are also harmed by pollution. Most notably, environmental contaminants alter the composition of skin lipids: the lipid ratio is disrupted, cholesterol content is reduced, and sebum production is increased. Lipids and proteins are also oxidized in the skin[8]–[11]. The skin has an elevated pH and lactic acid concentration after being exposed to pollution. These are only a few examples of chemical indicators that, if carefully monitored, might be used to assess health. Figure 1 shows the main mechanisms of pollutant action on the skin.

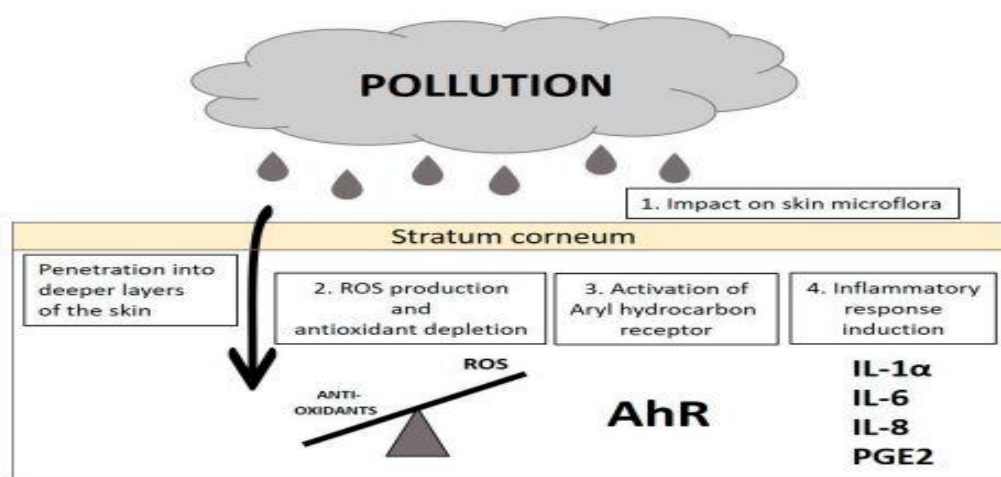


Figure 1: The above diagram shows the main mechanisms of pollutant action on the skin.

1.2 Efficacy Against Pollutants:

Other writers have beautifully evaluated the effect of different pollutants on skin health and defense mechanisms against environmental toxins. As a result, we will concentrate on the major pathways of action on the skin produced by pollutants in the next paragraphs of this review. Various kinds of bacteria colonize the skin, forming the residual skin microbiome.

Its composition varies somewhat across people and bodily sections, and it is influenced by factors such as age, nutrition, lifestyle, and environment. The skin ecosystem is recognized to be related to the human immune system, to maintain appropriate skin barrier function, and to have an impact on general human health. Pollutants in the air have a detrimental effect on the microflora of the skin. In the presence of ozone, He et al. found a 50% reduction in residual skin microflora. These changes may lead to pathogenic bacterial colonization of the stratum corneum, such as specific strains of *Staphylococcus* spp. and *Streptococcus* spp., which have been linked to severe skin disorders including cellulitis. The link between pollution in the environment and acne has also been shown. Pollution particles land on the skin, clogging pores and producing an anaerobic environment, which is perfect for the development of *Propionibacterium acnes*, the bacteria strain that causes acne. Furthermore, pollution increases sebum production, lowers vitamin E levels in the skin, and promotes inflammation, all of which exacerbate the skin's state.

1.3 Reactive Oxygen Species Production (Ros):

ROSs are produced in every live cell, mostly during mitochondrial processes, but they may also be produced by external stimuli such as UV radiation, harmful chemicals, and other contaminants. ROSs have an essential function in regulating cellular signalling pathways linked to cell growth and survival at low concentrations. ROSs, on the other hand, are unstable and may readily react with other molecules in the cell, causing harm. Antioxidant enzymes such as catalase, superoxide dismutase, and glutathione peroxidase are found in every live cell and help to counteract the harmful effects of ROS. The antioxidant enzymes in the epidermis are known to be depleted by air pollution. They also decrease the amount of other antioxidants including ascorbic acid, tocopherol, and glutathione in the body. Therefore, the redox equilibrium is disrupted, resulting in oxidative stress and significant skin cell damage. Accumulated reactive oxygen species (ROSs) react with skin lipids, causing lipid peroxidation and disrupting the skin barrier's permeability. This may lead to problems with the body's defensive systems against poisons, allergies, infections, and UV radiation. Lipoproteins have been demonstrated to be protected against oxidation by PON1. As a result, elevated serum MDA and reduced PON1 activity may be indicators of oxidative stress induced by pollution.

1.4 Aryl Hydrocarbon Receptor Activation (Ahr):

AhR is a ligand-activated receptor found in all kinds of cells in the skin as well as other tissues exposed to environmental stimuli, such as the lungs and liver. Its role is to promote a cellular response to external signals via cell homeostasis, immune cell activation, and stimulation of xenobiotic metabolizing enzymes. Environmental contaminants, primarily dioxins and PAHs, activate AhR, which participates in the biochemical signaling cascade and harmful consequences of these pollutants. Cell growth, proliferation, and differentiation are among processes in which it plays a role.

Human volunteers have also verified the link between inflammatory skin disorders and AhR transcript levels. Using quantitative real-time PCR analysis, skin biopsied samples from patients with atopic dermatitis and psoriasis were compared to healthy volunteers in terms of AhR transcript levels (qRT-PCR). The expression of AhR in the skin samples was also seen using immunofluorescence labelling. In comparison to healthy skin, afflicted skin samples had higher amounts of AhR transcripts. Furthermore, the ELISA test revealed higher expression of inflammatory cytokines in epidermal keratinocytes of individuals with psoriasis and atopic dermatitis, demonstrating a link between AhR activation and skin inflammation lesions. In normal human melanocytes, increased AhR transcript levels were also found in response to dioxins. Tyrosinase activity and total melanin content increased after AhR activation, which are linked to skin ageing, pigment patches, and skin cancer.

After being exposed to cigarette smoke, the effect of AhR activation on matrix metalloproteinase (MMPs) was studied. MMPs are the enzymes that break down collagen and elastin fibers.

They're also involved in collagen biosynthesis. AhR activation by cigarette smoke has been linked to increased MMP-1 and MMP-3 expression in the skin. This resulted in an increase in collagen breakdown and a decrease in collagen production, resulting in accelerated skin aging and wrinkle development.

Environmental contaminants, on the other hand, aren't the only ligands that bind to the AhR. Certain natural components, such as plant compounds, have been shown to interact with AhR, suppressing AhR signalling. Their binding will prevent AhR signalling from having a detrimental effect in response to pollution. These AhR antagonists are mostly polyphenols like flavonoids and catechins.

1.5 Inflammatory Cascade Induction:

When skin cells are exposed to pollutants, they become inflamed. Several investigations have shown that skin cell lines grown in vitro and exposed to various contaminants produce more pro-inflammatory chemicals. In the presence of particle matter, HaCaT (cultured human keratinocyte) cells produced more transforming growth factor (TNF-) and interleukins (IL-1 and IL-8), resulting in the formation of inflammatory cells and an inflammatory response. Normal human epidermal keratinocytes (NHEKs) treated with a pollution mixture including heavy metals, particulate matter, and ozone had similar outcomes. Two inflammatory markers, IL-1 and prostaglandin E2 (PGE2), were found to be overproduced in this study [40]. After application of benzo (a) pyrene, a chemical found in cigarette smoke, an elevated quantity of IL-8 was identified in human keratinocytes under in vitro conditions.

It was discovered that benzo (a) pyrene binds to the AhR in keratinocytes and promotes the expression of CYP1A1, an oxidative stress marker. The release of IL-8 was triggered by this cellular alteration. Inflammatory skin disorders, skin aging, and skin cancer are linked to the overproduction of TNF, IL-1, IL-6, IL-8, and other pro-inflammatory mediators.

1.6 Anti-Pollution Claims Are Put To The Test:

As previously said, our environment is very contaminated, and this has a significant effect on human health. Because the skin is continuously exposed to external elements such as pollutants, new solutions that protect the skin from pollution's harmful effects are required. Appropriate tests to assess their anti-pollution effectiveness are also required. It's critical that the research

design be reliable, repeatable, and carried out in circumstances that are as close to real life as possible.

To determine if a product or ingredient has a substantial anti-pollution impact, we must first understand the nature of pollutants, their effects on the skin, and how to evaluate them. Then we must ensure that we can quantify those changes and determine whether or not they are substantial. Several anti-pollution research models have been developed and evaluated in vivo and in vitro. Some of them will be discussed in the current review.

1.7 Efficacy Testing in Vivo

Anti-pollution experiments are carried out on human volunteers' skin in real time. Therefore, the real-world circumstances are accurately replicated, and the produced findings are trustworthy. Although, in this research design, the pollutant combination must be applied to human skin, which may be an ethical issue in terms of health risks. Many tests choose volunteers based on their living circumstances and lifestyle, such as individuals who spend a lot of time in polluted areas or smokers—people who are already exposed to a variety of contaminants. However, the research design often necessitates the application of a fake pollution mixture to the skin of participants.

2. DISCUSSION

The author has discussed about the, Industry and vehicle exhaust are the primary sources of these pollutants. Indoor air quality is also important. People In the united states spend almost all of their time inside, where they are exposed to contaminants including carbon monoxide, nitrogen dioxide, and gases (VOCs) emitted by cigarette smoke, paints, varnishes, and air deodorizers. Dust, fungi, pets, and insect allergies all have an impact on indoor air quality. Contaminants in the environment are well known to have a negative impact on human health. Excessive pollution exposure may lead to a number of health problems, including heart and lung disease, as well as a greater risk of microbial and viral infections. Environmental contaminants influence the skin, which is the largest vital organ and one of the most important barriers against pollution. Contaminants have been linked to skin aging, pigmentation spots, and acne. Because of exposure, more serious dermatological disorders such as atopy, lupus, and even skin cancer may occur. By decreasing the skin barrier function and seeping through the skin, pollutants may induce systemic toxicity in other organs.

3. CONCLUSION

The author has concluded about the, Pollutants in the environment have a significant effect on people's quality of life and health. There is no question that protecting ourselves from the harmful effects of pollution is critical. The redox balance is disrupted, placing the cells under stress. Some pollutants penetrate the epidermis and reach the skin's deeper layers. They bind to the Aryl petroleum receptor (AhR), which helps to mediate the negative effects of pollutants. Changes in the microbiota, oxidative stress, and AhR activation all contribute to the initiation of an inflammatory cascade in the skin. Increased production of baller cytokines such as interleukin 1 or interleukin 8 has a substantial impact on cell biological activity, result in skin lesions and skin deterioration. Various assays have been developed to investigate the mechanism of pollutants' effect on live cells and to demonstrate the protective efficiency of anti-pollution

products. Because both in vivo and in vitro tests have benefits and drawbacks, combining the two is the greatest choice for obtaining accurate and trustworthy findings.

REFERENCES

1. Bourdrel T, Bind M.A, Béjot Y, Morel O, and Argacha JF. Cardiovascular effects of air pollution. *Archives of Cardiovascular Diseases*. 2017; 2017 Nov;110(11):634-642. doi: 10.1016/j.acvd.2017.05.003.
2. Rembiesa J, Ruzgas T, Engblom J, Holefors A. The Impact of Pollution on Skin and Proper Efficacy Testing for Anti-Pollution Claims. *Cosmetics*. 2018;5(1):4. doi: 10.3390/cosmetics5010004.
3. Chae Y, An Y J. Current research trends on plastic pollution and ecological impacts on the soil ecosystem: A review. *Environmental Pollution*. 2018;240:387-395. doi: 10.1016/j.envpol.2018.05.008.
4. Lee KK, Miller MR, Shah ASV. Air pollution and stroke. *Journal of Stroke*. 2018;20(1):2-11. doi: 10.5853/jos.2017.02894.
5. Maduna K and Tomašić V. Air pollution engineering. *Phys. Sci. Rev.*, 2017; 45: 159. doi: 10.1515/psr-2016-0122.
6. Aunan K, Hansen MH, Wang S. Introduction: Air Pollution in China. *China Quarterly*. 2018;234: 279 - 298. doi: 10.1017/S0305741017001369.
7. Rajé F, Tight M, and Pope FD. Traffic pollution: A search for solutions for a city like Nairobi. *Cities*, 2018, doi: 10.1016/j.cities.2018.05.008.
8. Villarrubia-Gómez P, Cornell SE, Fabres J. Marine plastic pollution as a planetary boundary threat – The drifting piece in the sustainability puzzle. *Mar. Policy*, 2018;96: 213-220. doi: 10.1016/j.marpol.2017.11.035.
9. Ierodiakonou D. et al. Ambient air pollution. *J. Allergy Clin. Immunol.*, 2016 Feb;137(2):390-9. doi: 10.1016/j.jaci.2015.05.028.
10. Karlsson TM, Arneborg L, Broström G, Almroth BC, Gipperth L, Hassellöv M. The unaccountability case of plastic pellet pollution. *Mar. Pollut. Bull.*, 2018 Apr;129(1):52-60. doi: 10.1016/j.marpolbul.2018.01.041.
11. Fayiga AO, Ipinmoroti MO, Chirenje T. Environmental pollution in Africa. *Environment, Development and Sustainability*. 2018;20(1):41–73. doi: 10.1007/s10668-016-9894-4.

DOCTRINE OF THE BASIC STRUCTURE

Aruno Raj Singh*

*Assistant Professor,
Department of Criminal & Constitutional Law,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- arunorajsingh@gmail.com

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ABSTRACT

The Indian Constitution's foundations were created to guarantee that the document was rigorous. As a result, the Parliament was given the power to amend in accordance with Article 368 in order to address potential issues with the constitution's operation. However, the flexibility of constitutional provisions must be tempered by the need to preserve their normative presence as a higher law that limits the country's transitory legislative majority. Nonetheless, the Supreme Court ruled in KesavanandaBharati v. State of Kerala (1973) that Article 368 did not allow the legislature to change the Constitution's "fundamental structure or system," despite the fact that it did not contain any explicit limitations on the legislature's amending authority. Since its introduction, the idea has been hotly debated as a key part of contemporary structural debates concerning constitutional recognition and change. The nature and application of the basic framework concept as a procedural defense are examined in this paper, as well as the theory of the basic framework and its impact on the development of constitutional jurisprudence, which is the result of a history and reflection of the concepts that serve as the foundation for Indian democracy.

KEYWORDS:Constitution, Democracy, Parliament, Regular Legislation,Supreme Court.

1. INTRODUCTION

Independent India has moved away from the British paradigm of disregarding the difference between constitutional and regular legislation by adopting a written Constitution, which is also the worlds longest. The Constituent Assembly, which spent three years writing this Constitution, chose to follow the American model of a Supreme Court with the authority to strike down legislation that are in violation of the Constitution, particularly those in the third section on basic rights (Articles 15 and 32 of the Constitution).

Indian citizens were similarly inspired by the United States to create a review process that required a two-thirds majority vote in both houses of Parliament, as well as approval from at least half of the state legislatures. In a much more centralized federal system, Ambedkar, probably the most influential member on constitutional issues, responded to criticisms of the overly difficult revision by pointing out that it would be relatively simple; instead of a majority

of three-quarters of the federated states as in the United States, a simple majority of state legislatures would suffice[1].

Whatever the objectives of the Constitution's drafters, the history of independent India is characterized by a series of modifications to the Constitution, numbering in the hundreds (the 107th amendment was approved in 2020). This buildup is mainly owing to Parliament's readiness to bypass the Supreme Court's roadblocks to many legislative initiatives (it is, after all, practically master of the power of review)[2]. This never-ending battle between the legislature and the court gave rise to a body of law known as the "Basic Structure Doctrine," which is both the product of history and a reflection of the ideas that underpin Indian democracy.

2. DISCUSSION

2.1 History of Politics:

While all significant changes in constitutional law take place in a particular historical context — we're thinking of the "revolution" ushered in by the Constitutional Council's judgment of July 16, 1971 — they aren't always linked to political crises and power struggles. The same is true in India, where the Supreme Court has been confronted with a combination of executive (with its means of controlling parliamentarians, especially when it has large majorities) and legislative (with its means of restricting the scope of constitutional review of laws) offensives since 1951[3]. Starting in 1967, these recurrent "assaults" gave birth to the concept of the fundamental structure, which has been resurrected many times as a way of fighting for the survival of comprehensive judicial review.

Even before the Supreme Court was established, several high courts were asked to consider the constitutionality of agrarian reforms or nationalization laws passed by state legislatures or the Indian Union under Article 31 of the Constitution, which at the time protected landowners from expropriation without compensation. Faced with the possibility of undermining the government's and its parliamentary majority's major political orientations in favor of voluntary wealth redistribution, Prime Minister Nehru supports the option of revising the Constitution by a 1st Amendment (1951, the vote is then carried out by the single constituent assembly), which "immunizes" 12 pieces of legislation by placing them in the Constitution (Ninth Schedule to which articles 31A and 31B now refer)[2].

The provisions included in these statutes are raised to the level of constitutional standards and now seem outside the purview of judicial review, as envisioned by The Advocate General at the Court of Madras. From that point forward, the debate's founding arguments were exchanged: on the government's side, the urgent need to adapt the constitutional text in accordance with the political will of the majority (two thirds of the two chambers recall it); on the judges' side, Chief Justice Gajendragadkar's fear that the Constitution would self-destruct by severing the ties between the two chambers.

The Supreme Court initially ruled in *Shankari Prasad Singh v. The Union of India* and the *State of Bihar v. Kameshwar Singh* (1951) that the laws subordinated by Article 13 to respect for fundamental rights did not include constitutional amendments, effectively protecting the agrarian laws of the IXth Schedule from the actions of large landowners (the zamindar). Cases in which courts reject social reforms in the name of the Constitution, on the other hand, do not go away, prompting a new amendment, the 4th, in 1955, to limit the compensation given to expropriated

proprietors and to expand the list of laws that are immune. In response to fresh legal challenges in this area, Parliament passes the 17th Amendment shortly after Nehru's death, strengthening this process even more[4].

In *Sajjan Singh v State of Rajasthan* (1964), a "bench" of five Supreme Court justices accepts the amendment's legality, but two minority judges dispute the non-derogability of some constitutional provisions, particularly those pertaining to basic rights. In 1967, when Indira Gandhi was still Prime Minister, the Supreme Court handed down its decision in a lengthy and complicated dispute between the heirs of Golak Nath's family and the Punjab government, who claimed their land under a statute guaranteed by the 17th Amendment.

The Supreme Court rules that the power to amend the Constitution must not infringe on fundamental rights, at least in the future, in a decision by a majority of six judges (including Chief Justice Subba Rao) against five others — the Golak Nath decision is a "prospective overruling" that does not, out of prudence, call into question previous decisions. For the first time, the plaintiffs' attorneys talked of a "fundamental structure" of the Constitution from which the power of revision cannot deviate, and the Chief Justice adopted this concept, influenced by a lecture delivered in India by Dieter Conrad on the German Fundamental Law's immortality clause.

Indira Gandhi, who refused to recognize the Supreme Court's invalidation of a Bank Nationalization Act in 1970, used her election win in 1971 to vote on the 24th amendment, which included an affirmation of Parliament's authority to modify any article of the Constitution at the beginning of article 368. By its judgment in *KesavanandaBharati* on April 24, 1973, on an immunity legislation (i.e., put in the 9th appended list) on religious properties, the Supreme Court is obliged to decide on this modification. This judgment, which is regarded as a genuine forerunner of the basic structure doctrine (the judges use the terms basic structure and essential features), contains a number of unique elements[5].

It is a juxtaposition of eleven views followed by a six-point summary accepted by nine justices (including the Chief Justice, who was two days away from retirement) as the court's opinion (the decision was itself adopted by seven judges against six). The majority of the court approves the 24th Constitutional Amendment, but believes that Article 368 does not provide Parliament the authority to change the Constitution's fundamental framework.

Judges' opinions differ on the content of these non-derogable norms, with some emphasizing fundamental rights (as in Golak Nath), while others preferring "guiding principles" (especially to the detriment of the right to property), the democratic form, the "secular" character of the state, and the use of judicial review. Parliament is only required to follow the fundamental framework for changes made after April 24, 1973.

Indira Gandhi's reaction to this decision after initially disobeying seniority conventions in the procedure for appointing a new Chief Justice is inextricably linked to the declaration of a state of emergency on June 26, 1975, and the numerous restrictions on individual liberties that followed. Not only do the 38th and 39th amendments protect the state of emergency and Indira Gandhi's election as a Member of Parliament in 1971 (which had previously been challenged in the courts for corruption), but the 42nd amendment, passed at the end of 1976, prevents courts from challenging constitutional amendments[6].

The Supreme Court, which seemed to yield in the issue of Indira Gandhi's election while pointing to the fundamental structure, reaps the advantages of the new scenario produced by the 1977 elections: Indira Gandhi leaves power, and fresh amendments are introduced in 1978-1979 to rethink the state of emergency's abuses. In the *Minerva Mills* decision on the nationalization of a textile factory, issued shortly after Indira Gandhi's return to power, constitutional jurisdiction went on the offensive, invalidating the 42nd amendment on the grounds that it violates the Constitution's essential features and destroys its basic structure by excluding any form of appeal.

The Supreme Court has frequently invoked the concept of fundamental structure to question the constitutionality of legislation included in the 9th Schedule, most notably in *Maharao Sahib Shri BhimSinghji v. Union of India* (1981) and, more recently, *IR Coelho (Dead) by LRS v. State of Tamil Nadu*. These judgments, made in a less tumultuous political environment despite acrimonious disagreements between Parliament and the Supreme Court, demonstrate that the fundamental structural concept has weathered the storm that precipitated its adoption. If the memory of the state of emergency lingers over this jurisprudence, it seems that it must be explained by reasons other than choices made in a more or less dramatic setting.

2.2 Indian Democracy's Fundamental Foundation:

The concept of the fundamental structure presents a number of issues in constitutional theory and practice, and it has even been attacked in India for being "anti-democratic and counter-majority"⁸. Since the beginning of the twentieth century, Western jurists have been used to analyzing the "inderogability" of eternal phrases in constitutional texts in connection to Kelsen and Merkl's normativist ideas. The Indian case is unique in that non-derogable constitutional norms are not mentioned in the Constitution (called "entrenched rights" by Indian judges to describe the situation in Germany) and that this category was created by the Supreme Court based on jurisprudence — changing according to majorities and compositions, more or less broad^[7].

The Supreme Court justices' assertion of dual inspiration in the Common Law and the United States Supreme Court model is sufficient to support a broad reading of Article 32 of the Constitution, granting the court procedural powers to enforce Part III's basic rights. If this article does not expressly empower the court to strike down laws that violate these fundamental rights, or a fortiori to censor constitutional amendments for the same reason, judges interpret it as not excluding and thus authorizing a contrario such a possibility, otherwise in accordance with its purpose of judicial protection of fundamental rights. While the Supreme Court ruled in 1951 and 1964 that Article 13 proclaiming legislation to be in violation of basic rights was unconstitutional, since 1967 and 1973, it has believed that it has had the authority to reverse this jurisprudence, at least for the time being. The Supreme Court was able to read in the Constitution, in its "penumbra" or between its lines, that it contained a basic structure that was non-derogable, just as it was able to recognize the full constitutional value of the Indian Constitution's Preamble another contribution of the *Kesavananda* decision. The creation of this category of norms which dare not be called supra-constitutional because they are included in the Constitution without being expressly qualified as such is supposed to return to the judge's creative power through a method, directly inspired by Chief Justice Marshall's remarks on the "living document" Constitution, which can delight interpretative realism supporters^[8].

These non-derogable criteria, which were established by the Supreme Court, are also subject to judicial interpretation. The phrase "fundamental framework" is obviously meant to combine many criteria together while remaining ambiguous enough to allow judges some leeway. For obvious reasons of judicial policy, the Indian judges did not seek to provide an exhaustive list of these non-derogable norms, similar to the general principles of law in French Council of State jurisprudence or the fundamental principles recognized by the laws of the Republic in constitutional jurisprudence. The difference of views between judgments and between the judges themselves is added to the argument of flexibility, which is helpful in the employment of this weapon. In this field, two major issues continue to clash: one sees the basic structure as a set of principles on free and periodic elections, federalism, secularism, separation of powers, and judicial independence that would connect the various articles of the Constitution (in *Golak Nath* and *IR Coelho*), and the other sees it as a set of principles on free and periodic elections, federalism, secularism, separation of powers, and judicial independence that would connect the various articles of the Constitution (protection of life and personal freedom).

The tensions arising from Articles 14 (equal protection of the laws is the most common cause of ordinary law invalidation), 15 and 16 (absence of discrimination and reserved positions for Scheduled castes, Tribes, and "Other Backward Classes" in public office), the latter two of which have been criticized in two recent Supreme Court decisions, *M. Nagaraj v. Union of India* (2006) and *Ashoka Kumar Thakur v. Union of India* (2008), the Supreme Court debated whether the constitutional amendments enshrining affirmative action in the civil service (with a maximum quota of 50% of posts and the exclusion of the "top layer" or creamy layer according to jurisprudence) were constitutional. The negative response to this issue does not mean that this concept is abandoned; on the contrary, it helps to reconcile formal equality with affirmative action, on the grounds that the Constitution mandates both equal protection of the laws and judicial measures in favor of the underprivileged[9].

At the same time, the current emphasis on basic rights allows the issue of private property protection, which has been absent from Article 19 since 1979, to resurface in a climate of neoliberalism and fast economic growth. Without attempting to restore a constitutional protection against expropriations - the *IR Coelho* judgment does not find in favor of compensation for the petitioner in this regard - the Court tries to differentiate between two separate criteria for the legality of the legislation in the 9th Schedule: The "essence of rights" test must ensure that the amendment at the time of this insertion (on the basis of article 31B) has no negative impact on the set of fundamental rights (as if Part III of the Constitution were put in brackets by this amendment), and then the rights test must ensure that each law added to the 9th Schedule after 1973 does not infringe on those rights. This minor difference has been debated, but its impact seems to be to jeopardize the survival of the numerous legislation, many of which are of "socialist" origin, that have remained in the 9th Schedule since 1973, despite the fact that it has virtually lost its constitutional significance. At the same time, the Supreme Court resolved the long-debated issue of whether ordinary legislation should be subjected to the concept of the fundamental structure[10].

3. CONCLUSION

The prohibition of the constituent power to "immunize" laws through constitutional validation, which weighs on the suspicion of circumventing a review of the constitutionality of laws considered indispensable to democracy, appears to be the common thread of this jurisprudence,

which will be said to serve the interests of the court. In the same way that majority rule and the protection of fundamental rights are "twin foundations of contemporary democracy," as Chief Justice Sabharwal put it in 2007, "full judicial review" is part of the basic framework. This approach seems to us likely to revive discussions on what may explain, in a positivist conception, the presence of a basic foundation placed above the other constitutional provisions in the hierarchy of norms, without ever resorting to any inherent right, which is alien to Indian tradition.

Do the Supreme Court of India's judges not assist us in distinguishing the legal features of democracy majority rule, which involves frequent changes in the law, separation of powers, which allows these changes to be implemented in pre-determined procedures, the guarantee of fundamental rights, and the principle of equality by constitutional judges, which prevents these changes from undermining democracy without putting us in danger of losing our democracy? Rather than returning us to the route of a hypothetical fundamental norm, Indian basic structure jurisprudence takes us to the tempting notion of a paradoxically flexible foundation of ideas supporting our adherence to the Constitution.

REFERENCES

1. Hamid NA, Nawang IN, Salleh K, Harun N, Bidin A. The doctrine of basic structure of the Malaysian constitution: A study of framework. *Pertanika J. Soc. Sci. Humanit.*, 2017; 25 (S): 163 - 170.
2. Raza A. The Doctrine of 'Basic Structure' of the Indian Constitution: A Critique. *SSRN Electron. J.*, 2018; 11(9): 1-32. doi: 10.2139/ssrn.2661127.
3. Sethi A. Basic Structure Doctrine: Some Reflections. *SSRN Electron. J.*, 2011, doi: 10.2139/ssrn.835165.
4. Verfassung R, Übersee. Basic Structure Doctrines and the Problem of Democratic Subversion: Notes from India," 2015, doi: 10.5771/0506-7286-2015-2-99.
5. Mukherjee S. The Unconventional Dimensions of the Basic Structure Doctrine: An Insight. *SSRN Electron. J.*, 2018, doi: 10.2139/ssrn.3109541.
6. Bhandari B. Basic Structure in the Constitution of India. *Int. J. Trend Sci. Res. Dev.*, 2018; 6. doi: 10.31142/ijtsrd16994.
7. Colon-Rios J. Beyond Parliamentary Sovereignty and Judicial Supremacy: The Doctrine of Implicit Limits to Constitutional Reform in Latin America. *Victoria Univ. Wellingt. Law Rev.*, 2013; 44(3-4): 521-534. doi: 10.26686/vuwlr.v44i3/4.4988.
8. Malek MA. Vice and virtue of the basic structure doctrine: A comparative analytic reconsideration of the Indian sub-continent's constitutional practices. *Commonw. Law Bull.*, 2017; 43(1): 48-74. doi: 10.1080/03050718.2017.1358648.
9. Srivastava T. Parliament's Power to Amend Indian Constitution - Doctrine of Basic Structure. *SSRN Electron. J.*, 2012, doi: 10.2139/ssrn.1688864.
10. Winn JK. Introduction to Common Law Legal Reasoning as Taught in American Law Schools. *SSRN Electron. J.*, 2015, doi: 10.2139/ssrn.2655771.

INTERPRETATION OF THE BANNED PERIOD IN THE STORIES OF NAIM KARIMOV

Akbar Gofurovich Sabirdinov*

*Candidate of Philological Sciences,
Fergana State University, UZBEKISTAN

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ABSTRACT

The creation of a work based on the unique interpretation of the life of a well-known poet, writer, Rich in wonderful events, unforgettable meetings, requires high skill from the creator. The fact that Naim Karimov, the author of a number of educational and biographical novels, took place in the book "By ajob dunë" is valuable because he received important information about the hard fate of Uzbek intellectuals who participated in the cinema, musical drama and comedies during the old Shura period. The events related to the dolgali activities of sensitive creators such as Fitrat, Chulpon, Oybek, Gafur Gulom, Maksud Sheikhzada, Usmon Nosir are impressive and interesting stories.

KEYWORDS: *Real Story, The Era Of Banned, Artistic Skills, Uzbek Literature, Sensitive Creator, Freedom.*

INTRODUCTION

The next book of Naim Karimov, a well-known literary scientist, Doctor of philological sciences, professor, academician of the Academy of Sciences of the Republic of Uzbekistan, known to a wide audience of readers with a number of articles and books, has been called "By ajob dunë" (- Tashkent: "Uzbekistan" NMIU, 2016). The real stories and stories from this book, the works of the stage are valuable because of the interesting interpretation of remarkable events that took place in the life of prominent figures of Uzbek literature of the 20th century, unforgettable meetings and pages of the past unknown to many people. The Amazing Story, film and plays associated with the life of such sensitive creators as Abdurauf Fitrat, Abdulhamid Chulpon, Muso Tashmuhammad ogli Oybek, Maksud Sheikhzada, Gafur Gulom, who are known for a number of educational and biographical novels, bring us to the reality of the era of Shura-XX century, which is based on banned. If the author expresses the tragic fate of the Uzbek intelligentsia in lines of deep suffering, then goh describes the strange events that took place with them in a light manner. For example, the story "Fafurona safar" brings the reader to the reality associated with the ten-day celebrations of Belarusian art, which took place in Moscow from 5-15 June 1940 year. It is stated that the adventures of Ghafur Ghulom, who went to Moscow with Hamid Alimjan to participate in this holiday, went to the event of the centenary anniversary of Akaky Tseriteli, a classical demonstration of Georgian literature, which is planned to be held in Tibili a few days later – after leaving the train in one direction and how "ghafurona" got to his On 17 June (1940 year is considered-S.A.) As part of the multinational delegation of the Union Writers' Union, Gafur Ghulom, who sits on the train from the Kiev railway station, falls into

Perron in one of the cities saying "I get fresh air" and begins to look for "material of mobilization" from the shops. "... it turns out that in one or two shops around, there is no such thing as a piece of mobilized rarity from a kremsoda with lemonade. After that, he enters the restaurant of the Tupa vokzal, greets with the servants, and then jumps out to the apron until he puts one or two bottles under his arm. But let's see with the eye of ne, now just put his suitcases and the train that came out of his cup did not wait for him, but left until "Pu-pub" [1]. Then the poet in both a funny and difficult situation advises someone to sit on a plane and fly to Kharkov or Rastov.

The story ends with this image: "soon the familiar train will appear. As soon as he stops, the Ghafur Ghulom, as if nothing had happened to the fur, goes out into the wagon and into the empty mug. The companions in the cup saw the Ghafur Ghulom and remained hang-mang. And the poet, like the one who drove the army out of the wagon, said, "Are you coming well?"that is, you will see sincerely with your companions..."[2]

MAIN PART

The story "Амин ва Амина", dedicated to the happy life of the sensitive creator Amin Umari, known for his special talent in Uzbek poetry at the beginning of the XX century, tells about the High love and the tragic consequences of inappropriate jealousy arising through him. This poet, born in the Lamb, whose original name was Muhammad, was called Amin by friends of the penkash. This poet, known to elga under the pseudonym Amin Umari, gets acquainted with Amina, one of the Edil, in Samarkand. As explained in the story, they wrote a leaf of love, which caused Usmon Nosir to strike the leaf of the flowers. In the work, the happy moments of lovers"when they were married in 1937 year, Amin and Amina were as if two palms of one apple had a long and happy life with each other" In this way, in the footsteps of Amina, who entered the medical institute, came to Tashkent, Amin married her and began to spend her happy days, although she was renting. Their daughter Alfia is also born here. In the story, he was sent to a Bekabad metallurgical plant for work, where he was finally hospitalized with thousands of sufferers who had been infected by sweating patients among the builders.

The story explains that Amina is unclean to Amin's relatives, who came to the guest from Kokand, that she did not give a list, that the couple had a gap in their relationship, that eventually Amin had the choice to see Katya to fill the void while lying in the hospital. Between Katerina and Amin, who served in the account department of the Writers' Union, there was a love, Amina in her heart, too, in turn, aroused suspicion. Amina, who is a witness of their pincer meetings, raises a brawl in the chamber. "Ignorance did not even blame the patient lying in the face of death. Amina forgot everything and showed rosa watch. Amin tried to comfort him until his strength reached him, to understand that there was nothing and could not be. Tormented by black sweat. The temperature rose excessively and did not know what the incident would end. So did not come to himself... On the night from November 13 to November 14, 1942, Amin Umari, one of the beautiful poets of the 30s, died. The 29-year-old poet's heart string was interrupted in the curtain of outbreak " [3]

As described in the story, Hamid Alimjan said that when he called the hospital a few days ago, the condition of Amin Umari was still improving. Therefore, the poet's death from tusat causes doubts in his soul, giving birth to the idea that Amina did not commit murder as a result of jealousy. In the game, the funeral of the mischievous poet "after an hour of farewell, the

mourners raised the coffin and went to the cemetery of the minor. The cemetery was in anticipation of autumn. In the shocks of the trees, the bark leaves, like the lifeless face of the deceased, kept the deposit intact. Even when oxundy opened the mourning camp and spoke about the poet, and other speakers said the words of vido to the deceased's honor, the leaves that entered the same soil color spilled tirelessly as tears flowing in their black eyelashes. One or two zucchini leaf fell on the coffin, on the chest of the deceased to the arms of the dove. During the living, these hands to Amina, what is needed now to hide, Katya – Katyusha was also fond of flower sails. Now both these loving hands and these autumn leaves are inanimate" [1].

In the book, along with the mysterious stars Katya on the grave of the poet, the young pours of the dawn are described impressively: "the next morning, with the dawn, the nests of the Kokand Amin Umari arrived. As soon as they come to the cemetery, they say, "Wow, brother!", "Wow, my brother!", "Wow, get out!"the wailing of the wailing screams filled the environs. At that moment, the top of the grave was asthmatic, the sensations-imperceptibly shaken, and a couple of exits from the mound were scattered down the soil. Then a leakage, consisting of all the fibers, appeared, and around those who carried a cry, the goh shriveled, and the goh stretched along the neck of the man, and stood floating. The jigars of the deceased, who were burned in the field of tribulation, felt this mystery—whether they grew up in vain, but, apparently, the spirit of the poet, who missed the spilled soil of the blood of navel, the seeds of his parents and relatives, even the weeping voices of these saints, met and said goodbye to them..."[1]

And the events described in the story "Тараддуд" occur at the end of the 40-ies of the XX century. The heroes of the story Said Ahmed, Shuhrat, Shukrullo, Ramz Bobojon, Mirmuhsin and Turob Tula, as well as the creators, will take Adham Hamdam to Tashkent, where he came to the seminar of young writers of the Republic, to the "feast"without allowing him to return immediately to Ferghana. Early in the morning, two dignitaries – Said Ahmad and Adham Hamdam reach the House of Mirmuhsin. The humor that the creators make to each other, and then the fear of their laziness about the need to be mutual extrovert, creates a picture in the reader about the environment in which the kingdom prevails.

The message of Adham Hamdam's return to the bosom of his family after a ten-year prison term, Ashurali Zahiri, sends everyone to place. They are also beginning according to taraddud to meet him worthy of being firmly convinced that Usmon Nosir will also be released from prison in the coming days. This "taraddud"becomes a poetic. Thanks to the poet's"Haxmon" friend, they began to read by heart one after another, full of Shukrullo, Nemat, Toshpulat,Turob Tula. Someone says to memorize the translation made from the"Demon". In the story, the poetry office in anticipation of optimistic feelings is described as follows: "it was difficult to know who was the listener, who was the reader of the poem, in a circle drunk from the wine of poetry. All at the same time were both readers and listeners. True, there was no listener. Both Shuhrat and Ramz Bobojon and Mirmuhsin were added to the poetry, which began Badakhatan. There is no one left without attachments. The round ascended mood was talpingandek to the sky on the wings of the birds" [1]. Thus, those who gathered in the Circle plan to celebrate the return of the vulnerable poet Usmon Nosir to his native land of health as a historic day after passing the ten-year sentence. But it is not known which camp the lucky poet is in. The story ends with the image of the following nature, which is in harmony with deep philosophical thought:... On the two shores that crossed the garden, flowed from the overgrown, apples also stopped. Instead of these apples, the last golden rays of the setting sun began to play" [1].

The story "Достонга арзийдиган қўшиқ" begins with the description of the process of writing the wedding of Sobir and Anorkhon in the novel "Олтин водийдан шабадалар" by Muso Tashmuhammad o'g'li Oybek. When the writer writes a novel in Kislovodsk, events that took place four years before his dream come true. At that time, professor Rakhmatulla Mallin and his wife Bibi Sattorova were the guests of a group of employees of the Institute of language and literature of Tashkent. Folklore scientist Hodi Zarif Muzayyana Alavi asks to sing one of the folk songs. Muzayyana Alavia sings various "tracks" with a pleasant voice. Especially when he sang "yor-yor", which is sung in the tune "Sayra bulbul", which Alexander Konstantinovich Boravkov loves, Oybek highly appreciates as "Бир достонга арзийдиган қўшиқ". He applauds Muzayyana Alavia's dedication in collecting folk songs by stroking her silver hair and hugging her father's shoulder. At the end of the glorious meeting "Saints! Scholars and scholars! Not only now can not poets write the lyrics of the song that Muzayyanakhanim sang, "manaman". Such artistically harmonious works can be created by the people as magnificent. Such masterpieces can be created only by the people who made a great contribution to the treasure of human culture..."[1]

In the next part of the story, again, writer's process of writing the novel, the landscapes of the image of the cathedral and the wedding of Anorkhan in the work are reflected. The work is concluded as follows:... After completing the novel and returning to Tashkent, writer ordered the transfer of hands to his wife Zarifa sister. And the text "Yor-yor" was taken from Muzayyana Alevi and assigned to add, flew to Pakistan along with the friends" [1].

Well, this story, consisting of four conditional parts, is valuable in that it gives Oybek information about real events that are based on the creation of the novel "Олтин водийдан шабадалар".

Stop the story of "Муборак имзо" begins with the image of Jalalov's book "Ўзбек шоирлари" to receive a review from Oybek, to get a hundred thousand copies of his apartment in the "workers' town" where he lives. Because he had heard that Oybek was seriously ill, and Zarifakhonim, who had met him in Astana, had also confirmed this. Tukhtasin Jalalov "I know that there are ill the teacher... But I am also aware of the fact that he is writing one book a year. Consequently, I have come to hope that they will also be able to read the book," he answers. Zarifakhonim is getting a five hundred-page manual, asking him to receive a message a week later. Tukhtasin Jalalov comes to this apartment deliberately later – after two weeks, so as not to torment the sick Adib. While waiting for him with an open look, Oybek notes that in the book Zebiniso is written, Uvaysi is a short novel. Motivates to write a novel about Nodira. Because Tukhtasin Jalalov also survived the dead Valley, which fell into the banned mill at the end of the 40-ies – in the beginning of the 50-ies. To some extent in his fate, there were no shared sides to the fate of Nodira. At the same time, Oybek asks Jalalov to write a novel about himself. But stop Jalalov could not write a novel about himself, when he was released from the suffering, which was called the "labor-correctional camp", where he was given a petition not to open a mouth about what he saw they knew, what he had experienced.

A few days after the break, one of the publishing staff reports to cease Jalalov that he must immediately reach the office. The former prisoner goes to a thousand different dreams. In a sidra dress-head, in all probability, places in the sack out of the dried bread. Publishing director Nasrullo Okundy puts a sheet of paper in front of him, while warmly asking for it. It was an Oybek review. In the review, Oybek noted that the book is valuable, that nothing has been

created about Uzbek poets in Uzbek literature yet. Let's stop because Jalalov is imprisoned, this tolerance and courage of Oybek will wave the writer while all he takes away from giving a review of his book. The story ends like this: "let Nasrullo Okhundiy until Tukhtasin Jalolov's hand is sewn into a bag that has not yet fallen: "you have to wash, oksokol!" he said. But these words did not enter his ear. He kissed writer's blessed signature of great human and was washing it down with his joyous..."[1]

The story "Унутилмас кун" is about the life of Maksud Sheikhzoda after his release from prison. He was arrested for the second time in 1951 year 21 September and sentenced to 25 years, after the death of Stalin was released from prison in June 1954 year before his term. But Maksud Sheikhzoda was neither restored to the membership of the Writers' Union until 1957 year, nor his written poems were printed on the newspaper. The poet's applications to the centrum were also left unanswered: those who wore an iron bracelet on his arm were still riding a horse and throwing a javelin. In those years, Maksud Koriev, the editor-in-chief of the newspaper "Тошкент ҳақиқати", asks Maksud Sheikhzoda to help him to print his poems on the newspaper. Maksud Kariev asks to write an article on the poems of amateur poets, before suddenly starting with the poem, that in Uzbek there is a saying "Musulmanin is slow". This proposal will be welcomed by the prince and will write an eight-nine-page article. Maksud Koriev's courage told his Ismail Suleiman that "someone must dare, Ismail! Someone should give starting. Until now, Sheikh brother strong poet is a choir. Come on, let's get it done! At the top of the article, write the author as "Maksud Shaykhzoda", which is expressed in the words" [3]

Maqsud Sheikhzoda, who lives in the injustice and humiliation again, the poet who was imprisoned with the slander of villain people after the injustice in the work, described his experiences after seeing the article "Турмуш ва товушлар" printed on the newspaper "Тошкент ҳақиқати" on the morning of March 20, 1957: "Maqsud Sheikhzoda "on the top of the article seemed to be written Sheikhzoda's heart beat"gup-gup". Both in the solitary chamber of the prison, and in the forests of the viburnum, tears did not pour out... On this day, a simple article printed by the poet Maksud Koriev with courage threw in pieces the iron barriers imposed by the regime against him" [1]

The story "Шам ва Чакмоқ" was built on the basis of retro plot. The events of the work begin with the image on July 1, 1968, when the died writer Muso Tashmuhammad ogli Oybek. Regrettably, Abdurahman did not visit writer during his life, his farewell to the house of Oybek is thrown. The black days of hell in the Camp "Qarlag" in Karaganda, where he was sentenced to twenty-five years in prison from his memory, come to life again. They were imprisoned as "enemies of the people" for their captivity in the war. Those who are physically and spiritually crushed by seeing, clinging and insulting in the animal line of Supervisors will be reinforced by the events, glorious proverbs in the novel "Навоий", read in dim light. The bright image of hazrat Navoi, described in the novel, the word evokes hope for the future.

The last line of the story ends like this: "when Abdurahman passed through the puddles and alleys, bridges and fields and the workers arrived at that sanctuary in the town, the writer courtyard and the gate were full of mourning people. As they agreed to like the surviving prisoners arrived. How many years of suffering and reading – in epic years one of them is Zayniddin, the other is Sultanmurod, the third is Arslonqul... had received the names " [1]

The events described in the story "Иккинчи учрашув" were also built on the basis of retrospective plot. The image of Muzayyana Alavia's return from the long prison of her husband Lutfullokhan in 1947 year from home forms the basis of the work. Studying for two years at the Eastern Institute in Leningrad, he was forced to return to his homeland for illness, working as the head of the department at the commissariat Lutfillokhan destlar is accused of participating in a criminal case related to the poisoning of Obid Saidov, and then, as a member of the nationalist organization, headed by the cast-iron poet Botu (Mahmud Hodiev) The "Red Wedding" of Lutfillohan with Muzayyanakhan, the nephew of Abdulla Alavi, takes place in the spring of 1930 year. Lutfilla Alavi was a relative on the mother's side of the Muzayyanakhan. Two or three months later, Lutfillakhan is imprisoned for ten years. Lutfillakhan Alavi Muzayyanakhan, who returned from prison, thinks that he is already married to another. But when he sees that he keeps his letter, which he once wrote, as a talisman, he begins to read compliments on the loyalty of his spouse. The situation of the former prisoner when he received the letter is expressed as follows: "by capturing what was unknown, whether the color of the toilet paper was gone, whether it was a triangle or a rectangle, he was seeing this oil, the rotten threads spilled on his own and the paper folded several times from the inside came out. He opened the paper with trembling hands. And he read from him the inscription in color: "my dear beautiful relative!..." Lutfillakhan was deeply excited. The fact that his letter, which he wrote in love with Muzayyanakhan, was preserved to this day as an eye shadow, was a sign of his loyalty. He greased the letter with gleaming youth spilled eyes..." [1]

The story "Хамойил" is devoted to the life of the talented Abdulhamid Chulpan on the eve of his repression. The event of the work begins with the image of the arrival of the Chulpan to Andijan on the Tashkent–Andijan train in its original state. Then he reaches the neighborhood of Qatarterak and there is an inscription called the Chulpan, he collects all the papers and puts them in a suitcase, then he goes back to Tashkent, despite the fact that his childhood friend Sharafiddin Salahiddin took from his son's house the books he once gave and the letters he sent from Moscow and asked his sisters the ending was the last of feelings, thoughts, dreams. As the Chulpan watched this fiery cry, tears were poured out from his eyes... Finally, all of his works, in which the poet was a mirror of spiritual, creative and social life, became burning ashes. The steppe collected ash and put it in a pre-prepared bag. So much so that the ashes of books and handicrafts were in a small bag, and the bag was lighter than the dead mouse child..." [1,80]

In his interview with Vadud Mahmud, who is a guest of the Chulpan's house, he also talks about the Tsarist Russia, and then the bolsheviks' occupation of Turkistan and, as they wish, demand, chauvinistic policy. The attitude of the Chulpan to the policy of Shura in the story quot; bolshevik means that he lost his human appearance, did not see the color of mercy come true, as long as it is the executioner himself who, if necessary, flows the river of blood!.. Bolshevik's a lot of seeds! One dies, ten stands! When ten die, a thousand are raising a sword brother" In the summer of 1937, among all the intellectuals living in Shura state, there was a reason for the fact that the Chulpan was also worried about his fate.

This image related to the naming of the story is especially characteristic: "since the evening breeze outside began, Katya opened the window and wanted to refresh the room air. The breeze that came in from the outside with the opening of the window tossed the amulet hanging over the window frame with cheats. Usually mothers hung amulets on the door or window frame, in which words were written, so that the eyes could not touch their brides, their happily married

children, as if they were fourteen days old. Vadud Mahmud's eye fell into the amulet and asked the Chulpan what it was:

– My friend, do you hang something on the window? My first sight. Do your sisters write a prayer "let the head of our brother be from the stone" or?

It's a amulet... "

The work features Javaharla'l, a fighter for the freedom of the Indian people, as well as the second plot line associated with his beloved wife Kamola. They give him a piece of paper with a message that Kamola's condition is aggravated when he is released from prison by Javaharla, who was imprisoned for the freedom of the Indian people against the British. In front of Kamola, who is being treated in the German sanatorium in Sweden, he quickly reaches. Kamola died 28 February 1936 year. Javaharla'l the ashes of the body of his beloved person flow into the Gang River according to the Indian custom. When the Chulpan also showed the ashes of his works written by Vadud Mahmud, he said, "Indeed, this sack was put in my ashes! My eyes, my heart, my words this, Vadudjon!.. I am a savings person, my friend. If the Soviet state is not today, then tomorrow will definitely shoot me and get out of the humour. He does not see you any worse than me. You, God willing, will remain alive. You will see days of Dorilomon. The same hammock bears you. If you survive and one day go to India with time, then go to the banks of the Gang River and make the same holy river stream, where the dirty feet of the Bolsheviks did not touch. My ashes, too, like the ashes of Indian saints, joined the silver waves of the Gang River and let it flow in a playful way..."

The story "Қасамёд" describes Abdurauf Fitrat's proposal to send talented youth to study in Germany to the chairman of the government Fayzulla Khujayev on the days when the people's Republic of Bukhara was established and was approved as the new chairman of the government and the people's commissar of Education. At that time, the list of students who will be sent from Turkistan to Germany, which is considered the most advanced state in Europe by science, will be formed when they say two months. According to the Muslim tradition, every child visits the graves of his deceased parents before going to the distant or near path. Fitrat also carries young people to Samarkand to visit the Amir of Gori. In his eyes, the grandfather of these young people was Amir Temur. He tells the students about his conversation with the Japanese boyfriend No Kamo, who went on a trip around the world on the "devil's cart" – cycling, when he went to study in 1909-1913 years at the Fitrat hotel. National pride in the Japanese guy calls for a lesson from him, when he talks about the high level of confidence in the future. Raise the glory of the Uzbek nation around the world so that your children who will come into the world in the future will be proud of belonging to this nation. But this glory of the Fitrat did not hold. The tyrannical state strongly demanded that students sent to study in Germany in 1922 year return to the former Union in 1924 year. He was shot as a spy in Germany in 1937 year, if anyone had finished reading this year or later. Or sent to exile to cold lands. And some of them were in Turkey, and the rest preferred to seek asylum from European countries.

CONCLUSION

Well, in the essence of the above real stories of N.Karimov, an idea is embodied in the crime of establishing the rule over the creator of the policy of Shura, based on the banned. In the eyes of the reader who read these stories, the bright picture of our enlightened grandfathers, who sacrificed their lives for the happiness of the people, freedom, is shown. It is understood more

deeply that independence is an invaluable blessing, that it is a sacred duty to preserve it with dignity.

REFERENCES:

1. Sabirdinov A. "Analysis of the poem "Autumn dreams" by Abdulla Oripov". The American journal of social science and education innovations. 2021; 3(1):556-559.
2. Sabirdinov A. Interpretation of characters in Utkir Hoshimov's story "Yanga". International journal of multicultural and multireligious understanding. 2021; 8(5):196-200.
3. Hamidov M. Artistic features of Shukrat's novel "Mashrab". "Actual problems and solutions of modern philology". Collection of materials of the international online conference. 2020; 13601: 125-129.

APPLICATION OF HYDROGRAPHY AND COHESIVE SEDIMENT MODELING TO THE RM DYB TIDAL REGION

Bhagwan*

*Assistant Professor,
Department of Mechanical Engineering,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- Bhagwan.engineering@tmu.ac.in

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ABSTRACT

Estuaries serve as sinks for fine-grained sediments, and heavy metals and nutrients tend to concentrate in estuaries due to the cohesive characteristics of these sediments. Modeling of cohesive sediment dynamics is a highly helpful technique for quantifying the erosion, transport, and deposition of these contaminants. The description of cohesive sediment dynamics, on the other hand, because the physical characteristics of cohesive sediments are complicated, numerical analysis is a challenging job. The setup and calibration of a cohesive sediment transport model for the period October 20, 1999 to October 20, 2000 are presented in this paper. The events of December 13, 1999 are recounted, and the outcomes are interpreted. A comparison with measured data is also useful. The modeling periods suspended sediment concentrations and bed level data are given. Bathymetry is utilized in great detail. This is required in order to accurately depict the water motions. A foundation the description is written in such a manner that variations in sediment readability may be specified. In addition, a spatially differentiated in order to explain the erosion and deposition of the cohesive sediment bottom, essential shear stress is described. The settling and scour processes take time. The hydrodynamic simulation has shown to be extremely trustworthy, allowing essential parameters for the system to be extracted. Area. As a result, the flood and ebb maximum current velocities for the Lister Dyb region are predicted to be 1.2 and 0.93 m s⁻¹, respectively. According to the era the tidal prism has been calculated to be 620 106 m³. The greatest sediment concentrations at a particular location occur when cohesive sediment transport modeling is used. There are prevailing onshore breezes. Furthermore, the findings show that the sediment transport direction is inward. Persisting, particularly after a period of high winds and waves has generated large quantities of material.

KEYWORDS: Marine Technology, Wind Turbines, Electric Potential, Oceans, Sea Measurements, Generators, Topology, Marine Vehicles, Propellers.

1. INTRODUCTION

As a result, modeling of cohesive sediment dispersion will become more important in the future, and numerical simulation models will have enormous potential for estimating the impacts of port dredging, dam construction, pollution discharge, and global eustatic sea level rise. These simulation models may be used to calculate sediment erosion, transport, and deposition across a wide region over a period of time. The findings may be examined at temporal ranges as small as 5-minute intervals. Traditional in situ measurements are unlikely to provide this combination of characteristics. Nonetheless, fieldwork is the foundation for model creation, and fieldwork is needed to calibrate and validate the model. As a result, fieldwork and modeling may be a very lucrative combo[1].

To represent cohesive sediment transport in the water column, all current cohesive sediment transport models utilize an advection–dispersion equation. The current velocity components and water levels that are usually supplied by a decoupled hydrodynamic model are required by the advection have also included a number of equations that explain the cohesive sediment erosion, flocculation, and deposition processes in various ways. Most publications that provide cohesive sediment transport model settings only offer extremely short time series (hours or a few days). Longer time series with a high degree of veracity are required if a realistic extrapolation of modeling findings in time and space is to be carried out. This initial step requires a well calibrated hydrodynamic model. Following that, a complete calibration of the cohesive sediment transport model must be performed, going through each of the calibration parameters carefully[2].

There will be a greater need for understandable sediment transport models in the future, as well as for dependability. It was tried in this research effort to build up and calibrate a numerical model so that sediment transport could be accurately represented, as well as to simulate cohesive sediment movement in a Danish estuary over a period of many weeks. The model is used to forecast sediment movement in the future. The findings are analyzed, and a comparison to previously published studies in the region and theoretical elements of cohesive sediment movement are included in the article. The Lister Dyb tidal compartment spans about 400 km² and has a semidiurnal tide with a mean range of 1.8 meters. The Rm Dam limits the region to the north, while the Hindenburg Dam limits it to the south. Lister Dyb, which has a mean depth of 20 to 30 meters, is the sole link to the North Sea. With two tiny fresh-water sources, the rivers Brede Aa and Vida, the Lister Dyb tidal region is microtidal (Davies, 1964) or lower meso-tidal (Hayes, 1979). The region may be categorized as a bar constructed estuary based on the physiographic classification (Pritchard, 1960), and as a choked coastal lagoon based on the morphogenetic classification[3].

The three minor tidal waterways are collected by Lister Dyb, the major tidal canal. Tidal mud flats, which are flooded almost every flood tide, make up a small portion of the Lister Dyb tidal region. During each tidal cycle, the tidal flats are covered with water for 4.5–8 hours under typical weather circumstances (Andersen, 1999). Studied the distribution of bottom sediment on the intertidal flats in the Lister Dyb tidal region. Sand flats (>95 percent sand), mixed mud flats (10 – 50 percent sediment 63 Am), and mud flats (>50 percent sediment 63 Am) are the three types of intertidal flats identified in these studies. On the basis of 210Pb-datin. (1997) calculated the deposition of fine-grained sediment (63 Am)[4]. The first year's accumulation totals 58 000 tons. A sediment budget was estimated in the same research, with the inputs of fine-grained

sediment being 14 percent fluvial intake, 15 percent biological production, 5 percent salt marsh erosion, and 2 percent atmospheric sedimentation. The North Sea is projected to account for 64% of the total sedimentation in the Lister Dyb tidal region. Only approximately 5% of the fine-grained sediment intake from the North Sea to the Wadden Sea is actually deposited, according to Postma (1981). If this is correct, about 740 000 tons of suspended sediment are transported to and from the region each year. The fine-grained cohesive sediment contains approximately 50 percent montmorillonite, 30 percent illite, and 20 percent kaolinite, with a median primary particle size of around 10 μm [5].

For the period of October 20, 1999 to December 13, 1999, the MIKE 21 modeling system (DHI, 1999a) was built up for the Lister Dyb tidal region. This seven-week timeframe therefore encompasses a typical fall condition in Denmark, with both windy and quiet intervals. Furthermore, on December 3, 1999, a severe storm scenario occurred[6].

First, the Lister Dyb tidal region and a portion of the North Sea (Fig. 1) were hydrodynamically modeled using the MIKE 21 HydroDynamic (HD module) model (DHI, 1999a). After that, a new hydrodynamic model was created that only included the Rm Dyb tidal region. This region was utilized for further research, including fine-grained sediment erosion, transport, and deposition modeling. Model MIKE 21 Mud Movement (MT module) was used to simulate sediment transport. A variety of wave fields, each with distinct values of water level, wind direction, and wind velocity, have been simulated using the model MIKE 21 Near Shore Waves (NSW module) because of the significant impact waves have on sediment erosion (e.g. Janssen-Stelder, 2000). (DHI, 1999b). A three-dimensional wave database is created using these wave fields. An interpolation in this database is performed at each time step in the model to produce a time-specific wave field, simulating the impact of wind waves[5].

The MIKE 21 hydrodynamic model is a numerical modeling system for water levels and flows in estuaries, bays, and coastal regions. In one-layer (vertically homogenous) fluids, it mimics unstable two-dimensional flows. The hydrodynamic simulations serve as the foundation for add-on modules such as the MIKE 21 MT mud transfer module.

The MIKE 21 NSW near shore wave's module is a wind-wave model that simulates the propagation, development, and decay of short-period waves in near-shore environments. The refraction and 290 effects are included in the model. shoaling owing to changing depth, wave production due to wind, and energy dissipation due to bottom friction and wave breaking / Journal of Marine Systems 38 (2003) 287–303 Using the formulae from the conservation equation for the spectrum wave action density, the effects of currents on these phenomena are incorporated. Johnson presents the module's assumptions, as well as a comprehensive explanation of the governing equations (1998).The mud transport module is based on Mehta et al. (1989) formulae and contains descriptions of sediment settling with various settling velocities (flocculation), impeded settling, and a combination of currents and waves to compute the bottom shear stress. The module may be used in places like estuaries where a significant portion of the silt possesses cohesive characteristics.

2. DISCUSSION

The predicted sediment concentrations do not match the observed values very well. The patterns of the simulated sediment concentrations, on the other hand, match the observed and anticipated patterns, with the greatest concentrations occurring at low water slack and the lowest occurring

shortly after high water slack. The typical pattern of elevated sediment concentrations immediately after and before drying of the flats may be observed in the area's intertidal areas.

A comparison of silt concentration patterns and wind data from the region reveals that sediment concentrations are highly influenced by local wind conditions. When the wind comes from the west and southwest, the majority of the region shows the greatest concentrations; only the Kongsmark site, which is onshore, shows greater concentrations when the wind comes from the east and southwest. This is in line with the results of Andersen and Pejrup (2001), who found values over 400 mg l⁻¹ during onshore winds and between 50 and 250 mg l⁻¹ during offshore winds. Advection determines the sediment concentrations in the tidal channels. Pejrup (1986) discovered that the wind direction determines the majority of the sediment concentration patterns in tidal channels, whereas the wind velocity determines the magnitude of the concentrations. This is also true in this researching certain sections of the Rm Dyb tidal region, a typical concentration pattern with high concentrations immediately after flooding and before drying of the flat may be seen at the intertidal flats. Other writers (e.g., Andersen, 1999) have seen this trend, which they attribute to low water depths and more powerful wave action, resulting in greater bottom shear stresses. Deposition in the range of 15–30 mm may be observed at the beginning of the era. This is accompanied by easterly (onshore) light breezes, which adds to the area's importance. Then comes a four-week period during which the sedimentation pattern indicates a low export rate. Low-speed northerly (longshore) and westerly (offshore) winds cause this. The wind is rising to approximately 20 m s⁻¹ from the west near the conclusion of the simulation time. This leads in a significant rise in sedimentation, which may be owing to the site's sheltering and high sediment concentrations caused by strong wave action elsewhere in the region. The findings of net sedimentation indicate that sediment is carried inwards and settles in the tidal channels over time. The silt is eroded and transported farther inland when the next flood season arrives. During the three-year period 1997–2000, Andersen and Pejrup (2001) measured bed levels at three stations at Kongsmark. During the simulation period reported here, results from these leveling indicate modest accretion at the most landward station and erosion on the order of a few millimeters at stations 225 and 575 m from land[7].

The fine-grained sediment transport module simulations indicate that the lowest concentrations occur around high water, while the greatest concentrations occur near low water slack. Because of the high concentrations in low water, flocculation will rise, resulting in greater deposition rates. The freshly deposited substance will be very erodible at first. The material will be transported landwards when the next flood season arrives, resulting in an inward net transport direction. When it comes to calculating the sedimentation in a particular estuary, the settling velocities of the sediments are a critical parameter (Dyer, 1989; van Leussen, 1994; Van der Lee, 2000). As a result, many simulations with various settling velocities have been attempted. Figure 9 depicts the net sedimentation results from these simulations. The description of settling velocities given by Burt (1986) and endorsed by other writers (e.g. van Rijn, 1989) results in considerably lower net deposition rates than the Lister Dyb tidal region data indicate. Furthermore, when settling velocities are recorded during the winter, deposition rates are lower than when settling velocities are collected during the summer. This stresses the necessity of gathering site-specific settling velocities from the research region prior to constructing a cohesive sediment transport model or estimating deposition rates in any other manner. Figure 1

discloses the Comparison of measured and observed water levels at calibration point B. Legend: (—) observed water levels; (----) simulated water levels[8].

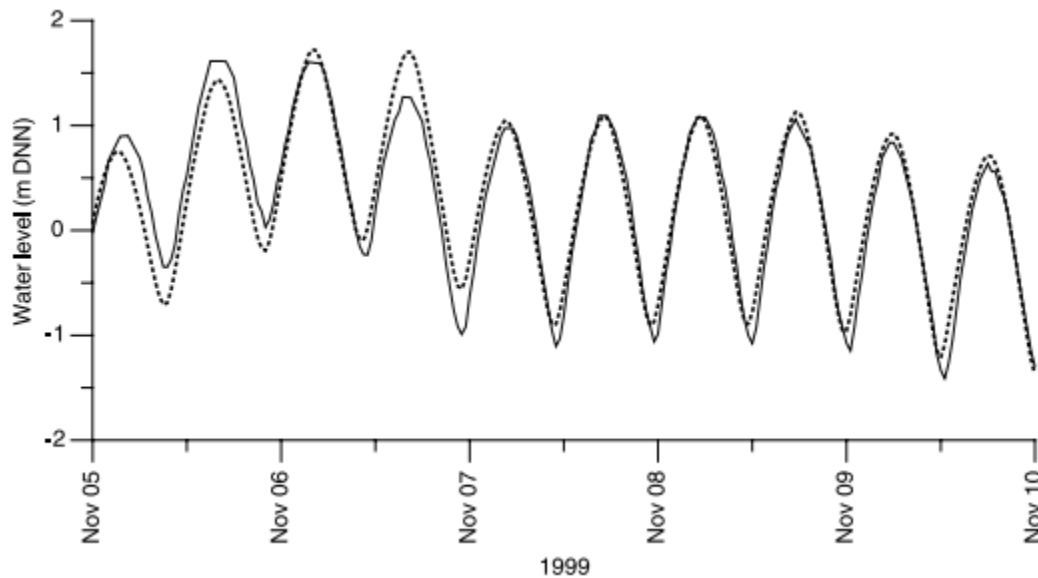


Figure 1: Comparison of Measured and Observed Water Levels at Calibration Point B.
Legend: (—) Observed Water Levels; (----) Simulated Water Levels.

3. CONCLUSION:

The goal of this research was to calibrate a numerical state-of-the-art model for calculating water flows and cohesive sediment dynamics. The hydrodynamic model that covers the whole Lister Dyb tidal region has been verified using field data. The model accurately depicts the real water motions in the region, and the tidal wave distortion is well modeled. When modeling cohesive sediment dynamics, it is essential that the hydrodynamic simulation be of high quality. In addition, the research produced new and highly reliable tidal prism and current velocities in the region. The size of the simulated suspended sediment concentrations is comparable to that reported in local literature. When onshore breezes predominate, the greatest concentrations occur at a particular location. This is thought to be related to the area's high wave activity. The waves have a significant impact on bottom shear strains, particularly in regions with low water levels, such as tidal mud flats. The material settles out during low water slack and is eroded again during flood tides, according to observations. According to the basic principles of settling and scour lag, sediment will be carried in the flood direction, resulting in sediment accumulation in the area's interior.

Field data from the region were compared to the net deposition rates [9]. The general pattern is consistent with the field data, although deposition rates are often too high or too low at certain places in the region. The sediment movement from tidal channels to intertidal flats has been found to be successfully predicted using time series. This single parameter has been demonstrated to account for variations in accretion rates up to several centimeters per day during simulations that depict various scenarios for the settling velocity of the material. This also solves the need for a site-specific model configuration. A non-site-specific configuration may provide

negligible or even incorrect results. It has been shown in this research that it is feasible to simulate cohesive sediment movement in a highly dynamic environment such as a tidally affected estuary. Fine-grained sediment characteristics are very complicated and difficult to conceptually explain. Although modeling cohesive sediment transport is a difficult job, it is feasible to get the correct orders and patterns of suspended sediment concentrations and net sedimentations using a site-specific configuration[10].

REFERENCES:

1. Jing Gu Y, Wei Liu H, Li W, Gang Lin Y, Jian LiY. Integrated design and implementation of 120-kW horizontal-axis tidal current energy conversion system. *Ocean Eng.*, 2018; 338-349.
2. Bryden IG, Couch SJ, Owen A, Melville G. Tidal current resource assessment. *Proc. Inst. Mech. Eng. Part A J. Power Energy*, 2007; 221(2): 125–135.
3. Sheng Q, Jing F, Zhang L, Zhou N, Wang S, Zhang Z. Study of the hydrodynamic derivatives of vertical-axis tidal current turbines in surge motion. *Renew. Energy*, 2016; 96: 366-376.
4. Uihlein A, Magagna D. Wave and tidal current energy - A review of the current state of research beyond technology. *Renewable and Sustainable Energy Reviews*. 2016; 58: 1070-1081.
5. Xuan J, Yang Z, Huang D, Wang T, Zhou F. Tidal residual current and its role in the mean flow on the Changjiang Bank. *J. Mar. Syst.*, 2016; 154.
6. Vindenes H, Orvik K.A, Søliland H, Wehde H. Analysis of tidal currents in the North Sea from shipboard acoustic Doppler current profiler data. *Cont. Shelf Res.*, 2018.
7. Jo CH, Lee JH, Rho YH, Lee KH. Performance analysis of a HAT tidal current turbine and wake flow characteristics. *Renew. Energy*, 2014; 65(C): 175-182.
8. Alldredge AL, Hamner WM. Recurring aggregation of Zooplankton by a tidal current. *Estuar. Coast. Mar. Sci.*, 1980; 10(1): 31-37.
9. Ren Y, Li XM, Gao G, Busche TE. Derivation of Sea Surface Tidal Current from Spaceborne SAR Constellation Data. *IEEE Trans. Geosci. Remote Sens.*, 2017; (99): 1-12.
10. Ma Y. et al. Theoretical vertical-axis tidal-current-turbine wake model using axial momentum theory with CFD corrections. *Appl. Ocean Res.*, 2018; 79: 113-122.

A REVIEW ON GRINDING DRESSING PROCESS

Bhagwan*

* Assistant Professor,
Department of Mechanical Engineering,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- Bhagwan.engineering@tmu.ac.in

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ABSTRACT

Grinding is a common action in practically all manufacturing processes. This document summarizes a number of studies on dressing and grinding procedures conducted by various writers. We are going toward more comfortable and time-saving methods, which are why many engineers are providing their creativity for a variety of things in order to make things simpler, easier to handle, and save production time. Grinding technologies are an important stage in the manufacturing of high-value, high-precision parts for strategic industries like aerospace, automotive, healthcare, and wind energy. Dressing is a procedure for resharpening grinding wheels those results in increased productivity and time savings while producing a high surface finish on a work piece. Grinding is a type of machining that involves removing cloth with abrasives. Abrasive grains' sharp edges operate as a cutting tool, removing material in the form of powder or fine chips. This method gives a quick overview of several grinding dressing techniques and parameters that affect the dressing process. Grinding is a fast operation, but dressing the grinding wheel is equally crucial for fine grinding, which is why multiple procedures are employed for dressing the grinding wheel. Such as ELID (Electrolytic In-Process Dressing), DTD (Diamond Tool Dressing), LTD (Laser Tool Dressing), and so on. This document summarizes a number of studies on dressing and grinding procedures conducted by various writers. Dressing is the process of preparing a grinding wheel to improve its efficiency and productivity. Grinding is an abrasive machining process that uses abrasive grits to increase the surface polish of practically any manufacturing process. The effect of several process factors such as dressing orientation, feed rate, depth of cut, and number of passes on surface roughness, grinding wheel performance, and wear is discussed in this study.

KEYWORDS: *Abrasive, Dressing, Grinding, Process Parameters, Surface Roughness.*

1. INTRODUCTION

For machining processing a variety of technical materials[1], a number of grind and dressing processes[2] are now used. Internal, cylindrical, center less, and surface grinding are examples of these procedures. Dressing processes[3] include single point dressing and internal arc dressing. These techniques are extensively utilized to improve productivity and quality by providing a

superior surface polish. Grinding is an abrasive machining procedure for removing material that is used to shape and finish metal and non-metal components. Abrasives have been used to shape materials for over 2000 years. Abrasive stones[4] were used to resharpen weapons, knives, and tools in the past. Grinding was invented in 1959 as an industrial method. It's now used in high-tech applications including aircraft engines and missile guiding systems. To restore the shape of a grinding wheel, a dressing process is conducted. It is a wheel finishing method [5] that reduces grinding forces and improves grinding efficiency. Dressers of many varieties, including electroplated, vitrified, and metal bonded, are used in the dressing process. Grinding outcomes are also improved by optimizing some dressing parameters such as dressing orientation, depth of cut, number of passes, and speed shown in Fig. 1.

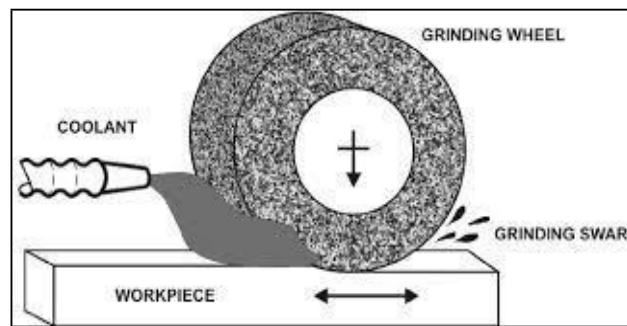


Figure 1: Grinding Process.

Grinding is a machining technique for removing[6] cloth that uses abrasives. Abrasive grains' sharp edges operate as a cutting tool, removing material in the form of mostly powder or very fine chips. In the shape of a wheel, abrasive grains or grit (such as carbide (Sic), corundum (Al_2O_3), or fine diamond grains) are used. The grit is combined with a binder (metal, organic compound, or vitrified), a cloth that binds the abrasive particles together and imparts the combination in the shape of a wheel. After a grinding operation, the edges of the grains become blunt, reducing the wheel's cutting performance. Additionally, the wheel is frequently loaded with material that is being machined. The wheel must be ready to cut as previously in order to be used for machining properly once more. This can be performed by the use of additional techniques such as dressing and truing. Dressing[7] is a wheel-based operation that aims to restore the wheel's cutting ability.

The main premise of wheel dressing is the creation and exposing of new cutting edges on the wheel's surface. It is accomplished by breaking the existing abrasive grains and allowing for desired abrasive particle protrusion on the surface. The action also unloads the grinding wheel, removing any work piece material that has become embedded on the wheel surface during the grinding process. When this process is completed, the wheel will re-machine at a higher feed and in-feed (depth of cut) rate, allowing the machining to be completed in less time but with more accuracy. Regular dressing is essential to maintain the required grain edge sharpness and, as a result, grain protrusion. Dressing is a technique for treating the surface of a grinding wheel in order to reshape it after it has lost its shape due to wears. There are many different types of dressing techniques, and these techniques are constantly evolving and improving. Grinding is a machining procedure used to finish exhausting materials with low surface roughness and strict

tolerances. For grinding wheel dressing, it is necessary to choose the tool carefully. The sharpness of the abrasive grains determines the roughness of the grinding procedure.

2. DISCUSSION

2.1 Classifications:

Grinding wheel is subdivided into with mega-textures, macro textures and micro textures

2.1.1 Grinding Wheel with Megatextures— are the wheels that TDs are larger than $500\mu\text{m}$. According to the wheel structure, this kind of wheels includes:

- Slotted/Grooved Grinding Wheels[8], which rely on a variety of material removal techniques to create slots or grooves (i.e. passive areas) on standard Grinding Wheel surfaces.
- Segmented Grinding Wheels are made by clamping, screwing, or adhesively attaching separate abrasive segments to wheel hubs.
- Internal coolant supply structures, similar to slotted/grooved Grinding Wheels, but with internal coolant chambers and tunnels to store and deliver coolants to the grinding zone.

2.1.2 Grinding Wheel with macro textures[9]— are the wheels that TDs are larger than $100\mu\text{m}$ and smaller than $500\mu\text{m}$. This kind of wheels could include:

- Engineered Grinding Wheels, which are a type of monolayer-abrasive Grinding Wheel in which abrasive grains are organized in pre-determined patterns. The passive zones could be thought of as the spaces between grains.
- Grinding Wheels with macro textures, which are comparable to slotted/grooved Grinding Wheels but have a considerably smaller range of TDs and more complicated patterns than those of Grinding Wheels with megatextures.

2.1.3 Grinding Wheel with Micro Textures:

Are the wheels for which texture dimension is smaller than $100\mu\text{m}$.

2.2 Structure of Grinding Wheel:

The basic structure of Grinding Wheel contains two key elements:

1. The pattern of slots and
2. The geometry (in the cross section) of each slot

The basic patterns[10] could include checkerboard, staggered, diagonal, and V-shaped configurations, whereas the basic slot geometry on the wheel periphery and side surfaces is normally rectangular (see Fig.2), allowing for intermittent coolant transit into the grinding zone.

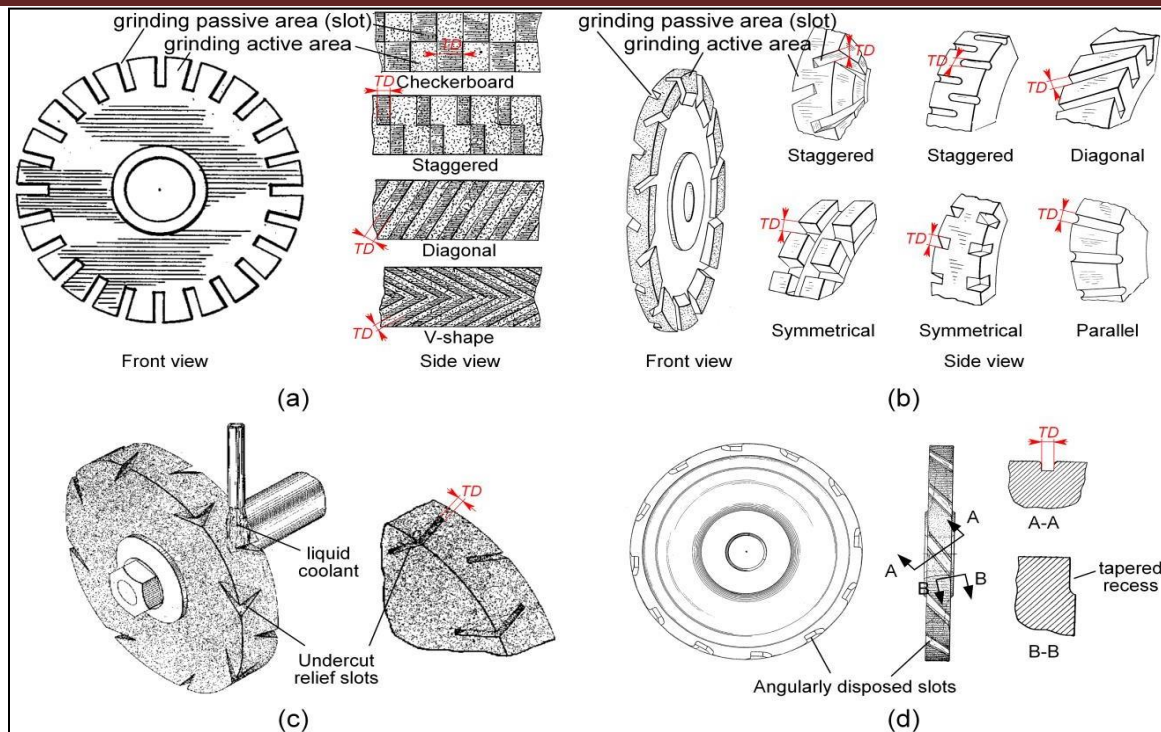


Figure:2 Basics slot patterns including (a) checkerboard, staggered, diagonal, and V-shape and (b) staggered, diagonal, symmetrical and parallel patterns; Optimised slot geometries including slots (c) with undercut relief and (d) with tapered recess.

Efforts to improve the fundamental rectangular slot geometry have also been described. The undercut relief slot (Fig.2c) could help coolants stay in slots longer and get to the grinding zone faster. The tapered recess at the radial part of slots' leading edges (Fig.2d) could allow the trailing edge to scoop up more coolants and route them down the slot to efficiently cool the ground surface.

2.3 Improvement of Grinding Process:

Although early research showed that slotted (grooved) grinding wheels can reduce grinding temperatures significantly, further research was needed to quantify rather than qualitatively explain the advantages in grinding performance. Reduced grinding forces might be viewed as a typical improvement in segmented Grinding Wheel grinding performance, which could be attributed to the greater volume of coolants that can be introduced into the grinding zone. Grinding of ordinary steel (e.g. SCM 3) yielded reductions of 23-47 percent, bearing steel (e.g. A534 and carbon steel (e.g. A135) yielded reductions of about 50 percent, and brittle materials (e.g. carbon fibre-reinforced ceramics yielded reductions of more than 62.3 percent. Under the same machining circumstances, the grinding temperature was observed to be lowered by at least 110°C compared to that induced by conventional Grinding Wheels. By percentage, temperature reductions of 21-38 percent were found for common steel (e.g. SCM 3), 49 percent for bearing steel (e.g. A534) and carbon steel (e.g. A135), and 40-80 percent for advanced ceramics.

2.4. Advantages of Grinding:

There are number of advantages of grinding which are as follows:

- Simple in operation.
- No advanced skill required.
- Good dimensional accuracy can be achieved.
- Less investment.
- Approximate surface finish can be achieved.

2.5 Application of Grinding:

- Grinding of different cutters and tools.
- Surface finishing.
- Internal and external cylindrical surface grinding.
- Parting and slitting.
- Descaling and deburring.

3. LITERATURE REVIEW

Mayank Srivastava of Ujjawa I[11](2013) investigated grinding, dressing, and truing procedures. Grinding is a machining procedure that uses abrasives to polish the surface. The abrasive grits are used to remove the powdered substance. To improve grinding efficiency, dressing and truing procedures are conducted on the grinding wheel. Dressing is a process that improves the cutting capacity of a grinding wheel by treating it. Mayank Srivastava of Ujjawal (2013) investigated grinding, dressing, and truing procedures. Grinding is a machining procedure that uses abrasives to polish the surface. The abrasive grits are used to remove the powdered substance. To improve grinding efficiency, dressing and truing procedures are conducted on the grinding wheel. Dressing is a process that improves the cutting capacity of a grinding wheel by treating it.

Z. Shi and S. Malkin[12](2006) looked at how grinding wheel wear impacts grinding efficiency and surface topography. CBN wheels are electroplated carbon boron nitride (CBN) wheels with a single layer of ultra-abrasive grains and an electroplated nickel bond. They're commonly used to machine automotive and aerospace parts. The trials are carried out on an internal grinding machine, and the surface is seen using Scanning Electron Microscopy (SEM). It depicts the differences in CBN grain shape, size, orientation, and height. Surface roughness reduces as active grain density rises. Grain fracture and grain withdrawal cause CBN grains to wear. Grinding efficiency is improved by uniform grain breakage.

Dadaso, D. Mohite, and S.M. Jadhav (2016) evaluated the effect of different dressing parameters on minimal surface roughness, such as angle of dresser orientation, number of passes, depth of cut, and feed rate. The way a grinding wheel is dressed has an impact on its performance. The Taguchi method is used to optimize process parameters in order to achieve the lowest possible surface roughness using a CNC cylindrical grinding machine. The sensitivity of the input parameters is tested using analysis of variance (ANOVA). They came to the conclusion that the dressing feed rate has a greater impact on surface roughness than the other variables. Surface roughness can be reduced by lowering the feed rate, dressing angle, and cut depth, according to multiple regression analysis.

J. Kundrak[13] colleagues investigated the evaluation of diamond abrasive ability using an indirect criterion, the specific power of grinding. This simple to measure parameter is a definitive criterion of diamond dresser abrasive ability. Rough dressing shocks should be completed at

moderate speeds, while final dressing should be completed at high rotating speeds of the grinding wheel, according to the paper.

A. Sudiavsoet al studied that the electrical dressing method is used for overcoming the limitations of the conventional dressing methods available in relation to superabrasive wheel because of hardness of its abrasive grains and durability of its bonding material. It also results in better surface finish by suitable maintaining the process conditions.

4. CONCLUSION

It may be deduced from the aforementioned literature that various process parameters in the dressing and grinding operations affect the response parameter in different ways. More impacting parameters include dresser orientations, number of passes, depth of cut, and feed rate. The dresser orientation and feed rate have the most impact on surface roughness. For decreased surface roughness and better surface quality, the dressing angle and feed rate must be low. Dressing performance is also influenced by the wheel's abrasive grain size. Higher grinding efficiency and lower grinding forces can be achieved by using the optimal range of dressing parameters. This review will assist in the development of a mechanism for grinding wheel dressing. We have recommended a method in this review, which is a Dressing fixture using a Dovetail sliding joint and a diamond dressing tool. This device, which combines the dressing of the grinding wheel with the grinding of the work piece, will be in use. As a result, we are able to reduce the time required for the total process, such as grinding and dressing, which are now done using separate mechanisms or by employing expensive or time-consuming procedures such as ELID, LTD, and others. As a result, this mechanism lowers the cost of the process, which is what we want to achieve, i.e. simple time and cost optimization.

REFERENCES:

1. Megawati WB, Sulistyono SH, Hidayat M. Sulfuric acid hydrolysis of various lignocellulosic materials and its mixture in ethanol production. *Biofuels*, 2015; 6(5-6):331-340. doi: 10.1080/17597269.2015.1110774.
2. Tönshoff HK, Peters J, Inasaki I, Paul T. Modelling and Simulation of Grinding Processes. *CIRP Ann. - Manuf. Technol.*, 1992;41(2): 677-688. doi: 10.1016/S0007-8506(07)63254-5.
3. Godino L, Pombo I, Sanchez JA, Mendez I, Cearsolo X. Analysis of the dressing process using stationary dressing tools. *Procedia Manuf.*, 2017, doi: 10.1016/j.promfg.2017.09.023.
4. Liu T, Kure T, Hirogaki T, Aoyama E, Liu YD. Investigation of Abrasive Super Finishing under Various Paths with a 5-Axis Closed-Link Compact Robot and Fine Diamond Stone. *Adv. Mater. Res.*, 2016, doi: 10.4028/www.scientific.net/amr.1136.472.
5. Hou Y, Li C, Zhou Y. Applications of High-Efficiency Abrasive Process with CBN Grinding Wheel. *Engineering*, 2010;2(3): 184-189. doi: 10.4236/eng.2010.23026.
6. Panthangi RK, Naduvanamani V. Optimization of surface roughness in cylindrical grinding process. *Int. J. Appl. Eng. Res.*, 2017;12(18): 7350-7354.
7. D'Addona DM, Matarazzo D, Teti R, De Aguiar PR, Bianchi EC, Fornaro A. Prediction of Dressing in Grinding Operation via Neural Networks. 2017; 62:305-310. doi:

10.1016/j.procir.2017.03.043.

8. Aurich JC, Kirsch B. Improved coolant supply through slotted grinding wheel. CIRP Ann. - Manuf. Technol., 2013, doi: 10.1016/j.cirp.2013.03.071.
9. Samani SG, Senior S, MacDonald CA. Development of a mortar abrasion test for fine aggregates and wear resistance of concrete pavements. 2016. 23p.
10. Shang X, Fu J, and Duan Z. Application of vector rotating method in grinding involute worm with plane envelope method. Chinese J. Mech. Eng. (English Ed.), 1999.
11. Srivastava UM. Review of Dressing and Truing Operations for Grinding Wheels. Int. J. Eng. Sci. Technol., 2013;5(1):8-19.
12. Shi Z, and Malkin S. Wear of electroplated CBN grinding wheels. J. Manuf. Sci. Eng. Trans. ASME, 2006; 128(1):110. doi: 10.1115/1.2122987.
13. Kundrać J, Mamalis AG, Markopoulos A. Finishing of hardened boreholes: Grinding or hard cutting? Materials and Manufacturing Processes. 2004; 19 (6): 979-993. doi: 10.1081/AMP-200034480.

PYTHON: THE FUTURE PROGRAMMING LANGUAGE

Ramesh Chandra Tripathi*

*Professor,
Department of Computer Engineering,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- tripathi.computers@tmu.ac.in

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ABSTRACT

Python is a good language to learn quickly and use in real-world programming. Guido van Rossum, a programmer, developed Python, a sophisticated high-level programming language. The review article begins by introducing you to the characteristics of Python programming. This article also examines the causes behind Python's recent designation as the fastest-growing programming language, as shown by global research. Important knowledge and tools related to the Python programming language are also included in this article. Python will be the language of the future. Python programming language is better used for app development, web app or web development, game development, scientific computing, system administration, etc. There are several traits of this programming tool which has provided it with an incredibly successful journey.

KEYWORDS: *Efficient, Fast Programming, Python Programming, Real-Time Programming.*

1. INTRODUCTION

1.1 Introduction to Python:

Python is a high-level, general-purpose programming language that has recently gained popularity. It enables programmers to write code in fewer lines, something that is not feasible in other languages. Python programming is notable for its support for a variety of programming paradigms. Python comes with a rich standard library that may be expanded. Python's major characteristics are as follows: High level, Simple and simple to understand, Freeware and open source, Simple and easy to learn, Freeware and open source language for high-level programming Platform agnostic, portability Both procedural and object-oriented, dynamically typed Extensive Library, Interpreted, Extensible, Embedded[1].

We want to provide a quick overview of Python in the areas of data science, IoT, and machine learning in this article. Python is well-known for its packages that help with data analysis and scientific computing. For instance, we may create a Python application that aids data analysts in analyzing huge quantities of data for scientific computing. This article requires a basic understanding of statistics as well as some programming expertise in a C-style language. Python expertise is advantageous, but it is not required. To support the lesson, a Github repository is available. There are many notebooks with python code snippets for reference[2].

It is beneficial to look through a number of examples relating to various Python modules. Python is the most in-demand talent on employment sites, and it also comes with a higher-than-average pay. Python coders have been more in demand with the advent of Hadoop, since it is a talent that works hand in hand with data science and machine learning. Python's rapid growth may be attributed to the following factors: Python is the fastest-growing programming language, due to a significant increase in its usage in data science and related areas. Python's growth is expected to continue, according to the Python Software Foundation, since the language's accessibility and use continue to be appealing to academics doing analytics. "However, the number of Python programmers who are also data scientists is quickly increasing. This indicates that Python's prominence in data science and machine learning is most likely the driving force behind its rapid rise. Other evidence supports the overarching interest in data science among Python developers. The fastest increasing tag among Python-tagged queries is pandas, a data analytics software package for Python. It was first launched in 2011 and currently accounts for almost 1% of all Stack Overflow question views. According to Stack Overflow's study of customers by industry, individuals asking Python-related questions are most often from academics, followed by the manufacturing and software sectors[3].

1.2 Characteristics of Python Language:

Python is a well-designed language of programming with real-world applications. Python is a high-level, dynamic, object-oriented, general-purpose programming language that uses an interpreter and may be used for a variety of purposes. Python was created with the goal of being easy to learn and use. Python is an easy-to-use programming language. Python's popularity as a beginner-friendly language has grown to the point that it has overtaken Java as the most popular entry-level language. As one might expect from a dynamically typed language, Python is very flexible. You'll also be able to build and run your program until you reach the problem area since Python is tolerant of errors. Python is a flexible, clean, and simple programming language. This language can handle a wide range of programming methods, such as structural and object-oriented programming. Other styles may be used as well. Python's ability to use modules and components developed with the help of other computer languages gives it a lot of flexibility[4].

It took the programming community a couple of decades to appreciate Python. But since the early 2010's, it has been booming and eventually surpassing C, C#, Java and JavaScript in popularity. But until when will that trend continue? When will Python eventually be replaced by other languages.

Putting an exact expiry date on Python would be so much speculation, it might as well pass as Science-Fiction. Instead, I will assess the virtues that are boosting Python's popularity right now, and the weak points that will break it in the future.

1.3 Python Popular Right Now:

Python's success is reflected in the Stack Overflow trends, which measure the count of tags in posts on the platform. Given the size of StackOverflow, this is quite a good indicator for language popularity.

While R has been plateauing over the last few years, and many other languages are on a steady decline, Python's growth seems unstoppable. Almost 14% of all StackOverflow questions are tagged "python", and the trend is going up. And there are several reasons for that. Python has

been around since the nineties. That doesn't only mean that it has had plenty of time to grow. It has also acquired a large and supportive community.

So if you have any issue while you're coding in Python, the odds are high that you'll be able to solve it with a single Google search. Simply because somebody will have already encountered your problem and written something helpful about it.

1.4 It's Beginner-Friendly:

It's not only the fact that it has been around for decades, giving programmers the time to make brilliant tutorials. More than that, the syntax of Python is very human-readable.

For a start, there's no need to specify the data type. You just declare a variable; Python will understand from the context whether it's an integer, a float value, a boolean or something else. This is a huge edge for beginners. If you've ever had to program in C++, you know how frustrating it is your program won't compile because you swapped a float for an integer.

And if you've ever had to read Python and C++ code side-by-side, you'll know how understandable Python is. Even though C++ was designed with English in mind, it's a rather bumpy read compared to Python code.

1.5 Python Programming & the Future Scope of a Python Developer:

The Future Scope of a Python Developer: The world is getting digitized. Data is king! With the ongoing digital transformation, we will slowly move towards an era of exabytes of data, and then to an era of zettabytes and yottabytes, and so on. The future is all about automating processes and utilizing the heaps of data to make intelligent decisions. This puts to the forefront technologies such as artificial intelligence (AI), machine and deep learning, Internet of Things (IoT), etc. As these technologies lay the foundation for the future, programming languages associated with these emerging technologies are already gaining popularity. Therefore, this makes the position of languages such as R and Python, among others extremely powerful. With this blog post, we will discuss the future scope of Python as a programming language and a career option for the developer.

1.6 Future Technologies Are Banking On Python:

Artificial Intelligence (AI) overarching technologies like machine learning, deep learning, neural networks and natural language processing (NLP) along with Big Data heavily bank on Python. Released in 1989, Python is an object-oriented programming language (groups data and code into objects capable of modifying each other), which allows easy execution of tasks, enhanced stability and code readability. The programming language is easy to use, requires writing fewer codes and is, therefore, less time-consuming. Unlike earlier, the Anaconda platform has spruced up the speed. Another reason is its compatibility with Hadoop, the most popular open-source Big Data platform.

2. DISCUSSION

The python is a high-level language with an excessive number of learning resources. Python offers a broad range of third-party tools, making it considerably simpler to use and encouraging users to stick with it. Python has a syntax that is both basic and beautiful. Python programs are considerably easier to understand and write than programs written in other languages such as C#,

Java, or C. Python makes coding enjoyable and enables us to concentrate on the problem rather than the syntax. Python is an excellent place to start if you're a beginner programmer. Python applications may run on a variety of operating platforms, including Windows 10, Linux, UNIX, iOS, and Mac OS. In python the user doesn't have to worry about difficult chores like memory management, garbage collection, and so on, as you would in Java or C++. When you execute a Python application, it most likely transforms your code to a format that your machine can comprehend. The user don't have to be concerned with low-level activities.

Python applications may be moved from one platform to another and run without modification. It works on nearly all operating systems, including Windows, Mac OS X, iOS, and Linux. The Python group retains all rights to this programming language, it is open source, and there are no restrictions on who may use, change, or distribute it. Python is free to use and distribute, whether for personal or commercial use. You can not only use and distribute Python-based applications, but you can also make modifications to the Python source code itself. Python has a huge community that is continuously working to improve. It can work with .Net and other types of objects. Python is embeddable and extensible. Many organizations have utilized and continue to use this tool for a variety of purposes. Python is used extensively by YouTube. Python is used to create the Torrent peer-to-peer file-sharing system uTorrent. Python is used by Google to customize their famous GIS mapping tools. Python is used by NASA and others for sophisticated scientific programming jobs. Python is used by Media Tek for hardware coding.

Python is used by the National Security Agency for encryption and intelligence-related applications. The One Laptop per Children initiative uses Python to create its user interface and activity model. The Python is a quicker, more powerful, portable, easy, and open-source coding language that may be used with a variety of technologies. Python's popularity has grown as a backend web development language, thanks to the emergence of jQuery and, more recently, Node.js, particularly because it has a fragmented MVC environment.[5]-[8] However, as big data becomes more popular, Python has become a more in-demand talent than it has ever been, particularly since it can be incorporated into virtually any online project. Python is actively developed with a rapid update cycle, with new versions released every year or so to ensure that it stays relevant. When compared to other languages, the search volume for interest in learning Python has risen to the first position [9].

3. CONCLUSION

We briefly discussed the Python programming language as a viable option for studying programming and real-world programming in this article. Python's characteristics, features, and kinds of code support were addressed in this article. We discovered Python to be a quicker, more powerful, portable, easy, and accessible coding language that supports a wide range of technologies. Then, several kinds of programs that Python can write were explored. The presentation also covered some of the most recent Python applications by well-known companies. Based on information collected from prominent and reputable online blogs and websites, the article addressed the reasons why the Programming language is the fastest growing coding language.

REFERENCES:

1. Love K. What is Python Used For. Technology, 2018.

2. Mindfire Solutions. Advantages and Disadvantages of Python Programming Language. Medium, 2017.
3. Bogdanchikov A, Zhaparov M, Suliyev R. Python to learn programming. 2013, doi: 10.1088/1742-6596/423/1/012027.
4. Hoving R, Slot G, Jansen S. Python: Characteristics identification of a free open source software ecosystem. 2013;13-18. doi: 10.1109/DEST.2013.6611322.
5. Mcgugan W. Beginning Game Development with Python and Pygame From Novice to Professional. 2007.
6. Chun W. Core Python Applications Programming 3Rd Ed. 2018.
7. Rashed MG, Ahsan R. Python in Computational Science: Applications and Possibilities. Int. J. Comput. Appl., 2018; 46(20):26-30. doi: 10.5120/7058-9799.
8. Buranosky M, Stellnberger E, Pfaff E, Diaz-Sanchez D, Ward-Caviness C. FDTool: A Python application to mine for functional dependencies and candidate keys in tabular data. F1000Research, 2019;7:1667. doi: 10.12688/f1000research.16483.1.
9. Zhou JJ, Wang SF, Li LM. Application of Python web crawler technology in infodemiology. Zhonghua Liu Xing Bing Xue Za Zhi, 2020, doi: 10.3760/cma.j.cn112338-20190901-00643.

A REVIEW PAPER ON HACKING

Chanchal Chawla*

*Associate Professor,
Department of Finance and Taxation,
Teerthanker Mahaveer Institute of Management and Technology,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- chanchal.management@tmu.ac.in

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ABSTRACT

Hacking may bring up thoughts of technological vandalism, espionage, colored hair, and body piercings in your mind. The majority of people connect hacking with violating the law, and they believe that anybody who participates in hacking activities is a criminal. Granted, some individuals employ hacking methods to violate the law, but that isn't what hacking is all about. In fact, obeying the law is more important than violating it when it comes to hacking. The core of hacking is discovering unexpected or missed applications for a situation's rules and characteristics, and then using them in novel and creative ways to solve a problem— whatever that issue may be. Despite the fact that the rules for this issue are clearly stated and straightforward, many people remain stumped as to how to solve it. Hacked solutions, like the answer to this issue (presented on the final page of this book), obey the system's principles but apply them in unexpected ways. This offers hackers an advantage, enabling them to solve issues in ways that traditional thinking and methods could not. Hackers have been inventing new ways to solve problems since the dawn of computing. A gift of components, mainly obsolete telephone equipment, was donated to the MIT model train club in the late 1950s.

KEYWORDS: *Cracker, Ethic, Hacking, MIT Model, Software.*

INTRODUCTION

The traditional dry disciplines of arithmetic and electronics were a source of grandeur and elegance for the first hackers. They saw programming as a kind of creative expression, with the computer serving as a tool for that expression. Their drive to analyze and comprehend wasn't meant to demystify creative efforts; rather, it was a method to get a better understanding of them.

The Hacker Ethic would ultimately be named after these knowledge-driven values: the admiration of logic as an art form and the encouragement of the free flow of information, overcoming traditional boundaries and limitations for the simple aim of better understanding the world. This is not a new cultural trend; despite not having computers, the Pythagoreans in ancient Greece had a comparable ethic and subculture. They discovered several fundamental ideas in geometry and found beauty in mathematics. From the Pythagoreans to Ada Lovelace to Alan Turing to the hackers of the MIT model railroad club, the desire for knowledge and its

positive consequences has persisted throughout history. Hackers like Richard Stallman and Steve Wozniak have carried on the hacking tradition, giving us contemporary operating systems, programming languages, personal computers, and a slew of other technology that we use on a daily basis[1].

Hacking is now a widely studied and recognized phenomenon, but it is still difficult to define and experimentally identify since it has come to refer to a broad range of material activities, some of which are incompatible. By briefly reviewing Foucault's idea of genealogy and interpreting its perspectival position via the feminist materialist concept of the situated observer, this article offers genealogy as a framework for understanding hacking. A history of hacking will be presented in four stages, using genealogy as a theoretical frame. The 'pre-history' of hacking is the initial phase, during which four fundamental hacking techniques were established. The second phase is the so-called "golden era of cracking," in which hacking becomes a self-aware identity and culture, with many people associating it with breaking into computers, even as non-cracking activities like free software develop[2]. The growth of serious cybercrime, hacktivism, the separation of Open Source and Free Software, and hacking as a business and work ethic are all part of the third phase, which sees hacking split into a variety of new activities while old ones persist. The last phase involves widespread awareness of government-sponsored hacking, the resurgence of hardware hacking in maker labs and hack spaces, and the spread of hacking as a generalized "smart" activity. Finally, it will be argued that hacking is an interrogation of the objectivity of information techno-cultures enacted by each hacker practice situating itself within a distinct techno-culture and then using that techno-culture to change itself, both in terms of changing great promise actions that can be taken and changing the nature of the techno-culture itself, across all of the practices surveyed[3].

How can one tell the difference between good hackers who offer us technical marvels and bad hackers who steal our credit card numbers? To differentiate between good and bad hackers, the word "cracker" was created.

Crackers were meant to be the evil people, while hackers were supposed to be the good ones, according to journalists. Crackers were solely concerned in violating the law and earning a fast profit, while hackers adhered to the Hacker Ethic. Crackers were thought to be much less skilled than professional hackers since they just used to hacker-create tools and scripts without knowing how they functioned. Cracker was intended to be a catch-all term for anybody who was doing anything illegal with a computer, such as pirating software, defacing websites, or, worst of all, without knowing what they were doing. However, this phrase is no longer widely used. The term's obscurity stems from its ambiguous etymology: cracker originally referred to those who cracked software copyrights and reverse-engineered copy-protection systems. Its current unpopularity may be due to its two confusing new definitions: a group of individuals who participate in illicit computer activities or people who are relatively inexperienced hackers. Few technology writers feel obliged to employ words that are unknown to the majority of their audience. Most people, on the other hand, are familiar with the mystery and expertise associated with the word hacker, thus a journalist's choice to use the term hacker is simple. Similarly, the phrase "script kiddie" is occasionally used to describe crackers, although it lacks the oomph of "shadowy hacker." Some may argue that there is a distinction between hackers and crackers, but I think that anybody with the hacker spirit is a hacker, regardless of the laws he or she breaks[4].

The present rules limiting cryptography and cryptographic research make the distinction between hackers and crackers even more blurry. Professor Edward Felten and his Princeton University research team were ready to publish a study in 2001 that examined the flaws of different digital watermarking methods. This article was written in response to the Secure Digital Music Initiative's (SDMI) Public Challenge, which invited the general public to try to defeat various watermarking methods. The SDMI Foundation and the Recording Industry Association of America threatened Felten and his colleagues before they could publish the study (RIAA). It is unlawful to discuss or supply technology that may be used to circumvent industry consumer protections under the Digital Millennium Copyright Act (DCMA) of 1998. Dmitry Sklyarov, a Russian computer programmer and hacker, was charged under the same statute. He'd developed software to get through Adobe's too simple encryption, and he'd presented his results at a hacking conference in the US[5]–[7]. He was apprehended by the FBI, resulting in a protracted court struggle. The intricacy of the business consumer controls is irrelevant under the law—it would be legally unlawful to reverse engineer or even discuss Pig Latin if it were employed as a consumer control in the industry. Who are the crackers and hackers these days? Do the good people who express their views suddenly become evil when regulations seem to interfere with free speech? I think that, rather than being defined by government rules, the hacker's spirit transcends them.

Nuclear physics and biology are both capable of killing, yet they also enable substantial scientific progress and contemporary medicine. Knowledge in and of itself is neither good nor evil; morality is found in how it is used. Even if we wanted to, we couldn't halt society's technological development or conceal knowledge of how to transform matter into energy. In the same manner, the hacker spirit is unstoppable and impossible to classify or analyze. Hackers will continue to push the boundaries of knowledge and acceptable conduct, driving us to expand our horizons[8].

Part of this motivation leads in a mutually beneficial co-evolution of security via competition between attackers and defenders. The rivalry between hackers offers computer users with better and stronger protection, as well as more complicated and sophisticated attack methods, much as the swift gazelle evolved from being pursued by the cheetah, and the cheetah grew even faster from pursuing the gazelle. Intrusion detection systems (IDSs) were introduced and progressed as a prominent illustration of this co-evolutionary process. The defensive hackers build IDSs to supplement their arsenal, while the invading hackers develop IDSevasion methods, which are ultimately compensated for in larger and better IDS products. This connection generates smarter individuals, better security, more reliable software, creative problem-solving methods, and even a new economy as a net consequence[9].

This book's goal is to educate you about the real meaning of hacking. We'll examine a variety of hacking methods, from the past to the present, to see how and why they operate. A bootable Live CD holding all of the source code used in this book, as well as a customized Linux environment, is included with the book. The art of breaking requires exploration and creativity, therefore this CD will allow you to follow along and explore on your own. Only an x86 CPU, which is found on all Microsoft Windows and later Macintosh systems, is required; simply insert the CD and reboot. This alternative Linux installation will not interfere with your current OS, so just reboot and delete the CD after you're through. You'll acquire a hands-on knowledge and respect for hacking in this manner, which may motivate you to enhance current methods or create new ones.

Hopefully, regardless of whatever side of the issue you choose to be on, this book will pique your interest in hacking and inspire you to contribute in some way to the art of hacking.

Both individuals who create code and those who exploit it are referred to as hackers. Despite the fact that their ultimate objectives are distinct, these two types of hackers employ comparable problem-solving methods. Because knowing how to program helps those who exploit, and knowing how to exploit helps those who program, many hackers do both. Both the methods for writing beautiful code and the strategies for exploiting programs include intriguing hacks. Finding a creative and counterintuitive solution to a problem is what hacking is all about. In most cases, the hacks discovered in software exploits utilize the computer's rules to circumvent security in ways that were never intended.

Programming hacks are similar in that they make novel and creative use of computer principles, but the end objective is efficiency or reduced source code, not necessarily a security risk. There are an unlimited number of programs that may be developed to do any given job, but the majority of them are needlessly big, complicated, and sloppy. Small, efficient, and tidy solutions are the only ones that survive. These programs are said to be elegant, and the smart and innovative methods that lead to their efficiency are referred to as hacks. Both the beauty of beautiful code and the cleverness of smart hacks are valued by hackers on both sides of the programming divide.

In the corporate sector, cranking out functional code is valued more than attaining smart hacks and beauty. When dealing with contemporary computers that have gigahertz of processor cycles and terabytes of memory, spending an additional five hours to develop a little quicker and more memory efficient piece of code simply doesn't make financial sense. While all but the most skilled users are unaware of time and memory improvements, a new feature is marketable. Spending effort on ingenious optimization techniques makes little sense when the bottom line is money.

Hackers are the only ones who truly appreciate programming elegance: computer hobbyists who want to squeeze every last bit of functionality out of their old Commodore 64s, exploit writers who need to write tiny and amazing pieces of code to slip through narrow security cracks, and anyone else who enjoys the pursuit and challenge of finding the best coding solution. These are the individuals who are passionate about programming and can appreciate the elegance of a well-written line of code or the inventiveness of a smart hack. Because knowing how to program is a requirement for knowing how to exploit programs, programming is a logical place to start.

Hacking may bring up thoughts of technological vandalism, espionage, colored hair, and body modification in your mind. The majority of people connect hacking with violating the law, and they believe that anybody who participates in hacked activities is a criminal.

Granted, some individuals employ hacking methods to violate the law, but that isn't what hacking is all about. In fact, obeying the law is more important than violating it when it comes to hacking. The core of hacking is discovering unexpected or missed applications for a situation's rules and characteristics, and then using them in novel and creative ways to find a solution—whatever that issue may be. The following arithmetic problem exemplifies what hacking is all about: To total 24, do any of the four fundamental arithmetic operations (addition, subtraction, multiplied, and division) once for each of the numbers 1, 3, 4, and 6. Each number must be used

only once, and the sequence of operations may be defined; for example, $3 * (4 + 6) + 1 = 31$ is legal, but wrong, since it does not total 24.

Despite the fact that the rules for this issue are clearly stated and straightforward, many people remain stumped as to how to solve it. Hacked solutions, like the answer to this issue (presented on the final page of this book), obey the system's principles but apply them in unexpected ways. This offers hackers an advantage, enabling them to solve issues in ways that traditional thinking and methods could not.

DISCUSSION

The author has discussed about the hacking, most people associate hacking with breaking the law, and they think that anybody who engages in hacking crimes is a criminal. Granted, some people use hacking techniques to break the law, but that isn't the point of hacking. In fact, when it comes to hacking, following the law is more essential than breaking it. Hacking is all about finding unexpected or overlooked uses for a situation's laws and features, and then using them in new and exciting ways to solve a problem whatever that problem may be. Many individuals are puzzled as to how to answer this problem, deny the reality that the rules are plainly stated and simple. Hacked solutions, such as the solution to this problem (given on the last page of this book), follow the system's rules but apply them in unusual ways. This gives hackers an edge, allowing them to solve problems in ways that conventional techniques and thinking could not. Since the beginning of computers, hackers have been finding innovative methods to tackle issues.

CONCLUSION

The author has concluded about the hacking, The Hacker Ethic would eventually be called after these knowledge-based values: respect for logic as an art form and promotion of the free flow of information, breaking conventional limits and restrictions for the sole purpose of better understanding the universe. This is not a new cultural trend; the Greek philosophers in ancient Greece had a similar ethic and subculture despite not possessing computers. They saw beauty in mathematics and developed many basic concepts in geometry. The thirst for knowledge and its beneficial effects has endured throughout history, from the Pythagoreans to Ada Vinci to Alan Turing to the hackers of the MIT model train club. Hackers such as Richard Stallman and Steve Wozniak have continued the hacking heritage, providing us with modern operating systems, programming, personal computers, and a host of other technologies that we use every day. Hacking is now a well-studied and understood phenomenon, but it remains difficult to define and empirically detect since it has come to refer to a wide variety of material actions, some of which are irreconcilable.

REFERENCES

1. Bittau A, Belay A, Mashtizadeh A, Mazières D, Boneh D. Hacking blind. Proc. - IEEE Symp. Secur. Priv., 2014;227–242. doi: 10.1109/SP.2014.22.
2. Erickson J. Hacking: The Art of Exploitation, 2nd Edition. .
3. Jordan T. A Genealogy of Hacking. Convergence, 2017;253:1–34. doi: 10.1177/1354856516640710.
4. Cekerevac Z, Dvorak Z, Prigoda L, Cekerevac P. Hacking, protection and the consequences

- of hacking. Communications - Scientific Letters of the University of Zilina. 2016; 18(4):129 – 133. doi: 10.26552/com.C.2018.2.83-87.
5. Omoyiola B O. The Legality of Ethical Hacking. J. Comput. Eng., 2018; 61-63.
 6. Barros US, Barros M.S. A Survey of Ethical Hacking process and Security. In International Conference on System Modeling & Advancement in Research Trends (SMART), 2015.
 7. Billig J, Danilchenko Y, and Frank CE. Evaluation of google hacking. In Proceedings of the 5th Annual Conference on Information Security Curriculum Development, InfoSecCD '08, 2008, doi: 10.1145/1456625.1456634.
 8. Lakshmi C and Basarkod PI. Basics of ethical hacking. 2015.
 9. Suresh Kumar VVN. Ethical Hacking and Penetration Testing Strategies. Int. J. Emerg. Technol. Comput. Sci. Electron., 2014;5(3): 3389-3393.

TIDAL ENERGY CONVERSION AND USES: A REVIEW

Dr. Varun Kumar Singh*

*Associate Professor,
Department of Chemistry,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- drvarun.engineering@tmu.ac.in

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ABSTRACT

Although there is a lot to be learned from wind turbines and ship propellers, there have been a few trials looking at marine current turbines. As a consequence, a study of the power, thrust, and cavitation characteristics of a 1/ 20th scale model of a potential 16 m diameter horizontal axis tidal turbine was conducted. Experiments in a cavitation tunnel for various blade pitch settings were compared to simulations based on a newly developed blade element-momentum theory. This hypothesis has been proven to be a good fit for the experimental turbine performance data. The established theory has been utilized to construct potential horizontal axis tidal turbines for the tidal flows surrounding Portland Bill as an example application. The findings indicate that there is a clear balance between design loads and energy yield optimization.

KEYWORDS:Current, Energy, Marine, Tidal Energy, Tidal Turbine.

1. INTRODUCTION

Around the globe, there is a rising demand for 'green' electrical energy produced from renewable resources. Many nations, such as the United Kingdom, are providing government-sponsored incentives and goals, such as 10% renewable energy by 2010 and 20% by 2020. The world's seas provide a vast energy resource that has yet to be fully exploited. Although waves and ocean thermal currents have more power, tidal or marine currents with peak flows of above 4 kn (2 m/s) produced by restricted topography provide an intriguing opportunity for the extraction of predictable energy. Many methods for converting marine current energy are being researched, but the majority are based on an underwater wind turbine known as a marine current turbine[1].

DG Science and Bennie Black & Veatch Ltd released research on the utilization of tidal marine currents in UK seas, suggesting that energy generation of 10–30 TW years is feasible. MCTs may provide 2.5–7.5 percent of current UK energy demand, based on the 401 TW year electrical uses in 2003. The Channel Islands' Race of Aldermen, for example, could provide 1.34 TWh/year with a large MCT farm. The ability to utilize such a site depends on the capacity to anticipate their hydrodynamic properties, which necessitates the development of methods that characterize the physical and operational performance of the turbines, allowing for the investigation and evaluation of designs. Much may be learned from the design and operation of wind turbines and ship propellers to some degree.

However, there are a number of basic distinctions in the design and functioning of MCTs that will require further study, development, and examination the experimental findings from cavitation tunnel experiments described and utilized in this article for validation of the numerical approach come from a considerably wider set of tests. The cavitation inception observations, impact of yaw, tip emersion, and twin rotor interactions were all performed in both the cavitation tunnel and the towing tank. These experimental findings are addressed in depth in Bahaj , which also includes complete descriptions of the experimental rig design as well as tabular data from the experiments[2].

A cavitations tunnel at QinetiQ, Haslar, was used to measure the torque and thrust characteristics of an 800 mm rotor. Figures 1 depict the experimental setup in the cavitation tunnel. The tunnel has a 2.4 1.2 m working section and a maximum flow rate of 8 m/swath zero yaw and cavitation inception observations, this offered a controlled setting for the main measurements. The diameter of the rotor was set at 800 mm to strike a balance between maximizing Reynolds number and avoiding severe tunnel blockage rectification. The test setup required a boss with a diameter of 100 mm.

The blades were designed using a NACA 63-8xx profile with a chord, thickness, and pitch distribution as shown in. In the University workshops, the model blades were machined from aluminum alloy using a 5-axis CNC machine. The blades are clamped by two parts of the rotor hub, which allows for pitch adjustments. The hub pitch is described as a 20 percent radius at the hub, with the section interpolated to a circle. A test rig is a device that is used to conduct tests. An experimental test rig was developed to test model rotors and could be attached to either the carriage of the towing tank or the ceiling of the cavitation tunnel. The building was done at the University's workshops[3].

The rig is presently set up to handle model rotors with a diameter of up to 900 is connected to the rotor. Batten Ocean Engineering main shaft that powers a DC generator from a pulley through a belt that runs up the vertical support tube s a picture of the test rig set-up in the cavitation tunnel. The thrust and torque were measured using an in-line strain gauge dynamometer placed next to the turbine. This dynamometer was built to operate wet, allowing readings to be taken before bearing or seal failure. The strain gauge bridge circuit is linked to conditioners through a slip-ring assembly, and output signals were recorded on a computer. Rheostats absorb the electrical power, allowing the rotor speed to be controlled as well. Bahaj provide full information on the experiment test equipment, models, and findings.

The torque and thrust were obtained using the dynamometer for a particular tunnel flow speed and rotating speed. To resolve the torque (Q) and thrust (T), the averaged excitation voltages from the torque and thrust bridge circuits were adjusted for zero offset and then multiplied by the calibration factor (T). The coefficients of power (CP) and thrust (CT) were defined as follows: Negative thrust (effectively the situation of a generating turbine) is not appropriate for typical boundary adjustments for propellers. Brantley and Wellicome updated Flaubert's equations for wake expansion in the case of a turbine in order to account for blockage.

Provide the equations, which are used to compensate for boundary layer effects in order to present findings based on free stream inflow speed (U_0). With a thrust coefficient of 0.8, for example, the adjustments resulted in an 18 percent reduction in power coefficient and an 11 percent reduction in thrust coefficient[4].

Today, fossil fuels are the primary source of energy generation all over the globe. The burning of these fuels is increasing in tandem with the worldwide growth in energy demand. As a result, challenges such as climate change, air pollution, and energy security are becoming more prevalent. The rapid replacement of fossil fuel-based carbon energy sources with clean, zero-emission renewable energy sources is an effective answer to this severe concern. This must happen in tandem with the world's total energy demand continuing to rise. There are several renewable energy options accessible.

Thermal energy, solar photovoltaic energy, biomass and wind energy, tidal energy, hydropower, and geothermal energy are among them. Tidal energy, in particular, has a lot of promise because of its reliability, high energy density, predictability, and durability. The energy extracted from the tides, which is based on the predictable vertical motions of water that cause tidal currents, might be turned into kinetic energy and used to generate power. Tidal barrages may channel mechanical energy, while tidewater river turbines might capture tidal current energy. The current developments, ecological implications, and technological possibilities for tidal energy are discussed in this paper.

2. DISCUSSION

The blade element-momentum (BEM) theory, which is based on a mix of momentum and blade element theory, is used. The axial and circumferential inflow factors are calculated using the momentum theory, with a tip loss factor added to account for the limited number of rotor blades. By splitting the rotor blade into a number of elemental sections, the blade element theory is utilized to simulate section drag and torque. The rotor's thrust and power coefficients may be calculated by integrating these numbers throughout the blade. The modified numerical software is based on BEM theory and Barnsley and Jellicoe's wind turbine design program.

The code created, on the other hand, includes significant improvements particularly designed to cope with operations in water, as well as additional additions such as the pressure rise due to wake, and novel extrapolation for stall data. The 2D panel algorithm XFOIL was utilized to solve for the lift and drag coefficient data needed to solve for the blade components. A viscous solution interacts with the incompressible potential flow through a surface transpiration model in the XFOIL linear vortices stream function panel technique.

NACA sections appropriate for the tip of an MCT have been compared to XFOIL in recent cavitation tunnel experiments. The findings were in excellent agreement with pressure distributions and lift curves, although drag coefficients around stall angle were underestimated. In the cavitations tunnel, the derived theory was utilized to solve for the model turbine. Shows the chord, pitch, and thickness distributions that were utilized to create the blade form. The fundamental section lifts and drag statistics for three thickness ratios solved using XFOIL are presented.

Was utilized to extrapolate up to the stall delay angle. Veterans and Corrigan technique for post stall forecasts allowed for extrapolations beyond the stall delay angle. Shows interpolated and extrapolated lift and drag data for four radial locations from 101 to 601. This diagram depicts the hub's significant impact on the stall delay equations. The developed BEM theory uses this data collection, together with the blade form data, as input data. In both cavitations tunnels and towing tanks, many experimental experiments were conducted over a broad variety of hub pitch angles. As can be seen from the example findings. The accuracy of the predictions is more than

enough for utilizing the established theoretical tools for design exercises and parametric investigations.

The turbine blades were pitched over the design speed to maintain a constant power; the turbine was yawed towards the tidal flow; the cut speed for operation is determined by the power required to overcome the generator and gear box efficiencies. The tidal velocity data which was obtained from simulations near Portland Bill by Blunden and Bahaj was used to demonstrate the applicability of the proposed tools. The tidal velocity data is mean depth averaged at 15 minute intervals over a Lunar month in the middle of the spring and neap tides. As illustrated in, this data set may be presented as a histogram of hours at a particular speed cubed[5].

Because power is related to the cube of speed, the speeds (U_0) are distributed as cubes to provide more precise estimates. When compared to time stepping through the whole month of velocity data, the adoption of cubic distribution reduced the number of bins in the histogram by over 3 based on early simulations of energy production. This tidal energy histogram is obviously distinct from wind velocity data from wind farms, which has a distribution similar to the Weibull with zero hours and near zero m/s[6].

2.1 Designing for Tidal Data and Matching Design Speed:

The appropriate design TSR and design speed are unclear based on the assumed turbine design, the power coefficient curve and the velocity histogram, but the following could be anticipated (4oTSRo7) and (2o UDeso3). The energy throughout the Lunar month has been estimated from the histogram of tidal velocity data using the assumed turbine design and the established BEM theory. The findings are shown in Table for a variety of TSR and design speeds. The overall trend indicates that when design speed rises from 2 to 3 m/s, the growth of energy slows but maximum thrust increases dramatically[9].

Illustrate example results with a design speed of 2.5 m/s and TSRs of 4 and 5, respectively. Although the rated power for the design TSR of 5 is almost 10% greater, the power generated is only 5% higher, while the maximum thrust experienced is 15% higher. The use of a low TSR has two effects: first, the design CP is lower, which means that although the rated power is lower at slow tidal rates (high TSR), the turbine is more efficient and therefore produces comparable quantities of energy[7].

Second, the lower the TSR, the lower the CT on the graph, and therefore the lower the maximum thrust. With modest increases in yearly energy production, there is obviously a balance between the expense of constructing turbine and support structures for the increased loads and rated power[8]

The energy production for four design speeds throughout the Lunar month, with the lower speed exhibiting an essentially linear rise in energy and the higher speed indicating a lag in energy output during the spring tides. As a result, a lower design speed combined with a high load factor of > 0.5 may result in a superior grid base supply load.

2.2 Design Speed Optimization:

Turbine with a design speed of 2.5 m/s, rated power of 636 kW, a diameter of 16 m, and a TSR of 14.5. 1018 W. The findings of this research are given in by. The highest peak energy

production of 174 MWh is achieved when the thrust is not restricted. Figure 1 discloses the Photograph of the assembled test rig in the cavitation tunnel[10].



Figure 1: Photograph of the assembled test rig in the cavitations tunnel.

3. CONCLUSION

The Southampton University test programs on the model MCT and the produced blade Experiments and element theory have demonstrated excellent agreement. In essence, the diverse outcomes are satisfactory. Verified the blade element hypothesis that had been established this numerical approach may now be utilized as a design tool. And using tidal data to optimize energy production for the sake of illustration, let's say you're trying to match the turbine design to the environment. There is definitely a difference in the tidal flow statistics near Portland. Balance between maximum design loads and energy consumption the output of the turbine.

High load factors capable of providing a better load to the grid. It has been shown that an optimization software may give a technique for matching design speeds for a certain design structure of support. Due to the fact that the optimal energy output is When it comes to a certain turbine design, there are a variety of options. Significant increases in loads with modest yearly increases production of energy the work shown here connects device and location. The first study of optimizing parameters is represented by parameters. While keeping an eye on other issues such as energy yields the effect of maximal stress on device costs. Further Efforts are presently being made to determine the right balance. For different maritime systems, there is a trade-off between energy output and system cost. Current locations in the United Kingdom.

REFERENCES:

1. Jenkins LD. Human dimensions of tidal energy: A review of theories and frameworks. *Renewable and Sustainable Energy Reviews*. 2018;97.
2. Neill SP, Hashemi MR, Lewis M.J. Tidal energy leasing and tidal phasing. *Renew. Energy*, 2016;85:580-587.
3. Rourke FO, Boyle F, Reynolds A. Tidal energy update 2009. *Applied Energy*. 2010;87:398-409.
4. Mohd Yusoff NA, Ramli NL, Mohamed M.R. Investigation of the potential harnessing tidal energy in Malaysia. *ARN J. Eng. Appl. Sci.*, 2015; 10, 9835-9841.
5. Guerra M, Cienfuegos R, Thomson J, Suarez L. Tidal energy resource characterization in Chacao Channel, Chile. *Int. J. Mar. Energy*, 2017;97:323-337.
6. Zainol MZ, Ismail N, Zainol I, Abu A, Dahalan W. A Review on the Status of Tidal Energy Technology Worldwide. *Sci. Int.*, 2017;29(3):659-667.
7. Lewis M., Neill SP, Robins P, Hashemi MR, Ward S. Characteristics of the velocity profile at tidal-stream energy sites. *Renew. Energy*, 2017;114:258-272.
8. Segura E, Morales R, Somolinos JA. Cost assessment methodology and economic viability of tidal energy projects. *Energies*, 2017;10(11),1806.
9. Segura E, Morales R, Somolinos JA, López A. Techno-economic challenges of tidal energy conversion systems: Current status and trends. *Renewable and Sustainable Energy Reviews*. 2017.
10. Goward Brown AJ, Neill SP, Lewis M.J. Tidal energy extraction in three-dimensional ocean models," *Renew. Energy*, 2017;77:536-550.

FACTORS AFFECTING NATION-BUILDING RELATIONSHIPS IN FERGANA VALLEY

Rahmonali Begalievich Bekmirzaev*

*Lecturer,
Fergana State University,
Fergana City, UZBEKISTAN

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ABSTRACT

In this article we will talk about political, social, economic, ethno-social, natural geographies affecting the relations of modern nationalities in Fergana Valley. In today's all the nations of the world live happily, live the same life, and have the same rights and obligations. But nevertheless, their interests and needs do not coincide, mass riots, divisions of the nation, bloody clashes are being avoided.

KEYWORDS: *Fergana Valley, Modern Nationalist Relations, Factor Of Threat To General Security, Natural Geographic Factors, Problems Related To Political-Territorial Limitation, Ethno demography And Population Growth Problems, Factor Of Religious Relations, Ethnic Factor.*

INTRODUCTION

In today's modern science, scientists focus on the concept of nation-wide relations as a topical subject.

To the territorial and linguistic totality created the main conditions for the formation of the nation and considered as its main signs. Religious beliefs and racial commonality can also be a factor contributing to the formation of a nation.

In today's all the nations of the world live happily, live the same life, and have the same rights and obligations. But nevertheless, their interests and needs do not coincide, mass riots, divisions of the nation, bloody clashes are being avoided.

Unfortunately, in some countries there are such problems. In particular, the emergence of Albanian autonomy in Kosovo, in the countries of the volcanic peninsula, in Azerbaijan, Armenia, Tajikistan, Moldova, Georgia, Uzbekistan, Kazakhstan, Kyrgyzstan (Osh events), as well as in Russia and Ukraine contradictory events of the nation can be an example of this. Today, it is an unforgivable mistake that the state cannot properly establish ethno-political relations instead of taking lessons from such political events.

Therefore, today the research of modern nation-building relations in Fergana Valley in the scientific field is one of the topical topics of the need for a clear analysis of the factors affecting nation-building relations.

MAIN PART

The ethno-cultural processes taking place in the Fergana Valley and the current state of nation-wide relations are of strategic importance that affects the security of the entire region. At a new stage of historical development, the scientific need to understand the model of conflicts in the relations of modern nationalities requires an in-depth and complete study of the impressive ethno-psychological and ethno-social components of each people's culture. For this reason, today, the nation demands a special assessment of relations, the development of civil and nation-wide harmony, the identification of problems in the existing relations, addressing the roots of its origin, foreseeing the threats to the future of the region, as well as predicting its prospects for the future of the Central Asian region.

In the recent past, the former allied states of Central Asia, including the Fergana Valley, were also part of a single political and economic space. The policy carried out in Soviet times had a negative impact on the general political-social, cultural and national characteristics of the indigenous peoples. As a result of the collapse of the Soviet Union, this situation became more complicated.

LEVEL OF STUDY OF THE SUBJECT

Today, modern nationalities in the Fergana Valley can show the following influences on relations:

1. The factor of threat to General Security; the presence of regional conflicts in the nearby regions and the fact that its negative impact is still preserved (the issue of Afghanistan, political crises between Tajikistan and Kyrgyzstan "North" and "South"); border ignorance of regional conflicts.
2. Natural geographic factors. Scarcity of land resources; uneven location of land resources associated with farming and livestock when distributed across countries located in the Fergana Valley regions; according to the Ministry of Agriculture of Tajikistan, arable land in 2013 year is 0.11 hectares per capita and is considered the lowest in the CIS. In Kyrgyzstan, this indicator is at several high levels. In Uzbekistan, 0.19 hectares of land is per capita, while the current global figure is 0.30 hectares [1].

General problems associated with the limitation of water reserves and water supply. After the Central Asian countries won their sovereignty, there was a dispute over water resources for all countries. The demand for water resources for Fergana Valley, whose economy is mainly agrarian, has a serious meaning. Today, the problem of water use is very important for the Fergana Valley, both from a political and economic point of view. The impact of problems with the use of water and water can be identified as a leading factor in nation-wide relations. The dependence on this problem can be concluded by great conflicts [2].

3. Problems related to the political-territorial boundary in the valley, which remained the norm from the Soviet Union; the problem of the enclaves and the exclaves; Shahimardon, Soh, Chon-Gara, Tashtepa, Kalacha, Jangal, Tayan (Uzbek enclaves in Kyrgyzstan); Barak (Kyrgyz enclave in Uzbekistan); Vorukh, Kairagoch or Western Kalacha (Tajik enclaves in Kyrgyzstan); Sarvan (Tajik enclave in Uzbekistan) [3].

The existing border problems in the region significantly increase the potential of conflicts in the Fergana Valley. Violation of border control not only raises the issues of setting boundaries, but also demarcation, the establishment and introduction of the border order, as well as the need for serious decision-making in this area. The main ethnic problems, large Diasporas live in the enclave regions on different sides of the Valley. When defining boundaries, it calls for the Prevention of the occurrence of events that lead to nation-building relations, where other peoples are discriminated against. It should be noted that as a result of the national-territorial division, the borders of the states in the region were established in 1924-1929 years. In the process, it was delimited without taking into account many ethno-political omens. This left a lot of problems, including painful borderline problems.

4. Demographic factor. The present ethnic situation of the Fergana Valley; economic, social, political processes affecting the changes in its ethnic composition; the absence of any legal framework regulating the situation associated with internal labor migration in the Fergana Valley, where the population is densely populated and labor resources are high.

The ease of natural conditions for living in the Fergana Valley greatly affected the population density of the territory. The density of the population of the Fergana Valley is much higher than in other regions of Central Asia (1 sq. km is about 360 people) [1].

Ethnodemography and population growth problems. Ethno-social analysis of lifestyle, economy and Real income of Fergana Valley population. The density of the population of Fergana Valley is the problem of unemployment and labor migration. The poorest layer of the Valley's population is 40 per cent [2]. This is evidenced by the fact that a large part of the population from the territory falls into the migratory flow.

5. Religion relationship factor. Religion is a matter of tolerance; the majority of the population of the Fergana Valley is Sunni; the Ismaism sect. The extent to which the Islamic factor affects the sharpening of relations among nations. The consequences of radicalism in Islam. It is a model of conflicts between the religion of Islam and the people's pre-Islamic religious beliefs.

After the atheistic mood of the Soviet era in the last 20-30 years, a new wave of Islamization arose among the population [3]. "Indigenization of the second generation [1]" is a counter-response to the policy of long-term Sovietization, that is, it is understood as a return from forgotten ancient traditions, from secular culture to religious culture.

6. Ethnic factor. The territory of the Fergana Valley is the territory belonging to multinational states. Ethnic originality ("Ethnicheskaya identichnost" - this is a psychological category, which means an integral part of the social background of a person, belonging to a particular ethnic community [2]. Problems with a number of indicators of objects (ethnic origin, place of birth, language, culture of parents) that determine ethnic originality; interaction between national Diasporas and titular nations. National separatism (separatism) is the degree of abstinence of moods and the factors affecting it. (1992-1997-the civil war in Tajikistan, 1989-conflicts between the Uzbek and Meskheti-Turks, 1990 and 2010-disputes between the Uzbek and Kyrgyz).

The ethnic composition of the population of the Fergana Valley is diverse. For example, Tajiks are Persian, and Turkic – speaking differ from Uzbeks and Kyrgyz. Also, the way of life of Uzbeks and Kyrgyz differs with different levels of Islamization [3]. In addition, mountain Tajiks

are clearly distinguished from the inhabitants of the valley by their appearance, from the point of view of language and religion belief (the Ismailia sect).

CONCLUSION

The analysis of the problems in contemporary nation-wide relations in Fergana Valley is following a deeper study of the existing problems, based on the opinions, forecast analyses and interests of researchers-experts outside the region who have expressed their views on this issue. It is necessary to identify the existing problems and not to allow them to pose a challenge for the Central Asian region. The ethnocentric factor in the multinational Fergana Valley is one of the most complex and topical issues of today. Ethnic-territorial problems, resources, linguistic, environmental, demographic, migration and other regional problems both determine and impart the level of ethno cultural relations.

REFERENCES:

1. Karimov UU, Karimova GY. The Importance Of Innovative Technologies In Achieving Educational Effectiveness. Журнал Естественных Наук, 2021:(1).
2. Umaralievich, KU. Spiritual Education Of Students Of Pedagogical Universities On The Basis Of Cultural And Humanistic Approach.
3. Rayimov AA, Karimova GY. Social Aspects Of The Formation Of Social Activity In Youth. Oriental Journal Of Social Sciences, 2021;29-32.

AN OVERVIEW ON ADAPTATION TO NEW TECHNOLOGIES

Neelanchal Trevedi*; Ashish K Verma; Rahul Arora*****

*Assistant Professor,
Department of Pharmacy,
TeerthankerMahaveer University,
Moradabad, Uttar Pradesh, INDIA

**Assistant Professor,
Department of Pharmacy,
TeerthankerMahaveer University,
Moradabad, Uttar Pradesh, INDIA

***Assistant Professor,
Department of Pharmacy,
TeerthankerMahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email id- neelanchal.pharmacy@tmu.ac.in

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ABSTRACT

New social, technological, and research challenges arise as the population ages. Poland is set to attend the bunch of nations where one-third of the population is above 65 by 2080. Several strategies are being developed to address the above - mentioned demographic challenge, including the widespread use of humanoids in the elderly care. This article seeks to uncover the perceived key benefits that may shape positive attitudes about humanoids in the care of elderly people, since this research would be the first of its type in Poland. The model posits that four types of perceived benefits, including an effect on life quality, functional elements, ethical issues, and a social impact, may directly form an orientation toward a technology based on the specific characteristics of a humanoid technology. A conceptual framework also predicts that a patient's attitude toward humanoid technology will have an indirect effect on the technology's future intended use. The study data was collected using a survey technique. Private interviews with Polish people was performed using an electronic questionnaire. A total of 643 questionnaires completed. The structural equation modeling showed that the most important factor influencing human views was the perceived social effect of employing humanoids to care for the elderly and make their own lives more pleasant. Men had a more positive attitude about humanoids than women, according to the findings. People between the ages of 26 and 40 had the highest positive attitudes about humanoids across the other age groups of respondents[1].

KEYWORDS: Ageing Population, Attitude, Elderly, Intention, Humanoids.

1. INTRODUCTION

In resource economics, the article addresses research on two distinct but related change processes: adaption and adoption. In order to better comprehend that relationship between the two processes, we culled data from the vast adoption literature and explored its implications for adaptation study. The reaction by economic agents and societies to major environmental changes. And/or political and economic shocks is known to as adaption. Due to worries about global warming, there's been a recent uptick in focus on coping with environmental changes, a subject that we emphasize here. Adoption, described as a shift in economic agents' or a community's behavior or technology, has a long intellectual history. The quest to understand the adoption of modern agricultural practices and the Green Revolution inspired adoption research.

Such research has long been a staple of resource, environment, and development studies, and it has coincided with a rising interest in conservation technologies uptake. When compared to conventional neoclassical microeconomic theory, both acceptance and adaptation need a shift in analytical focus. Pioneers including such Marshal and Samuelson developed concepts which utilize calculus to calculate marginal reactions to minor changes, assuming well-behaved continuous connections. Adaptation is the process of reacting to noncontiguous changes, and comprehending discrete choices is an important part of adoption study. As a result of the focus on variables in adoption research, different analysis methods have been developed that will serve as a basis for adaptation studies. This article begins by providing an overview of the main studies and current findings in the adoption and innovation literature. We next go through some of the most current research on adaptation methods in general, with a focus on adoption, migration, and institutional change like trade and insurance. We conclude with lessons learned from the adoption studies that may be applied to the new literature on adaptation, as well as research recommendations for the future[2].

1.1 Main Strains of Literature:

The acceptance and diffusion research includes a variety of models and strains and spans many disciplines, notably economists, sociology, and advertising. Below, we'll go over the various models[3].

1.2 Diffusion as a Process of Imitation:

Diffusion has been shown to be an S-shaped time dependent in empirical research. Rogers. Emphasizes the importance of social network communication in accelerating spread and provides a simple framework for quantifying diffusion as an emulation process. As according Griliches. when a modern tech is more profitable, it expands quicker. Expanded attempt to mimic models. Have been widely used in marketing, and recent polls. Show that all these models have been enlarged to include consumer communication. And major advertising integration. The copycat model, on the other hand, lacks a clear microeconomic basis, particularly explicit modeling of firm and person behavior. The threshold model was designed to address the flaws in the copycat model[4].

1.3 The Threshold Model of Adoption:

The threshold prototype of adoption, initially proposed by David. And eventually expanded by Steinman Feeder ET al. assumes that individuals make adoption process based on the economic decision-making rules, heterogeneous nature of adopters, and dynamic processes. All of which

impact change over time. The author emphasized static profit maximization and anticipated maximization as micro-level economic decision-making criteria. According to some recent research, the time of adoption is determined by the trade-off between both the benefit of usage in the present and the likelihood of a lower price in the future. Additive or multiplicative random walks are two instances of stochastic processes that influence yields and costs. In these situations, policymakers are using a real-options approach, which means that the time of deployment is chosen so that the marginal benefit outweighs the margin cost plus the hurdle rates which rise as uncertainty grows.

The time & amount of acceptance are affected by many sources of variability. One factor is location; adoption rates are often greater closer to a city center. Distance has little to no impact on adoption thanks to the Internet. Size is another source of variability. As according Foster & Rosenzweig, size is a significant barrier to technology acceptance in developing nations and a key factor to low productivity. As a result, a rise in farm size may be a major factor in improved overall production. Some other source of heterogeneity is the quality of capital assets, such as human capital. Individuals with a greater degree of education, for instance, are more likely to use sophisticated computer software. Vintage was added as a source of variability that may drive adoption in the puttyclay method; for example, older equipment is more likely to replace within a company. However, a research by Comin and Hobijn examining technology diffusion within nations consistently shows a trickle-down process in which innovations are accepted first in rich countries and then in poor ones. As a result, trade openness aided quicker adoption by allowing older vintages to be sent to developing countries[5].

1.4 Models of Adoption as A Multistage Process:

The adoption decision was divided into five stages in Rogers' landmark book. Knowledge, interest, evaluation, trial, and adoption. This category depicts adoption as a time- and attempt activity, emphasizing the necessity of understanding the learning and judgement that come with it. This knowledge base has mostly come from sociologists. And marketing. Only two stages are defined by Kalish, awareness and acceptance. He models awareness using imitation epidemic type paradigm and creates a threshold framework for adoption. Emphasizing the importance of risk variables in adoption decisions. Studies emphasizing the impact of learning in reducing uncertainty followed his lead. As the usage of technology expands across borders, Ganesh ET al. capture sequential learning across nations. Recent research has focused on the value of prior adopter recommendations. And the effects of social networks on consumer adoption and abandonment.

1.5 Adoption and Increasing Return to Scale:

Much of the traditional adoption literature assumes that production technology has a decreasing or constant return to scale, implying that it is produced by a competitive industry. Arthur. On either hand, acknowledges that modern technologies often contain a significant element of increasing return to scale. Biotech, software, and medicines, for example, need a high initial investment yet have a minimal variable cost when it comes to building new goods. Network effects are another driver of rising return to scale. The advantages of using the Internet or the telephone increase in direct proportion to the amount of people connected to the network. Increasing return to scale leads to monopoly market businesses producing and marketing technologies, implying that adoption choices may be path dependent. If two techniques are

present, and the inferior was introduced first and therefore has a strong foundation, it may ultimately dominate. Since such technologies may provide inefficient outcomes in the long term, Arthur suggests using opportunities to motivate the acceptance of better technologies that are still in the initial phases of development. However, intervention's ability to affect route dependence is limited.

1.6 Interdependency and Adoption:

Interdependence across industries, as according David. May lead to the sequence of development and the spread of new technology. Adoption of some overall technologies, for instance, may alter the technological route, resulting in the more changes in technology. The use of electric power rather than mechanical power. Was a notable example, leading in radical reforms in the whole sector and plant location, for example? As according Mujumdar ET al the use of broadband for communications is expected to change the architecture of the telecom industry, result in the creation of new industrial uses, and lead to new technological development pathways. As a consequence, in the event of significant innovation process, the new technology not only replaces an older technology, but also changes the evolution of existing industries and leads to the creation of technological advances. Various modeling paradigms have produced various empirical techniques. The imitation model has been estimated many times using time information on aggregate uptake shares across time & regions. Researchers used discrete-choice methods such as logit or probit to find the origins & effects of variability among adopters when micro-level panel data became available; scientists used the threshold approach to find the source and effects of heterogeneity amongst adopters. The Heckman method and the Tobit model were used to estimate adoption choices and also their intensity. Hyper - connected and the innovation process, as well as patterns associated with rising return to scale, can be identified via historical study of technology spread across places[6].

1.7 Adoption in Agriculture and Natural Resources:

The extensive literature on agricultural technology adoption. Highlights many important variables that influence adoption and serves as a platform for further study into agricultural adaptation to external changes. We review the major results from the literature reviewed, then go on to findings relating to two key areas for global adaptation strategies: preservation technologies and genetic modification. Varieties. Individuals often progressively embrace divisible technologies as they experiment with all of them and diversify risks. New technologies that are incorporated in capital goods are frequently leased at first, with purchasing choices made only when enough experience has indeed been gathered. In situations when older people are less likely to adopt technology that are embodied in capital goods or that require additional training, such as computers, generational concerns become critical. Why are innovations that seem to be very beneficial, such as energy-saving devices, inadequately? This is a major topic of adoption studies.

One issue may be a lack of financing, which could stifle the uptake of otherwise profitable technology. Short-term sharecropping or leasing agreements may also slow the adoption of sustainable techniques like terracing. It's possible even evaluating modern technologies will come at a significant cognitive cost. These costs add to the fixed cost of technology search and assessment, which may explain why certain conservation solutions are sluggish to catch on. Furthermore, since they have low intellectual costs and work with a longer planned period,

younger people are more likely to embrace these and other technologies. Adoption of new crop types is a major approach for adapting to the changing climate. Qaim. Reviews recent micro-level studies on GM variety adoption and finds that yield gains from GM variety adoption are greater in developing countries, as GM traits tend to address pest issues that were previously untreated. In industrialized nations, however, such varieties often replace chemical pesticides, resulting in cost savings as well as environmental benefits. Using aggregate data, Sexton & Zilberman. Found similar results, claiming that the introduction of GM increased maize, soybean, and cotton supply, reducing prices significantly. Qaim. Also shows that the ease of adoption. And noncash benefits such as enhanced convenience and improved safety helped GM spread quickly[7].

1.8 The Role of Information and Marketing:

Adaptation choices are frequently made in unpredictable and learning settings, much as they are with global warming. The role of informal information exchange, such as word of mouth, in inducing adoption is highlighted in the adoption studies in sociology. Furthermore, econometric evidence shows that informal interactions among friends and acquaintances provide roughly half of the information used by farmers to make economic decisions. Furthermore, when formal sources of information. E.g. Extensions, commercial sources. And media. Are lesser developed, informal information sharing rises? The informational cascades research looks at strategic adoption decisions and learning, including such actors' incentives to postpone adopting in order to learn from those other adopters. Zhao. Shows that, in the study of strategic learning, better information flow between agents may delay the beginning stages of dissemination whilst speeding up the latter stages when a large number of officers had adopted.

Social norms and community values, in addition to learning, are significant variables that may influence individual behavior. According to Lynne. Social capital and concern for community values may help people embrace agricultural practices. Experiments have been used to evaluate the effectiveness of marketing tactics and policy tools in promoting adoption. Song and Perry. Perform a scientific test to determine the effect of various promotional tools on uptake. They discovered that when customers are given a clear incentive (e.g., a discount) and/or the opportunity to learn about the experiential characteristics of a new product, adoption rises. Hayes ET al. utilize experimental techniques to assess people's willingness to pay on safer food and show that the degree of that willingness is determined by information. As according Roust ET al. customer readiness to pay for or try new GM goods is influenced by the product's features, the consumer's prior views, and the sources of information on the new product. Tests are used by Liu & Huang. to estimate behavioral economic concepts such as cognitive bias, which are then used in an economic study of biotechnological uptake in China. The aim to get a realistic understanding of technological decisions has led to a greater dependence on field experiments, including randomized trials on technology acceptance, especially in the context of sustainable development. Miguel and Kremer. utilize randomized trials to demonstrate that, in certain instances, institutions like schools may be more successful than incentives at implementing new practices like deworming[8].

2. DISCUSSION

The reality that in actuality, people or organizations may change or adapt the original planned use of a technology or service. Extending TAM to Measure F o Adoption in Health Arenas explains more. New technologies are sometimes simply trends that come and go fast. It's

important to adapt to the appropriate latest tech for your company. You will be better prepared to make appropriate business choices if you have experience and knowledge in your sector. Technology connects people's skills, information, processes, methods, and equipment to solve problems and make their life safer and easier. Technology is important now because it is pushing the world forward and enhancing it. According to the Digital with Purpose study by Gesso and Deloitte, digital technologies can aid in the fight against climate change by reducing emissions, strengthening resilience to climate-related natural hazards, and increasing our ability to act. Wind turbines, solar cells, concentrated solar power, geothermal power, ocean wave power, and a variety of other emerging technologies are among the advances. A technical invention is a new or better item or process with significant technological differences from older iterations. New goods. And procedures in use. That have been put on the market are examples for technical product innovations that were adopted[9].

3. CONCLUSION

Adoption is a crucial step in the evolution of fresh concepts. When new innovations are presented, this raises important concerns about who will adopt them and when they'll be accepted. Patterns of adoption, the profile of adopters, the timing of adoption, and the evolution of the technology once accepted, and the effect on other technologies and pricing are all investigated in the adoption studies. Adoption is one of several acts that may be taken in response to a shock (such as climate change). Adoption may occur in a variety of situations, but adoption refers to a major event. The two literatures have many similarities, and we believe that the adaptation literature, in particular, may benefit from the adoption literature's teachings. Recent adaptation research has focused on five key factors. First, the humankind's characteristics have a significant impact on the adoption process. When compared to traditional technologies with rising marginal cost, innovations with increasing return to scale have entirely different patterns of development and acceptance. Second, networks are essential for both learning and lowering operational costs. Third, different behavioral economic models may help explain certain patterns that neoclassical models can't explain. Behavioral economics is particularly useful for enhancing information and learning modeling in economic models. Fourth, there is a growing recognition that route dependence is important, and that previous actions limit adoption patterns considerably[10].

REFERENCES:

1. Andries P and DebackereK. Adaptation in new technology-based ventures: Insights at the company level. *International Journal of Management Reviews*. 2006;8(2): 91-112. doi: 10.1111/j.1468-2370.2006.00122.x.
2. EjdysJ and HalickaK. Sustainable adaptation of new technology-The case of humanoids used for the care of older adults. *Sustain.*, 2018;10(10): 3770. doi: 10.3390/su10103770.
3. Montalván J, Shin H, Cuéllar F, LeeK. Adaptation profiles in first-time robot users: Towards understanding adaptation patterns and their implications for design. *Int. J. Des.*, 2017; 11(1): 1-19.
4. Zwitter A and Boisse-DespiauxM. Blockchain for humanitarian action and development aid. *J. Int. Humanit. Action*, 2018, doi: 10.1186/s41018-018-0044-5.
5. Fukushima M, Alva R, CastilloG., Calderón C, ShimokawaL, FukushimaJ. Adaptation of new

- technologies for operation of a demonstrative module for tilapia culture in La Libertad.Sci. Agropecu., 2016; 3:16. doi: 10.17268/sci.agropecu.2016.03.21.
6. Komunikasi J. et al.,Adaptation and the new media technology: a study on malaysian students in australia and united kingdom.Malaysian J. Commun., 2015, doi: 10.17576/jkmjc-2014-3001-10.
 7. Bruque S, Moyano J, EisenbergJ.Individual adaptation to IT-induced change: The role of social networks.J. Manag. Inf. Syst., 2009; 25(3):177-206. doi: 10.2753/MIS0742-1222250305.
 8. CozzolinoA, Verona G, and Rothaermel FT. Unpacking the Disruption Process: New Technology, Business Models, and Incumbent Adaptation.J. Manag. Stud., 2018;55(7): 1166-1202. doi: 10.1111/joms.12352.
 9. Ejdys J and HalickaK.Sustainable Adaptation of New Technology — The Case of Humanoids Used for the Care of Older Adults.Sustain. Adapt. new Technol. case humanoids used care older adults, 2018;10(10): 3770. doi: 10.20944/preprints201809.0235.v1.
 10. Ablain J and ZonLI.Of fish and men: Using zebrafish to fight human diseases.Trends in Cell Biology. 2013 Dec;23(12):584-6. doi: 10.1016/j.tcb.2013.09.009.

A REVIEW ON HEAT EXCHANGER

Bhagwan*

*Assistant Professor,
Department of Mechanical Engineering,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- Bhagwan.engineering@tmu.ac.in

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ABSTRACT

Heat exchangers are devices that transmit heat from one medium to another without causing them to combine. There is a lot of research being done to improve heat transfer with heat exchangers. The study done by several researchers to improve the effectiveness of heat exchangers is discussed in this publication. Corrugated plate heat exchangers were discovered to have the highest rate of heat transmission after a thorough investigation. Heat exchangers are one of the most common heat transfer devices used in sectors such as oil refining, chemical engineering, and electric power generation, among others. Shell-and-tube heat exchangers have long been the most popular and effective heat exchangers in industry. Heat exchangers are very significant in the industry and play a critical role in recovering heat between two process fluids. Concentric tube (double pipe), shell and tube, and plate heat exchangers are the most popular heat transfer devices. Computational Fluid Dynamics (CFD) is a computer numerical calculation and graphical presentation of the physical processes involved in fluid flow and heat conduction. The basic design methodologies for two fluid heat exchangers are discussed in this chapter.

KEYWORDS: *Cfd, Heat Exchanger, Mechanical Design, Thermal Design.*

1. INTRODUCTION

A heat exchanger[1] is a device that transfers thermal energy between two or more fluids, a solid surface and a fluid, or solid particles and a fluid, all of which are at different temperatures and in thermal contact. There are usually no external heat and work interactions[2] in heat exchangers. Heating or cooling a fluid stream of interest, as well as evaporation or condensation of single or multi-component fluid streams, is common applications. In other cases, the goal may be to sterilize, pasteurize, fractionate, distil, concentrate, crystallize, or regulate a process fluid. The fluids exchanging heat are in direct contact in a few heat exchangers. Heat transfer between fluids in most heat exchangers occurs transiently via a separating wall or into and out of a wall. A heat transfer surface separates the fluids in many heat exchangers, ensuring that they do not mix or leak. Direct transfer type exchangers, or simply recuperators, are what they're called. Indirect transfer type, or simply regenerators, exchangers in which there is intermittent heat

exchange between the hot and cold fluids via thermal energy storage and release through the exchanger surface or matrix are referred to as such.

Due to pressure differences and matrix rotation/valve switching, fluid leakage[3] from one fluid stream to the other is common in these exchangers. Shell-and-tube heat exchangers, vehicle radiators, condensers, evaporators, air preheaters, and cooling towers are all examples of heat exchangers. It is frequently referred to as a sensible heat exchanger if no phase shift happens in any of the fluids in the exchanger. A heat exchanger is a device that transfers heat from one fluid to another. In both cooling and heating processes, heat exchangers are used. The fluids could be separated by a solid wall to keep them from mixing, or they could be in direct touch. Space heating, refrigeration, air conditioning, power plants, chemical plants, petrochemical plants, petroleum refineries, natural-gas processing, and sewage treatment are all places where they're used[4]. The basic example of a heat exchanger is seen in an internal combustion engine, where engine coolant circulates through radiator coils and air passes through the coils, cooling the coolant and heating the incoming air.

Another example is a heat sink, which is a passive heat exchanger that transfers heat from an electrical or mechanical device to a fluid medium, most commonly air or liquid coolant. Heat exchangers are classified into three groups based on their flow configuration. The two fluids enter the exchanger at the same end and travel in parallel to the other side in parallel-flow heat exchangers[5]. The fluids enter the heat exchanger from opposite ends in counter-flow heat exchangers. Heat exchangers are intended to maximize the surface area of the wall between the two fluids while decreasing fluid flow resistance through the exchanger for maximum efficiency. The addition of fins[6] or corrugations in one or both directions, which increase surface area and may channel fluid flow or produce turbulence, can also impact the exchanger's effectiveness. Although the driving temperature across the heat transfer surface fluctuates depending on position, a suitable mean temperature can be established. This is the "log mean temperature difference" in most simple systems (LMTD). The NTU technique is utilized when direct knowledge of the LMTD is not accessible.

2. DISCUSSIONS

2.1 Types of Heat Exchanger:

There are various[7] distinct heat exchanger versions based on the design characteristics mentioned above. The following are some of the more typical variations used in industry:

- 1) Shell and tube heat exchangers
- 2) Double pipe heat exchangers
- 3) Plate heat exchangers
- 4) Condensers, evaporators, and boilers.

2.1.1 Shell and Tube Heat Exchangers:

A shell and tube heat exchanger[8] is a class of heat exchanger designs. It is the most common type of heat exchanger in oil refineries and other large chemical processes, and is suited for higher-pressure applications. As its name implies, this type of heat exchanger consists of a shell (a large pressure vessel) with a bundle of tubes inside it. One fluid runs through the tubes, and another

transfer. With advances in numerical techniques and computation power, Computational Fluid Dynamics (CFD) can be used to predict the performance of machines in design phase only without manufacturing them. Much commercial software is available in the market. By using CFD, information about the output temperature, velocity, pressure and other non-dimensional parameters can be obtained. CFD is not only useful to predict the performance but it also helpful to determine the effect of change in any design parameter on its output. In Computational Fluid Dynamics, geometry of machine is created and meshing is done for domain. Meshing helps in the discretization of the domain into small elements. Governing equations are applied on these discrete elements to find numerical solutions regarding pressure distribution, temperature gradients etc a series of tubes make up a shell and tube heat exchanger. The fluid that needs to be heated or cooled is contained in one set of these tubes. The second fluid flows across the tubes that are being heated or cooled, allowing it to either contribute or absorb heat. The tube bundle is a collection of tubes that might be plain, longitudinally finned, or a combination of the two. High-pressure applications (pressures more than 30 bar and temperatures greater than 260 °C) are commonly served by shell and tube heat exchangers. Because of their form, shell and tube heat exchangers are extremely durable.

The shell and tube exchanger consists of four major parts:

- 1) **Front Header:** This is where the fluid enters the tube side of the exchanger. It is sometimes referred to as the Stationary Header.
- 2) **Rear Header:** this is where the tube side fluid leaves the exchanger or where it is returned to the front header in exchangers with multiple tube side passes.
- 3) **Tube Bundle:** this comprises of the tubes, tube sheets, baffles and tie rods etc. to hold the bundle together.
- 4) **Shell:** This contains the tube bundle. Shell and tube heat exchanger design.

There can be many variations on the shell and tube design. Typically, the ends of each tube are connected to plenums (sometimes called water boxes) through holes in tube sheets. The tubes may be straight or bent in the shape.

2.1.2 Plate Heat Exchanger:

The plate heat exchanger[9] is another type of heat exchanger. One is made up of a series of thin, slightly spaced plates with huge surface areas and heat-transfer fluid flow channels. In some cases, a stacked-plate heat exchanger can be more efficient than a shell and tube heat exchanger in a given space. The plate-type heat exchanger has become more practical as gasket and brazing technology has advanced. Large heat exchangers of this sort are known as plate-and-frame in HVAC applications; when used in open loops, these heat exchangers are usually gasket type to allow for periodic disassembly, cleaning, and inspection.

A) Plate and Shell Heat Exchanger:

A plate and shell heat exchanger[10], which combines plate heat exchanger and shell and tube heat exchanger technologies, is a third form of heat exchanger. A fully welded circular plate pack formed by pressing and cutting round plates and welding them together is at the heart of the heat exchanger. Flow enters and exits the plate pack via nozzles (the 'Plate side' flow channel). The fully welded plate pack is encased in an outer shell, which forms a second flow route (the

'Shell side'). High heat transmission, high pressure, high operating temperature, compact size, little fouling, and close approach temperature are all advantages of plate and shell technology. It does not need any gaskets, which ensures leak-free operation at high pressures and temperatures.

B) Adiabatic Wheel Heat Exchanger:

This heat exchanger holds heat in an intermediate fluid or solid store, which is subsequently transferred to the other side of the heat exchanger to be released. Adiabatic wheels, which consist of a huge wheel with fine threads moving through hot and cold fluids, and fluid heat exchangers, are two instances of this.

C) Plate Fin Heat Exchanger

To boost the efficiency of this form of heat exchanger, "sandwiched" passageways with fins are used. Cross flow and counter flow are combined with a variety of fin configurations, including straight fins, offset fins, and wavy fins. Heat exchangers with plates and fins are typically composed of aluminum alloys, which have a high heat transfer efficiency. The material allows the system to run at a lower temperature while also reducing the equipment's weight. Plate and fin heat exchangers are typically utilized in low-temperature applications such as natural gas, helium, and oxygen liquefaction facilities, air separation plants, and transportation industries such as automobile and aeroplane engines. Plate and fin heat exchangers provide the following advantages:

High heat transfer efficiency, particularly in the treatment of gases Greater surface area for heat transmission the weight of a shell and tube heat exchanger is approximately 5 times that of a shell and tube heat exchanger. Having the ability to resist tremendous pressure.

D) Pillow Plate Heat Exchanger:

In the dairy sector, a pillow plate exchanger[11] is often used to cool milk in big direct-expansion stainless steel bulk tanks. The pillow plate prevents gaps between pipes welded to the tanks outside, allowing for cooling throughout virtually the full surface area of the tank. A thin sheet of metal is spot-welded to the surface of a thicker sheet of metal to make the pillow plate. The thin plate is welded in a serpentine pattern of weld lines or in a regular pattern of dots. Following welding, the contained space is pressured to the point that the thin metal bulges out around the welds, allowing heat exchanger liquids to flow.

E) Fluid Heat Exchangers:

This is a heat exchanger in which a gas passes upwardly through a shower of fluid (usually water), which is then carried somewhere else and cooled. This is frequently used to cool gases while simultaneously eliminating contaminants, effectively solving two problems at once. It's a popular energy-saving method of chilling super-heated water for use in espresso extraction in espresso machines.

2.2. Applications and Uses:

A shell and tube heat exchanger's simple design makes it an ideal cooling solution for a wide range of applications. The cooling of hydraulic fluid and oil in engines, transmissions, and hydraulic power packs is one of the most common applications. They can also be used to chill or heat other media, such as swimming pool water or charge air, depending on the materials employed. One of the biggest benefits of employing a shell and tube heat exchanger is that they're frequently simple to maintain, especially with types that include a floating tube bundle (tube plates that aren't bonded to the outer shell).

Heat exchangers with shell and tube designs can transport enormous volumes of heat at a low cost and in a serviceable manner. They can give a great amount of functional tube surface while reducing floor space, liquid volume, and weight requirements.

Shell and tube heat exchangers come in a variety of sizes. Thermal technologies and manufacturing methods have been utilized in industry for over 150 years, thus they are well defined and applied by modern competitive manufacturers.

2.3. Methodology:

The basic design methods for two fluid heat exchangers are

- 1) log-mean temperature difference (LMTD) method
- 2) the effectiveness-NTU [12] method
- 3) dimensionless mean temperature difference (Ψ -P)
- 4) (P1- P2) to analyze recuperations.

2.4 Existing Industrial Scenario:

In industries, heat exchangers are used in industrial process to recover heat between two process fluids. Shell-and-tube heat exchangers are the most widely used heat exchangers in process industries because of their relatively simple manufacturing and their adaptability to different operating conditions. But nowadays numbers of industries are researching for effective and less time consuming alternatives of designing of shell-and-tube heat exchangers. As per literature and industrial survey it is observed that there is need of effective design options for STHE (Shell and Tube Heat Exchanger).

➤ Part A-Thermal Design:

The thermal design of STHE includes;

- 1) Consideration of process fluids in both shell and tube side
- 2) Selection of required temperature specifications
- 3) Limiting the shell and tube side pressure drop
- 4) Setting shell and tube side velocity limits
- 5) Finding heat transfer area including fouling factor

➤ Part B-Mechanical Design:

The mechanical design of STHE includes;

- 1) Selection of layout—based on thermal design.
- 2) Selection of required temperature specifications.

- 3) Limiting the shell and tube side pressure drop.
- 4) *Setting* shell and tube side velocity limits.
- 5) Finding heat transfer area including fouling factor.

2.5 Computational Fluid Dynamics (CFD):

One of the most successful approaches of solving common heat exchanger problems is computational fluid dynamics (CFD) analysis. HTRI uses CFD simulation to improve heat exchanger performance for customers all over the world in its research and contract projects. Computational Fluid Dynamics (CFD) is a finite element model technique that holds a lot of potential for studying fluid flow, heat transfer, and other topics. In general, a finite element model is a model of anybody created by splitting it into little sections called elements. Because studying the action on each particle is impractical due to the infinite number of particles in the body, the body is divided into small elements to obtain the results. Meshing is the term for this procedure. The discretization of the domain into small volumes, where the equations are solved using iterative methods, is known as meshing. Modeling begins with characterising the domain's boundaries and initial conditions. CFD is the study of forecasting fluid flow patterns, heat and mass transfer, chemical reactions, and associated phenomena by solving a set of governing mathematical equations such as conservation of mass, momentum, energy, species, and effects of body forces, among others. It is a strong tool for heat transfer simulation and modelling of heat exchangers in multiphase flow systems, as well as for research and development. These approaches, however, are computationally time demanding, resulting in numerical mistakes during calculation, and are unable to anticipate all thermal and hydraulic responses of fluids in flow fields. Computational fluid dynamics (CFD) software can be used to solve these problems. Ansys Fluent is capable and well-known software that calculates conjugate heat transport accurately. Standard wall function mode can also be used with realisable K-Epsilon. The pressure, temperature, heat transfer rate, and velocity parameters at various portions of the annulus and pipe are calculated in this simulation. Ansys Fluent can calculate natural and forced convection inside fluids, conduction in solid sections, thermal radiation, and external heat gain or loss from the models outside limits. The findings of 3D in CFD simulations are used to do parametric analysis on the average value of convective heat transfer coefficient.

4. CONCLUSION

The design of STHE, i.e. the thermal and mechanical design, was done both manually and using software, in accordance with TEMA/ASME standards. It has been discovered that the design of STHE developed using both approaches is highly basic, easy to progress, and takes less time than a current heat exchanger. The basic design methodologies for two fluid heat exchangers were covered in this chapter. The recuperated and regenerator design approaches.

REFERENCES:

1. Lienhard JH. A heat transfer textbook. 1981.
2. Ibrahim NI, Al-Sulaiman FA, Rahman S, Yilbas BS, Sahin AZ. Heat transfer enhancement of phase change materials for thermal energy storage applications: A critical review," Renewable and Sustainable Energy Reviews. 2017; 74(C):26-50. doi: 10.1016/j.rser.2017.01.169.
3. Carroll SA, Iyer J, Walsh SDC. Influence of Chemical, Mechanical, and Transport Processes

- on Wellbore Leakage from Geologic CO₂ Storage Reservoirs. *Acc. Chem. Res.*, 2017; 50: 1829–1837. doi: 10.1021/acs.accounts.7b00094.
4. Fernandes NF, Mignaco LJ, Gomes JR. Refinery hydrotreated diesel production by organic oils hydroconversion. 2008.
 5. Boda M, Deshetti S, Gavade M. Design and Development of Parallel - Counter Flow Heat Exchanger. *Int. J. Innov. Res. Adv. Eng.* 2017;4(2).
 6. Khan TA and Li W. Optimal design of plate-fin heat exchanger by combining multi-objective algorithms. *Int. J. Heat Mass Transf.*, 2017;108. doi: 10.1016/j.ijheatmasstransfer.2017.01.031.
 7. Schwartz MP. Four Types Of Heat Exchanger Failures. *Plant Eng. (Barrington, Illinois)*, 1981.
 8. Mostafa AAH, Khalil EE, El-Hariry G, Abdelmaksoud WA, Saad EM. Shell and tube heat exchanger performance. 2017, doi: 10.2514/6.2017-5026.
 9. Abu-Khader MM. Plate heat exchangers: Recent advances. *Renewable and Sustainable Energy Reviews.* 2012; 16(4). doi: 10.1016/j.rser.2012.01.009.
 10. Imran M, Pambudi NA, Farooq M. Thermal and hydraulic optimization of plate heat exchanger using multi objective genetic algorithm. *Case Stud. Therm. Eng.*, 2017;10: 570-578. doi: 10.1016/j.csite.2017.10.003.
 11. Tran JM, Piper M, Kenig EY, Scholl S. Pillow-plate heat exchangers: Fundamental characteristics. In *Innovative Heat Exchangers*, 2017.
 12. Xie Y, Xu Z, Mei N. Evaluation of the effectiveness-NTU method for countercurrent humidifier. *Appl. Therm. Eng.*, 2016;5. doi: 10.1016/j.applthermaleng.2016.01.112.

AN OVERVIEW ON SOCIAL NETWORKS

Neha Anand*

*Assistant Professor,
Department of Humanities,
Teerthanker Mahaveer Institute of Management and Technology,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- nehaanand002@gmail.com

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ABSTRACT

Online social theory is a key paradigm in social system research which has been widely used to a variety of sectors. This study examines the development of social media network theory research and most recent advances, and the interdisciplinary research of social networks. This article evaluates the structure of social network at three levels: micro level, sleeveless, and methods that can be applied, in order to reveal the deep social hierarchy, and uncovers the genesis, development, perfection, and also most given proper of complex network models. This introduces the regular graph, model, exponential random network model, small-world schematic diagram, and magnitude schematic diagram. The findings show that SNSs are mostly used for social purposes, with the majority of these actions being related to the maintenance of preexisting offline networks. Moreover, extraversion appear to use social networking sites for major aim, whilst introverts appear to use them for social compensating, both of which appear to be associated with greater usage, as do low industriousness and high narcissism. Decreased real-life social community participation and academic achievement, as well as relationship problems, are all negative correlates of SNS use, and each could indicate potential addiction.

KEYWORDS: Motivations, Personality, Social Network Addiction, Social Networking, Sites.

1. INTRODUCTION

I'm an addict. As asked why she would not see herself being able to assist her kid with her homework, a young mother replies, "I just get lost in Facebook." She spends most of her time talking and reading the social networking site. Instead of supporting her kid. While this case is severe, it does hint to a possible new health problem that may arise as online social media sites become more prevalent. Similar cases have been covered in the press, suggesting that the national media was ahead of the curve in recognizing the potentially addictive qualities of social networking sites. Due to such media coverage, women are more likely as males to acquire SNS addictions. The increasing popularity of social media on the Internet may be reason for worry, particularly given the steadily increasing lengths of time people spend online. People engage in a variety of activities on the Internet, some of which have the potential to be addictive. Rather than

being addicted to the medium as a whole, some users may get addicted to particular online activities. Young claims that there are five types of internet addiction: computer addiction, info overload.net compulsions, cyber sexual addiction, and cyber-relationship addictive personality. Because the goal and primary motivation for using SNSs is to create and maintain both on- and offline relationships, it seems to fit into to the final group[1-2].

1.1.Personality:

A variety of personality traits seem to be linked to the quantity of utilization of social media sites. Some studies. Show that people with extensive outdoor social networks, who may be more extroverted, and who have higher self-esteem, use Facebook for social improvement, supporting that 'rich become richer' principle. Similarly, the size of individuals' social networks has a strong correlation with life satisfaction and well-being. But has no effect on the size of their offline networks or emotional closeness to those in real-world networks. Furthermore, it seems that individuals with different personality traits use SNSs differently. And prefer to utilize different Facebook features. Persons with high degrees of extraversion and openness to new experience are more likely to utilize social networking websites, with the former being true for older people and the latter for young folks. Furthermore, extraverts and accessible people are members of substantially more Groups on Facebook, use socializing features more often, and have significantly more Facebook friends than introverts, indicating the former's greater sociability in general. On the other side, introverts provide more personal details on their sites. Furthermore, it seems that especially shy individuals spend a lot of time on Fb and have a lot of friends on this social media platform. Because of the possibility of quick access to peers without demands of real-life closeness and intimacy, SNSs may seem to be advantageous for individuals whose real-life networks are restricted. This group's ease of access necessitates a greater time commitment, which may cause excessive and/or potentially addictive usage[3].

1.2.Negative Correlates:

A number of possible negative correlates of extensive SNS use have been identified in certain research. For example, according the findings of an online study of 184 Web users, individuals who spend more time on social media sites are considered to be less involved in their real-life communities. This is comparable to the findings that people with a poor social identity utilize SNSs more to compensate for their lack of confidence in their real-life connections with peers. Moreover, research seems that the type of peer feedback obtained on a person's social media profile influences the effects of SNS use on happiness or self-esteem. According to a more recent research. That investigated at the connection between Facebook usage and academic performance in a group of 219 university students, Face bookers had worse GPAs and reduce the time spent studying than kids who did not use this social networking site. Three-quarters. Of students who have said their use had an effect on their life has a negative impact, such as delay, distraction, and poor time management. One possible explanation is that students who utilized

the Internet to study were distracted by simultaneous participation in social media sites, indicating that this kind of multitask is harmful to academic achievement[4].

1.3.Addiction:

Excess use of new technologies. Has been suggested to be particularly addictive to young folks. According to the bio. Psychosocial framework for the genesis of addictions. And the spectrum model for addiction. People addicted to SNSs have symptoms that are similar to those who have addiction to drugs or other activities. This has important clinical implications since, unlike other addictions, one aim of SNS addiction therapy cannot be complete abstinence from the Internet because it is an integral part of today's professional and leisure society. Instead, the ultimate treatment goal is to utilize the Internet and its many functions in a controlled manner, especially social networking apps, and to avoid relapse utilizing techniques established in cognitive behavior therapy. Participants were asked how many days in the previous week they had visited SNSs at least four times a day, one week after completing the first questionnaire. Past conduct, subjective norm, attitude, and self-identity were shown to be significant predictors of both behavioral intentions and behavior in this research. Self-identity and belongingness were also shown to be significant predictors of addictive tendencies when it came to SNS usage. As a result, individuals who identified as SNS users or those who used SNSs to find a feeling of belonging seemed to be at risk of developing an SNS habit.

1.4.Specificity and Comorbidity:

It seems to paying careful attention to I the uniqueness of Suns usage and potential comorbidity is critical. Hall ET al.describe three main reasons why comorbidity between mental disorders, such as addictions, must be addressed. To start with, many mental illnesses have extra. Clinical issues or diseases. Second, in order to enhance treatment results, comorbid disorders must be addressed in clinical practice. Third, specialized preventive programs incorporating various aspects and treatment methods that specifically target related mental health issues may be created. As a result, understanding the specificity and possible comorbidities of Suns usage is critical. However, there has been almost little study on this subject to far. Because there have been so few studies investigating SNS addiction, as noted in the preceding section, there has been virtually no research on the co-occurrence of SNS addiction with other kinds of addictive behavior. However, there are a number of speculative assertions that may be made regarding co-addiction co-morbidity in connection to SNS addiction based on the limited empirical basis[5].

1.5.Uses and Benefits of Education and Training:

SNSs have indeed been utilized to teach, learn, and improve educational relationships amongst peers, pupils, instructors, and preceptors. Course assignments and projects have included usage of Twitter and Facebook. They were found to be effective, simple instructional aids for supplementing and improving students' learning. Raman et al clearly shown the utility, feasibility, and acceptance of WhatsApp as a supplement to "issue learning." SNSs promoted

interaction in both peer and sufficient skilled when used to assist teaching and learning. The apps fostered a good social atmosphere and provided opportunities for learning outside the classroom. They aided in the construction of students' own learning as well as their continued presence in growth. SNSs, according to Reams et al, have a beneficial impact on students' educational experiences and involvement. By monitoring or subscribing for changes in SNSs, health professionals may keep up to speed on news and information pertinent to their career practice. For example, the most a go clinical data and real-time surveillance on an aggressive outbreak may be made public before peer-reviewed papers are published. Facebook and Twitter helped in the development of professional growth, as well as the outreach from a scientific conference, enabling active involvement via communications during the symposium[6].

1.6. Visualizing Social Networks:

Because visualization methods for social networking sites are already well standardized and provided in most SNA software packages, we only identified one paper in the TP2.2 area. This subcategory's article suggested a technique for disaggregating relationships into their component events, as well as event-based changing network analyzes using dynamic graphs.

1.7. Opportunities:

We have reason to believe that this area of study is still in its early stages, with many research opportunities, since so few studies had addressed this subject and the bulk of them were published lately. Regardless of the fact that SNA techniques and tools are very well, more specific tools for studying social networking sites for specific purposes are still required. Moreover, the papers we look at suggested a number of areas for further study. Many of the studies, for example, used a specific kind of SN or even a single site to test various algorithms or tools. They recommended that the study be extended to include other kinds of SNSs, other sites or domains, other tasks, and/or different samples. We also saw a trend of SNA moving toward social media network intelligence, as well as more chances to do so[7].

1.8. General patterns:

The majority of articles in this area investigated the impact of structural or macro-structural features of a social network on users' views or actions. The systemic or macro-structural holistically developed from the single-tie level, such as relationship commitment, to the system level, such as network size, density, and primacy, to the system level, such as size of the network, density. Individuals and organizations. System usage, bid behavior, adaptability to IT-induced transformation, and so on are among attitudes and behaviors studied. Many other papers. Focused on the various variables that are unique in a social network context and its impact on issues such as behavior and adoption.

1.9. Trust and Interpersonal Relationships:

Users' data privacy concerns and ego behaviors in OSN have been the subject of a major stream of SN research that emerged around 2010. However, the bulk of the suggested factors are related to the structure of social networks. Posey ET al. for example, presented an online community self-disclosure model that took into account social influence to use an internet forum, reciprocity, online community trust, or privacy risk beliefs, then tested it in a cross-cultural context.

1.10 Knowledge Management:

The majority of the articles on this relevant and keep on how well the structural features of the social network affect different forms of knowledge management, such as knowledge transfer. Knowledge exchange, knowledge exchange, and knowledge application. Some papers were linked to TP1 because it focused on variables influencing step input in social networks. For example, argued that social video streaming creation is motivated primarily by visibility and reputation[8]. We really cannot locate many publications that used SNAs to perform citation analysis, despite their ability to give objective justification on problems. Only one study examined 120 journals using citation analysis and SNA, with the aim of determining CACM's position in the IS publication network.

2. DISCUSSION

A social media platform is a site that connects people together who have same hobbies and allows them to share information, photos, and videos. Those using social networking websites for personal purposes communicate using a range of media to share their lives and interests. What are the most common types of social media sites? Big brands like Facebook, LinkedIn, Facebook, and Twitter is one of the most popular social media sites. In the United States, are the most popular social media platform? Pinterest, Tumblr, Instagram, Tikor, and Vimeo are one of the others. Social networking focuses on allowing like-minded people to interact with others via websites and internet apps. Social media sites include Fb, Myspace, Instagram, and LinkedIn. Facebook alone has a user base of nearly half of the global population.

3. CONCLUSION

In addition to the obvious consequences and suggestion for future studies, more focus should be given on selecting bigger samples that are representative of a larger population in order to improve the external validity. The generalization of findings is critical for identifying people at likelihood of developing SNS addiction. Likewise, further psycho - physiological study seems to be needed in order to assess the phenomena from a biological perspective. In particular, clear & proven addiction criteria must be assessed. Reducing addiction study to only a few criteria is inadequate. The use of frameworks established by international classification guides is required to differentiate pathology from high frequency or problematic use. Moreover, clinical research and practice indicate that it is critical to pay attention to the substantial damage that SNS addicts suffer in a number of life domains as a result of their violent and/or addictions. Similarly, data due to self is inadequate for diagnosis because research suggests they may be inaccurate. Self-

reports could theoretically be augmented with organized clinical interviews, further real case data, and observations from the users' significant others. To conclude, social networks on the Net are dazzling Web. Phenomena which provide opportunity to take part in and use collective knowledge. Nevertheless, employing the most proper scientific methods, the hidden psychological health consequences of excess and addictive use are still to be explored.

REFERENCES:

1. Zhou W, Duan W, and Piramuthu S. A social network matrix for implicit and explicit social network plates. *Decis. Support Syst.*, 2014;68: 89–97. doi: 10.1016/j.dss.2014.09.006.
2. Bolotaeva V and Cata T. Social network marketing. 2009, doi: 10.4018/978-1-4666-4864-7.ch007.
3. Koçak NG. Social Networks and Social Network Analysis Faculty of Open Education. *Int. J. Bus. Soc. Sci.*, 2014;5(2):126-135.
4. Scott J and Stokman FN. Social Networks In *International Encyclopedia of the Social & Behavioral Sciences: Second Edition*, 2015.
5. Friemel TN. Dynamics of social networks. 2011;22:2-3. doi: 10.1016/j.sbspro.2011.07.050.
6. Can U and Alatas B. A new direction in social network analysis: Online social network analysis problems and applications. *Physica A: Statistical Mechanics and its Applications*. 2019; 535: 122372. doi: 10.1016/j.physa.2019.122372.
7. Musiał K and Kaziienko P. Social networks on the Internet. *World Wide Web*, 2013; 16: 31–72. doi: 10.1007/s11280-011-0155-z.
8. Allen DW. Social networks and self-employment. *J. Socio. Econ.*, 2000; 29(1): 487-501.

AN OVERVIEW ON DIDACTIC GAMES

Navneet Kumar Vishnoi*

*Assistant Professor,
Department of Computer Engineering,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- navneet.computers@tmu.ac.in

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ABSTRACT

The introduction of new technologies into culture has resulted in a need for interactive content that can fully maximize the benefits of technological advances. Serious play, often called as kids software, are video games or interactive apps with the main intention of providing not only amusement but also instruction in fields such as health, marketing, education, and so on. This paper examines different examples of effective real games and their impact on the learning experience, examines coaching as a key to directing the learning experience in serious games, and analyzes the types of talents and skills that can be acquired via such games. Individuals must be prepared to face future challenges at this time of financial, economic, and social crises, and their particular values should be linked to those of society as a whole. Serious play are the ideal instrument for accomplishing these goals, as well as for effectively and attractively conveying information and ideals[1].

KEYWORDS: Achievement, Educational Technology, Gaming, Simulations.

INTRODUCTION

A games is a form of play wherein players should conform to a set of rules. Educational games are described by.as the use of games to support learning and teaching. Games can be used as a supplement to traditional teaching methods to enhance learners' educational experiences while also imparting other skills such as rule-following, issue, interaction, critical reasoning, creativity, collaboration, and good sportsmanship. Learning should never be boring, and it should not be limited to rote memory, wherein pupils learn and grasp ideas through repetition or rushing. Teachers can use the energy and creative thinking that comes with utilizing technology in education to help students perform better [2].

To develop a student who's really eager to study. To excite and encourage pupils. Decreasing job learning techniques. To assist students with their attention, self-esteem, and memory. Experimentation time is short. Using open source applications. Moodle is an open source application that allows teachers to modify and publish material in a demo account. After 60 min, the demo time will end and all content will be reset. Propos is also an open source application with limitations which hinder the design process.

1.1. Overview of Games in Education:

Educational games are used in a variety of settings, including educational institutions, colleges, and households. The main objective of using games in development is to educate critical thinking abilities while teaching a certain topic by enabling pupils to think outside of the box while adhering to rules. Other games that can be used to improve knowledge in a specific subject include math games that are the most popular. Games like chess are not regarded educational since they do not produce information or relay curriculum material, according to. They improve logic skills, rationale, and other traits valued in schooling, but they are not considered informative because they do not yet produce information or relay syllabus material. Instructional game is a game that integrate curricular content or other instructional resources[3].

1.2. Teaching History:

The nature of Economics as a topic requires the use of current and emerging tools to complement the main delivery of teaching. In contrast to courses like Math and Science, which seem to be more essential, history is a topic that deals on facts that must be preserved as they are. Students may not feel a need to study in order to grasp words and ideas if History is regarded as a subject of little importance in the world. Instead, they may feel the need to learn just to do well on the test and forgot about the course. By applying game ideas to History, students will be able to view the subject in a different light, since History is much more than a recap of past events. The necessity to interest students in such a course is becoming increasingly evident in order for them to retain what they study in the future. The goal of adding a Historical module to Arts students in their final year of undergraduate years is to ensure that graduates have no difficulty finding rewarding jobs in a variety of fields such as news reporting, developmental psychology, and finance, business, as well as consulting in law and public government. Graduates can also broaden into careers in finance, biz, and advising in law and public administration, journalism broadcasting, and also in a variety of other fields[4].

1.3. Their Potential:

Serious game is a game which are used for training, advertising, simulation, or education. There is no universally accepted definition of serious games. Application of game principles, technology, or ideas to non-entertainment purposes is an alternative definition. In Clark Act was the first to use this phrase. Serious play, he believes, are excellent teaching and training methods for learners of all abilities in a variety of circumstances since they are extremely motivating and convey basic ideas and facts of many topics very well. They provide a fertile ground for risk-free active investigation of important social and intellectual issues. Michel ET al. split the history of severe games into four periods: first, learners became accountable for their own learning with introduction of learning machines and Presser's Drum Teacher in.

The MIT Tornado project, which allowed military flight crews to train in a controlled environment, was launched in. Then, using a systematic manner, learning was accomplished via experimentation. As a result, the state of flow. And immersion increased. Simulators became more accessible to the public as video games became more democratized. Michel ET alien the article by saying that simulation games have progressively been professionalized that since early. Games are being utilized in professional training again, but in a wider sense and not only for the

acquisition of technical skills. As a result, serious games may be described as technology and video game platforms having goals other than pure enjoyment. The virtual world that goes along with it appears to be geared at trying to engage students.

1.4.The Relevancy of Tutoring:

One of the most essential characteristics of successful kid's software is their capacity to maintain a student's interest and motivation by tailoring the learning and game to the requirements, interests, objectives, and skills of each learner. The role of a tutor is critical in accomplishing this, and several academics are researching on this topic. The concept comes from the field of responsive tutoring in traditional innovation teaching and learning, which was largely motivated by Benjamin Bloom, who tried to claim in. that students who received. Tutoring performed on par with the top. Of students who receive classroom training.

In the education process, a tutor serves as an adviser: not only does he or she offer information to a passive user, as in traditional education, but the user also adds his or her own prior skills and knowledge to the community. As a result, tutors and students must interact and collaborate during the educational process. After each choice is executed, the instructor seeks input. Serious games need two things: excellent teaching and a dynamic environment. The process of learning will not be completed if this is not done. This coaching enables for the monitoring of any abnormal conduct on the part of the user, and the prevention of improper behavior that is feasible but socially undesirable. It also aids in the marketing of the educational benefits that serious games provide. Tutoring performance is key for directing the learning process in serious games, and it should include the following particular important elements[5].

1.5.Games for Learning Vocabulary and Numbers:

Two games for children aged 6 and above are. The first is used it to teach basic Basque, Spanish, and English vocabulary. The second is used to help children develop their numeracy abilities in basic operations including addition, subtraction, multiplication, and division. Punto, a figure that takes the shape of a punctuation and looks after the language, was featured. The goal would be for players to assist him in guessing the word or number it should appear under each image in order to get the highest possible score. Pictures emerge on the screen during these games, and the central protagonist must fill in the gaps with the help of the learner. There are three difficulty levels, each with a variety of screens including enemies and items to aid learners. Punto must fill the gaps in the words at both the easy and difficult levels. The following word appears once the previous one has been finished, and so on.

The central protagonist "Puntu. has to cope with bulls that appear out of nowhere and attempt to stop him from completing the word. These activities have been utilized in a few primary education in the Basque Country, and all of the instructors involved claim it was a huge success. Children learned new vocabulary quickly and in a wonderful way. Moreover, when the instructors used these activities in class, all of the students paid more attention. Punto has to cope with birds that attempt to distract him in this game. Both games are very helpful in helping young children acquire basic language and basic mathematical operations, according to. Percent of parents who have gamed with their children. As a result, they see them as important instruments for enhancing children's learning[6].

1.6.Development of the Game:

These kind of games are used to encourage innovation among engineering students at universities and learners at vocational college. Sustainability, teamwork, solidarity, innovative thinking, creative thinking, problem-solving, continual improvement, energy efficiency, mathematical precision, initiative, goal achievement, action orientation, flexibility, and working with the environment are among the skills and abilities that these games typically develop. The takes on the role of mayor of the island, with the goal of maximizing the happiness of the island's residents. He or she is responsible for handling the islands economic in order to attain the highest suitable balance. Users on the island have access to a wide range of nonrenewable energy sources, including oil, Nat gas, and uranium. Water, the sunlight, and the wind are all renewable energy. Furthermore, since they live in a village, they must better manage the little area available. In a summary, the player is elected governor of the island, and his or her goal is to maximize the utilization of the planet's resources. The strategies that are put in place must take account the relevant framework of limitations, just as in reality in public resources planning, i.e. a budget that contains income and expenditure, as well as any new problems that may occur as a result of the choices taken and the available space[7].

1.7.Results of Using the “Island” Game:

The Provincial Government of Vizcaya inside the Basque Country has been holding a competition including the serious game of an Island for the last two years. Students form universities and technical education are scheduled to join. The competition's goal is to instill and develop skills and talents in young people in places such as creativity, business, sustainability, and public-sector finance, management of natural resources, initiative, client orientation, and awareness campaigns. A look at the data shows the following. Of respondents received a high sufficient citizen rating to pass the first issue set and advance to the second. Eighty percent of those who took part were pursuing engineering degrees or vocational training modules. Percent of users rated the game either.

For teaching how to manage a public-sector economy with its natural resources and public infrastructure to improve people' welfare, while. Rated it as.of the teaching staff who assist the students believe the game is beneficial to students learning and provides them with real world experience in how government universities manage resources and public infrastructures in order to achieve a sustainable balance and increase societal welfare. This programmer provides a dynamic way for the Province Council of Vizcaya in the Basque Country to convey and foster a culture of innovation, competences, and skills among the young people who would be the province's future managers, oriented toward good public resource management in order to ensure better social and economic development. For the serious game, mathematical algorithms were created to serve as the basis for a mathematical model that links the results produced from the many endogenous variables computed using the data input in the independent factors that make up the entire model.

1.8.Game Theory:

Nicholas Feynman delivered diversion hypothesis, a half-and-half field between program design and money related angles, and about the same time that Wittgenstein was creating his concept of Sprachspiele. John Nash later expanded and formalized game theory, which is a theory of communication that simulates complex social. Games are categorized into two kinds: communal

and focused difficult games, in which players act as experts who follow the game's rules and take it in turns. Typically, game theory is used to represent disputes or market dynamics. Guidelines, turns, collaboration, and competition are all includes showing of a game in game theory, where victory, or pleasure, is shown as a numerical outcome. Game theory aims to explain how a game works and defines reenactments as an intuitive process directed at accomplishing a goal. We shall identify its approach as functional since game theory offers a phenomenology account of a game, for instance, what occurs during in the match, without examining the meaning of a game, for instance, why do we play. Tools Used:

The educational game was created using licensed professional Build and Test Knowledge, a free software program. Propos is indeed an online platform for instruction and evaluation that was founded by Sameer Bhatia with the goal of building and testing knowledge. This online tool allows for the sharing of resources and online education, so it provides study guides, practice tests, as well as articles for certifying exams. Instructors may create tests, polls, flashcards, and games using ProProfs.com, a Web. Application. Users may cooperate and share data with the site's millions of users. Moodle.net is an e-learning platform is built on an open source platform. This application has been used to make the game accessible to students by posting links to the game on the portal that they could access by providing their log-in information[8].

1.9.Games Designed:

Propos serves as a tool for posting and distributing games that may be shared on a weblog, website, and other social media outlet. This open source game creation application may be used to build activities such as word search, crossword, puzzle, executioner, word jumble, slide puzzle, mind tease, and quiz games[9].

DISCUSSION

Including activities in a lesson as element of the teaching - learning activities helps to create a pleasant environment in the class, encouraging students to participate and maintain a positive attitude toward learning. In the classroom, games can also generate a pleasant learning and memory environment for pupils. A didactic system is the system of training processes and outcomes that is difficult to structure and has two key elements: teaching. And learning. Didactical modeling falls within the category of academic research methods. It is a method for developing, testing, and implementing learning method, as well as for managing pedagogical processes and integrating pedagogical models and ideas linked to curriculum materials, purpose, and prognosis views. One significant distinction between didactics and pedagogy is whether they concentrate on the teacher or the student. Didactics is usually focused on the instructor. Pedagogy, on the other hand, is learner-centered and entails devising instructional methods that are tailored to the unique learning styles of individual pupils. When someone acts too much like a teacher, this term is frequently used negatively. When you're didactic, you're attempting to impart knowledge. Almost everything a teacher does is didactic, and the same can be said for coaches and mentors. Didactic is a term that is often used offensively. Minecraft is usually suggested for children aged 8 and up, since it is a game that isn't overly violent or tough to learn. It was, in fact, one of the many children's first online video gaming experiences[10].

CONCLUSION

The many examples of successful real games examined in this paper allow us to infer that serious play have a lot of potential for training since they have such a positive impact on users' learning. It's because they captivate people in a simple, dynamic way and convert people into active participants in their very own learning. Serious play strive to be a mechanism that groups learn in a dynamic, engaging, motivational, and engaging way, rather than for fun. Serious play are flexible enough to work on a variety of devices, including PCs, Macs, phones, iPads, and tablets. HTML 5 and Unity, that are well-suited to the development of serious games, are the best technologies for them. Tutoring is critical in serious games for 3 motives: first, it promotes education, second, it helps users in achieving their goals during the game, and third, it offers a monitoring tool for avoiding improper user behavior. If games are utilized as a learning technique in initial training, the learners' profiles, particularly their prior expertise in the field being studied, must be taken into account. Something which excellent tutoring can help with. Serious play can use game.to provide a solution in any training phase in any thematic area, because serious play tailored to the learning content of the course can be formed. According to the Game of Island as well as an ordinary least squares model, the majority of students improved their abilities in sustainable development, teamwork, solidarity, innovation, creativity, issue, continuous improvement, energy efficiency, arithmetical precision, leadership, goal attainment, action orientation, flexibility, as well as working together after playing the games. This is because, as the findings of the econometric analysis indicate, the game has a positive effect on the learning process

REFERENCES:

1. Gabdulkhakov VF. A Didactic Game Technology. *Procedia - Soc. Behav. Sci.*, 2016;233: 170-174.
2. De Almeida MO, Ribeiro VGP, Arruda ARP, Maia FJN, Mazzetto SE. The effect of contextualization and of didactic game on learning of organic functions. *Rev. Virtual Quim.*, 2016;8(3).
3. Jančič P, Hus V. Didactic Games in Social Studies in Primary School. *Creat. Educ.*, 2017; 08(12):1892-190.
4. Pushkareva TA, Rybalko OA. Designing Of Didactic Game Programs In Mathematics For Primary School Using Adobe Flash. *Educ. Sci. Psychol.*, 2016;2(39).
5. Makarova N, Potemkina M, Chernova N, Dorozhkin A. A System of Didactic Games as a Foundation of Teaching History in Secondary School. *SHS Web Conf.*, 2018;50(19):01009.
6. Tkachova N, Tur O. Didactic Game As An Advanced Method Of Communicative Competence Formation In Future Specialists In Documentation And Information Services. *Adv. Educ.*, 2017.
7. Bateneva EV. Arbitrary Memory Improvement In Older Preschoolers Using Didactic Games. *Procedia - Soc. Behav. Sci.*, 2016 233:259-263.
8. Moreno LF, Hincapié G, Alzate MV. Cheminoes: A Didactic Game To Learn Chemical Relationships Between Valence, Atomic Number, And Symbol. *J. Chem. Educ.*, 2014;91(6): 872-875.

9. Nechifor A, Purcaru MAP. Differentiated Instruction With Mathematics And English Language Teaching Methodology Seminars: Didactic Game And Individual Work. Bull. Transilv. Univ. Brasov. Ser. Vii Soc. Sci. Law, 2017;10(2): 132-142.

Romano CG, Carvalho AL, Mattano ID, Chaves MRM, Antoniassi B. Chemical profile: A game for teaching the periodic table. Rev. Virtual Quim., 2017.

THERMAL ENERGY STORAGE WITH PHASE CHANGE: A REVIEW

Dr. Megha Sharma*

*Assistant Professor,
Department of Finance/marketing,
TeerthankerMahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- drmegha.computers@tmu.ac.in

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ABSTRACT

Energy storage in generally, and ion exchange material (PCMs) in specific, have been a major focus of study over the last two decades, however despite the vast amount of data available, it is dispersed across the literature and difficult to locate. Energy supply security is often accomplished via the use of additional technology. The use of phase change materials (PCMs) may be able to eliminate or minimize the need for this additional equipment. Thermal inertia and thermal management are the areas where PCMs have a greater market penetration. Because it deals on energy conservation, the efficient and logical use of existing resources, and the optimal use of alternative fuels, the work mentioned below is of worldwide significance. The development of thermal storage using solid–liquid phase transition has been reviewed in this paper. This evaluation focused on three aspects: materials, heat transmission, and applications. Over 150 materials utilized in study as PCMs are mentioned in the article, including approximately 45 available commercially PCMs.

KEYWORDS:*Energy Storage, Heat Transfer, Phase Change, Pcms, Thermal Energy.*

INTRODUCTION

Thermal energy storage (TES) in generally, and ion exchange material in particular, have been a major focus of study over the last two decades, however despite the vast amount of data available, it is dispersed across the literature and difficult to locate.[1] TES offers solutions in the following areas under this framework:

- The lag time and available power from power generation or supply and use in receiving devices (solar energy, cogeneration, etc.)
- Energy supply security (hospitals, computer centers, etc.)
- Thermal protection and thermal inertia[2]

In the first instance, applications involving the use of renewable energy sources, such as solar energy, are popular, but they may also be seen in co - generation equipment or systems that provide lower rates for electrical energy used during off-peak hours. This article

presents an overview of research using phase transition materials in TES. The information in this study has been organized into the following categories:

- Phase change materials
- Analysis of heat transfer
- Applications

As illustrated in Fig. 1, the first two sections address the two basic factors to be examined in a heat storage system: material and thermal.[1]

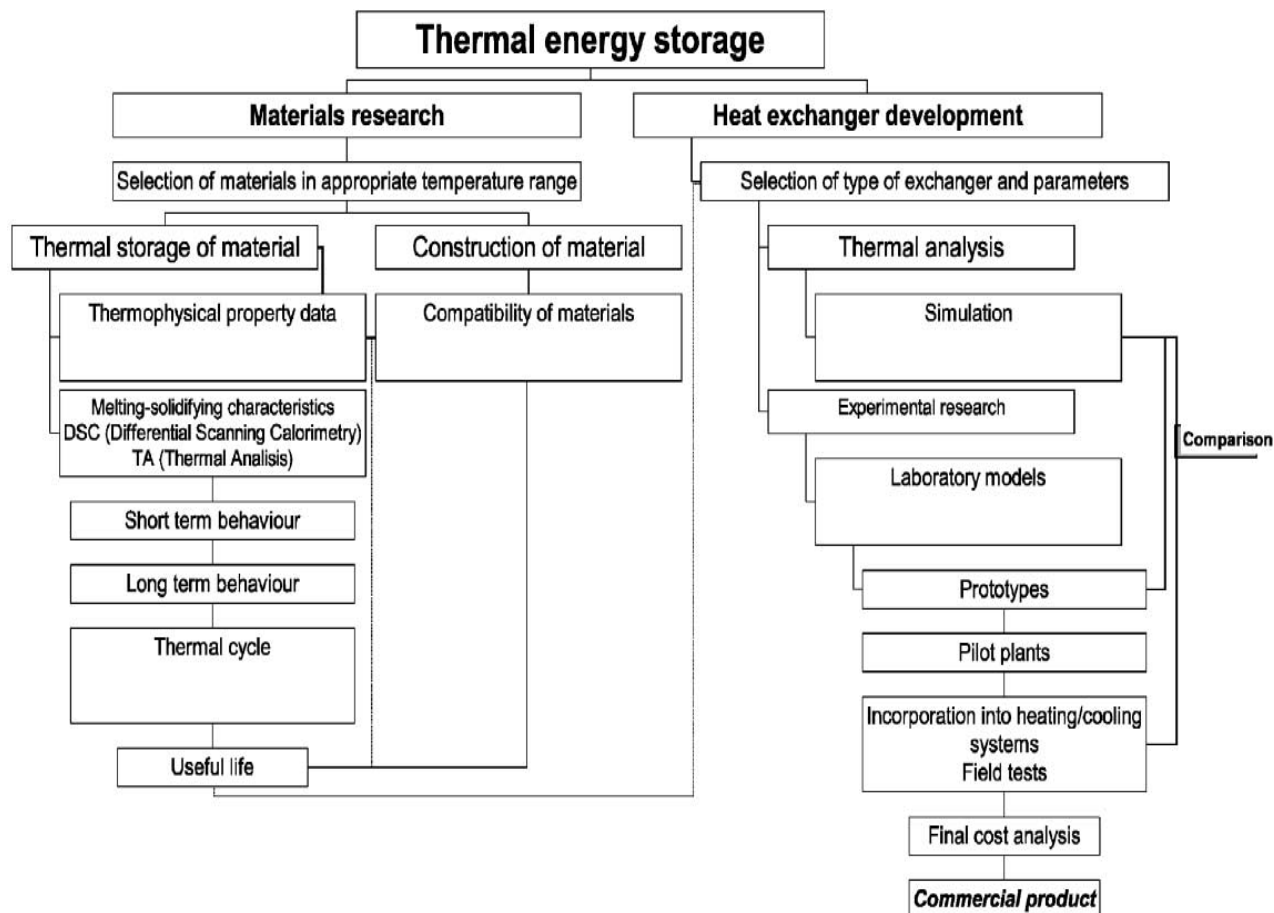


Figure 1: Area of Research in Thermal Storage Systems[1]

DISCUSSION

1. Materials That Change Phase:

1.1 Commercial and Non-Commercial Materials:

Although many compounds have indeed been investigated as possible PCMs, only a few have been commercialized. The many chemicals, eutectics, and combinations (inorganic, organic, and fatty acids) that were investigated for its possible use as PCMs by various researchers. A few of their thermo physical characteristics are listed (relatively high melting, heat of fusion, thermal conductivity, and density), although some writers include further details (tightly correlated

melting, liquid limit, specific heat, and so on). A list of commercial PCMs on the market, along with their thermo physical characteristics (melting point, temperature of fusion, and density), as well as the firm that produces them.[3]

1.2 Materials (Organic and Inorganic):

Table 8 shows the comparison of the benefits and drawbacks of inorganic materials. Hydrates and their many uses in the area of solar energy storage stand out among inorganic materials. Lane gives a thorough overview of phase transition materials, particularly hydrated salts. The many kinds of encapsulating and their suitability with various materials are discussed in Chapter 3 of same book. Organic compounds such as alkanes, waxes, and paraffins have been used by a large number of writers. MCPAM (Phase change materials made up of molecular alloys) is a family of organic materials made up of alkane-based alloys that have the benefit of being thermo adjustable, that is, they enable changes to the phase change temperature via their composition. The literature has a great deal of information on this topic.

In terms of storage heat or phase change, temperature distribution in accumulators may be enhanced by selecting a PCM with a temperature that optimizes the temperature gradients with regard to the material with which heat is transferred. It is feasible to alter the amount of carbon atoms in paraffins and alkanes, for example, or create various molecular alloys, allowing a virtually continuous modification of the phase transition temperature within specific limits.[4]

2. Heat Transfer:

2.1 Simulation Theory:

In terms of the thermal gradient, publications by Strub and Bejan provide information on the study of entropy of the system and the use of the second principle of thermodynamics, as well as a comprehensive review of Dincer and Rosen. Exergy is critical in gaining a solid knowledge of the thermodynamic behavior of TES systems, as well as in logically evaluating, comparing, and increasing their efficiencies, according to these authors' research. The use of exergy analysis is particularly significant because it accurately represents the thermodynamics and financial impact of storage operations by taking into consideration the losses of accessibility and degree of heat in storage activities.[5]

2.2 Moving Boundary Problems:

The assessment of heat transfer in crystallization processes, also known as moving boundary troubles in research journals, is particularly difficult because the ends moves relying on the rate at which dormant heat is transferred or lost at the solid–liquid boundary. Table 8 shows the comparison of physical and chemical heat storage materials. Organics Inorganics Advantages There are no corrosives. Greater enthalpy of phase change Undercooling should be kept to a minimum or not at all. Stability chemically and thermally Disadvantages Lower enthalpy of phase change Undercooling Thermal conductivity is low. Corrosion Inflammability Separation of phases Lack of thermal stability, phase segregation shows some of the most important properties of energy storage materials. Thermal characteristics Physical characteristics Chemical characteristics Economical qualities Temperature of phase transition adapted to the application Variation in density is minimal. Stability Cheap and plentiful There is no phase separation. Near the temperature of usage, there is a large shift in enthalpy. Dense population Container materials compatibility Undercooling is little or non-existent. Toxic, flammable, and polluting-free Both in

liquid and solid phases, there is a high heat conductivity (although not always) 264 The location of the border is not known a priori and constitutes part of the solution, Eckert et al. conducted a review of experimental and analytical work in the field of phase transition, particularly freezing and melting processes. Melting and freezing of spheres, cylinders, and slabs; Stefan issues; ice in porous materials; interface melting; and crystallization in casting were among the topics covered in the review.[6]

3. Improved Heat Transfer:

In a latent heat thermal store, there are many ways to improve heat transmission. Various researchers have suggested the use of finned tubes in thermal storage systems, including Abhat et al., Morcos et al., Sadasuke, Costa et al., Padmanabhan, Velraj, and Ismail et al. There have been many additional heat transfer improvement methods described. Siegel investigated the effect of highly conductive particles on the solidification rate of molten salt. The PCM may also be embedded in a metallic matrix structure. Bauer and Wirtz pioneered use of thin aluminum plates loaded with PCM. A graphite-compound-material was suggested by Mehling et al. and Py et al, in which the PCM is embedded within a graphite matrix.

The primary benefit of such a material is that it increases heat transfer in the PCM without significantly reducing energy storage, but it also reduces salt hydrate sub cooling and reduces dimensional changes in paraffins. Other scientists, such as Fukai et al, have looked at the use of graphite as a better heat transfer material. Brushes composed of carbon fibers were created. The relative density of the fibres can be precisely and readily regulated using this technique, and low volume fraction threads are completely distributed in the PCM. Using paraffin, a styrene–butadiene–styrene triblock copolymer, and exfoliated graphite, Xiao et al. produced a composite. They claimed that paraffin undergoes a solid–liquid phase transition in the composite and that there is no leak even while it is melting. The composite has excellent thermal conductivity and approximately 80% latent melting point per unit mass of paraffin.[7]

Some of the many uses that have been discovered in the literature like Dincer and Rosen provide a comprehensive review of several latent TES, cold TES, and seasonal storage methods.

Thermal insulation or inertia, and storage, are the two major categories of applications. The heat conductivity of the material is one significant distinction between these two important areas of application. Low conductivity levels are acceptable in certain instances of thermal protection, but they may be a significant issue in storage systems since there may be enough energy stored but inadequate capacity to dispose of it fast enough.[8]

4.1. Storage Of Ice:

In the past, the majority of research focused on analyzing pure chemicals, most often freshwater (for ice stores). London, Goodman, Lazaridis and Saitoh are among the studies that may be mentioned. In the years thereafter, and especially lately, owing to the industrial and commercial deployment of the so ice storage solutions, a plethora of material water related as a storage substance has emerged in the literature.

4.2. Temperature-Sensitive Materials Conservation And Transportation:

When carrying food, the temperature must often be maintained above a particular level, or heat from the coolant must be prevented if the food is frozen. When carrying temperature-sensitive

medicines, the issue is identical. Because PCM's capacity to retain temperature extremes in a range of just a few degrees may be utilized in both applications, it's a good fit for both. Many businesses currently provide shipping crates for sensitive goods, thus this application is already on the market.[9]

4.3. Construction Applications:

One of the earliest uses investigated, along with traditional storage tanks, was the use of PCMs for put forth the effort storage in buildings. Telkes in 1975 and Lane in 1986 were the first to discuss the use of PCMs for heating and cooling in buildings in the literature. Barkmann and Wessling brought out the utilization of buildings critical elements for heat storage in 1975, and additional writers followed suit.

Safety is a critical consideration in applications such as the usage of PCMs in buildings. This article examines a variety of applications in the area of heating and cooling, as well as the materials, benefits, drawbacks, and features of a number of PCM compounds that may be used for thermal energy storage in buildings. The paraffin type (hydrocarbons; 60 to 80 C), whose origin can be from the polymerization process of propylene or as a by-product of petroleum, had the most benefits of the four PCMs studied. Shell, Exxon, Gulf, Sun Oil, and Witco are among the providers mentioned. There are also commercial names and pricing for different paraffins.

4.4 Additional Applications:

Even though radiation from the sun and air conditioning occur at the same time, some heat storage is required for the chiller to operate continuously or for the operation time to be extended, so Safarik et al. established a solar climatization scheme using a nitrogen absorption chiller with paraffin-latent heat storage.[10]

CONCLUSION

The use of solid–liquid phase transition in TES has been reviewed. The collected data is organized into three sections: materials, heat transmission, and applications. The thermo physical characteristics of materials utilized by researchers as potential PCMs are discussed. Professional PCMs also have been included in the list. There are many techniques for determining thermal characteristics. Problems with the materials' long-term stability and encapsulation are addressed. Heat transport is mostly addressed from a theoretical standpoint, using various simulation methods. PCMs have a wide range of uses, including ice storage, construction applications, heat sensitive material preservation and transit, water reservoirs vs. PCM tanks, and more.

REFERENCES

1. Zalba B, Marín JM, Cabeza LF, Mehling H. Review on thermal energy storage with phase change: Materials, heat transfer analysis and applications. *Applied Thermal Engineering*. 2003;23(30): 251-283. doi: 10.1016/S1359-4311(02)00192-8.
2. Sharma A, Tyagi VV, Chen CR, Buddhi D. Review on thermal energy storage with phase change materials and applications, *Renewable and Sustainable Energy Reviews*. 2009;13(2): 318-345. doi: 10.1016/j.rser.2007.10.005.
3. Zhou D, Zhao CY, Tian Y. Review on thermal energy storage with phase change materials (PCMs) in building applications. *Applied Energy*. 2012;92:593–605. doi:

10.1016/j.apenergy.2011.08.025.

4. Socaciu LG. Thermal energy storage with phase change material. Leonardo Electron. J. Pract. Technol., 2012;11(2):75-98. doi: 10.1201/9780367567699.
5. Nkwetta DN, Haghighat F. Thermal energy storage with phase change material - A state-of-the-art review. Sustain. Cities Soc., 2014;10(10):87–100. doi: 10.1016/j.scs.2013.05.007.
6. Subrahmanyam PB, Soni PR. The Viability of Thermal Energy Storage and Phase Change Material: A Review. Int. J. Trend Sci. Res. Dev., 2018;2(3): 2636-2641. doi: 10.31142/ijtsrd12776.
7. Beyhan B, Paksoy H, Daşgan Y. Root zone temperature control with thermal energy storage in phase change materials for soilless greenhouse applications. Energy Convers. Manag., 2013;74:446-453. doi: 10.1016/j.enconman.2013.06.047.
8. Zarma IH, Hassan H, Ookawara S, Ahmed M. Thermal Energy Storage in Phase Change Materials:-Applications, Advantages and Disadvantages. Iccee 2017, 2017.
9. Fatih Demirbas M. Thermal energy storage and phase change materials: An overview. Energy Sources, Part B: Economics, Planning and Policy. 2006;1(1):85-95. doi: 10.1080/009083190881481.
10. Duan X-L, Roul J, Ryan S, Hodder S, Stamp J. Solar Thermal Energy Storage with Phase Change Material - Heat Exchanger Design and Heat Transfer Analysis. 2017, doi: 10.2991/icsd-16.2017.83.

USING PROVERBS AS A LEAD-IN ACTIVITY IN TEACHING ENGLISH AS A FOREIGN LANGUAGE

Hilola Musinovna Sotvaldieva*

*Senior Teacher,
Fergana State University,
Fergana City, UZBEKISTAN

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ABSTRACT

Teachers often find it difficult to keep their students' interest high in learning English. They have to do their best to attract the students' attention to the subject so that the students may have a feeling of pleasure while learning, and they are enhanced to learn more at the same time. Using English proverbs can serve as an alternative lead-in activity to start new lessons to keep the students interested in the lesson from the beginning.

KEYWORDS: Proverbs, Lead-In Activity, English Teaching, Purpose, the Process Of Learning, Culture.

INTRODUCTION

Due to the development of science and technology, the world is shrinking. Communication between people all over the world is becoming so intense that they need an international language in which they can share their feelings or their business. English has become one of the important international languages that people all over the world study. Teaching and learning English is becoming an important thing. Linguists and foreign language teachers continue to search for the best method of teaching English. However, teaching English as a foreign language is likely to turn out to be a failure. Many students refuse to learn a language for many reasons before they master it. In order not to give up, an English teacher should make every effort to make his/her teaching interesting, and his/her students have fun while studying, as well as lead their students to great success in learning the language being studied. To do this, he/she must bring various methods to his/her class so as not to get bored in class. Something interesting should be presented at the very beginning of the lesson so that students are encouraged to study more, their concentration can be maintained and at the same time they can have fun. To get a good start, the teacher needs something to increase the motivation of students or warm them up so that they enjoy the learning process. To do this, it is necessary to conduct a good introductory operation. Reading or using English proverbs can be an effective way to start a new lesson. If necessary, the teacher can compare English proverbs with Russian proverbs. For example, a teacher may ask his students to compare the English proverb "Make hay while the sun shines" with the Russian proverb "Make hay while the sun shines". [1]

For example, a teacher may ask his students to compare the English proverb «Make hay while the sun shines» with the Russian proverb «Заготовить сено, пока светит солнце». Using proverbs, a teacher can help his students learn English faster and get

pleasant impressions in the learning process. A good start can guarantee a happy and useful pastime during your studies. An experienced teacher will know from the very beginning whether his lesson will be interesting or not. If the class starts with a fun situation, the next step of learning will be easier and the students will learn better.[2]

MAIN PART

The introductory assignment will determine the successful class to some extent. Therefore, the teacher should do everything possible to make his introductory assignment interesting, dramatic and vivid. English proverbs can be used as an alternative to the introductory task. Webster defines a proverb as a short traditional utterance that expresses an obvious truth or similar experience. Proverbs have been used for centuries as teaching aids for teaching moral values and social skills. They can deal with intelligence, wisdom, experience, knowledge and authority. They are indeed effective means for transmitting wisdom and knowledge about human nature and the world as a whole [1]. The parables contain in a few words the truth relating to everyday life, which has universal value, and they are easy to remember. Given the good values of proverbs, a teacher can use proverbs to teach English as a foreign language as an introductory lesson before learning language skills. This is a good way to consolidate the study of vocabulary, grammar, sentence models, moral values, and the like.

Grammar: The teacher can use certain proverbs to start his grammar lesson before studying the material in detail. For example, a teacher who wants to teach a gerund can use the following proverbs as an introductory exercise:

Seeing is believing. Before criticizing a man, walk a mile in his shoes.
Lingting never strikes twice in the same place. Missing the wood for the trees.
Thinking the worst always prepares you for the worst. Winning is earning. Losing is learning.

When teaching imperative sentences, the teacher can use the following proverbs as an introductory task. These can be positive and negative imperative sentences. Here are some examples of proverbs for this purpose:

Positive: **Fool** me once, shame on you. **Fool** me twice, shame on me - «Обмани меня один раз, позор тебе. Обмани меня дважды, позор мне».

Give a man a fish and you feed him for a day, **teach** a man to fish and you feed him for a life time - «Дай человеку рыбу, и вы его накормите на день, научи человека ловить рыбу и вы кормите его всю жизнь».

Look before you leap - «Посмотрите, прежде чем прыгать».

Make hay while the sun shines - «Сделать сено, пока солнце светит».

Never trouble trouble till trouble troubles you - «Никогда не доставляйте неприятностей, пока неприятности не беспокоят вас».

Negative: **Don't bite** the hand that feeds you - «не кусай руку, которая вас кормит».

Don't burn your bridge before they're crossed - «Не сжигайте мосты, пока они не перейдут».

Don't count your chickens before they're hatched - «Не считайте цыплят, пока они не вылупились».

Don't cry over spilt milk - «Не плачьте над пролитым молоком».

Don't judge a book by its cover - «Не судите книгу по обложке».

During classes, the teacher can show the use of the articles a, an or the used in proverbs, and may ask students to memorize the proverbs in order to learn the rule.

An apple a day keeps **the** doctor away - «Яблоков день убережет доктора».

A bird in **the** hand is worth two in **the** bush - «Лучше синица в руках, чем журавль в небе».

A friend indeed is **a** friend indeed - «Горшок с молоком испорчен каплей яда».

2. Pronunciation. Learning pronunciation can be boring, but proverbs can have a little fun in this matter. When teaching pronunciation, the teacher may use proverbs with some vowels or consonants that are difficult for students. Here are some examples of proverbs for this purpose:

Vowels. A friend in need is a friend indeed - «Друг в нужде - это действительно друг».

A good wife and health is a man's best wealth - «Хорошая жена и здоровье - лучшее богатство мужчины».

New lords, new laws - «Новые лорды, новые законы».

Haste makes waste - «Поспешишь - людей насмешишь».

No joy without annoy - «Нет радости без досады».

Consonants: Practice makes perfect - «Практика делает совершенство»

There is nothing which has been **bitter** before **being** ripe - «Нет ничего, чтобы было горьким перед созреванием».

Birds of the same **feather** flock together - «Птицы одного пера стекаются вместе».

Something is better than **nothing** - «Что-то лучше, чем ничего».

Alazy youth, a lousy age - «Ленивая молодость, паршивый возраст».

Never trouble trouble till trouble troubles you - «Никогда не доставляйте неприятностей, пока неприятности не беспокоят вас».

The beauty of a language can be something interesting to interest students in their studies. Memorizing short proverbs with beautiful rhymes will encourage students to learn more and train their speech organs to practice the language being studied. Students can relatively easily memorize some examples of the following proverbs: [3]

No **pain**, no **gain** - «Нет боли - нет пользы».

A friend in **need** is a friend **indeed** - «Друзья познаются в беде».

Haste makes **waste** - «Поспешишь - людей насмешишь».

There is no **fool** like an old **fool** - «Нет дурака лучше старого дурака».

Too many **cooks** spoil the **broth** - «Слишком много поваров портят бульон».

A thematic presentation or writing can begin with the introduction of several proverbs related to the topic under discussion. Repetition and memorization of the relevant proverbs will be useful

for training the organs of speech. The next step is an oral discussion of proverbs or writing essays based on selected proverbs. The topic can be changed depending on the interests of the students, for example: [4]

Love: Love is blind - «Любовь слепа».

Loveless life is a living death - «Жизнь без любви - это живая смерть».

Hatred is as blind as love - «Ненависть слепа, как любовь».

Pity is akin to love - «Жалость сродни любви».

Friendship: A friend in need is a friend indeed. A friend to all is a friend to none. A friend's eye is a good mirror. Friendship is like money, easier made than kept. Friendship is love with understanding

«Друг в нужде - это действительно друг».

A friend to all is a friend to none - «Друг для всех - другу никому».

A friend's eye is a good mirror - «Глаз друга - хорошее зеркало».

Friendship is like money, easier made than kept - «Дружба подобна деньгам, их легче заработать, чем сохранить».

Friendship is love with understanding - «Дружба - это любовь с пониманием».

Money: Time is money - «Время - деньги».

Money makes the world go around - «Деньги заставляют мир вращаться».

Money talks - «Деньги говорят».

Money does not grow on trees - «Деньги не растут на деревьях».

In for a penny, in for a pound - «За пени, за фунт».

Since proverbs are rich in meaning, they can be used to teach moral values, to teach students character formation and at the same time teach English. Proverbs value wisdom, discipline, justice, friendship, willingness, fate, happiness, effort, and so on. For example, when teaching reading, a teacher may introduce some values that are contained in reading text. Here are some examples of proverbs bearing moral values: [5]

Discipline: Time is money - «Время - деньги».

Healthy: An apple a day keeps the doctor away - «Одно яблоко в день удержит доктора».

Optimism: Every cloud has a silver lining - «У каждого облака есть серебряная подкладка».

Readiness: Make hay while the sun shines - «Коси сено, пока светит солнце».

Friendship: A friend's eye is a good mirror - «Глаз друга - хорошее зеркало».

Caution: Don't judge a book by its cover - «Не судите книгу по обложке».

Language teaching is inseparable from teaching culture in this language. In fact, language is a part of culture. Therefore, when a teacher teaches English, he/she simultaneously teaches English

culture. To introduce English culture, the teacher can use proverbs as an introductory task. Here are some examples of proverbs that can be used to get acquainted with English culture. [6]

Make hay while the sun shines- «Сделать сено, пока солнце светит».

Time is money- «Время – деньги».

An Englishman's home is his castle- «Дом англичанина - его крепость».

Every cloud has a silver lining - «Нет худа без добра».

Half loaf is better than none - «Пол буханки лучше, чем ничего».

If in February there be no rain, it's neither good for hay nor grain- «Если в феврале не будет дождя, это не годится ни для сена, ни для зерна».

CONCLUSION

Lesson preparation plays an important role in achieving success in the classroom. Interest is the first motive that motivates people to explore new experiences. The teacher needs to use this phenomenon when teaching English. As the proverb says: "A good beginning is a half battle" - "Хорошее начало - это полдела", as soon as the lesson begins in a pleasant atmosphere, the next step will be correspondingly fun.[7] To conduct an introductory activity, the teacher must use different methods. One of the techniques that can be applied is the use of proverbs. The teacher needs to choose proverbs that are relevant to the topic discussed in the classroom and correspond to the level of the students. Parables can serve as interesting introductory exercises because they are meaningful and contain some useful values that can be applied in everyday life. As for character education, proverbs have an educational value that can be used to form the character of students. English proverbs as the crystallization of collective wisdom are the essence of the English language. Based on the features of English proverbs, the teacher can use English as an introductory task. He can use them when teaching English or the language components of English.

REFERENCES:

1. Mieder W. 2004. Proverbs: A Handbook. Westport: Greenwood Press. Guse, J. 2011. Communicative Activities for Eap. Cambridge: Cambridge University Press.
2. Winnick. What Goes Around Comes Around: The Circulation Of Proverbs In Contemporary Life. Utah: Utah State University Press. 2004.
3. Guse J. Communicative Activities for Eap. Cambridge: Cambridge University Press. 2011.
4. Richard LA, Porter E, McDaniel ER. Communication between Cultures. 2007.
5. Karimov UU, Karimova GY.. The Importance Of Innovative Technologies In Achieving Educational Effectiveness. Журнал Естественных Наук, 2010;1(1).
6. Abdurakhmonova MM, Uglimirzayev MA, Karimov UU, Karimova GY. Information Culture and Ethical Education in the Globalization Century. The American Journal of Social Science and Education Innovations, 2021;3(03):384-388.
7. Salomov G. Fundamentals Of Translation Theory. Tashkent: Teacher, 1983.

A TAXONOMY OF DATA MINING PROBLEMS

Dr. Priyank Singhal*

*Assistant Professor,
Department of Information Technology,S
TeerthankerMahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- priyanksinghal1@gmail.com

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ABSTRACT

The development of effective data mining algorithms has dominated most of the research in data mining and knowledge discovery. Researchers and practitioners to address a variety of real-world data mining issues have created data mining methods. However, there is no one source that specifies which methods address which issues and how, as well as their benefits and drawbacks, and real-world applications. Identifying data mining methods and the issues that they address has recently gotten a lot of attention. The author of this article discusses the progress achieved in creating data mining methods and then categorizes them using a data mining issues taxonomy to aid practitioners in utilizing suitable data mining approaches to address business problems. Researchers will be able to add to the corpus of knowledge in this field because of this. Based on the data mining methods employed, this article offers a taxonomy for data mining issues. Classification, optimization, prediction, partitioning, relationship, pattern matching, recommendation, ranking, sequential patterns, and anomaly detection are all common data mining issues. In general, the data mining methods utilized to address these data mining issues are classified as top 10 data mining algorithms.

KEYWORDS:*Data, Mining, Network,Taxonomy, Technique.*

1. INTRODUCTION

Organizations in the early twenty-first century store all commercial operations in computer storage systems. Data is also collected or utilized from third-party systems. Data growth has accelerated dramatically in businesses over time. The Internet, social networking platforms (e.g., Twitter, Facebook, and LinkedIn), and online shopping sites have all made it possible to capture massive amounts of data relevant to business. The US government authorized the release of a massive amount of privacy-protected Healthcare and Medicare data in 2014, which may be utilized for analysis and decision-making by academics, policymakers, businesses, and the general public. Companies are able to capture, process, transform, and store large volumes of data thanks to the advent of commodity hardware (to process big data), computer processing power (thanks to Moore's Law), maturity of computer engineering, software engineering, network bandwidth, and increasingly low data storage costs.

Data provides economic value to organizations, which they have grown to depend on in their decision-making process. Reports, interactive queries, and Online Analytical Processing (OLAP) are all examples of traditional Business Intelligence (BI) tools that may offer insight into what occurred in the past[1]–[3].

In the past, reporting was done based on what had occurred. Predictive analytics is being used by businesses these days to comprehend what will happen now and in the future (for example). With the rise in fraudulent actions, there is a need to identify them as soon as possible, which is why anomaly detection (credit card fraud) is being used. Data mining methods and algorithms enter the scene at this point, and they play a significant role in delivering answers to complicated business issues[4]–[6].

In huge data sets, data mining methods are used to uncover previously undiscovered and valuable intriguing patterns and connections. Given the increasing quantity of data in corporate data warehouses, it is clear that data-driven decision-making will aid companies in gaining a competitive edge. However, effective data mining techniques that aid in extracting hidden information and converting it into business values are required to use this data to achieve commercial success. Figure 1 shows the Data Mining Taxonomy.

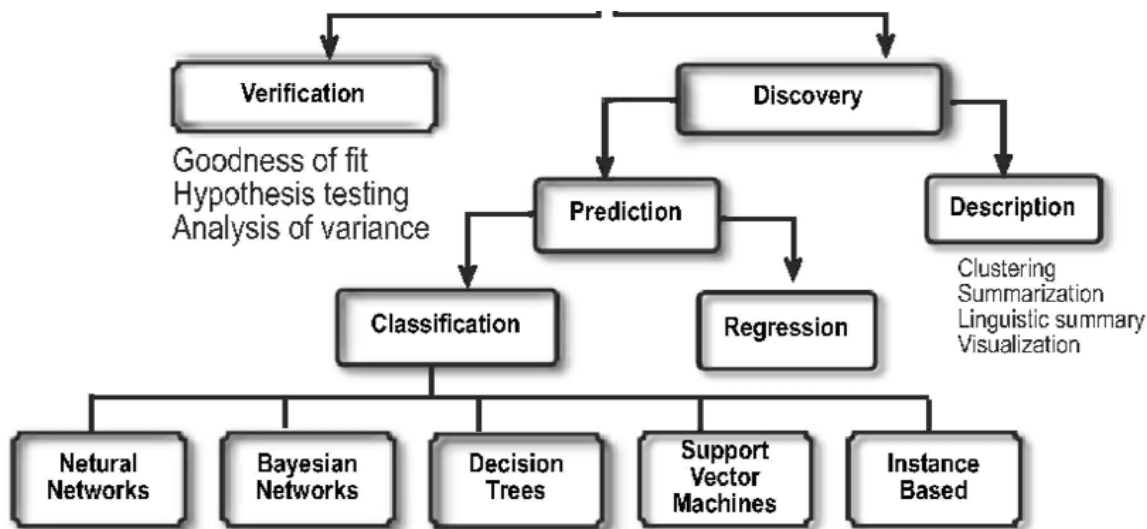


Figure 1: The above figure shows the Data Mining Taxonomy.

The author of this research discusses data mining issues that are related to solving business problems. Anomaly detection, prediction, classification, pattern recognition (Jain, 2010), sequence discovery, data visualization, and recommendation system are examples of data mining issues. In addition, the author discusses the data mining methods that are utilized to address data mining issues. Bayesian networks, neural networks, decision trees, association rules, clustering, support vector machines, logistic regression, and k-nearest neighbours are all examples of these techniques.

The majority of research in the last two decades has focused on the theoretical and computational aspects of data mining and knowledge discovery. Now is the time to assess those data mining methods and categorize them according to the data mining issue taxonomy. This will enable users to choose the best algorithm for a given data mining issue. This article looks at data mining

problem taxonomy by providing a comprehensive taxonomy of data mining challenges in the context of real-world applications.

1.1 Problem Taxonomy In Data Mining:

“Taxonomy is the study of categorizing things according to a pre-determined system, with the resultant catalog serving as a conceptual foundation for debate, analysis, and information retrieval”. To address data mining issues, a variety of methods have been employed. The authors try to categorize data mining issues in terms of data mining methods in this article.

Data mining uses methods from a variety of disciplines, including statistics, machine learning, artificial intelligence, and database systems to evaluate data and generate predictions for decision-making. As a result, during the past two decades, a variety of data mining methods has developed to address specific data mining issues. However, depending on data amount, complexity, data item characteristics, potential connections, and contexts, these methods offer answers to these particular data mining issues. The authors expand on several data mining issues and one or more data mining methods to address each of these data mining problems in this section[7]–[9].

1.2 Classification

One of the most frequent data mining issues is classification. In the real world, a sales manager would want to know which clients are high-value customers so that extra services may be provided. An insurance firm may be curious as to which insurance customers are potentially hazardous. Classifiers are built in these situations to forecast target consumer groupings. Several data mining methods were used to tackle this data mining issue.

1.3 Optimization:

The Bayesian network has been used to solve optimization issues as well as discover relationships between variables of interest. Use BN to solve an optimization issue using a huge data collection. Several data mining methods have been evaluated in the real-world optimization problem solution space utilizing various use-cases. Bayesian networks, decision trees, neural networks, and support vector machines are examples of these. A hierarchical Bayesian optimization algorithm to investigate the scalability of optimization techniques.

Neural networks may be utilized to address a variety of issues in optimization, parallel computing, and signal processing. They provide real-time and visualization-assisted solutions. The use of support vector machines to address optimization issues. The suggested method enables for the training of decision trees with the tree needed to maximize the signal importance by a simple majority of votes of the construct trees for fresh data.

1.4 Prediction:

Based on training data, prediction is used to identify values of certain characteristics from those of others. Predictive mining is the most prevalent kind of data mining with direct commercial applications in data mining. It is difficult to make predictions based on unstructured data. Predictive analytics is not predicated on a high level of confidence.

Bayesian network model to assess its ability to forecast students' preferences for computer-based long-distance educational techniques at an open university. The author create a neural network

model for predicting bankruptcy. Their methodology was put to the test using financial data from several businesses. The authors conclude that a neural network model might be used to forecast bankruptcy based on the findings. One of the most often-used prediction models is decision trees. The C4.5 architecture is used to create a decision tree that may be utilized to make predictions, use neural networks, support vector machines, and decision trees to forecast bankruptcy. In comparison to neural networks and SVM, they discovered that decision trees were more accurate for that data set. Neural network models have traditionally been used to solve prediction issues. On the other hand, use support vector machines to explore the issue of bankruptcy prediction[10].

The authors demonstrate that when it comes to predicting business insolvency, a support vector machine-based classifier beats a back-propagation neural network, compares the benefits and drawbacks of neural networks with logistic regression for medical outcome prediction. When result prediction is the main objective and the data set includes complicated nonlinearities, the author suggests using a neural network model. However, for determining potential causal connections between independent and dependent variables, logistic regression may be the best option. To predict the existence of coronary artery disease. The author evaluate the performance of logistic regression, classification and regression trees, and neural networks. According to their findings, all of these methods work well in predicting coronary artery disease.

1.5 Partitioning:

Partitioning is the process of arranging datasets into logical or meaningful groupings. Unsupervised learning is used to divide data in data mining. There are no output datasets given to an unsupervised learning machine to train it for grouping. A supervised learning machine is given output datasets in order to train it to produce desired output, such as data groupings.

Data clustering methods have been used to organize data into logical groups as part of the partitioning process. To tag objects according to present IDs, clustering methods do not rely on any predefined labels or identifiers. Cluster analysis does not utilize class labels, which are used to designate objects with prior IDs. "Data clustering (unsupervised learning) is distinguished from classification or discriminant analysis (supervised learning) by the lack of category information."

The Microsoft Corporation (2012) clustering method groups instances in a dataset into clusters using iterative approaches. The clustering algorithm creates a model only based on the connections found in the data and the clusters discovered by the algorithm. This clustering method is intended for finding hidden patterns in data sets from the standpoint of machine learning. The author uses customer clustering to identify high-profit, high-value, and low-risk clients. This technique is extensively used in scientific data exploration, customer relationship management (CRM), marketing, and insurance, among other data mining applications. It aids in the identification of different consumer groups in marketing. This data aids in the creation of market segmentation and target market programs.

1.6 Relationship

A Bayesian network is used to establish probabilistic connections among variables of interest in a data collection. The Bayesian network has been used to solve optimization issues as well as discover connections between variables of interest. The Bayesian network, which is made up of

nodes containing random variables that quantify a causal connection between them, is used to study gene expression patterns. The author has discovered causal connections and interactions between genes using a Bayesian network. Bayesian network to analyze a huge collection of nurse data. They point out that the structural learning process of Bayesian networks may discover hidden connections among variables that a researcher would overlook. They also propose that Bayesian networks may be used as an exploratory data analysis method for capturing variable connections. In each group of a data collection, a neural network is also utilized to detect connections between and within input characteristics.

1.7 Recognizing Patterns

Pattern recognition is the search for significant patterns in data mining. Pattern recognition as "automated (machine) recognition, description, categorization, and grouping of patterns." Unsupervised learning (e.g., classification) or supervised learning (e.g., pattern recognition) are both used to recognize patterns (e.g., clustering). Neural networks are extensively utilized in pattern recognition. For engineers and scientists, provides pattern recognition using neural networks, including theory and methods. Pattern recognition and its nonlinear extension using neural networks are discussed in depth by the author.

For pattern recognition, suggest a k-nearest neighbour's method. In the wavelet domain, they utilize the mean of the vector to decrease search space. As a result, classification time is decreased, and performance is improved. In the area of pattern recognition, the support vector machine is extensively used. It is utilized as an intrusion detection system in corporate applications. In a knowledge-discovery cup data set, SVM outperformed neural networks in terms of false alarm rate and accuracy in most types of assaults.

1.8 Recommendation

The use of a recommendation system in Electronic Commerce (also known as E-Commerce) has grown in popularity. Individual consumers benefit from customized purchasing experiences provided by recommendation systems. With the introduction of the Internet, the conventional brick and store business model for many goods has shrunk, while E-Commerce for those products has grown. Companies utilize a variety of methods to interact with people. Associating their goods with the substance of recommendations is one of them. Users are often given suggestions for other goods. Recommendation is dependent on a number of factors. One of them is forecasting future purchasing behavior based on previous purchases. There are varieties of applications for data mining-based recommendation systems. When a client purchases a book on Amazon, he or she gets suggested other books that are relevant to the subject matter of the book that the customer initially intended to buy. Users see this as a beneficial purchasing experience. Large social media data to propose an automated trip recommendation system based on customized user travel interests.

Three data mining approaches are often used to solve recommendation problems: collaborative filtering, cluster models, and search-based algorithms. Amazon utilizes item-to-item collaborative filtering to offer real-time suggestions that are both scalable and of high quality. The author has discuss the limits of collaborative filtering methods in terms of sparsity and scalability, which result in poor e-commerce recommendation.

2. DISCUSSION

The author has discussed about a taxonomy of data mining problems, this research looked at real-world data mining issues that were addressed using data mining methods. The study discovered that data mining has advanced steadily over the past two decades, with academics elaborating on how to overcome the limits of various data mining methods. Classifications, optimization, prediction, partitioning, relationships, pattern recognition, recommendations, rankings, sequence discovery, anomaly detection, text mining, geographic knowledge discovery, and visualization are some of the most common data mining problems solved by data mining techniques, according to the author.

3. CONCLUSION

The author has concluded about a taxonomy of data mining problems, this taxonomical categorization of data mining issues may aid user groups in determining which techniques are appropriate for solving their specific business difficulties. The authors pointed out that different data mining methods are used to address different data mining problems. The authors would like to point out that one specific data mining method might not be adequate to solve the issue in all use-cases. The context and type of data sets that the model developer is attempting to accomplish will determine the data mining method to use. This categorization of data mining issues may aid researchers in developing new methods and/or improving current techniques in order to address new problems or difficulties, as well as contribute to future discoveries. The authors believe that the data mining methods described and issues mentioned together with references will offer readers with a high-level overview and insights into this area and serve as a starting point for future study.

REFERENCES

1. Tamilselvi R, Kalaiselvi S. An Overview of Data Mining Techniques and Applications
Keywords: Data mining Techniques; Data mining algorithms; Data mining applications 1.
Overview of Data Mining. Int. J. Sci. Res., 2013;2(2):506 - 509.
2. Vikrama P, Radha Krishna P. Data Mining Data mining. Min. Massive Datasets, 2005.
3. Hermawati FA. Data Mining Data mining. Min. Massive Datasets, 2005.
4. Twin A. Data Mining Data mining. Min. Massive Datasets, 2005.
5. Li BAB. Data Mining Data mining. Min. Massive Datasets, 2005.
6. Chen Y, Hu D, Zhang G. Data mining and critical success factors in data mining projects. In
IFIP International Federation for Information Processing, 2006.
7. Yang TL, Bai, Gong YS. Spatial data mining features between general data mining, In 2008
International Workshop on Education Technology and Training and 2008 International
Workshop on Geoscience and Remote Sensing, ETT and GRS 2008, 2008.
8. Kusriani ETL. Data Mining Data mining. Min. Massive Datasets, 2005.
9. M. Adams DJHN. Data Mining Data mining. Min. Massive Datasets, 2015.
10. Wang G, Si JH, Yang CF. Research of data mining system. Beijing Gongye Daxue Xuebao /
J. Beijing Univ. Technol., 2005.

PRODUCTION OF NEW ANTIBIOTIC FROM MARINE FUNGI USING BIOTECHNOLOGY

Mr. Anil Kumar*

*Associate Professor,

Department of Computer Engineering,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA

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ABSTRACT

Filamentous fungus are well-known for their capacity to produce natural antibiotics. Recent research has shown the potential of antimicrobials derived from marine fungus with broad chemo diversity. The conversion of such natural materials into lead compounds requires a long-term supply. At different stages of the process chain, including discovery, manufacturing, downstream processing, as well as lead development, marine biotechnology may make a major contribution to the creation of novel antibiotics. The number of biotechnological methods reported for large-scale production from marine fungus, on the other hand, is much less than the total number of newly found natural antibiotics. Marine fungal biotechnology methods or technologies are mainly derived from comparable terrestrial processes and seldom address the unique needs of marine fungus. Current advances in metabolic engineering and marine microbiology have yet to be translated into processes, but they provide a wealth of opportunities for improving industrial processes and establishing new process chains. The present status of biotechnological production of marine fungal antibiotics is summarized in this study, which highlights biotechnology's tremendous potential at all phases of the discovery-to-development pipeline. At the same time, the literature review indicates that further technological transfer and technique development are required for the production of marine fungal antibiotics to be sustainable and creative.

KEYWORDS: *Marine Biotechnology, Full Fermentative Process, Genetic, Metabolic Engineering, Downstream Processing.*

1. INTRODUCTION

The discovery of the first antibiotic penicillin by Sir Alexander Fleming from the mold *Penicillium notatum* ushered in a new era of chemotherapy, permanently changing the quality of human life. We've had access to antibiotics of various chemical classes to fight dangerous bacteria since the discovery of penicillin in the 1940s, which ushered in a golden era of natural antibiotics produced from *Streptomyces* species. So far, more than 350 antibacterial agents have been approved for use. Among these are natural products, semi-synthetic antibiotics, and synthetic chemicals. The extensive use of antibiotics, on the other hand, has resulted in the development of antibiotic-resistant bacteria as a result of antibiotic-induced evolutionary

selection pressure. The number of viable therapeutic methods against life-threatening bacterial and fungal illnesses has reduced substantially as a result of the development of multidrug-resistant (MDR) pathogens. Infectious diseases are currently the second leading cause of death worldwide, and they are often regarded as the century's most pressing global societal problem. Antibiotic R&D efforts have been substantially reduced or discontinued by several pharmaceutical companies, which is concerning. Drug development pipelines are almost empty, with just a few new medicine candidates undergoing registration or study. Antibiotic programs have recently been resurrected as a result of an increase in the occurrence of bacterial MDR diseases. More methods and strategies are urgently needed throughout the world to fight medication resistance and promote research in antibiotic drug development, especially those from natural sources[1].

Microbial sources have generated thousands of natural antibiotics. Antibiotics are produced by actinomycetes, non-filamentous bacteria, and filamentous fungi. Actinomycetes create more than half of all antibiotics, non-filamentous bacteria make 10%–15%, and filamentous fungi produce about 20%. Still, since drug research efforts often involve a specific focus, such as taxonomic groups or habitats, this may only represent a small portion of the microbial bioactive chemical repertoire. Despite the fact that marine microorganisms may gather structurally unique bioactive natural chemicals not found in terrestrial counterparts, marine environments have remained largely studied in this respect. Large portions of marine scaffolds are brand new. Aeronomies A and B, quinazolin-4-ones substituted with a pyrrolidin-2-iminium moiety from the marine-derived fungus *Penicillium aurantiogriseum*, and aspergilols A or B from a deep-sea *Aspergillus versicolor*, are new marine scaffolds[2].

1.1. Marine Fungi As A Source Of Potential Antibiotics:

Penicillin's discovery sparked a renewed interest in microorganisms as valuable commodities sources of antimicrobial. This has sped up the development of biotechnological techniques, which have now been applied to a variety of product processes. In the past decade, there has been a resurgence of interest in fungus for the development of anti-infective lead compounds, highlighting the importance of biotechnology. Unfortunately, the low cultivability (1%) of microbes in typical laboratory conditions prevents the discovery and subsequent biotechnological synthesis of further antibacterial compounds encoded in yet-to-be found fungus. Culture-independent molecular description of microorganisms from a range of natural settings has shown a hitherto unknown microbial richness, exposing a new dimension. by demonstrating the presence of novel phylotypes of fungal diversity in the ambient maritime environment[3].

Biotechnology as a Long-Term Method of Producing New Antibiotics Unlike microorganisms, microorganisms have the advantage of being both practical and long-lasting. Anti-infective natural goods cultivation on a big scale to generate huge quantities of anti-infective natural products at a reasonable cost. The worldwide proportion of antibiotic fermentation products reflects this.

1.2. The Role Of Biotechnology In Production Of Antibiotics:

Natural product synthesis in sufficient quantities is essential for drug development and may be done using a number of biotechnological techniques. The bulk of studies on marine fungal antibiotic biotechnology have aided that part of the production process.

They include (i) fully fermentative procedures that use the natural producer; (ii) semi-synthetic techniques (such as fermentation to create a precursor molecule or bioconversion to change a synthetic product); and (iii) heterologous production in genetically modified hosts. In the sections that follow, we go through each of these directions in detail. Full Fermentative Processes are utilized in the manufacturing process[4].

Despite the fact that fungi have long been employed in food production, the commercialization of penicillin fermentation is a watershed moment in filamentous fungal biotechnology. In contrast to macroorganisms, the ability to transfer matching microbial producer strains into an existing biotechnological production technique determines the suitability of large-scale microorganism production. “The problem of separating sufficient raw natural product components for cultivable microorganisms is easily solved, using large-scale cultivation or fermentation, and by utilizing different techniques to enhance the culture medium for higher synthesis of target biomolecules. However, research into improving marine fungal fermentation in bioreactors is lacking. Up-scaling is challenging since most production techniques were established at the shaking flask level (Erlenmeyer flasks, EMF) and lack mechanistic understanding of the antibiotic manufacturing process. It has been shown that marine fungus may be effectively transplanted into STR and used to synthesize antibiotics. For example, an ascosetin and lindgomycin-tetramic acid compound[5].

Fungus of the Lindgomycetaceae family from the Arctic. The controlled process resulted in a better yield and a significant reduction in process time. Another example of specialized techniques to transfer marine fungi into controlled systems is the work of Lorenz and Molitoris, who grew marine fungus in 20–100-L systems at naturally occurring high pressures for obligate marine fungi from deep-sea habitats. The utilization of such specific environmental conditions may increase gene cluster expression, which may lead to the creation of new antibacterial natural chemicals, for example[6].

1.3.Manufacturing That Is Semi-Synthetic:

When full fermentative processes are not economically feasible and chemical synthesis is restricted due to structural complexity, semi-synthetic approaches offer an alternative path in product creation. Stereo sensitivity is especially essential in substances with complex stereochemistry. Enzymatic changes may be the only way to get an optically pure molecule. Semi-synthesis happens when a fermentation process generates precursor molecules that are subsequently processed by chemical synthesis, or when a synthetic product is altered by bioconversion involving enzymes, whole cells, or even fermentation processes. A notable example of marine fungal natural products as medicines is the discovery of the β -lactam antibiotic cephalosporin C, which was later enhanced by semi-synthetic methods: its producer, an *Acremonium chrysogenum* strain, was discovered from saltwater samples near a sewage outlet in Sardinia. Although cephalosporin C had little antibacterial activity at initially, its potency has steadily increased. Semi-synthetic cephalosporin derivatives manufacturing Two-thirds of all real estate in the United States is commercial real estate. Cephalosporins are antibiotics that are derived from cephalosporin C, a biotechnologically produced antibiotic. a chemical that is used to make semi-synthetic cephalosporins[7].

1.4.Production Of Heterologous Systems And Genetic And Metabolic Engineering:

Metagenomics and genome mining techniques may be used to uncover hidden chemo diversity in a wide range of microbes, including the hitherto undiscovered resource of unculturable marine fungus. Transfecting a host strain with DNA from the environment may result in the production of new natural substances. Molecular techniques provide an option for the (heterologous) expression of "silent" gene clusters and the targeted alteration of biosynthetic pathways for the improvement of production processes. Using a heterologous host that is designed for industrial-scale production instead of a time-consuming optimization process of culture conditions for the native producer strain is a major tool for bioreactor manufacturing. Due to the complexity and size of the genetic clusters that encode for natural products, despite great advancements in molecular techniques, their application in biotechnological production of natural commodities is still limited.

1.5. Biotech Role In Downstream Processing:

Separation, cell disruption, capture, or concentration processes, as well as extraction, purification, polishing, and formulation, are all part of downstream processing. Aside from upstream processing, DSP is the second most important component in a manufacturing process (USP). Unfortunately, just a few instances have been documented in the maritime industry that concentrate on the DSP component. As part of the cephalosporin purification process, fungal biotechnology, such as enzymatic treatment, is used production. Despite the fact that DSP is the most costly and, regrettably, inefficient component of a bioprocess, it is often overlooked in the creation of biotechnological processes. Great efforts must be done in DSP to be able to utilize, particularly in terms of commercialization, the diversity of antibacterial chemicals from marine fungus. Because biotechnological production is currently dependent on 'batchwise' methods, which restrict cost and resource efficiency, this involves the development of continuous DSP approaches. Continuous USP and DSP are already used in many other (bio)industries, resulting in cost, energy, and space savings[8], [9].

1.6. Biotechnology's Role In Lead Development:

In the late phases of the discovery pipeline, such as lead development, biotechnological techniques may be used. In general, medicinal chemistry is used in lead development to create derivatives with enhanced characteristics (e.g., higher bioavailability and metabolization) and to allow SAR investigations. Mode of action investigations aid in the understanding and improvement of medicinal use during lead development. Nature has previously shown how tiny derivatisations influence bioactivity, despite the fact that it is not strictly biotechnology. Calcarides, naturally occurring macrocyclic and linear polyesters from a marine Calcarisporium sp., are one such example. *S. epidermidis* and *X. campestris* are inhibited by all macrocyclic calcarides, while linear polyesters, which are very closely related, exhibit no activity below a MIC of 100 μ M. Because of the promiscuity of enzymes and/or ecological significance, marine fungus may generate a large variety of derivatives. As a result, biological derivatives may be produced via bioconversions in biotechnological procedures including enzyme treatment. This was effectively shown for the laccase-catalyzed amination of corollosporin compounds[10].

DISCUSSION

From a scientific, technical, and economic standpoint, industrial-scale biotechnology procedures should be viable. This feasibility must be shown by developing a fermentation-based process concept that includes metabolic engineering, purification, molecular design, and synthesis data.

The following characteristics seem to be important for the development of more efficient and varied biotechnological processes for antibiotic compounds of interest, based on current understanding and new approaches: Marine fungi are used. The variety of filamentous fungus found in maritime environments is mostly unexplored. Projects should add to our understanding of these species' biodiversity and chemo diversity. Technological innovation. The "Next Generation Biotechnology," which incorporates new methodological methods and a knowledge of the underlying biological and technical processes, is clearly needed. The ability to work across disciplines. Developmental initiatives that use a transdisciplinary and integrative approach should include research and development partners from academia, SMEs, and industry at all phases of the early drug discovery pipeline. As a result, significant gaps in our understanding of marine fungus that produce bioactive chemicals should be aggressively addressed and made relevant to pharmaceutical drug development pipelines. Closing the gap in innovation. Researchers may directly encourage innovation by using innovative methods to stimulate the biosynthetic pathway of new metabolites in initial stage drug discovery (lead finding) programs, as well as increasing the pool of metabolites accessible for screening programs. The process of closing the innovation gap seems to have just recently begun. Following years of industry-wide disinvestment in antibiotic research, a few major corporations have begun to reinvest. Collaboration to discover and improve new naturally-occurring chemical and biological anti-infective substances is one example of an interesting industry-academia collaboration. ADAPT (Antibiotic Development to Advance Patient Treatment), a measure introduced in the US House of Representatives to establish an expedited approval route especially for antibiotics, was one of the first legislative efforts to promote and finance the hunt for novel antibiotics. They must be resolved via the construction of new generation tools and processes that will help us better understand the ocean as well as its riches, and also the development of methods for the sustainable development of marine resources. There are just a handful known biotechnological techniques for antibiotics produced from marine fungus. More intense studies and comprehensive research activities are needed to improve this prospective field. To expedite their development, successful terrestrial processes or other areas of production, such as enzymes, may be utilized. Successfully addressing these problems will require the cooperation of many teams.

CONCLUSION

Antibiotics have traditionally been the primary line of defense in the battle against bacterial illnesses. Researchers are urged to concentrate on the isolation of antimicrobial properties, their modes of action, and their metabolic route, which have been ignored for a long time due to pathogen evolution contributing to resistance to antibiotics. Microbes that live in severe environments, such as hydrothermal vents with very high temperatures or arctic areas with temperatures as low as 0°C, have an abundance of potential secondary metabolites with antimicrobial properties. To summarize, marine fungal biotechnology may provide a variety of tools and methods for the effective manufacture of (new) antibiotics, as well as a starting point for the long-term utilization of marine resources to address societal issues.

Process engineers, on the other hand, nevertheless confront a number of challenges. They must be addressed via the development of techniques for the sustainable development of marine resources, as well as the creation of new generation instruments and processes that will help us better comprehend the ocean and its riches. Overall, there are just a few biotechnological methods for antibiotics derived from marine fungus documented. To enhance this potential area,

more intensive investigations and comprehensive research efforts are required. Successful terrestrial processes or other areas of production, such as enzymes, may be used to accelerate their growth. Addressing these issues successfully would need the collaboration of diverse teams. Methods and technologies for marine fungal biotechnology are mostly taken from similar terrestrial processes and rarely address the specific requirements of marine fungus. Although current advancements in metabolic engineering including marine microbiology have yet to be converted into processes, they provide a plethora of possibilities for enhancing industrial processes and creating new process chains. This research summarizes the current state of biotechnological manufacturing of marine fungal antibiotics, highlighting biotechnology's great promise at all stages of the creation pipeline. At the same time, the literature study suggests that for the production of marine fungal antibiotics to be sustainable and creative, further technology transfer and method development is needed.

REFERENCES:

1. Kennedy J. et al. Isolation and analysis of bacteria with antimicrobial activities from the marine sponge *haliclona simulans* collected from Irish waters. *Mar. Biotechnol.*, 2009;11(3):384-96
 2. Fouillaud M, Venkatachalam M, Girard-Valenciennes E, Caro Y, Dufossé L. Anthraquinones and derivatives from marine-derived fungi: Structural diversity and selected biological activities. *Mar. Drugs*, 2016 Mar 25;14(4):64
 3. Mandelare PE, Adressa DA, Kaweesa EN, Zakharov LN, Loesgen S. Coculture of Two Developmental Stages of a Marine-Derived *Aspergillus alliaceus* Results in the Production of the Cytotoxic Bianthrone Allianthrone A. *J. Nat. Prod.*, 2018 Apr 27;81(4):1014-1022.
 4. Lin A, Lu X, Fang Y, Zhu T, Gu Q, Zhu W. Two new 5-hydroxy-2-pyrone derivatives isolated from a marine-derived fungus *Aspergillus flavus*. *J. Antibiot. (Tokyo)*, 2008 Apr;61(4):245-9.
 5. Gomes NM et al. Antibacterial and antibiofilm activities of tryptoquivalines and meroditerpenes isolated from the marine-derived fungi *Neosartorya paulistensis*, *N. laciniosa*, *N. tsunodae*, and the soil fungi *N. fischeri* and *N. siamensis*. *Mar. Drugs*, 2014 Jan 28;12(2):822-3.
 6. Sebastianes FLS. et al. 3-Hydroxypropionic acid as an antibacterial agent from endophytic fungi *Diaporthe phaseolorum*. *Curr. Microbiol.*, 2012 Nov;65(5):622-32.
 7. Saarinen EM-J, Belfast QU, Aumasson J-P, Security K. The BLAKE2 Cryptographic Hash and Message Authentication Code (MAC). *Constr. Build. Mater.*, 2015.
 8. Auckloo BN, Pan C, Akhter N, Wu B, Wu X, He S. Stress-driven discovery of novel cryptic antibiotics from a marine fungus *Penicillium* sp. BB1122. *Front. Microbiol.*, 2017.
 9. Hamzah H. Hubungan Amalan Kepemimpinan Pengetua dengan Pengurusan Kurikulum di Sebuah Sekolah Menengah Kluster. *Educ. Lead. (Pemimpin Pendidikan)*, 2015.
- Navarri M. et al Deep seafloor fungi as an untapped reservoir of amphipathic antimicrobial compounds. *Mar. Drugs*, 2016 Mar 10;14(3):50.

TRANSGENIC PLANTS ROLE IN AGRICULTURE AND BIOPHARMACEUTICALS

Anurag Verma*; Deepak Singh**

*Professor, Principal,
Department of Pharmacy,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA

**Lecturer,
Department of Pharmacy,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- tmuipr@gmail.com

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ABSTRACT

Environmental deterioration and an ever-increasing population are two of the world's most pressing issues today. The little arable land available on the planet makes meeting the requirements of this increasing population challenging. Despite the fact that there are legal, societal, and political obstacles to biotechnology use, advancements in this area have significantly benefited agricultural and human life. Genetic engineering (GE) is a key technique in biotechnology that is used to alter plants, animals, and microbes to meet specific requirements. In reality, genetic engineering allows for the transfer of desired traits into other plants that would otherwise be impossible to achieve via traditional plant breeding. Several crops, including rice, mustard, maize, potato, tomato, and others, have been modified to be more resistant to a range of stressors, including herbicides, insecticides, viruses, and a combination of biotic and abiotic stresses. Apart from agriculture, GE is widely used to alter plants for increased production of vaccines, hormones, and other pharmaceuticals. Vaccines against certain illnesses are available on the market, however the majority of them are prohibitively expensive. Developing nations cannot afford to manage illness with such expensive vaccines. Vaccines against illnesses such as hepatitis B, cholera, and HIV have been developed using common food plants such as banana, tomato, rice, and carrot. As a result, the up- and down-regulation of desirable genes employed in plant modification plays a significant role in the development of genetic crops.

KEYWORDS: Agriculture, Bio Pharming, Genetic Engineering, Transgenic Plants.

1. INTRODUCTION

Environmental pressures, population explosions, and food shortages have wreaked havoc on humanity throughout the world. The world's population is rapidly growing, with an estimated 8.5

billion people by 2025. It is challenging to meet everyone's food needs with limited natural resources. This aspect has resulted in food insecurity, which has led to malnutrition, which is a major health issue these days. Producing crops of higher quality and quantity is critical for meeting rising food demand via sustainable agriculture, which may be accomplished by traditional selection and breeding or genetic engineering. The use and development of biotechnology has resulted in new chances and possibilities for improving organisms' qualitative and quantitative characteristics[1].

Biotechnology for crop development has evolved into a long-term approach for combating dietary inadequacies by improving the composition of proteins, carbs, fats, vitamins, and micronutrients. Since the 1990s, agricultural biotechnology has focused mostly on characteristics for insect and herbicide resistance, nutritional quality, viral resistance, shelf life, and biofuel generation in crops. Crop development via genetic engineering is not a straightforward procedure since all of these characteristics require a lot of genes. This is made much more difficult by a lack of basic understanding of plant molecular biology and genetics. Different genetic engineering methods have been used to create transgenic plants, but this has resulted in a slew of legal, political, and societal issues. The World Health Organization (WHO), for example, has identified three major concerns with genetically engineered crops, particularly GM food crops: allergenic food production, incorporation of modified food genes into the human body, and transgenic plant crossing with non-transgenic conventional plants. All of these variables may jeopardize food safety. Despite these obstacles, China, Canada, the United States, Brazil, and Argentina are already permitting transgenic agricultural cultivation. Transgenic approaches have improved yield in a variety of crops, including wheat, rice, tobacco, brassica, and soybean, among others, but there is still a pressing need to develop high yielding and high quality transgenic[2].

1.1. Transgenic Cultivars/Lines In Modern Agriculture:

Biotechnology has recently transformed agricultural development by generating GM crops with improved trait availability and usage. According to one estimate, the global area of GM crops increased by more than 60 times from 1996 to 2006, from 1.7 to 102 million hectares. Transgenic plants with enhanced characteristics offer a number of benefits over natural plants, but there are also drawbacks. Scientists were able to alter DNA at the molecular level in the 1970s, and the technique was dubbed genetic engineering. Scientists may use this technique to transfer particular genes from one creature to another (bacteria, plants, or mammals). Everyone has heard about genetic engineering, and it is now a common technique in both fundamental and applied sciences[3].

Tomatoes were the first transgenic food to hit the market in the United States in 1994, followed by maize and squash. Following then, the global area of transgenic crops exploded. The advancement of transgenic biotechnology has greatly aided the marketing of genetically modified crops. In agriculture, yield is a significant output, and increasing plant production by counteracting biotic and abiotic environmental cues is a major focus area. Crop cultivars with improved yield and stability are thus needed. In this context, sophisticated molecular biology techniques have made significant progress in improving agricultural yields across the globe. Under saline circumstances, the introduction of the vacuolar Na⁺/H⁺ antiporter gene AtNHX1 resulted in yield improvements of 50% in wheat, 2.34 percent in Brassica napus, and 21% in tobacco (Wang et al., 2004). Under water shortage circumstances, rice encoding *Oryza sativa*

AP37 had a 16–57 percent greater grain production. When 1 -pyrroline-5-carboxylate synthetase (P5CS) was introduced into potato (*Solanum tuberosum*), it increased plant growth and tuber production (21%) compared to non-transformed plants under salt stress. Environmental variables are important components that have a significant impact on crop production. The development of agricultural plants that are resistant to heavy metals, salt, cold, and drought has become a hot subject in agriculture. Drought and salt resistant plants that have been genetically modified may be utilized to commercially exploit wastelands with high salt content and limited water supply[4].

1.2. Resistance Against Insects And Diseases

The literature also reveals scientists' efforts to design plants to over-express natural defences against a range of pests, such as insects, fungus, and bacteria. Insect-resistant *Bacillus thuringiensis* (Bt) crops are one of the most remarkable accomplishments in plant transgenic technology. Bt is an insecticide made up of crystal protein endotoxin generated by certain strains of *B. thuringiensis*, a soil bacterium (a soil bacterium). Lepidopterans, dipterans, and coleopterans are poisoned by the Bt crystal (cry) insecticidal protein (-endotoxin) genes.

Resistance to herbicides early herbicides were discovered to be very harmful to most plants and to have negative environmental consequences. New herbicides, like as glyphosate, have been extensively suggested for usage since soil microorganisms can quickly breakdown it, making it environmentally benign. Glyphosate tolerance genes have been introduced into crops, allowing the herbicide to be sprayed over the top of crops throughout the growing season to better manage weed populations. In 1998 and 1999, plants expressing changed herbicide tolerance accounted for 71% of all transgenic crops cultivated globally. The main transgenic products include herbicide-tolerant soybean, corn, cotton, and canola. These IR-maize lines were resistant to the *Striga hermonthica* weed, resulting in a significant reduction in yield loss. The expression of the bar gene, which is responsible for herbicide resistant crops in sweet potatoes, has been shown. GmGSTU4 from soybean, a tau class GST isoenzyme, is active as glutathione-dependent peroxidase (GPOX) and has catalytic performance for the diphenyl ether herbicide fluorodifen/alachlor in transgenic tobacco[5], [6].

Tolerance to abiotic stress Salt, drought, floods, high temperature, and oxidative stress are among abiotic stressors that reduce plant development and production. If crops were engineered to better deal with environmental stressors, agricultural output might skyrocket Stress tolerance in plants has been improved through transgenic control of solutes such as mannitol and proline (Hasegawa et al., 2000). The choline oxidase (codA) gene promotes the synthesis of glycine betaine, which aids osmotic adjustment in the cells, allowing the plant to adapt to various stressors. Chloroplast targeting the codA gene is a highly efficient method to increase tolerance to various abiotic stressors, according to rice studies.

Vitamin C, commonly known as ascorbic acid, is essential for collagen production as well as circulatory system function in humans. Humans, like the majority of animals, are unable to store ascorbic acid. This occurs as a result of a mutation in the ascorbate synthase gene. As a result, people need vitamin C from a variety of nutritional sources, including plants. For example, a transgenic potato (*S. tuberosum*) was created that overexpressed the strawberry GalUR gene. By increasing chlorophyll pigments and 1.6–2-fold higher accumulation of As A in transgenic plants

compared to wild type (non-transformed) plants, over-expression of GalUR resulted in improved tolerance to methyl viologen, mannitol, and salt[7].

1.3.Food That Is High In Nutrients:

Vitamin A deficiency may harm the eyes and increase the risk of children and maternal death. Vitamin A insufficiency has been observed in 21 percent of youngsters worldwide. According to estimates, vitamin A deficiency causes approximately 800,000 deaths in children and women of reproductive age. According to another estimate, around 0.25 to 0.5 million malnourished children in poor nations become blind each year due to vitamin A deficiency, with half of them dying within a year of being blind (WHO, 2008). Children and pregnant women are more likely to have VAD. One of the most serious problems in underdeveloped nations is nutritional insufficiency. Rice, which is low in vitamin A, is the main diet in the majority of nations[8].

In terms of better production and resilience to biotic and abiotic influences, GE crops outperform non-transgenic cultivars in a variety of ways. Producers and biotech firms benefit handsomely from the adoption of GE crops. In 2003, the adoption of transgenic crops in the United States was 73 percent for cotton, 70 percent for canola, 40 percent for maize, and 81 percent for soybean. Engineering oil crops that generate high-quality industrial lubricant oils is another accomplishment of transgenic crops. As a result, the demand on lubricant industries for petroleum-derived goods is reduced. Erucic acid-rich canola oils are very useful as industrial lubricants. Transgenic plants are also extensively utilized in the pharmaceutical industry (biopharming).

1.4.Pharming At The Molecular Level:

Plant biotechnology refers to scientific methods that may be used to create cellular- and molecular-based technologies that enhance plant production by increasing the quality of plant products and decreasing environmental constraints. Plant biotechnology allows plant breeders to make precise genetic changes that result in beneficial characteristics in plants, beyond all prior expectations. The future of biotechnology seems much brighter. The agricultural biotechnology revolution is predicated on effective and cutting-edge research and development, as well as public and regulatory acceptance. Agricultural biotechnology is the highest priority topic that has gained significant attention in the present age of different agricultural technologies, since it was originally intended to improve the production of plant-derived food in terms of quantity and quality[9].

Antibodies and vaccines Infectious illnesses are the world's most serious issues today, with infectious agents responsible for one-third of all fatalities each year. The emergence of new diseases such as HIV, Hanta virus, Hepatitis C virus, and SARS has sparked outrage, and the issue is becoming more complicated. The infectious microbes cause 15% of new malignancies (such as stomach cancer, hepatocarcinoma, and cervical cancer). Vaccination is a proven technique of illness prevention that is also highly cost-effective. Vaccines are now utilized to prevent infectious and non-infectious illnesses. The application of plant genetic engineering technologies for "biopharming," or the manufacture of medicines in plants, is becoming more common. Plant-produced antibodies are considered to be especially well-suited to topical immunotherapy. Plants were utilized as bioreactors to generate antigens induced by plant transgenic vectors, which were then used to create vaccinations for a variety of illnesses.

Antibody expression in transgenic plants. Following that, studies utilizing plants as bioreactors for vaccine manufacturing were extensively conducted.

Plants that are transgenic and their safety the use of genetic engineering to create transgenic cultivars/lines is a novel departure from traditional breeding, and it presents safety issues. Before field testing or commercial release, crops created via genetic engineering are thoroughly evaluated to verify that they do not have any unfavourable traits. Transgenic plant safety evaluation is a fascinating and difficult confluence of several disciplines, including ecology, agronomy, and molecular biology, all of which are primarily concerned with food and environmental safety. Environmental effects on worms, insects, birds, mammals, and other animals are also important factors to consider when evaluating GM plants, especially for insect or disease resistance characteristics. Since 1986, a codified policy known as the Coordinated Framework for Biotechnology Regulation has provided a mechanism for assessing goods created using current procedures[10].

2. DISCUSSION

Plant biologists have been able to combat the current enemies thanks to the development of genetic engineering (GE) and other technologies. Plants provide abundant resources such as carbohydrates, proteins, oils, minerals, fuels, medications, colors, fragrances, flavorings, and vitamins. GE adjusts the plant to generate sufficient quantities of the previously stated goods. The underlying processes of overproduction of these biomolecules in plants must be elucidated in order to fully comprehend the process. Plants that have been genetically modified have been developed to be more resistant to herbicides and pests. Others have been created to provide nutrient-dense meals as well as biofuel production. The creation of healthier oils, veggies, and fruits with reduced calorie sugars and vitamins is underway.

Golden rice is a crop that has been genetically engineered. It is high in iron and provitamin A (-carotene). Essential vitamins and minerals, such as vitamin A and iron, are in short supply in many areas of the globe. Golden rice is a potential crop for addressing this issue. In India, Vietnam, and the Philippines, golden rice is being studied for its potential to generate high amounts of vitamin A and iron. In India, a high-protein potato was created by transplanting a gene from such an amaranth crop. Agricultural biotechnology has produced significant economic advantages despite the concerns surrounding transgenic crops in several nations. According to Brookes and Barfoot (2011), the development of GM crops has enabled farmers to use 393 million kg fewer pesticides. This impact had a major part in lowering greenhouse gas emissions, which were equal to eliminating 7.8 million vehicles off the road in 2009. Because of the current transgenic crop growth trend, it is expected that accessible transgenic crops will increase agricultural production in the future, and the food generated from such crops would be nutritious rich. Plant breeders have also pioneered the use of plants in the manufacture of biopharmaceuticals.

3. CONCLUSION

The development of genetic engineering (GE) and other technologies has allowed plant biologists to battle against the dominant enemies. The rich sources such as carbohydrates, proteins, oils, minerals, fuels, medications, colors, fragrances, flavorings and vitamins are generated by plants. GE adjusts the plant to generate acceptable quantities of the earlier mentioned goods. Though plant-based vaccinations have demonstrated promising outcomes, the

oral tolerance to plant vaccines is a very significant issue that requires in depth study. The genetic modified plants being utilized require rigorous safety assessment.

The plant biotechnologists should bear in mind that the transformants that they are going to create should be safe enough. Apart from the success stories in many instances, several issues are still to be addressed before plant based vaccines become a genuine boom. The global most deadly illnesses like HIV and malaria are extremely complicated diseases. Plant-based vaccines have been shown to be highly promising in managing these illnesses successfully, but because all these studies have been carried out to a restricted scale, thus for their effective general usage, up-scaling of these studies is needed. Furthermore, while a number of vaccinations for various illnesses are given by the WHO, there are some diseases for which the vaccines have to be bought locally. For example, hepatitis-B/DTP combination vaccinations need to be bought from the local market and the cost of the vaccines is too high.

Resultantly, millions of youngsters are deprived of immunization and thus at the danger of this avoidable illness. To eliminate this issue transgenic plants may offer an ideal expression method and the vaccines may be administered directly to humans in the form of edible vegetables, fruits etc. The proponents of GM foods say that they are environment-friendly, pose no danger to human health, lucrative for farmers as well as highly controlled, many individuals are still of the strong opinion that GM foods may be harmful to human and animal health, since they have not been adequately studied. Also it is not known what kinds of long-term impacts GM foods may produce. Critics claim that putting new genes into a meal may change the chemical makeup of that food, which may cause the human body to react differently to that food, thus creating allergies or causing long-term damage. Furthermore, many GM crops contain antibiotic-resistant genes that may be picked up by bacteria existing in the body, thus boosting bacterial resistance to antibiotics. Thus, every nation has to establish clearly defined laws and regulations for the use of GM organisms, while many industrialized and some emerging countries have already formed particular legislation.

REFERENCES:

1. Kovalchuk I, Kovalchuk O, Hohn B. Transgenic plants as bioindicators of environmental pollution. *AgBiotechNet*, 1999;1(1):1-8.
2. Zapalska M, Kowalczyk K. The use of transgenic plants for the development of selected bioproducts - Achievements of the polish scientists. *Acta Sci. Pol. Hortorum Cultus*, 2013;12(3):183-195.
3. Kaya Y, Marakli S, Gozikirmizi N, Mohamed E, Javed MA, Huyop F. Herbicide tolerance genes derived from bacteria. *Journal of Animal and Plant Sciences*. 2013; 23(1): 85-91.
4. Liu F, Wang X, Zhao Y, Li Y, Liu Y, Sun J. Silencing the HaAK gene by transgenic plant-mediated RNAi impairs larval growth of *Helicoverpa armigera*. *Int. J. Biol. Sci.*, 2015, doi: 10.7150/ijbs.10468.
5. Weng X, Huang Y, Hou C, Jiang D. Effects of an exogenous xylanase gene expression on the growth of transgenic rice and the expression level of endogenous xylanase inhibitor gene RIXI. *J. Sci. Food Agric.*, 2013, doi: 10.1002/jsfa.5746.
6. Erpen L, Devi HS, Grosser JW, Dutt M. Potential use of the DREB/ERF, MYB, NAC and

- WRKY transcription factors to improve abiotic and biotic stress in transgenic plants. *Plant Cell, Tissue and Organ Culture*. 2018; 132:1–25. doi: 10.1007/s11240-017-1320-6.
7. Vinod Kumar S, Sharma ML, Rajam MV. Polyamine biosynthetic pathway as a novel target for potential applications in plant biotechnology. *Physiology and Molecular Biology of Plants*. 2006;12(1):13-28.
 8. Atkinson HJ, Green J, Cowgill S, Levesley A. The case for genetically modified crops with a poverty focus. *Trends in Biotechnology*. 2001;19(3):91-96 doi: 10.1016/S0167-7799(00)01547-X.
 9. qiu Teng Z, Shen Y. Research progress of genetic engineering on medicinal plants. *Zhongguo Zhong yao za zhi = Zhongguo zhongyao zazhi = China journal of Chinese materia medica*. 2015 Feb;40(4):594-601. doi: 10.4268/cjcmm20150405.
 10. Singh N, Mishra A, Jha B. Ectopic over-expression of peroxisomal ascorbate peroxidase (SbpAPX) gene confers salt stress tolerance in transgenic peanut (*Arachis hypogaea*). *Gene*, 2014; 547(1):119-25 doi: 10.1016/j.gene.2014.06.037.

AN OVERVIEW ON TRANSGENIC PLANTS AS BIOPHARMACEUTICAL FACTORIES

Dr. Ashutosh Awasthi*

*Assistant Professor,
Department of Agricultural Sciences,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- ashutosh.agriculture@tmu.ac.in

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ABSTRACT

Plants are readily converted and offer a cheap supply of protein, they have a lot of promise for producing biopharmaceutical proteins and peptides. Plant expression systems are now being developed, field tested, and patented by many biotechnology firms, and clinical studies on the first biopharmaceuticals generated from them are underway. For the first time, hirudin, a transgenic plant-derived biopharmaceutical, is being commercially manufactured in Canada. Purification of a product may be costly, and different techniques are being developed to address this issue, including oleosin-fusion technology, which enables extraction with oil bodies. In certain instances, direct ingestion of a biopharmaceutical product from a transgenic plant may eliminate the requirement for purification. Biopharmaceuticals or edible vaccines may be stored and delivered as seeds, tubers, as well as fruits, possibly making vaccination efforts in poor nations cheaper and simpler to administer. Transgenic plants may make some of the most costly biopharmaceuticals with limited supply, such as glucoce rebrosidase, considerably cheaper and more abundant.

KETWORDS: *Biopharmaceuticals, GM Crops, Edible Vaccine, Antibodies, Production Systems.*

1. INTRODUCTION

Transgenic systems such as cultured cell cultures, bacteria, or fungus have historically been used to make biopharmaceuticals. Existing biopharmaceuticals (e.g., erythropoietin to treat anemia or insulin to treat diabetes) as well as novel therapeutic proteins found via genomics research are anticipated to see significant increases in demand in the future. As a result, it's a good idea to look at alternative transgenic production methods and see how safe recombinant biopharmaceuticals may be made available in the future at a reasonable cost. Reduced health concerns from pathogen contamination, relatively large yields, and synthesis in seeds or even other storage organs are all advantages of producing therapeutic proteins in plants.

Transgenic crop growing, harvest, storage, as well as processing would all utilize existing infrastructure and need minimal capital investment, making commercial biopharmaceutical production an intriguing possibility. Plants may be a low-cost source of recombinant products.

Mammalian expression systems are used to make a lot of recombinant therapeutic proteins. These, as well as insect tissue culture methods, have the benefit of properly synthesizing and processing mammalian products. However, product yields are often poor, and the growing medium's need for lethal bovine serum makes manufacturing costly[1], [2].

Furthermore, shear pressures that occur during industrial-scale culture, as well as temperature, pH, dissolved oxygen, including specific metabolites, are all sensitive to cultivated mammalian cells. Because fluctuation in cell growth may influence fermentation and product quality, it's critical to carefully regulate culture conditions. Because of variations in metabolic pathways, protein processing, codon use, and the development of inclusion bodies, bacterial and fungal systems are not suitable for synthesizing many mammalian proteins. Plants and mammals have significant variations in post-translation processing and codon use, although they are minor in comparison to the differences between mammals and microbes. It may be feasible to create plants with changed protein maturation pathways when processing discrepancies are a concern.

Purification of biopharmaceuticals generated in cell culture systems from the culture supernatant is a costly procedure. Plants may be genetically modified to store proteins in their seed endosperm, which can then be readily removed. Purification is, however, a potentially costly process, and different techniques are being explored to address this issue, including the production of proteins as oleosin fusions (see hirudin discussion below). Another option is to pay purifying expenses with proceeds from the extraction of traditional goods like meal, oil, or starch. For example, the expenses of separating human serum albumin from starch potatoes may be offset in significant part by concurrent starch production. Furthermore, purification may not necessarily be required, such as in the case of edible vaccinations. Because plants do not serve as hosts for human infectious pathogens, plant-derived goods, whether pure or not, are less likely to be contaminated with human pathogenic germs than those produced from animal cells[3], [4].

Systems of agricultural production to make recombinant medicines in plants, two transformation methods are frequently employed. Using *Agrobacterium*-mediated transformation, particle bombardment, or other conventional transformation methods, stably transformed transgenic plants are generated in the first step. Other plants, such as *Nicotiana Benthiana*, *Arabidopsis thaliana*, turnip, tomato banana, black-eyed bean oilseed rape, Ethiopian mustard, potato rice wheat, and maize, have also been utilized as model expression systems.

The second method involves infecting non-transgenic plants with recombinant viruses that express transgenes during replication. In the company of the host. Tobacco with tobacco mosaic virus (TMV) and cowpeas with cowpea mosaic virus are the two most often utilized host-virus systems (CPMV). Product yields are usually comparable to those of transformed plants, although they may be much greater. TMV vectors were utilized to generate an antihypertensive peptide (angiotensin-1-converting enzyme inhibitor) in tomato and tobacco²¹, as well as an HIV replication inhibitor (-trichosanthin) in *N. bethamiana*. From infected cowpea plants, chimeric CPMV particles exhibiting human rhinovirus and HIV-1 have been purified. They were discovered to produce antibodies and, in the case of the HIV chimera, neutralize HIV-1 infection of T cells in vivo[5].

This second approach may be very beneficial in the manufacturing of vaccines. Vaccines must travel through the stomach to the gut-associated lymphoid tissues, where immunoglobulin A synthesis is promoted, in order to offer oral protection against illness. This is made easier by

expressing an epitope that produces virus-like particles or by connecting it to viral proteins. Constitutive CaMV 35S promoters are used to express medicinal proteins in transgenic plants. However, poor yields may occur; for example, blood serum albumin accumulated to 0.02 percent of total soluble protein (TSP) whereas human protein C to 0.001 percent of TSP.

Higher yields may be achieved by limiting expression to seeds. TSP26 may be accumulated to 2.9 percent by seed expressed enkephalins, for example. Transgenes were placed downstream of the glutelin (Gt3) signal peptide sequence and transcribed from Gt3 promoters² to achieve seed expression. The seed-specific, developmentally regulated legumin B4 promoter has also been shown to govern transcription of immunoglobulin transgenes in tobacco. Because immunoglobulins in the cytoplasm may disrupt cell function, it's preferable to have them released into the apoplast or trafficked to the endoplasmic reticulum, where they tend to collect a greater percentage of TSP (1–5%).

The legumin B4 signal sequence may control trafficking[6]. While the above-mentioned production systems have been extensively used for research and proof-of-concept studies because they are readily changed, well-characterized, and simple to work with, they may not be suitable for commercial or other large-scale applications. Removing and purifying recombinant products from such plants would be time-consuming and costly, since it would require the removal of a number of metabolites, including nicotine. Furthermore, since seed only accounts for a tiny proportion of the total weight of tobacco plants, vegetative tissue would have to be utilized. Commercial-scale protein extraction from tissue with a high water content may result in unnecessary proteolysis, decreasing process efficiency and raising costs⁵. As a result, tobacco will most likely be utilized exclusively to make biopharmaceuticals that are usually extremely costly[7].

1.1. Vaccines:

Plants have been engineered to generate vaccines against a range of human and animal illnesses using peptide epitopes from pathogens. Pigs fed an edible maize vaccine are protected against the transmissible gastroenteritis virus, according to clinical studies performed recently by the biopharmaceutical firm Prodi Gene (College Station, TX) (TGEV). This vaccine, as well as others made in transgenic plants, has been granted a patent by the firm.

Hepatitis B, which causes the majority of persistent viremia in humans and may lead to chronic liver disease, is a key focus for current vaccination efforts. After worries regarding the safety of serum-derived antigens, the first commercially viable recombinant vaccination was created in yeast. The use of recombinant vaccines has been banned in many areas due to cost and a lack of infrastructure (e.g., refrigeration systems). The Children's Vaccine Initiative was launched in 1992 by the World Health Organization (Geneva) and a group of other charitable organizations. Developed hepatitis B surface antigen-expressing transgenic tobacco and later potatoes (HbsAg). The company aims to create vaccines for poor nations by increasing the immunogenicity of untreated edible plant tissues. HbsAg transgenic potatoes given orally to mice have recently been demonstrated to induce humoral immune responses. Finally, emphasis will turn to the genetic alteration of bananas, which are widely cultivated in poor countries and, unlike potatoes, may be consumed fresh. Vaccinations made from bananas, given as a purée, would be a tenth of the cost of conventional vaccines. Banana vaccines may be developed in the future to protect against

illnesses such as yellow fever measles, polio, diphtheria, as well as some kinds of viral diarrhea[8].

1.2. Antibodies

Direct delivery of antibodies is an option to stimulating the immune system to generate antibodies. Although antibodies have long been recognized for their therapeutic potential (e.g., for people who need short-term protection against infectious pathogens), the challenges involved with their manufacture have restricted their clinical usage. The ability to generate functional antibodies in transgenic plants was first shown. Since then, a great deal of work has gone into creating plants that produce antibodies (or "plantibody"). Seeds and tubers may be targeted with recombinant antibodies, and it should ultimately be feasible to store, transport, and inject antibodies in such plant tissues, which would be beneficial for vaccination programs in poor nations. Many of the antibodies generated by transgenic plants have uses in human and animal health care, as well as bioremediation⁹. Fully assembled entire immunoglobulins, antigen-binding fragments of immunoglobulins, and synthetic single-chain variable segment gene fusions are all examples of recombinant antibodies (scFv). Single-chain Fv antibodies are produced by combining light- and heavy-chain variable sequences to create an artificial gene[9].

1.3. Biopharmaceuticals:

Transgenic plants have been created to express proteins such as enkephalins-interferon human serum albumin¹², as well as glucocerebrosidase and granulocyte-macrophage colony-stimulating factor, two of the most costly medicines. Rice plants have been genetically engineered to generate human α -1-antitrypsin, a protein with therapeutic promise in cystic fibrosis, liver illness, and hemorrhages, according to Applied Phytologics (API; Sacramento, CA). In 1998, researchers began testing α -1-antitrypsin transgenic rice using protein derived from malted grain. By 2004, API expects to obtain regulatory clearance for transgenic plant medicinal goods[10].

2. DISCUSSION

Biopharmaceuticals made from transgenic plants must satisfy the same performance and safety requirements as biopharmaceuticals made from other systems. There appears to be little reason why this shouldn't be the case, given that plants can frequently generate human-like proteins. Purification methods may be required in certain instances to guarantee that medicines made from non-edible plants, such as tobacco, are not co-purified with other potentially poisonous or allergenic plant metabolites. Despite this, commercial production of tobacco is more likely to be in food crops, since it is mostly utilized for fundamental research. After evaluating different crops for possible protein recovery and production economics, many firms developing transgenic plant expression systems have selected maize. The amount and precise type of glycosylation in plant-based biopharmaceuticals, which may vary from that seen in animals, is one source of worry. Some carbohydrate moieties are specific to plants and may provide an antigenic threat to the immune response, resulting in sensitization or immunization when given on a regular basis. However, numerous goods are already made from plants, and we are continuously exposed to plant glycoproteins in our diet without harm. Biopharmaceuticals derived from transgenic plants are generally regarded to be safer than those derived from animal sources, which may be infected with human illnesses. In addition, efforts are being taken to address specific environmental and health concerns throughout the development and commercialization of biopharmaceutical-

producing transgenic plants. Transgenic plants seem to have a lot of promise when it comes to generating safe and inexpensive therapeutic proteins and peptides.

Hirudin, an anticoagulant used to treat thrombosis, is another protein appropriate for transgenic expression in plants. It was first discovered in the leech *Hirudomedicinalis*, although it is currently mainly made by recombinant bacteria and yeast. Oilseed rape, tobacco, and Ethiopian mustard have all been modified to generate hirudin thus far, but seed purification has been costly. Purification is expected to become simpler and less expensive when hirudin genes are linked to oleosin genes in transgenics. The fusion construct is intended to have an end protease recognition site between both the two genes, allowing the recombinant fusion protein to be cleaved and the hirudin to be recovered. Oil bodies are used to isolate oleosin–hirudin fusion proteins, which may then be readily separated by flotation centrifugation. This purification technique guarantees that hirudin in the crops is only active after cutting, minimizing environmental exposure. SemBioSys has begun commercial production of oilseed rape transgenic for hirudin in Canada.

3. CONCLUSION

Transgenic plant-derived biopharmaceuticals must meet the same performance and safety standards as biopharmaceuticals derived from other systems. Given that plants can frequently produce human-like proteins, there appears to be no reason why this wouldn't be the case. To ensure that medications produced from non-edible plants, such as tobacco, are not co-purified with other potentially toxic or allergic plant metabolites, purification methods may be needed in certain cases. Despite this, since tobacco is primarily used for basic research, commercial production is more likely to be in food crops. Nonetheless, plant-specific glycosylation of medicinal proteins is being studied in tandem with transgenic development. It may be feasible to create more appropriate transgenic plants from mutants missing some of the enzymes involved in the glycosylation pathway where glycosylation is an issue.

Drugs may also be chemically changed after isolation⁸. Biopharmaceuticals induce reactions at low doses but may be harmful at larger quantities. Many have physiochemical characteristics that may enable them to remain in the environment or bioaccumulate in live creatures, thereby causing harm to non-target species (they are environmentally persistent, lipophilic molecules that can pass through cellular membranes). Pharmaceutical plants are already being grown in the open environment, with different ways of avoiding environmental "infection" being devised. In some cases, such as the production of glucocerebrosidase, pharmaceutical transgene expression is induced after harvest, preventing pharmaceutical exposure in the environment, while in others, such as the oleosin–hirudin example, the product is only active after it has been purified from harvested plant tissue. Other ways of avoiding environmental contamination have been extensively explored in the literature, but they are beyond the scope of this study. In general, biopharmaceuticals produced from transgenic plants should be considered safer than those obtained from animal-based sources, which may be contaminated with human diseases. In addition, throughout the development or commercialization of biopharmaceutical-producing transgenic plants, steps are being made to address particular environmental and health issues. Transgenic plants seem to have a lot of promise for producing safe and reasonably cheap medicinal proteins and peptides.

REFERENCES:

1. Ma Y. Beneficial bacteria for disease suppression and plant growth promotion. In Plant-Microbe Interactions in Agro-Ecological Perspectives, 2017.
2. Bhagat Y, Gund S. Transgenic plants: role in agriculture-A review. Agric. Rev., 2014;(35):233-237. doi: 10.5958/0976-0741.2014.00910.6.
3. Liu F, Wang XD, Zhao YY, Li YJ, Liu YC, Sun J. Silencing the HaAK gene by transgenic plant-mediated RNAi impairs larval growth of *Helicoverpa armigera*. Int J Biol Sci. 2015 Jan 1;11(1):67-74. doi: 10.7150/ijbs.10468.
4. Weng X, Huang Y, Hou C, Jiang D. Effects of an exogenous xylanase gene expression on the growth of transgenic rice and the expression level of endogenous xylanase inhibitor gene RIXI. J. Sci. Food Agric., 2013 Jan 15;93(1):173-9. doi: 10.1002/jsfa.5746.
5. Kaya Y, Marakli S, Gozikirmizi N, Mohamed E, Javed MA, Huyop F. Herbicide tolerance genes derived from bacteria. Journal of Animal and Plant Sciences. 2013; 23(1).
6. Erpen L, Devi HS, Grosser JW, Dutt M. Potential use of the DREB/ERF, MYB, NAC and WRKY transcription factors to improve abiotic and biotic stress in transgenic plants. Plant Cell, Tissue and Organ Culture. 2018; 132:1–25. doi: 10.1007/s11240-017-1320-6.
7. Singh N, Mishra A, Jha B. Ectopic over-expression of peroxisomal ascorbate peroxidase (SbpAPX) gene confers salt stress tolerance in transgenic peanut (*Arachis hypogaea*). Gene, 2014, doi: 10.1016/j.gene.2014.06.037.
8. Vinod Kumar S, Sharma ML, Rajam M.V. Polyamine biosynthetic pathway as a novel target for potential applications in plant biotechnology. Physiology and Molecular Biology of Plants. 2006; 12(1):13-28.
9. Atkinson HJ, Green J, Cowgill S, Levesley A. The case for genetically modified crops with a poverty focus. Trends in Biotechnology. 2001;19(3):91-96. doi: 10.1016/S0167-7799(00)01547-X.
10. qiu Teng Z, Shen Y. Research progress of genetic engineering on medicinal plants. Zhongguo Zhong yao za zhi = Zhongguo zhongyao zazhi = China journal of Chinese materia medica. 2015 Feb;40(4):594-601. doi: 10.4268/cjcmm20150405.

EXPERIMENTS ON THE HYDRODYNAMIC PERFORMANCE OF HORIZONTAL AXIS MARINE CURRENT TURBINES TO CONFIRM COMPUTATIONAL PREDICTIONS

Navneet Kumar Vishnoi*

*Assistant Professor,
Department of Computer Engineering,
TeerthankerMahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- navneet.computers@tmu.ac.in

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ABSTRACT

Converting the kinetic energy provided by ocean or marine currents is an intriguing prospect since it may provide a consistent and predictable energy source. The bulk of the suggested designs for converting this kind of kinetic energy are based on the horizontal axis turbine idea, which has many of the same features as wind turbines. Although wind turbine technology may teach and transmit a lot, there are some major distinctions. The consequences of the free surface and the development of cavitations are among them. As a result, any numerical techniques created must be validated. This paper describes the creation and testing of two simulation tools based on blade element momentum theory: a commercial code (GH-Tidal Bladed) and an in-house academic code (SERG-Tidal). Experimental data in a cavitations tunnel and a towing tank were used to validate a model 800 mm diameter turbine. Measurements of shaft power and thrust produced by the turbine for a variety of blade pitch settings and speeds are included in the experimental data. The outcomes of the two codes are compared and contrasted. These findings suggest that the two created codes provide comparable results and offer a good approximation of experimental turbine performance. These findings provide the required trust in the generated codes, resulting in suitable tools that may be used by marine current turbine producers.

KEYWORDS: Tidal Stream; Marine Currents; Marine Current Turbines; Tidal Energy; Ocean Energy; Turbine Design.

1. INTRODUCTION:

Over 70% of the earth's surface is covered by seas. They provide a vast energy resource with the ability to generate enormous quantities of sustainable power that may be used to generate electricity and/or fresh water. Ocean energy is stored in a variety of ways, including thermal energy, kinetic energy (waves and currents), and chemical and biological activities. The kinetic energy components of ocean energy, namely that found in ocean currents, are the subject of this paper. Ocean currents, also known as marine currents or tidal streams, are caused by the gravitational forces of the planets and moon. Due to the shifting locations of the Moon and Sun relative to the Earth's surface, the Earth's gravitational field varies.

The seas and the solid earth react in various ways, resulting in the lengthy ocean waves known as tides that propagate across the ocean. Although the majority of the world's marine currents are controlled by tides, there are a few that are driven by saline gradients, such as those in the Strait of Messina between Sicily's eastern point and Calabria's southern tip[1]. Marine currents are rapidly being recognized as a resource that may be used to generate electricity in a sustainable manner. The kinetic energy of the ocean may be harnessed.

Traditional horizontal axis turbine technology, such as that used in wind energy, may be used to convert tidal currents to power. Marine current velocities are increased by limiting topographies in specific parts of the ocean, resulting in significant velocities that may be exploited for the generation of sustainable electrical power. The Channel Islands' Race of Aldermen is one such location, with a huge turbine farm capable of supplying 1.34 TW h/year. However, anticipating the hydrodynamic properties of marine current turbines is part of the effectiveness of utilizing them to tap the currents. As a result, methods that can characterize the physical and operational performance of the turbines are required. This not only allows for the investigation and evaluation of suitable designs, but also for the long-term forecasting of energy outputs from such turbines[2].

Although much may be learned from the design and operation of wind turbines, there are a few key distinctions in the design and operation of marine current turbines that need to be explored further. The impact of the free surface, various velocity profiles, and the possibility of cavitations are among them. As a result, suitable verified simulation tools must be developed to enable designers of such turbines to proceed with their research before starting on expensive testing or large-scale installation. The research presented here attempts to solve these problems by presenting the findings of two design tools that may be used to build marine current turbines. Blade element momentum (BEM) theory is used to create the tools or codes, which include a commercial code (GH-Tidal Bladed) and an academic in-house code (SERG-Tidal). Experimental data in a cavitations tunnel and a towing tank were used to validate a model 800 mm diameter turbine. The experimental findings from cavitations tunnel tests and towing tank tests that have been blocked are drawn from a considerably broader collection of experiments. This includes observations of cavitations initiation, yaw effect, tip emersion effect, and twin rotor interactions[3].

A cavitations tunnel at QinetiQ, Haler, and a towing tank at Southampton Silent University were used to measure the torque and thrust characteristics of an 800 mm rotor. Figure 1 depicts the main components of the experimental test setup utilized. The Haler cavitations tunnel has a 2.4 m 1.2 m working section with a maximum flow rate of 8 m/s. Prior to operating, the rotor was centered inside the tunnel, and the arrangement of the rig within the tunnel. For the main measurements, this offered a controlled environment. Figure 3 depicts the setup in the towing tank. The tank is 60 meters long, 3.7 meters wide and 1.8 meters deep. At 0.84 m below the free surface, the rotor was almost perfectly centered. The diameter of the rotor was set at 800 mm to strike a balance between maximizing Reynolds number and avoiding severe tunnel blockage rectification. The blades were designed with a chord, thickness, and pitch based on the profile form of a NACA 63-8xx[4].

2482 / Renewable Energy 32 (2007) 2479–2490 distribution. The model blades were machined from aluminum alloy on a 5-axis CNC machine. The rotor hub is 100 mm in diameter and is divided into two sections that clamp the blades, allowing for variations in blade angle. The blade

set angle is the angle formed at the blade's tip (i.e. the blade angles in Table refer to a set angle of 01.) The blade is constructed in such a way that maximum power is generated at a 51-degree angle. Was written to test model rotors. An experimental test rig was Renewable Energy 32 (2007) 2479–2490 2483 that could be attached to either the carriage of the towing tank or the roof of the cavitations tunnel. The rotor is connected to a primary shaft that powers a DC generator through a pulley and a belt that runs up the vertical support tube[5].

The thrust and torque were measured using an in-line strain gauge dynamometer placed next to the turbine. This dynamometer was built to operate wet, allowing readings to be taken before bearing or seal failure. The strain gauge bridge circuit is linked to conditioners via a slip-ring assembly, and the output signals were recorded on a computer. Rheostats absorb the electrical power, allowing the rotor speed to be controlled as well. The experiment test rig design and models. Figure 1 discloses the Visualization of the experimental rig showing key components.

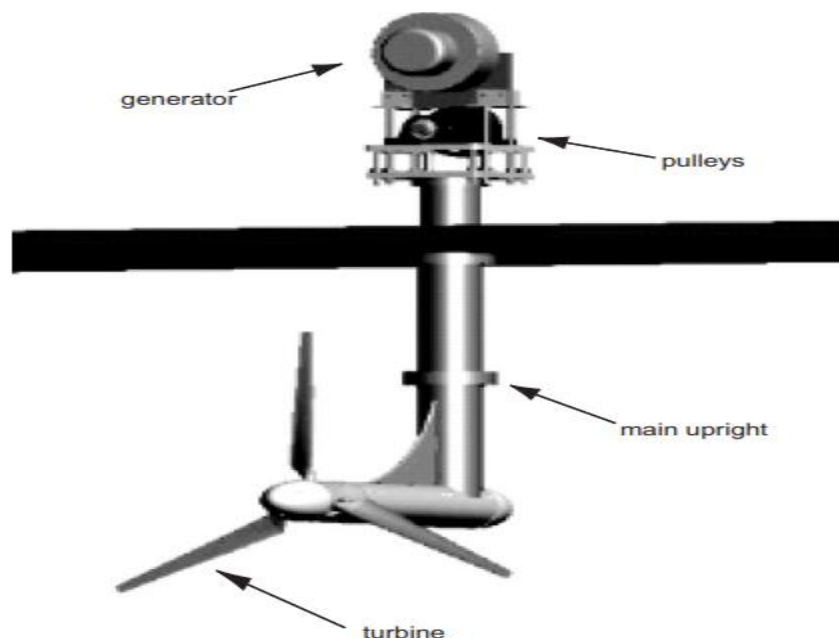


Figure 1: Visualization of the experimental rig showing key components.

2. DISCUSSION:

The BEM theory, which was utilized to create the codes, is a hybrid of momentum theory and blade element theory. The axial and circumferential inflow factors are calculated using the momentum theory, with a tip loss factor added to account for the limited number of rotor blades. By splitting the rotor blade into a number of components, the blade element theory is utilized to calculate the section lift and drag forces. The rotor's thrust and power coefficients may be calculated by integrating these numbers throughout the blade. The boundary effects of the bottom and the free surface are not modeled in the BEM models utilized in this study. Because some proposed designs have rotor diameters of 15 m and are situated within depths as low as 25 m at low tide, these impacts may need to be considered. As a result, adjustments similar to those shown in Table 2 may be needed to forecast actual performance.

2.1. Two-Dimensional Data

Using the 2-D aerofoil performance algorithm X, the lift and drag coefficient values for the blade components were calculated. XFOil is a surface transpiration model that combines a linear vorticity stream function panel technique with a viscous boundary layer solution. The findings of recent cavitations tunnel experiments for NACA sections appropriate for the apex of a marine current turbine were compared to the XFOil results. The findings indicate excellent agreement with pressure distributions and lift coefficients, although drag coefficients near the stall angle are underestimated. The blade form was determined using the chord, pitch, and thickness distributions in Table shows the basic section lift and drag data for five thickness ratios solved using XFOil. The developed BEM theories use this data set, along with the blade shape data, as input data. The commercial design tool GH-Tidal Bladed was created to simulate the loading and performance of tidal stream turbines. Its engineering models are based on the GH-bladed code for horizontal-axis wind turbines, but they have been modified to fit the new maritime application. The code provides a complete time-domain, hydro elastic treatment of the turbine response to external excitation. The blade arrangement, rotor set-up, support structure layout, drive-train layout, and control/safety systems all contribute to the overall design of the turbine. The user can also access detailed models of the flow environment (combined current and wave loading)[6].

Models of cavitations, as well as an addition to the depiction of increased mass to simulate fluid/structure inertial forces encountered by the rotor, are included to describe the under-water application[7]. To simulate buoyancy effects, applied pressure terms on the turbine from the surrounding fluid are also incorporated. The user may calculate severe and lifetime-fatigue loads on the turbine using post-processing functionality for a wide variety of components. ERG-Tidal is tidal turbine prediction software created at the University of Southampton that is based on Barnsley and Wellicome's BEM algorithm for wind turbines. However, the new code includes significant improvements designed especially for water operations, as well as additional additions such as better interpolation, new extrapolation for stall data, and tip loss factor choices.

The software is modular, allowing blade optimizing studies to be carried out. Has all of the program's information. In [6] recent comparisons and forecasts are given. Initial verifications of SERG-Tidal close to the design case are described in this reference, as well as how BEM simulations may be utilized to investigate the hydrodynamic design. This is further explored in , which shows how the BEM theory may be utilized to offer a helpful tool in understanding the functioning of marine current turbines, including the prediction of cavitations, the impact of tidal velocity profile, and the rise in blade roughness[8].

Tunnel and towing tank tests with fixed angles of 51 and 101. The findings indicate excellent agreement, indicating that both the blockage repairs and the use of a still water towing tank are acceptable. The towing tank data provides a wider range of findings, owing to the limited time frame for taking measurements imposed by the tank's short length. For TSR 14 4–7, the predictions from both theories show general agreement in all instances. The design case with a fixed angle of 51 and TSR 14 6 had the best agreement. For set angles 5–131, both theories tended to over predict the power coefficients. The thrust coefficients are large in these situations, and either the experimental[9].

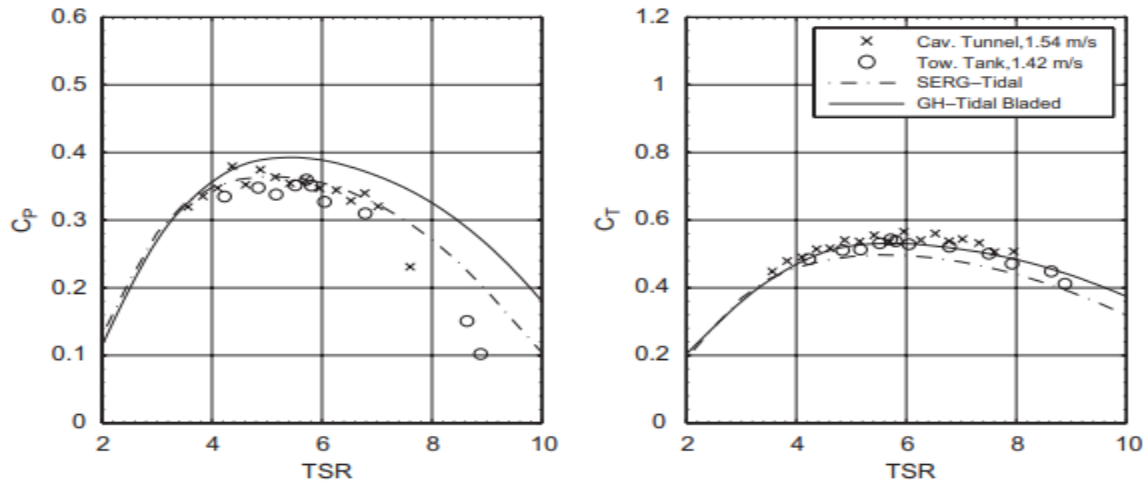


Figure 2: Comparisons between experiments and simulations with a 101 set angle.

It's possible that blockage correction or numerical wake adjustments aren't suitable. Both theories fail to explain the significant decrease in power and thrust coefficients with TSR47 for the set angle of 01. When comparing the BEM theories at TSR greater than the design case, there is a common pattern across the findings (set blade angle of 51) GH-Tidal Bladed has a propensity to somewhat overestimate power, while SERG-Tidal has a tendency to underestimate thrust to some degree. Figures show this for fixed angles of 5–131. It may be owing to inaccuracies in the big blockage adjustments applied to the experimental data, or it could be due to a different turbulent wake model employed in the BEM theory. The turbulent wake correction in the BEM model becomes increasingly significant as the TSR increases. As a result, this adjustment may need to be tweaked. Forecasts for a 20 m rotor working in a 2.5 m/s tidal stream. These findings exhibit similar patterns and provide strong indicators of the range inaccuracy of the design scenario predictions. The table shows that the forecasts around the design case of set angle 51 and TSR in the range 4–8 have a good agreement[10].

3. CONCLUSION:

The utilization of horizontal axis marine current turbines to convert ocean current energy is presently the leading technology that is expected to be adopted by industry and investors. Cost savings in design, installation, and maintenance are required for this technology to thrive. The goal of this project is to provide design tools to help with such needs. Experimental data obtained from testing a model marine current turbine in a towing tank and a cavitations tunnel were used to create and verify two design tools based on BEM theory. As a result of the investigation, the following conclusions were reached: The usefulness of employing a towing tank with suitable adjustments is shown by a comparison of the experimental findings. For utilizing the established theoretical tools for design exercises and parametric investigations, the accuracy of the predictions is acceptable. The design example had the best agreement between all experiments and forecasts. In general, the GH-Tidal Bladed algorithm overestimated the power in off-design situations, while the SERG-Tidal code underestimated the thrust. The findings of the two methods point to the value of creating tools for this new technology, and these tools, like those for wind turbines, are expected to assist in the knowledge of design and performance

characteristics of marine current turbines. Figure 2 discloses the Comparisons between experiments and simulations with a 101 set angle.

REFERENCE:

1. PachecoA. et al. Deployment characterization of a floatable tidal energy converter on a tidal channel, Ria Formosa, Portugal. Energy, 2018.
2. Khojasteh D, Khojasteh D, Kamali R, BeyeneA, IglesiasG. Assessment of renewable energy resources in Iran; with a focus on wave and tidal energy. Renewable and Sustainable Energy Reviews. 2018;81.
3. Zainol MZ, Ismail N, Zainol I, Abu A, DahalanW. A Review on the Status of Tidal Energy Technology Worldwide. Sci. Int., 2017;29(3):659-667
4. Dreyer SJ, Polis HJ, Jenkins LD. Changing Tides: Acceptability, support, and perceptions of tidal energy in the United States. Energy Res. Soc. Sci., 2017; 29:72-83.
5. Jenkins LD. et al. Human dimensions of tidal energy: A review of theories and frameworks. Renewable and Sustainable Energy Reviews. 2018;97.
6. Neill SP, Hashemi MR, LewisMJ. Tidal energy leasing and tidal phasing. Renew. Energy, 2016;85:580-587.
7. Segura E, Morales R, SomolinosJA. Cost assessment methodology and economic viability of tidal energy projects. Energies, 2017;10(11), 1806.
8. Mohd Yusoff NA, Ramli NL, MohamedMR. Investigation of the potential harnessing tidal energy in Malaysia. ARPN J. Eng. Appl. Sci., 2015.
9. Guerra M, Cienfuegos R, Thomson J, SuarezL. Tidal energy resource characterization in Chacao Channel, Chile. Int. J. Mar. Energy, 2017;20:1-16
10. Lewis M, Neill SP, Robins P, Hashemi MR, WardS. Characteristics of the velocity profile at tidal-stream energy sites. Renew. Energy, 2017;114:258-272.

CONSERVATION OF FLORA

Gaybullaeva Madina*; Akramov Adakhamjon**

*Lecturer,
Fergana State University,
UZBEKISTAN

**Lecturer,
Fergana State University,
UZBEKISTAN

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ABSTRACT

Humans use plants extensively for a variety of economic purposes. In Uzbekistan, cotton, wheat, legumes and cultivated crops are used as the main raw materials. Humans also use plants as building materials. They also clean the dust in the air and enrich it with oxygen. Forest plants play a special role in the rational use and protection of flora.

KEYWORDS: *Flora, Autotroph, Photosynthesis, Forest Fund, Importance of Forests, Ecological Culture.*

INTRODUCTION

As plants adapt to absorbing gaseous (photosynthetic) and liquid (water and dissolved mineral salts) substances from the environment during feeding, their body surface area expands. In higher plants, the expansion and specialization of the body surface led to the development of tissues and vegetative organs. Many important features of the structure of plants are related to their growth and reproduction, as well as their adaptation to distribution. [1]

MAIN PART

Plants are the world of living organisms; are autotrophic organisms capable of photosynthesis, usually consisting of thick cellulose and a reserve nutrient, starch. Heterotrophic nutrition, which is characteristic of some plants (saprophytes, parasites), is secondary. Other plant characteristics (specific development cycles, organ formation pathways, adhesions, etc.) do not apply to all plants.[2]

Flora: Divided into red algae and higher plants. These small worlds contain all the 350,000 species of plants. The origin of plants dates back to the earliest stages of life on Earth.

Plants play an important role in the life of all living organisms on Earth. Animals and human life cannot be imagined without plants. Plants with only green chlorophyll accumulate sunlight energy by synthesizing organic compounds from inorganic substances; At the same time, plants take in CO₂ gas from the atmosphere and release into the atmosphere the oxygen needed by almost all living organisms to breathe. In this way, green plants maintain the stability of the atmosphere. Plants form the basis of the food chain as producers of organic matter.[3]

Plants on Earth produce various life forms (grasses, shrubs, trees, lianas, epiphytes, etc.). Phytocenoses, which are composed of a wide variety of species, determine the diversity of ecological conditions for organisms, such as the Earth's landscape and others. Soil and peat are formed with the direct participation of plants. The formation of lignite and hard coal is also associated with plants. [4]

Of the many species of plants, Seed Plants and Flowering Plants are the most important. Seed Plants provide food, clothing, fuel, building materials, and more. Man has learned to build artificial coverings of cultivated plants (fields, gardens, alleys, etc.) on large areas, to create different varieties of plants.

However, over-harvesting and inefficient use of plant resources have led to their extinction in large areas; many plant species are in danger of extinction. For this reason, a special law on the protection of plants and the rational use of their natural resources was adopted in Uzbekistan on December 26, 1997, and the Red Book of Uzbekistan was introduced before this law.[5]

The Red Book of the Republic of Uzbekistan is a document that provides information about rare and endangered species. On December 6, 2019 at the Institute of Botany of the Academy of Sciences of the Republic of Uzbekistan was held the presentation of the next edition of the "Red Book of the Republic of Uzbekistan". This Red Book includes 314 plant species.

The diversity of life is primarily due to the diversity of plant and animal species on earth. Forests are one of the largest biodiversity areas on earth and it is important to protect them. There are more than 180 plants listed in the Red Book in Uzbekistan, and in the process of using nature, man usually interferes with natural processes and does not think about the consequences. As a result, the natural habitat of plants is declining, and these species are declining. In this regard, the Resolution of the Cabinet of Ministers of January 17, 2019 "On improving the regulation of the use of trees and shrubs in areas not included in the State Forest Fund and the procedure for issuing permits for their use" was signed. The purpose of such decisions is to protect the forest resources.[6]

The depletion and deterioration of forests is linked to the development of human society. In primitive society, people took some of what they needed from plants and caused it to change, albeit partially. In recent years, the world's forests have been cut down, and their area has shrunk dramatically due to their widespread use as fuel, construction, and shipbuilding. Two-thirds of the world's forests have been destroyed, especially in densely populated areas. As a result, 500 million hectares of land have been reduced and turned into steppe deserts.

Unplanned and irregular deforestation, in turn, has disturbed the balance of nature and accelerated the process of the following negative consequences for human economic activity; soil erosion accelerated, the regime of rivers and lakes changed, water began to decrease, floods, floods became more frequent, affected the microclimate, the area of migratory birds in the deserts expanded, etc. .

Forests play a vital role in keeping the planet's air clean. Because 1 hectare of forest cleans 18 million m³ of air. Forest air is 200 times cleaner than city air. They also give a person a cultural aesthetic pleasure.

The forest fund in Uzbekistan is 5.3 million hectares, with a total forest area of 2.37 million hectares, which is 5% of the country's land area. In Uzbekistan, forests are located in the plains. The total forest fund in the mountains of Uzbekistan is about 1.4 million hectares, of which 283.7 million hectares are covered with forests. Spruce, pistachio, walnut, apple, cherry, almond, and hawthorn grow in these forests. The main forests in the mountains of Uzbekistan are located in the Ugam, Piskom, Chatkal, Gissar, Turkestan, Zarafshan mountain ranges. The forests in the deserts of Uzbekistan consist mainly of black and white saxaul, sugarcane, juzgun, acacia, etc., which strengthen the mobile sands. The total forest fund in the valleys of the republic is about 210,000 hectares. The total forest area is 13,000 hectares. Forests protect riverbanks from erosion, limit sand erosion in oases, improve the microclimate of surrounding lands, and provide timber for buildings.

Scientific study of the geographical location of the forest fund By studying the geographical location of the forest fund to have a complete knowledge of the quality of the forest fund, the amount of timber in a particular part of the country possible. This allows for more efficient use of forests. Forests in western and southern Russia, which are densely populated but sparsely forested, are cut down, while sparsely populated forests are cut down in sparsely populated Siberia, the Far East, and northern Europe.

Deforestation measures in timber harvesting and processing are important for forest protection. This will bring forest industrial facilities closer to raw materials and create a plant that will use them in a complex way, which will limit the consumption of waste and allow planting new saplings instead of deforested forests. An example is the Association of Industrial Complexes, which combines forestry and forestry in the Carpathians. In addition to allowing the plant to operate continuously, the association produces various boards, cardboard, medicines, livestock yeast, etc. from previously wasted waste (twigs, covers).

CONCLUSION

Preventing the death of young seedlings plays an important role in protecting forest resources. in which, first of all, it is necessary to regulate the celebration of the New Year in order to put an end to the chaotic felling of immature young forests. This is because on the eve of the New Year, there are many cases of illegal logging in the suburbs of the big city on the eve of the New Year. Planted spring festivals are also a factor in the plant's extinction. Because most of those who go on vacation break the branches of young flowering plants, make a "bouquet" and return to the city.

REFERENCES:

1. Nigmatov A. Theoretical Foundations of Ecology. T. Uzbekistan. 2013
2. Nazarov M, Gaybullaeva M. Influence of Ecological Factors on Photosynthesis Processes in Legumes. Agro Science Journal. 2020, 2nd Appendix.
3. Gaybullaeva M F. The Role of Biomass in Saving Natural Resources. The American Journal of Horticulture and Floriculture Research. 2021; 3(2):1-6.

4. Kuzibaevna OG. Technologies of Developing the Ecological Culture of Students In The Process Of Learning A Foreign Languages In Higher Educational Institutions. Solid State Technology, 2020;63(1s):1816-1825.
5. Yuldashev IA. Pedagogical Bases of Formation of Social Activity in Pedagogical Sciences. Теория И Практика Современной Науки, 2020;(5):67-69.
6. Bozarov DM, Karimova GY. Role of the Self-Organization Model in Complex Social Systems. Oriental Journal of Social Sciences, 2021:1-9.

THE HYDRODYNAMIC PERFORMANCE OF MARITIME CURRENT TURBINES PREDICTION

Amit Kumar*

*Assistant Professor,
Department of Civil Engineering,
TeerthankerMahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- amit.engineering@tmu.ac.in

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ABSTRACT

A Hydrodynamic Productivity Of Maritime Current Turbines Is Predicted. It is described how a blade element momentum (BEM) model was developed for the hydrodynamic design of maritime current turbines. Interpolation of 2D section data and extrapolation for stall delay are included in the model. The numerical model is compared to experimental data acquired from cavitations tunnel testing of an 800 mm diameter model rotor. Theoretical predictions match the results of the experiments very well. A typical 3D rotor is utilized to illustrate parametric changes of the design parameters using this verified model. For this rotor, the impact of tip immersion on potential cavitations is evaluated. The model is then utilized to solve the tidal profile's dynamic impacts. The impact of increasing blade roughness is shown, with a very modest decrease in power. This research shows that the created numerical model may be used to investigate the hydrodynamic design and operate of maritime current turbines.

KEYWORDS: Tidal Stream; Marine Currents; Marine Current Turbines; Tidal Energy; Ocean Energy; Turbine Design.

1. INTRODUCTION

The extraction of electrical energy from maritime currents promises consistent and predictable energy. Several studies and a comprehensive review paper have focused on the placement and feasibility of such devices to harvest energy from maritime currents. These findings point to a number of benefits and potential economic feasibility for a variety of sites throughout the globe, especially when mean peak tidal currents exceed 2 m/s (4 knots). The Channel Islands' island of Aldermen, for example, has mean peak tidal currents of approximately 2.5 m/s and could potentially provide 7.4 TWh of electrical energy per year. The bulk of energy conversion designs are based on a horizontal axis wind turbine, which is the subject of this article. Predicting the hydrodynamic performance of marine current turbines, is critical to their effectiveness in tapping ocean currents.

Methodologies must be developed to characterize the turbines' physical and operational performance, enabling their design to be examined and their performance assessed. The design and functioning of wind turbines and ship propellers may teach us a lot. However, there are a

number of basic changes in the design and functioning of the marine current turbine that will require further study, development, and examination. Changes in Reynolds number, stall characteristics, and the possibility of cavitations are all notable variations[1].

This article discusses the construction of a numerical model for forecasting the performance of marine current turbines and the span wise distributions of blade loadings based on the blade element momentum (BEM) theory .For modeling rotor dynamics, such as marine propellers and wind turbines, the BEM theory is well known. While BEM theory can accurately predict span wise stress on thin blades such as those used in wind or marine turbines, it can't tell you about chord wise loading. Other techniques for predicting chord wise pressure, such as 2D panel methods, may be employed[2].

The analysis of stall characteristics and the development of cavitations relies heavily on distributions and loadings. The theory and numerical model are presented, together with comparisons to experimental data and examples to demonstrate how the approach may be used. The study presented here is part of a larger research project being carried out by the University of Southampton's Sustainable Energy Research Group. An EPSRC-funded project including extensive experimental investigations of an 800 mm diameter turbine in a cavitations tunnel and testing in yaw and dual rotor interactions in a towing tank is relevant to this study[3].

Theory Of Blade Element Momentum

A mixture of momentum and blade element ideas underpins the overall BEM theory. The axial and circumferential inflow factors are calculated using the momentum theory, with a tip loss factor added to account for the limited number of rotor blades. By splitting the rotor blade into a number of elemental sections, the blade element theory is utilized to simulate section drag and torque. The combination of these theories implies that the rotor thrust loadings $dCT=dr=R$ and power loadings $dip=dr=R$ at each blade radius are calculated by matching fluid momentum changes to blade forces based on lift and drag coefficients (C_L and C_D) at the blade sections' operating angles of attack. An approximation to the Goldstein tip loss factor is used to account for the limited number of rotor blades. The torque, drag, and power coefficients for the rotor may be calculated by integrating the loadings throughout the blade. The numerical algorithms used in this study are based on BEM theory and were modified from Barnsley and Wellicome's software for wind turbine design[4]. Appendix A contains the details of the fundamental equations utilized.

The lift and drag coefficient values for the blade components were calculated using the 2D panel algorithm XFOIL. XFOIL is a viscous linear vorticity stream function panel technique that interacts with incompressible potential flow via a surface transpiration model. A comparison of recent cavitations tunnel experiments of potential sections near the tip of a marine current turbine with XFOIL was made. The findings were in excellent agreement with pressure distributions and lift curves, although drag coefficients around stall angle were underestimated. The flow chart in Fig. 1 shows the entire numerical model showing how the numerical software may be utilized to give span wise and chord wise loadings as well as cavitations inception checks.

Theoretical And Experimental Comparisons

The cavitations tunnel and test tank experimental findings for an 800 mm diameter model marine current turbine published were used to verify the proposed theory. Validation tests were

conducted out at QinetiQ, Haslar, in the cavitation tunnel. Table 1 shows the chord, pitch, and thickness distributions of the rotor that were utilized in both the tests and the theory. The rotor is connected to a main shaft for the experiments, which powers a DC generator from a pulley via a belt carried up through the vertical support tube. The thrust and torque were measured using an in-line strain gauge dynamometer placed next to the turbine. This dynamometer was built to operate wet, allowing readings to be taken before bearing or seal failure. The strain gauge bridge circuit is linked to conditioners through a slip-ring assembly, and output signals were collected using a data collection system on a computer. Rheostats absorb the electrical power, allowing the rotor speed to be controlled as well.

Low tangential flow factors, suggesting that the BEM theory is suitable. The total CP and CT values obtained by integrating the span wise distributions... The theoretical CP findings for hub pitch angles of 201, 251, and 271 are similar to the tests up to a TSR of approximately 7, after which they are somewhat higher. The theoretical numbers for the 151 hub pitch angle are accurate up to approximately a TSR of 5, beyond which they continue to rise rather than fall. The causes behind this remain a mystery. For hub pitch angles of 201, 251, and 271, the predicted CT values are slightly lower than the actual findings. Above a TSR of around 5.5, the projections for 151 hub pitch angle are incorrect.

The theoretical model is thought to offer an acceptable representation of performance characteristics based on a fair connection between theory and experiment. When utilizing the theory for early design exercises, investigations, and parametric studies, this is especially true. It's worth noting that no more modifications to the theory have been made to bring the theoretical predictions closer to the experimental results[4].

2. DISCUSSION:

When the local temperature rises over a certain level, cavitations will develop on the turbine blade. The pressure falls to or below the sea's vapor pressure. Water. By comparing the local pressures, it may be anticipated. distribution with cavitation number A capitation is a kind of cavitations that occurs when is a number that is defined arson the blade, the local head of water (h) is computed as the blade in the highest position ($h = 14 h_t + R_r$), The tip immersion is h_t . The chord wise cavitations in the nearby area shows the number and lift coefficient. A score of eight Different tip immersion depths are shown by points A and B. Theas the tip is lowered, the findings indicate a reduction in s, as anticipated. Because of the higher speeds and shallower immersion, it was approached. A and B, as well as chord wise pressure distribution charts These pressure distributions were calculated using computed using XFOil on the assumption of ($t/c = 14\%$).

The outcomes even with a 2 m tip immersion, state that for Point A because the minimal Cypress is still barely half, capitation is improbable. Of the s Point B, on the other hand, with the blades highly pitched, for minor immersion situations, capitation is conceivable. It should be mentioned that the pressure minimum zone is currently on the foil's face, at the leading edge. This Face sheet capitation is a kind of cavitation. When choosing a blade section, it's essential to think about what you're looking for[5] thinking about capitation NACA 63-8xx was used in this research. There have been portions utilized. For this, capitation experiments are used, as well as Alternative 2D sections with a thickness chord ratio of 15% are available.

The cavitation inception's form the area of cavitation-free operation is defined by an envelope. Depending on the profile of the segment Figure 1 shows one example. 10 indicates the cavitation operation area that is free for both The NACA 63-815 and NACA 63-215 have less camber. The cavitations-free operating envelope is centered around at CL for the NACA 63-215 portion is lower than the CL for the NACA 63-215 section. Section 63-815 it's also worth noting that the XFOIL Theory has a habit of underestimating the area of interest. The procedure is devoid of cavitations. Goes into more detail on this. And data for two further two-section profiles are provided. As a result, if NACA 63-2xx sections are used in this design, if a different method were employed instead, cavitations would be more probable. Not at Point B, but at Point A. In conclusion, cavitations is conceivable for both the when the blade is highly pitched for power or in a design situation regulation. As a result, cavitations may develop on both sides.

Both sides of the blade, and therefore all operational regions [6] when constructing a rotor, this must be taken into account. The Choosing the right blade portion may help you save money. There's a chance of cavitations at one end of the procedure. Predictions of the blade's different forces are made. Needed for conducting a structural analysis, includes blade stiffness and hub bending tests moments. Depicts the normal and axial spanwise. Points A and B's force distributions for more information, go here. Where z is the vertical position and U_0 is the mean velocity. Preliminary tidal velocities observations across the According to Ark low is appropriate for these preliminary considerations.

The use of logarithmic equations that take into account the terrain for more accurate site-specific forecasts is recommended. Roughness scales for the seafloor may be more suitable. For a comprehensive design of a wind turbine farm, [7] for a specific location, measurements would need to be obtained. During the course of a month in order to get precise velocity information about your profile then there are the forces' powers and oscillations. With greater certainty, existing turbines might be anticipated. To show the magnitude of the potential dynamic forces depicts a typical velocity profile over time. A 10 m radius turbine in a marine current turbine tidal speed of 2 m/s and a depth of 30 m. According to the with this design and the power law, there will be a 20% reduction in the speed of the tide across the blade [8]. This is quite obvious. That the blade pitch should be optimized for maximum performance should be constantly changing, as near to the water surface as possible while heading into the water, cavitation's will be the design criteria. The design criteria will be the bed stall. With a turbine, the local solved span wise distributions. Demonstrate that at a design TSR 14.6 with a velocity of 2 m/s The local TSR near the point ranges from 6.2 and 7.7 [9].

blades A, B, and C, as shown in Figure , as expected Over one revolution, the power and thrust for each blade are the total of the three blades' contributions The rotor force oscillations as a consequence are up to 71 percent. Individual blades seem to be subjected to force oscillations. a percentage of up to 73 percent This must be taken into consideration. Fatigue loadings on the blades have been studied .As a rough estimate, the impact of an increase in By adopting a roughness and fouling model, roughness and fouling have been simulated The section drag coefficient may be increased by up to 50%.

The Surface roughness does not have a significant impact. Although it has no impact on the lift slope, it may change the angle at which stalls occur. It's possible. Experiments have shown that this is true approximation's findings are presented in Fig. 15. The CL distribution span wise hasn't changed much and a substantial rise in CD distribution throughout the span For a TSR of

6, the comparable figure is seen in 15c. CP distribution span wise and Fig. CP to a base is shown in 15d. TSR values for various CD values For instance; a rise in 50% increase in CD results in a relatively modest change in CP, up to an At a TSR of approximately 4, and a CP reduction of roughly 6–8%, TSR is higher. This equates to a power loss of around 5%. approximately 40 kW for the 580 kW design scenario[10]

3. CONCLUSION:

The BEM has been used to build and show a numerical model. Cavitation tunnel experiments on an 800 mm diameter rotor were used to effectively verify this concept. Routines are included in the model. For extrapolation and interpolation of 2D section data for stall delay to enable design predictions the research has been expanded to include a look at in the water, there is a large-scale apparatus. An illustration of a case study of a 20-meter-diameter rotor turbine shows the model's ability to anticipate predicted results. Performance qualities, such as power and speed curves of thrust. The prediction of cavitations was done for a specific reason. In other instances, the tip immersion is just a few millimeters deep.

It had been it was discovered that cavitations may be prevented by using appropriate designs and 2D section selection it is necessary to take precautions. As a result, precautions should be made to anticipate the onset of cavitations in all cases. Scenarios involving the use of marine current turbines, such as Close to the design, back sheet cavitations may develop. Facing sheet, but with pitch regulation designs Cavitation is a possibility the impact of the tidal velocity profile on blade loadings has been investigated. Has been depicted It was discovered that variations in the blade loadings were not trivial, and they will need to be addressed. In structural fatigue investigations, this should be taken into consideration. A similar approach may be used in other situations. On-uniform flow sources, such as those caused by waves or a flow that is slanted. The impact of blade fouling was examined, and it was shown to be negative.

A substantial loss of power may occur at TSR is higher. As a result, caution will be needed. Dependent on variables, a component of turbine maintenance such as operating regions and sea temperatures the verified model's use as a maritime design tool. A variety of current turbines have been shown. Apps as an example Overall, these applications serve as examples. Have conducted a review of some of the operational elements that must be taken into account throughout the design process when the model can be validated on a large scale, it will be feasible to do so. Real-time data on a device in use is a mode that is accessible to the investigators the work is ongoing and will continue in the future.

REFERENCES:

1. Ghassemi H, Ghafari H, Homayoun E. Hydrodynamic performance of the horizontal axis tidal stream turbine using RANS solver. *Sci. Journals Marit. Univ. Szczecin*, 2018.
2. Yang D, Ren Z, Guo Z, Gao Z. Numerical analysis on the hydrodynamic performance of an artificially ventilated surface-piercing propeller. *Water (Switzerland)*, 2018; 10(11):1499.
3. Sun H, Xiong Y, Zhang K. Influence of geometric parameters on the hydrodynamic performance of controllable pitch propellers. *Wuhan Ligong Daxue Xuebao (Jiaotong Kexue Yu Gongcheng Ban)/Journal Wuhan Univ. Technol. (Transportation Sci. Eng., 2013.*
4. Liu W, Li N, Zhao J, Su Y. Wake structure and hydrodynamic performance of flapping foils

mimicking fish fin kinematics. Saudi J. Biol. Sci., 2017 Sep;24(6):1344-135.

5. M Y. Wang, S Su, Shen HL, Du X. Numerical and experimental analyses of hydrodynamic performance of a channel type planing trimaran. J. Hydrodyn., 2014.
6. Luo W, Lyu W. An application of multidisciplinary design optimization to the hydrodynamic performances of underwater robots. Ocean Eng., 2015;104.
7. Belhenniche Samir E, Mohammed A, Omar I, Fahri Ç. Effect of geometric configurations on hydrodynamic performance assessment of a marine propeller. Brodogradnja, 2016;31-48.
8. quan Wang R, zhi Ning D, wei Zhang C, ping Zou Q, Liu Z. Nonlinear and viscous effects on the hydrodynamic performance of a fixed OWC wave energy converter. Coast. Eng., 2018;131:42-50.
9. Khalekuzzaman M, Hasan M, Haque R, Alamgir M. Hydrodynamic performance of a hybrid anaerobic baffled reactor (HABR): Effects of number of chambers, hydraulic retention time, and influent temperature. Water Sci. Technol., 2018; 78 (4): 968–981.
10. Ma Y, Hu C., Li Y, Deng R. Research on the hydrodynamic performance of a vertical axis current turbine with forced oscillation. Energies, 2018;11(12):3349.

AN OVERVIEW ON SOYBEAN

Navneet Kumar Vishnoi*

*Assistant Professor,
Department of Computer Engineering,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- navneet.computers@tmu.ac.in

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ABSTRACT

Soybean has acquired the position as one of the most significant food plants recognized for its seeds as a source of protein, oil and nutraceuticals. The presence of the isoflavones and folic acid has made it a flexible crop for health food uses. The usefulness of soybean crop for food applications is discussed. The soybean proteins are increasing significance as a vegetable source for protein based goods, with abundant amount of important amino acids. Its presence of quality fats and PUFA are also significant from nutraceutical point of view. The fermented soybean meal is also an excellent source of nutritionally dense tofu. In addition the biological characteristics of isoflavones and folic acid give value to the formulations which has been discussed here. Patents filed for improvements in goods and processes have gained popularity and offers promise for the future of soybean sector.

KEYWORDS: Carbohydrates, Oils, Proteins, Soybean.

INTRODUCTION

Soybean (*Glycine max* Leguminosae) is an important grain legume that is not only a lucrative oil crop but also utilized as feed for livestock and aquaculture. The origin and history of soybean plant is not known precisely, however, ancient Chinese literature tells us that as early as in 2853 BC, the Emperor Sheng-Nung of China designated soybean as one of the five frightened grain. The crop was originally grown during the shang dynasty in the eastern part of the north china, which is considered to be the center of origin for soybean. Soybean has been grown in China for more than 4,000 years. Soybean is a commercial commodity and cultivated in over 35 countries as the main oil seed. Globally 38 percent of total soybean crop is produced in US; followed by Brazil (25 percent), Argentina (19 percent), China (7 percent), India (3 percent), Canada (2 percent) and Paraguay (2 percent). The native of soybean is China, the main producers in the world of soybean products are the United States, Brazil, Argentina and India have been widely utilized as significant source of dietary protein and oil across the globe[1]–[4].

Plant Characteristics:

The genus *Glycine* is broken into 2 subgenera: *Glycine* as well as *Soja*. The former comprises of *Glycine canescens* and *Glycine tomentella* Hayata perennial wild species. Three annual species from Asia *Glycine max*, *Glycine soja* and *Glycine gracilis*. *Glycine max* is farmed, while

Glycine soja is grown in China, Japan, Korea, Russia and Taiwan and Glycine gracilis is planted exclusively in china. Soybean is an annual plant, grows prostrate with pods, stems and leaves coated by fine brown or grey hairs. Leaves are trifoliate with 3-4 leaflets per leaf and fall before the seed develop. Soybean fruit is simple or curve form of the waxed pod, 3-7 cm length, containing 1 or 2 seeds. Unripe seeds are green in hue and mature have from light yellow by green to brown tint. Modern varieties of soybean seeds have spherical form and yellow and green hue is the most desired. Flowers are papilionaceous type and purple, pink and white in hue. Anthers develop in the bud and discharge their pollen straight onto the stigma of the same flower and soybean flower has high degree of self-pollination.

Soybean As Food Ingredient:

Soybean is utilized as raw material for oil milling and soy waste used as feedstuff for domestic animals. Soybean has a high nutritional value owing to the high concentration of oil (18-25 percent) and protein (38-50 percent) and is a popular food all over the globe. Production and consumption of soy product grew in western nations. In Asian nations soybean is utilized as fermented and non-fermented food items such as soy sauce, miso, natto, yogurts, kinako, protein crisp, sweets, infant food and soy milk which is further processed into tofu, aburage and yuba. Soybean base products are utilized as a main protein source for various diseases such as lactose intolerance and severe gastroenteritis in newborns. Mature seeds of soybean include, about 35 percent protein, 31 percent carbohydrate, 17 percent lipids, 5 percent mineral and 12 percent moisture. Soybean protein includes sufficient quantity of essential amino acid i.e. histidine, isoleucine, leucine, lysine, phenylalanine, tyrosine, threonine, tryptophan and valine which is suggested for daily consumption as a balanced diet[5]–[8].

Soybean has been found to impart various health advantages such as reduction of plasma cholesterol, prevention of cancer, enhancement in bone mineral density and offer protection against bowel and renal illness. These health advantages are produced by the presence of isoflavone, saponins , protein and peptide in soybean.

Proteins:

Liu has observed that Soybean contains 35-40 percent protein on a dry-weight basis, it comprises globulins, 11S glycinin and 7S β -conglycinin. These proteins include all amino acids necessary to human nutrition, which makes soy products nearly comparable to animal sources in protein quality but with less saturated fat and no cholesterol. Soybean also includes the physiologically active protein components hemagglutinin, trypsin inhibitors, α -amylase and lipoxygenases. As per the FDA's 'Protein Digestibility Corrected Amino Acid'source technique, soybean is not only high quality protein, but it is currently considered to play preventative and therapeutic roles for many illnesses.

Oil:

Soybean contains approximately ~19 percent oil, of which the triglycerides are the main component. Soy oil is characterized by relatively high quantities of the polyunsaturated fatty acids (PUFA), i.e., ~51 percent linoleic acid and ~8 percent α -linolenic acid, stearic acid ~4, palmitic acid ~10, oleic acid ~23 of total fatty acids. Soybean oil contains essential fatty acids- linoleic acid and α -linolenic acid belonging to the ω -6 and ω -3 family, which plays an important

role in the regulation of a number of metabolic pathways and exerts important nutritional and physiological functions.

Carbohydrates:

Soybean includes ~35 percent carbs, polysaccharides, oligosaccharides such as, stachyose (4 percent) and raffinose (1.1 percent). Stachyose is a tetraose with a galactose-glucose-fructose structure, while raffinose is a triose with a structure of galactose-glucose-fructose. Polysaccharides are comprised primarily of insoluble dietary fiber. Soybean curd waste (Okara) contains soluble polysaccharides containing galacturonic acid. In addition to usage as a dietary fiber supplement, soluble polysaccharides have been utilized to alter the physical characteristics of different foods.

Vitamins and minerals:

Soybean is a superior source of vitamins B compared to cereals, but it lacks B12 and vitamin C. Soybean oil also includes tocopherols which are great natural antioxidants. Soybean also includes ~5 percent minerals. It is moderately rich in K, P, Ca, Mg and Fe. Soy ferritin may extra considerable amounts of iron.

Soybean Product:

Oriental soy foods, both fermented and nonfermented items form part of the everyday diet in many parts of the globe. Products such as soy sauce, tofu, tempeh and others are growing increasingly popular in the United States and Europe. Soy sauce is produced either by hydrolysis or by fermentation. Some commercial sauces contain both fermented and chemical sauces. Traditional soy sauces are prepared by combining soybeans and grain with mold cultures such as *Aspergillus oryzae* and other similar bacteria and yeasts. Soymilk originated in China. Soy milk is a complete protein; it may substitute animal protein and other sources of dietary fiber, vitamins and minerals. Soy products include sucrose as the fundamental disaccharide, which breaks down into glucose and fructose. Since soy does not include galactose a result of lactose breakdown, soy-based baby formulae may safely substitute breast milk in children with galactosemia. Natto has a distinct scent, somewhat akin to a pungent cheese. Stirring natto creates plenty of sticky threads. Natto contains 55 percent water, 18 percent protein, 11 percent lipids, 5 percent fiber and 5 percent carbohydrates. It is traditional Japanese morning meal prepared from fermented soybean with *Bacillus subtilis* as a high source of protein. Many businesses are engaged globally for soybean product.

Soybean and Health Benefit:

Traditionally soybean based-foods of have been eaten for millennia in most of the Asian nations and lately, this cuisine has had a tremendous appeal in the west hemisphere. Transgenic soybean is incorporated in agricultural technology to improve productivity mainly by decreasing inputs and therefore production cost.

Soybean is gaining significance as a nutritionally significant crop and also becoming popular for nutraceutical qualities since it includes necessary amino acid and secondary metabolites such as isoflavone, saponins, phytic acids, phytosterols, trypsin inhibitors and peptides. Soy, isoflavonedaizidin and genistein, their precursor's formononetin, biochanin A, their glycosides, glycosides malonates and acetyl glycosides were determined in red clover extracts using

chromatographic and spectrometric methods that are natural phytoestrogens able to inhibit LDL oxidation, thus decreasing the risk of atherosclerosis. It is isolated two novel isoflavonoids from leaves of *Millettiataiwaniana*, *millewanin-F* and *furowanin-A*, along with previously known five isoflavonoids.

Wiseman observed a reduction in sensitivity of LDL particles to oxidation with soy protein intake. Isanga and Zhang showed that the phytochemicals included in soybean as functional components affects the decrease of cholesterol and prevention of cardiovascular illnesses, diabetes symptoms, bone loss straight and cancer. Messina and Lane indicated that soybean-based meal may assist to decrease the level of cholesterol, soybean will aid to this change because offer quality protein, in addition is low in saturated fat and is free of cholesterol. Tavva revealed that transgenic soybean with content of α -tocopherol by expressing the gene γ -tocopherol methyltransferase of *Perillafrutescens* which is useful in protection of oxidative degradation of lipids during seed storage and germination. Eating soybeans, which are excellent sources of calcium and protein and simple method to help develop strong bones and potentially decrease the chance of osteoporosis.

Folate is required for physiological nucleic acid synthesis as well as the control of gene expression, cell division, neurotransmitter production, and amino acid metabolism in the one-carbon metabolism. Blencowe investigated the use of folic acid to decrease newborn mortality due to neural tube defects. Their research offers a quantitative assessment of the impact of folic acid fortification and supplementation on the reduction in the risk of newborn death.

Barua looked at the effects of folic acid supplementation during pregnancy, as well as the health and disease consequences. Folate may aid in the prevention of heart disease. The impact of folate on a variety of different health consequences is hotly debated throughout pregnancy. Soybean has approximately 2500 g kg^{-1} of folic acid on a dry matter basis. There is potential for research into the amounts of folic acid in processed grains and goods, as well as the vitamin's bioaccessibility. Folic acid levels are harmed as a result of the processing conditions. Folic acid has been linked to a variety of different health issues, including anemia, nutritional malabsorption, newborn brain development, Alzheimer's disease treatment, and age-related hearing loss. As a result, diets high in soybeans, which are a strong source of this vitamin, may be beneficial to one's health.

Patent Applications for Soybean

Because soybean products are so important commercially, there is a growing rush to patent soybean innovations in order to compete in the global market. The patents on the soybean crop are concerned with increasing production as well as quality characteristics. The patents also cover the method of creating numerous enhanced goods that are useful in the food and health food industries. As a result, the number of soybean patents is steadily rising. Only a few examples are provided here to illustrate the significance of soybean patents from the aforementioned viewpoints.

LITERATURE REVIEW

EkachaiChukeatirote et al. discussed a review on the significance of Soybean[9]. Bacteriophages are widely distributed and have been discovered in a variety of food items. Because they may interact with their bacterial hosts in food matrices, their existence is critical. Fermented soybean

products, such as Japanese Natto, Indian Kinema, Korean Chongkukjang, and Thai Thua Nao, are made organically and are one of the most frequently eaten ethnic cuisines among Asian people. This study focuses on bacteriophages that have been isolated from fermented soybean products and provides an overview of their variety, prevalence, and importance.

B. Vagadia et al. discussed about soybean trypsin inhibitor[10]. Soybeans are an important low-cost protein source. Because of their versatility and nutritional worth, they are frequently eaten. Soybean consumption has recently increased owing to its positive benefits on human health, such as the prevention and treatment of a variety of chronic ailments, such as cardiovascular disease and cancer. They do, however, include a number of bioactive anti-nutritional chemicals, including as protease trypsin inhibitors, phytic acid, and isoflavones, which have negative physiological effects and reduce nutritional quality. The most important factors to consider in the crucial stage of soy product manufacturing are inactivation of these trypsin inhibitors, as well as deleterious enzymes, microbes, and bioactive components, as well as improving protein quality by improving texture, color, flavor, functionality, and digestibility. The main techniques (physical and chemical) used by food researchers and industry to enhance the nutritional and functional characteristics of soybeans and remove the trypsin inhibitors found in them are discussed in this study.

DISCUSSION

Soybeans are one of the most widely planted and consumed oilseeds. Human and animal meals, industrial goods, chemicals, and precursor materials are all examples of applications. Separating oil from protein and fiber is an important step in using soybeans. Traditionally, this has been done via solvent extraction or expeller pressing, both of which provide oil and protein-rich meals. Soybean is becoming a popular crop due to its nutritional benefits and potential use in health foods. Soybeans are processed for their oil (which is used in a variety of ways) and meal (which is used in a variety of ways) (for the animal feed industry). A lesser proportion is processed for human consumption, resulting in goods such as soy milk, soy flour, soy protein, tofu, and a variety of retail food items. Many non-food (industrial) items include soybeans. This article examines soybeans and their impact on human health.

CONCLUSION

Soybean is becoming a popular crop due to its nutritional benefits and potential use in health foods. Though historically an Asian crop, it is now widely grown across the globe, and food technology advancements have introduced a variety of additional uses. The study into the explication of bioactive qualities is in full gear, giving the promises made for health applications more legitimacy. It is gaining popularity in designer foods because to its usefulness as a source of iso-flavones, which are the main bioactive compounds. As nutritionally essential dishes for individuals of all ages, the protein and fermented goods offer value. This crop is already a commercial success as a source of edible oil. The inclusion of folic acid is an added bonus, since folic acid deficiency is a major problem throughout the world. Although raw soybeans contain approximately 2500 g kg^{-1} on a dry matter basis, cooked Tempe will have the added advantage of B12 vitamin and isoflavone, as well as folic acid, which will be maintained with a bio-accessibility of over 80%. As a result, soybean has a lot of promise as a source of essential nutrients and nutra-ceuticals that may help people's health. As a result, the current advances in

the development of soybean processes and products will give a further boost to the aspect of soybean use beyond its use as an oil seed crop.

REFERENCES:

1. Engels C, Rodrigues FA, Ferreira OA, Inagaki TM, Nepomuceno AL. Drought effects on soybean cultivation - A review. Annual Research and Review in Biology. 2017, doi: 10.9734/ARRB/2017/35232.
2. Mukherjee R, Chakraborty R, Dutta A. Role of fermentation in improving nutritional quality of soybean meal - A review. Asian-Australasian Journal of Animal Sciences. 2016 Nov;29(11):1523-1529. doi: 10.5713/ajas.15.0627.
3. Mwenye OJ, van Rensburg L, van Biljon A., van der Merwe R. The role of proline and root traits on selection for drought-stress tolerance in soybeans: a review. South African Journal of Plant and Soil. 2016, doi: 10.1080/02571862.2016.1148786.
4. Salvagiotti F, Cassman KG, Specht JE, Walters DT, Weiss A, Dobermann A. Nitrogen uptake, fixation and response to fertilizer N in soybeans: A review. Field Crops Research. 2008; 108(1):1-13. doi: 10.1016/j.fcr.2008.03.001.
5. Khojely DM, Ibrahim SE, Sapey E, Han T. History, current status, and prospects of soybean production and research in sub-Saharan Africa. Crop Journal. 2018;6(3):226-235. doi: 10.1016/j.cj.2018.03.006.
6. Destro D, Carpentieri-Pípolo V, Kiihl RAS, Almeida LA. Photoperiodism and Genetic Control of the Long Juvenile Period in Soybean: A Review. Crop Breed. Appl. Biotechnol., 2001, doi: 10.13082/1984-7033.v01n01a10.
7. Jarvie JA. A review of soybean rust from a South African perspective. South African Journal of Science. 2009; 105(3-4):103-108. doi: 10.4102/sajs.v105i3/4.55.
8. Deshmukh R. et al. Integrating omic approaches for abiotic stress tolerance in soybean. Frontiers in Plant Science. 2014 Jun 3;5:244. doi: 10.3389/fpls.2014.00244.
9. Chukeatirote E, Phongtang W, Kim J, Jo A, Jung LS, Ahn J. Significance of bacteriophages in fermented soybeans: A review. Biomol. Concepts, 2018;71. doi: 10.1515/bmc-2018-0012.
10. Vagadia BH, Vanga SK, Raghavan V. Inactivation methods of soybean trypsin inhibitor – A review. Trends in Food Science and Technology. 2017;64:115-125. doi: 10.1016/j.tifs.2017.02.003.

AN OVERVIEW ON CAUSES OF ISCHEMIC STROKE

Dr. Ruchi Choudhary*; Dr. Vishvanayak**

*Associate Professor,
Department of Pharmacology,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- ruchi.upmanyu@gmail.com

**Professor,
Department of General Medicine,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email id: vishvanayak@gmail.com

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ABSTRACT

Stroke is the world's second largest cause of death and disability, with a rising prevalence in developing nations. The majority of strokes are caused by ischemic stroke caused by arterial blockage. Rapid reperfusion using intravenous thrombolysis and endovascular thrombectomy, both of which decrease disability but are time-sensitive, is the goal of treatment. As a result, optimizing the advantages of reperfusion treatments requires strengthening the healthcare system to minimize treatment delays. When given within 4.5 hours after the start of a stroke, intravenous thrombolysis decreases disability. Thrombolysis may also help patients who have perfusion imaging of salvageable brain tissue for up to 9 hours or who wake up with stroke symptoms. When done within 6 hours of stroke start or in individuals identified by perfusion imaging up to 24 hours after stroke onset, endovascular thrombectomy improves disability in a large population of patients with major artery blockage.

KEYWORDS: *Disability, Disorder, Hemorrhage, Ischaemic Stroke, Stroke.*

1. INTRODUCTION

Stroke is a major cause of mortality and disability globally, and it may be divided into two types: ischemic stroke and haemorrhagic stroke, which includes intracerebral and subarachnoid haemorrhage. Ischaemic stroke is described as a brain, spinal cord, or retinal infarction that accounts for 71% of all strokes worldwide. The definition of ischemic stroke has changed from a mainly clinical decision to a tissue-based categorization thanks to advances in brain imaging. On the basis of the detection of persistent tissue damage on MRI, many transitory episodes with complete clinical recovery are now classified as stroke. When blood flow is briefly stopped, a transient ischemic attack (TIA) occurs, which resolves before inflicting lasting damage. The pathophysiology is similar to that of ischemic stroke, as are the underlying cause investigations and secondary preventive measures[1]–[4].

Patients with ischaemic stroke are currently managed optimally in geographically defined stroke units by an experienced interdisciplinary team of physicians, nurses, and allied health clinicians who follow best-practice stroke guidelines, which include intravenous thrombolysis and/or endovascular thrombectomy. The epidemiology, pathophysiology, and etiology of ischaemic stroke and transient ischemic attack are discussed in this article.

Epidemiology:

Stroke, which includes both ischemic and hemorrhagic strokes, affects 13.7 million people worldwide each year and is the second largest cause of mortality, accounting for 5.5 million fatalities. A stroke affects one out of every four people at some point in their lives, and there are more than 80 million stroke survivors worldwide. These stroke survivors are a high-risk group, and secondary preventive efforts are aimed at them.

From 1990 to 2010, changes in the epidemiology of ischemic stroke varied according to a country's socioeconomic level. In high-income nations, for example, the incidence, mortality, disability-adjusted life years, and mortality-to-incidence ratio dropped, whereas there were no significant changes in low-income and middle-income countries over this time period. Differences in population age demographics, life expectancy, health condition, and health-care delivery standards may be to blame for these inequalities[5].

Risk Factors Include:

Age, sex, and genetic variables are all non-modifiable risk factors for ischemic stroke. The impact of age on the risk of ischemic stroke varies depending on a country's development level; for example, industrialized nations have seen faster rises in incidence and prevalence beyond 49 years of age compared to developing countries. Between 1990 and 2013, the worldwide prevalence of ischemic stroke almost quadrupled in individuals aged 20 to 64, with a 37.3 percent rise in related disability-adjusted life years. In the 2013 Global Burden of Disease Study, the incidence of ischemic stroke was greater in males than in women. Although some monogenic causes of ischaemic stroke, such as cerebral autosomal dominant arteriopathy with subcortical infarcts and leukoencephalopathy (CADASIL) and cerebral autosomal recessive arteriopathy with subcortical infarcts and leukoencephalopathy (CARASIL), have been identified, the majority of cases are sporadic[6].

Mechanisms/Pathophysiology:

The majority of ischemic strokes are thromboembolic in nature, with big artery atherosclerosis and cardiac disorders, especially atrial fibrillation, being frequent causes of embolism. Small vessel disease, which is linked with high blood pressure and diabetes mellitus and is especially prevalent in Asia, is another cause of ischemic stroke. Arterial dissection, vasculitis, patent foramen ovale (PFO) with paradoxical embolism, and hematological diseases are less frequent overall, but proportionately more common in younger individuals. The etiology of ischemic stroke is significant because it may help guide treatment methods to avoid recurrent stroke[7]–[9].

Arterial Causes Of Stroke:

i. Atherosclerosis:

An embolus in the cerebral vasculature caused by an ulcerated and usually stenotic atherosclerotic plaque in the aortic arch, neck, or intracranial arteries is a frequent cause of ischemic stroke. When the lipid core of atherosclerotic plaques is exposed to the circulation in individuals with atherosclerosis, thrombi may develop, which can be produced by inflammation and ulceration of the fibrous cap of plaques. These thrombi may obstruct the atherosclerotic artery or embolize distally, which is more frequent in the big arteries that cause stroke.

ii. Small Vessel Disease:

Small vascular disease affects the brain's smaller arteries and arterioles, as the name implies. Lacunar stroke, leukoaraiosis (white matter alterations seen as T2-hyperintensities on MRI or hypodensities on CT), cerebral microbleeds, and intracerebral haemorrhage are all examples of small vessel disease. Tiny-calibre perforating arteries that originate from much bigger arteries of the circle of Willis supply deep subcortical and brainstem regions, exposing the small vessels to high pressure that may lead to lipohyalinosis.

iii. Dissection Of The Arteries:

Stroke is often caused by a dissection or rupture in the intimal layer of an artery with intramural thrombus, especially in younger individuals. Most ischemic strokes occur in the extracranial carotid and vertebral arteries, which may obstruct the artery at the dissection site or induce thrombus development and distant embolism. Although cervical trauma may induce dissection in various degrees, it is frequently minimal; for some people, vigorous coughing or sneezing may be enough to trigger dissection[10].

iv. Cerebral Vasculitis:

Vasculitis of the cerebral arteries is uncommon, although it may develop as a primary CNS angiitis or as a symptom of a systemic vasculitis. Inflammation of the vessel walls may cause luminal narrowing and thrombosis, resulting in ischemic stroke (and sometimes intracerebral haemorrhage).

Stroke Caused By The Heart:

i. Atrial Fibrillation:

Atrial fibrillation and flutter cause blood to pool in the left atrial appendage, which may lead to thrombosis and eventual embolism in the cerebral or systemic circulation. Atrial fibrillation, both persistent as well as paroxysmal, increases the danger of cardioembolic acute stroke[5].

ii. Oval Foramen Patent:

The cardiac foramen ovale enables oxygenated placental blood to pass from the right to the left atrium in pregnancy. Most people's flaps shut after delivery due to increased pressure on the left side of the heart; however 25% of people retain some residual patency (that is, a PFO). This patency increases a risk of paradoxical embolism, which may result in an ischemic stroke. The substantial decrease in the incidence of recurrent ischemic stroke following endovascular closure of PFO has emphasized the significance of PFO in young adult stroke.

iii. Infective Endocarditis:

Septic emboli in the brain caused by bacterial endocarditis may lead to ischemic stroke. Aside from the increased risk of stroke, bacterial endocarditis complicates stroke therapy since it is

linked to a higher chance of haemorrhagic transformation following thrombolysis due to septic arteritis, which weakens vessel walls.

iv. Hypokinetic Section With Thrombus On The Wall:

Following a myocardial infarction, regions of segmental hypokinesis may develop inside the heart, increasing the risk of cardioembolic stroke. In certain instances, hypokinesis may enable mural thrombi (thrombi adhering to the artery or heart's wall) to develop, which can embolize and cause ischemic stroke.

v. Disorders Of The Blood:

Ischaemic stroke is caused by haematological diseases, which are an uncommon but significant cause. They are a more frequent cause of cerebral venous thrombosis (clotting in the veins of the brain). Three of the most frequent haematological disorders that lead to thrombus formation include essential thrombocytosis (higher platelet count), polycythaemia Vera (higher red blood cell count and blood viscosity), and antiphospholipid syndrome (more procoagulant status). These diseases may appear with a stroke as a symptom. Furthermore, sickle cell anemia may induce stroke and is a common cause of paediatric stroke among African-Americans[6].

Pathophysiology of a Stroke:

i. Blood Flow In The Flanks:

Alternative blood flow routes (called collaterals) may maintain viability in the penumbral brain areas for a length of time when an intracranial artery is blocked. Collateral flow varies greatly across people and is likely influenced by both genetic and environmental factors. Furthermore, the amount of collateral flow inside a single person may change over time.

ii. Reperfusion Damage and the Ischaemic Cascade:

The molecular implications of decreased cerebral perfusion in laboratory animals are well known, and models of stroke pathology have been developed that are substantially supported by human, in vitro, neuroimaging, and post-mortem investigations. However, given the significant variations in brain structure, coagulation system, and functional complexity between rodents and humans, it's possible that distinct route physiological events contribute to human illness in different ways than they do in animal models. Furthermore, additional mechanisms that are not present in animal models may be involved in human stroke.

iii. Effects on the Whole System:

Hypertension, arrhythmias including bradycardia, and pulmonary exudates are all early reactions to a massive ischemic stroke, but it's uncertain whether these changes are caused by brain damage or are due to other factors.

Pulmonary oedema, for example, could be an indirect result of the cardiac consequences (myocardial 'stunning') of severe brain injury, and could contribute to secondary insult and injury by reducing the efficient perfusion of brain regions that were not or only partially affected by the initial ischaemic insult. Even little strokes, though, may have far-reaching effects. A systemic immunological response, stress response (cortisol increase), splenic macrophage and bone marrow stem cell release, and alterations in gut permeability and microbiota are among them[5].

Recovery Mechanisms:

In animal models of stroke, the degree of behavioral recovery may be astonishing, and comparable gains can be observed in young people after stroke or traumatic brain damage. Neuroplasticity is responsible for a large part of this recovery (that is, the ability to leverage alternate pathways to replace those lost due to stroke). Local sprouting, synaptogenesis, or just the strengthening of transmission at existing synapses may all be examples of plasticity. Importantly, this flexibility seems to come at a cost; it is extremely typical for younger individuals to recover physically well but have difficulty attention to many events and tiredness. According to imaging studies, they need to recruit far bigger, more diffuse networks to operate properly, and this comes at a cost in terms of effort and the capacity to deploy these networks in other activities.

2. DISCUSSION

When the blood flow to a portion of your brain is stopped or decreased, brain tissue is deprived of oxygen and nutrients, resulting in a stroke. Within minutes, brain cells begin to die. A stroke is a medical emergency that requires immediate attention. Brain injury and other problems may be avoided if treatment is taken early. Hemorrhagic strokes are very hazardous because the blood in the brain may induce hydrocephalus, increased intracranial pressure, and blood vessel spasms. These diseases may cause serious brain damage and possibly death if not addressed promptly. Damaged brain cells, fortunately, may be repaired. They have the ability to renew, a process known as neurogenesis. After a stroke, the most rapid recovery happens in the first three to four months. Recovery, on the other hand, may last long into the first and second years.

3. CONCLUSION

When the blood flow to a portion of your brain is stopped or decreased, brain tissue is deprived of oxygen and nutrients, resulting in a stroke. Stroke medicine is a diverse and fast evolving discipline that offers patients suffering from the main cause of neurological impairment life-changing therapies. Stroke care will become more important in the future for neurologists, and as a speciality, we have a lot to contribute, particularly in terms of diagnostic competence. We may also need to further improve our abilities, such as treating critically sick patients with general medical issues on an acute stroke unit or learning how to conduct mechanical thrombectomy.

REFERENCES:

1. Katan M, Luft A. Global Burden of Stroke. *Semin. Neurol.*, 2018 Apr;38(2):208-211.
2. Feigin VL, Norrving B, Mensah G A. Global Burden of Stroke. *Circ. Res.*, 2017 Feb 3;120(3):439-448.
3. Powers WJ. et al. 2018 Guidelines for the Early Management of Patients With Acute Ischemic Stroke: A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association. *Stroke*, 2018;50(12).
4. Boehme AK, Esenwa C, and Elkind MSV. Stroke Risk Factors, Genetics, and Prevention. *Circulation Research*. 2017 Feb 3;120(3):472-495.
5. Alexandru R, Terecoasă EO, Băjenaru OA, Tiu C. Etiologic classification of ischemic stroke: Where do we stand? *Clinical Neurology and Neurosurgery*. 2017 Aug;159:93-106.

6. Yang JL, Mukda S, Der Chen S. Diverse roles of mitochondria in ischemic stroke. *Redox Biology*. 2018 Jun;16:263-275.
7. Boulanger JM. et al. Canadian Stroke Best Practice Recommendations for Acute Stroke Management: Prehospital, Emergency Department, and Acute Inpatient Stroke Care, 6th Edition, Update 2018. *Int. J. Stroke*, 2018.
8. Torregosa MB, Sada R, Perez I. Dealing with stroke: Perspectives from stroke survivors and stroke caregivers from an underserved Hispanic community. *Nurs. Heal. Sci.*, 2018 Sep; 20(3):361-369.
9. Jauch EC. et al. Guidelines for the early management of patients with acute ischemic stroke: A guideline for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke*, 2013 Mar;44(3):870-947.
10. Varma PK, Krishna N, Jose RL, Madkaiker AN. Ischemic mitral regurgitation. *Annals of Cardiac Anaesthesia*. 2017;20(4):432-439.

MODELING INVESTIGATIONS OF TIDAL FLAT RECLAMATION'S FAR-FIELD IMPACT ON TIDAL DYNAMICS IN THE EAST CHINA SEAS

Dr. Varun Kumar Singh*

*Associate Professor,
Department of Chemistry,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- drvarun.engineering@tmu.ac.in

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ABSTRACT

As a result of substantial economic development in the coastal regions, the reclamation of tidal flat carried out by authorities surrounding the Bohai Sea, Yellow Sea, and East China Sea (BYECS) has reached unprecedented heights in recent decades. We are worried that tidal flat restoration will have far-reaching impacts on tidal dynamics throughout the whole BYECS. When tidal flats surrounding the BYECS are eliminated, the tidal range and phase are altered, and the amphidromic points are relocated, a numerical analysis reveals various tidal patterns owing to tidal energy redistribution. Tidal flats store and dissipate tidal energy, with the former being much more important than the latter. The loss of these functions due to tidal flat reclamation will lead the additional tidal energy to be redistributed. Furthermore, we demonstrate that after substantial reclamation on the Chinese Jiangsu coast, far-field impacts on tidal dynamics will be seen on Korea's west coast. Reclamation on Korea's west coast, in turn, may have far-field impacts on China's shore. Reclamation in the BYECS has the potential to increase tidal amplitude and sediment movement onshore. The former may exacerbate coastal dangers including storm surge, while the latter could lead to significant siltation. As a result, any planned manmade modifications to the tidal flat must always be carefully considered, considering the impacts on both the local ecosystem and farther away.

KEYWORDS: *Far-Field Effect Tidal Flat Tidal Energy Tidal Asymmetry Reclamation.*

1. INTRODUCTION

Tidal motion is one of the most important dynamical processes in the East China Seas (Bohai, Yellow, and East China Seas, BYECS), where tidal dynamics are complex and tidal ranges are wide. The BYECS has been studied using numerical techniques since the 1970s (e.g. Guo and Yang, 1998; Kang et al., 1998; Bao et al., 2001). Due to the low model resolution, wetting and drying (WAD) is always considered to be a peripheral process. As a result, the function of tidal flats in the BYECS tidal system has never been investigated.

Have used hydrodynamic models with WAD simulation to investigate estuarine processes. Many scholars have looked at the relevance of the WAD process for coastal ocean systems. Numerical trials without the WAD procedure would either underestimate or exaggerate tidal height and current in tidal dynamics. Furthermore, Xue and Du (2010) discovered that the WAD process improves mixing and entrainment nears the estuary, resulting in greater tidal incursions into the estuary. They also hypothesized that the WAD process may have an impact on regions considerably wider than the intertidal zone, particularly via river plumes that feed coastal currents. In the numerical trials without the WAD method, tidal flats had to be assigned to either water or land, which both changed the local geomorphology. However, prior research only looked at local- and regional-scale processes as a result of local geomorphologic change. Tidal energy extraction in the Minas Passage, Bay of Fundy, would change tidal heights and currents across the Gulf of Maine, according to Hasegawa et al. (2011). This is referred to as the "far-field" effect. As a result, we questioned whether tidal flat reclamation had far-field impacts on tidal dynamics across the BYECS, despite the fact that the overall area of the tidal flats is rather modest in comparison to the BYECS (less than 2 percent of the surface area)[1].

As a result of substantial economic development in the coastal regions, the authorities' land reclamation surrounding the BYECS has reached unprecedented heights. In China, for example, the Shanghai city administration proposed reclaiming * Corresponding author in 2000.

By 2010, the Yangtze River Estuary had 400 km² of tidal flats. The CaoFeidian Reclamation Project in Tangshan, Hubei Province, northern Bohai Bay, intended to recover 129.7 km² of tidal flats from the Bohai Sea between 2004 and 2020. The Tianjin New Coastal Zone Project, which is situated in the municipality of Tianjin in western Bohai Bay, has reclaimed 265.5 km² of tidal flats from the Bohai Sea and extended the shoreline 3.8e16.0 km seaward since 1995. The Chinese Central Government has authorized a large project to recover approximately 2000 km² of land along the Jiangsu coast, including tidal flats, by 2020, and another 4400 km² in the Yellow River Delta is being considered.

South Korea began the Saemangeum Reclamation Project in 1991, with the goal of reclaiming approximately 401 km² of land and tidal flats from the Yellow Sea. Since the early 1990s, the Japanese government has overseen the Isahaya Reclamation Project, which has devastated a 16 km² stretch of tidal flats in Ariake Bay. Many researchers [2] examined the environmental reaction to such land reclamation operations, finding that they altered local hydrodynamics and resulted in pollution, contamination, siltation, and wetland losses. Between 1949 and 2002, reclamation converted over 12,000 km² of coastal wetland into industrial and agricultural areas, accounting for around 55% of China's entire coastal wetland[3].

The country's Gross Domestic Product has risen at a double-digit pace, in order to meet demand for land and seek economic gains and wealth accumulation. As stated by Le Provost and Lyard, the shape of tidal flats will affect the tidal energy dissipation, which is now dominated by friction in shallow water where tidal currents are greater than in deep oceans. In this context, we're interested in seeing how the loss of tidal flats surrounding the BYECS has spread this effect throughout the whole basin. Overtides and compound tides, on the other hand, are caused by distortion of astronomical tides in shallow water, where nonlinearities in the equations of motion cause tidal asymmetry in the rise- and fall-duration of water elevation, which can be manifested as an inequality in the magnitudes of flood and ebb tidal currents. An increase in flood tidal current may cause net onshore sediment transport and siltation; on the other hand, an increase in

ebb tidal current can cause net offshore sediment transport and coastal erosion. As a result, the impact of tidal flat reclamation on the local ecosystem as well as farther afield will be investigated in this research.

To investigate the tidal dynamics in the BYECS, we construct a very-fine-resolution model that covers all tidal flats. This model will be used to study the impact of tidal flat reclamation on tidal energy distribution and asymmetry. A description of the numerical model is given in Section 2. Section 3 describes and discusses the model findings after various treatments of the tidal flats. Finally, in Section 4, the study's findings are reported[4].

The current research encompasses the waters bordered by the Chinese mainland, Korean peninsula, Kyushu Island, Ryukyu Islands, and Taiwan Island, and spans the latitudes of 24N to 42N and 116E to 132E. . The Bohai Sea, Yellow Sea, and East China Sea are all part of this 1.22 million km² region. With an average depth of 18 meters, the Bohai Sea is China's inland sea. With an average depth of 44 meters, the Yellow Sea is a semi-enclosed shallow sea lying on the continental shelf. With a large stretch of continental shelf in the west and deep troughs in the east, the East China Sea lies on the western Pacific Ocean's edge. The Okinawa Trough has a depth of 2719 meters, with an average depth of 370 meters. Water depths vary from 200 meters on the shelf to more than 9000 meters east of the Ryukyu archipelago in the Pacific Ocean in the East China Sea, which features the world's widest continental shelf and steepest continental slope. In this area, tidal flats occur on a vast scale, with a breadth of 3 to 18 km and a gradient of less than 1/1000. Due to the extremely mild coastal slope, none of the two kinds of tidal flats along the Chinese coast provides adequate fetch for wind/wave interaction; therefore, the tidal flat coast is dominated by tidal processes and is often accompanied with a significant sediment supply. Because of its exposed position, the west coast of Korea is subjected to a more severe monsoon wind regime than the Chinese coast, and therefore alternates between a tide-dominated process in summer and a wave-dominated process in winter. The literature has detailed descriptions of the hydrodynamics and sedimentation processes on the tidal flats in this area[5].

We utilize the most recent version of the Stony Brook Parallel Ocean Model (sbPOM), a parallel ocean modeling algorithm based on the Princeton Ocean Model (POM). The latter is a simple-to-use yet sophisticated ocean modeling programme that is utilized by scientists for a variety of purposes. To make the parallel model appropriate for a coastal area research, we integrate the WAD scheme into it. During an external time step, whether the horizontal grid spacing is sparse or the time step is lengthy, the water surface may quickly drop to be on or below the bottom, causing the total water depth to approach zero or even become negative.

To prevent this, the water elevation (z) is restricted to $z \geq \max(z; H - D_{\min})$, (1), where H is the mean water depth and $D_{\min}$ is less than the minimum water depth (H_{dry}), beyond which the grid is deemed dry. If a high external time step or extremely sparse grids are utilized, the WAD method is considerably more resilient with a non-zero $D_{\min}$. The BYECS tidal simulation works well with this tweak to the WAD scheme, using $D_{\min} = 0.01$ m and $H_{\text{dry}} = 0.05$ m[6].

2. DISCUSSION:

The tidal flat over the Jiangsu Shoal water and Gyeonggi Bay are also significant “energy-sink” areas, according to our findings. Broad intertidal flats that lose a substantial amount of tidal energy. The reclamation of these areas will result in tidal energy outflows. Demonstrate where the additional tidal energy from these areas is going the reclamation of the Jiangsu Shoal water in

Case JS includes two components. Second, a portion of the energy flow from the Pacific Ocean to the Bay; and third, a portion of the energy flux from the Pacific Ocean to the Bay. The Jiangsu coast is returned through Japan's southwest and the Taiwan Strait is a waterway between Taiwan and mainland China. As a result, the M2 tidal component exhibits a decline of 5e25 cm from Hangzhou Bay to the Yangtze River Estuary in amplitude 10e25 cm increase in the west Korean coastal areas, as well as Jeju Island. A greater part of the excess tidal energy is delivered to the North Yellow Sea and the Bohai Sea in Case GB; a lesser portion is carried to the South China Sea. is carried to the South Yellow Sea's western border.

The amount of shoal water that reaches the Yangtze River Estuary is drastically decreased. Bay and Huizhou Bay are two of the most well-known bays in China. Water reclamation on the Jiangsu Shoal Reclamations on Gyeonggi Bay, on the other hand, significantly extend the tidal range on the south side of Shandong Peninsula. The Yellow Sea and the Jiangsu shore are primarily affected by reclaimed land on the Jiangsu coast. Reclamation on the Gyeonggi coast has resulted in the East China Sea, while The Yellow Sea and the Bohai Sea are the most affected. Results of the model in Jiangsu Shoal water and Gyeonggi The energy is mostly transferred into the tidal flat region via Case SD requires that the energy be dispersed in tidal flat areas two instances, also carried offshore through nearby waterways as the tidal flats' functions are lost (Fig. 9c and d). When it comes to Case JS, The tidal flats have been eliminated, and PTE has completely gone from the tidal flats. Also reduced significantly in nearby shallow-water regions In other areas, the PTE [7] rises as the population grows landwards in magnitude KTE is less important in the tidal flats. Compared to PTE; nevertheless, the channels exhibit a significant reduction in KTE. As a consequence, the bottom dissipates less energy. Horizontal diffusion and dissipation. In the case of the United Kingdom, the model is In PTE, the findings indicate a similar shift to Case JS. We is in both instances. On tidal flats, PTE is considerably more dominant than KTE; nevertheless,

KTE levels drop across a wider area and more in the channels. The disappearance of tidal flats releases not just the tidal energy that has been stored, but also the tidal energy that has been stored. They were absorbed by them and dissolved into the seas around them. However, it also affects the tidal energy distribution (e.g., the PTE and PTE). KTE decrease) in the surrounding areas, as well as the whole BYECS [8].

Changes in tidal asymmetry

Tidal asymmetry is one of the most significant features of a coastal tidal system. It has an impact on transportation and logistics. Sediment buildup in tidal estuaries, inlets, and basins (1988, Fredric's and Aubrey). In this research, we discovered that the tidal the patterns of components in shallow water vary dramatically. [9] One the BYECS has semidiurnal (F 0.25), mixed, and diurnal regimes. Mostly semidiurnal (0.25 F 1.5) regimes, in which the tidal Nonlinear interactions produce greater distortion than linear interactions. It is produced by the astronomical tides being added together. Changes in shallow-water tides (M4, MS4, and M5) were investigated in this research. S4) from Case SD to Case NT are comparable, although MS4 and S4 have lower magnitudes. As a result, in the following explanation of tidal power, we'll use M4 as an example of asymmetry. Song and colleagues (Song et al.) claim that the falling-tide length is often shorter for $gM2=M4=0$ and the for $gM2=M4>0$, the rising-tide duration is shorter. Furthermore, A distorted but symmetric tidal is produced by multiplying 24M2 4M4 14 0 or 180. When the tidal flat (solid arrow) is wet, tidal energy may be transferred there. Equation (7) is

used to determine the instantaneous tidal energy, which is then displayed as a time series. As seen here. The tidal flat is replaced by land in Case NT, resulting in a wall boundary condition and a loss of tidal energy. Mirrored (dashed arrow).

Patterns emerge as a consequence of relative phase distribution. In the vicinity of the M2 amphidromic points at the moment, the fast-rising tide is in charge. The heads of embayment's, and the asymmetry becomes more pronounced as you go closer to the center. coast, such as Liaodong Bay, Bohai Bay, and Lanzhou Bay in the Liaodong Bay, Bohai Bay, and Lanzhou Bay in the Liaodong Bay, Bohai Bay, and The Bohai Sea, which runs along Korea's west coast and includes the Jiangsu and Jiangxi provinces, The Yellow Sea and the East China Sea coasts of Zhejiang. The difference in $gM2=M4$ between Case NT The tidal asymmetry around the M2 amphidromic sites may exhibit an opposite due to differing relative phase shifts. The surrounding seashore is affected by this trend. There is, for example, aOn the coast, there has been a dramatic shift from fast-falling to fast-rising tides. The Shandong Peninsula's eastern tip, which is near to the M2,

In the North Yellow Sea, there is an amphidrome. When comparing the two scenarios, We discovered that reclaiming tidal flats in the BYECS would have a substantial impact. $gM2=M4$ increases in Liaodong Bay and Bohai Bay, both on the southwest Korean coast, and to the northwest of Jiangsu Shoalwater. where the majority of the shallow-water area has been reclaimed. In fast-rising tide, on the other hand, will be decreased from the southeast. Water from the Jiangsu Shoal to the Zhejiang shore. The primary source of tidal distortion in the BYECS is the interaction of tidal waves with the local terrain is nonlinear. As a result, the alteration in $M4$ is largely limited to the local level. Region.

Jiangsu Shoal water and Gyeonggi Bay reclamations produce a significant shift in $M4$ in the immediate area, but minimal far-field result (figure not shown). However, in addition to the increased local fast-rising tides, there is a significant far-field asymmetry difference in tidal asymmetry. Case SD, Cases JS, and Cases GB As may be seen in Fig. 11c and day tidal phase shift near the M2 is shown by the dipolar patterns. amphidromic points, which cause substantial changes to Asymmetry in the tides. In Gyeonggi Bay, reclamations impact all amphidromic sites, although only the point in the South Yellow Sea is unaffected. Reclamation on the Jiangsu coast has an impact on the sea. In the case of GB, theIn Liaodong Bay and Bohai Bay, fast-rising tides are increased; althoughLaizhou Bay, West Korea Bay, and Huizhou Bay have all seen a reduction. In the event that $gM2=M4$ indicates a small rise along the west coast of Jiangsu Shoal water, in addition to a noticeable increase to the northwest of Jiangsu Shoalwater. However, there was a decline in the coastal areas of Zhejiang[10].

3. CONCLUSION

Although the area of tidal flats is relatively modest (2% of the total sea surface), we confirm the significance of wetting and drying processes in tidal simulation in the East China Seas (the Bohai Sea, Yellow Sea, and East China Sea). Due to changes in the tidal energy flow, the removal of tidal flats will result in a systematic modification of tidal patterns. As a result, a better mesh, finer topography, and a more precisely defined BFC will result in a more realistic tidal simulation. In this paper, we use the newly released parallel model (Jordi and Wang, 2012) to investigate tidal simulation in the BYECS with 1-min spatial resolution and tidal flats included.

Model validation shows that the prediction is more accurate than in prior research. Furthermore, the nearly closed tidal energy budget and the prediction of M2 amplitude change in various situations suggest that the BYECS's tidal simulation, which includes tidal flats, is credible.

In the model domain, Case NT analyzes the elimination of roughly 24,700 km² of tidal flats. The reclamation will change the tidal characteristics of the whole BYECS, as seen in this diagram. The model findings indicate three major changes in tidal energy flow patterns: an increased flux around the Yellow Sea and into the Bohai Sea; a weaker flux into the East China Sea through the water channel between Okinawa and Japan; and an enhanced flux around the north of Taiwan. Tidal flats have two roles that influence tidal energy distribution, according to the tidal energy budget analysis: storage and dissipation. Tidal flats collect tidal energy during flood tides and release it during ebb tides; in the latter, tidal flats waste more tidal energy on bottom friction and horizontal diffusion than other water areas; the former is considerably more important than the latter in this examined region. The loss of these functions due to tidal flat reclamation will lead the additional tidal energy to be redistributed. Furthermore, the significance of the wetting and drying processes that occur on tidal flats is discussed, since they may influence tides via the methods described above. In tidal modeling, using just WAD processes will result in incorrect estimates of tidal heights and currents.

Reclamation projects, according to Cases JS and GB, will not only affect tidal range locally, but will also change the water level in the whole basin owing to tidal energy redistribution. The elimination of tidal flats along the Jiangsu coast increases the amount of tidal energy transferred to Korea's west coast. The elimination of tidal flats in Gyeonggi Bay also increases the tidal energy delivered to the south Shandong Peninsula and Jiangsu coast. The far-field impacts are caused by the redistribution of tidal energy, which expands the local effect across a considerably wider area. It may reveal a tight tidal dynamics connection between the Korean and Chinese coastlines. As a result, any changes in tidal dynamics on one side will have an impact on the other.

The destruction of tidal flats in these areas will have far-reaching local and far-field consequences. Furthermore, reclamation in the BYECS may increase tidal amplitude, thereby increasing coastal dangers like as storm surges. In areas where fast-rising tides are caused by the loss of tidal flats, net onshore sediment movement may occur, damaging ports, harbors, and estuaries and resulting in severe siltation. Those areas that become more ebb-dominant, on the other hand, may see increasing erosion, necessitating more reclaimed land care.

REFERENCE:

1. Erturk E, Gokcol O. Indirect measurement of free-stream turbulence level in wind tunnels. *ARPN J. Eng. Appl. Sci.*, 2018;13(24):9392-9396.
2. Osman KT, Kiyani KH, Matthaeus WH, Hnat B, Chapman SC, Khotyaintsev Yu V. Multi-Spacecraft Measurement Of Turbulence Within A Magnetic Reconnection Jet, *Astrophys. J. Lett.*, 2015.
3. Siebert H, Lehmann K, Shaw RA. On the use of hot-wire anemometers for turbulence measurements in clouds. *J. Atmos. Ocean. Technol.*, 2007;24(6).
4. Buchhave P, George WK, Lumley JL. Measurement Of The Turbulence With The Laser-Doppler Anemometer. *Annu. Rev. Fluid Mech.*, 1979;11: 443-503.

5. Huq P, Franzese P. Measurements of Turbulence and Dispersion in Three Idealized Urban Canopies with Different Aspect Ratios and Comparisons with a Gaussian Plume Model. *Boundary-Layer Meteorol.*, 2013; 147:103–121.
6. Ben Meftah M, Mossa M. Turbulence measurement of vertical dense jets in crossflow. *Water (Switzerland)*, 2018; 10(3).
7. Mcdougall TJ. Measurements of turbulence in a zero-mean-shear mixed layer. *J. Fluid Mech.*, 1979;94: 409-431.
8. Muschinski A. et al. Fine-scale measurements of turbulence in the lower troposphere: An intercomparison between a kit-and balloon-borne, and a helicopter-borne measurement system. *Boundary-Layer Meteorol.*, 2001;98(2):219-250.
9. Naka Y, Tomita K, Shimura M, Fukushima N, Tanahashi M, Miyauchi T. Quad-plane stereoscopic PIV for fine-scale structure measurements in turbulence. *Exp. Fluids*, 2016;57(5).
10. Kilcher LF, Thomson J, Harding S, Nylund S. Turbulence measurements from compliant moorings. Part II: Motion correction. *J. Atmos. Ocean. Technol.*, 2017;34(6).

AXIAL FLUX PERMANENT MAGNET DISC MACHINES: A REVIEW

Aaditya Jain*

*Assistant Professor,
Department of Computer Engineering,
TeerthankerMahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- aadityajain58@gmail.com

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ABSTRACT

The term blended learning is being utilized with expanded recurrence in both scholarly and corporate circles. Mixed getting the hang of, joining the best components of on the web and up close and personal schooling is probably going to arise as the overwhelming the showing model of things to come. Mixed Learning could become perhaps the main advancements of the 21st century. Blended learning is getting popular nowadays. Even though many studies have been conducted on online learning, studies specifically on blended learning are still scarce. This paper investigates a deliberate writing audit about mixed learning of 103 diary research articles. The reason of the audit is to investigate the status of mixed learning investigate and distinguish their topics and classifications as indicated by their substance. Twelve subjects are distinguished in the articles inspected in this paper. Discoveries demonstrated that these investigates predominantly have a place with six classifications: plan, system, factors, assessment, strategy, and audit. Investigates in each class are examined in this paper. Future headings for research are talked about.

KEY WORDS:*Magnet, Disc Machine, Axial.*

INTRODUCTION

Albeit mixed learning or mixed e-learning seems like a confounding term from the start since it is generally another the term for today's educators, it is an unavoidable pattern since the conventional vis-à-vis learning climate is irreplaceable for the social part of educating and learning anyway, Internet-based non concurrent advances, for example, email, discussion, listserv, blog, e-portfolio, web folio.etc. [1].

Can give students more adaptable and intelligent learning conditions autonomous from existence. This new way to deal with learning consolidates and incorporates the qualities of the eye to eye and internet learning in a synergistic way to make a unique learning experience compatible with the setting and proposed instructive purposely. As of late, research and usage of mixed learning are getting famous. Indeed in spite of the fact that numerous examinations have been directed on web based learning, concentrates explicitly on mixed learning are still scant. Accordingly, it is expected to investigate the writing to examine the different conclusions for mixed learning

accessible. This paper plans to investigate the status of mixed learning research, and recognize their topics and classes as indicated by their substance[2].

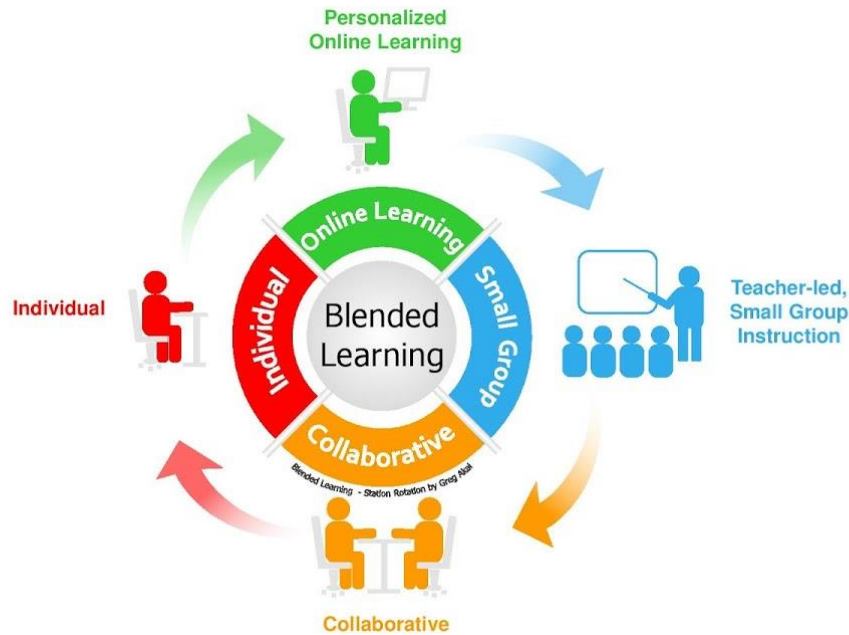


Figure 1: Blended Learning

Blended Learning Design:

There are 29 examination articles which are about mixed learning plan. Among which 7 examination articles stress the online segment, particularly for online apparatuses utilized. 22 articles propose mixed learning models, programs, and so on For the 7 examination articles which stress the on the web segment, 3 of them are about the utilization of Moodle as the online device for mixed learning. Muscarà and Beercock used the wiki apparatus in the Moodle open-source learning the board framework (LMS) as both the gathering information base administration and venture introduction device.

Jia, et al. redid the open-source course the executives framework Moodle to construct the individualized jargon survey and evaluation capacities for English guidance. Hersch zeroed in on the Moodle testing framework, which offers an option in contrast to traditional testing, to advance its course framework effectively. 4 of them stress online parts[3]. Derntl and Motschnig-Pitrik proposed a layered structure for getting Web-based help from these instructive standards. Méndez and González proposed a Fuzzy Logic-based regulator for a mixed learning approach in a starting control designing course, which depends on a web apparatus called Control Web.

Hubackova, et al. arranged on-line courses that are in view of coaches' and understudies' necessities, understudies' information, on instructors' drawn out experience, and obviously on the positive the mentality of ICT understudies (and not just of them) to present day innovations. Miyazoe and Anderson covered exact examination exploring the subjective changes in composing proficiencies because of utilizing three web based composition devices, i.e., conversation discussions, web journals, and wikis, in an EFL mixed configuration course. For

the 22 articles which propose mixed learning models or on the other hand programs, each article has made its own model or program. For instance, Köse depicted a mixed learning model which comprises of vis-à-vis climate also, a web based learning measure framed with Web 2.0 innovations. Yeh et al. built up an educator preparing program that incorporates information the board (KM) and mixed learning[4].

Evaluation:

There are 38 exploration articles in our data set concerning about the assessment of mixed learning, in which 20 of them inspected adequacy of mixed learning and gave the comparative end that mixed learning was powerful. For example, Deschacht and Goeman analyzed the impact of mixed learning on grown-up students' scholarly achievement and discovered that mixed learning improves test results. Articles assessed understudies' view of mixed learning. The majority of them got positive outcomes[5]. For example, Bentley et al. explored the learning experience and impression of the understudies, and indicated a genuinely significant level of understudy Fulfillment with the program. Though, Wakefield et al. found that understudies' perspectives on mixed learning fluctuated. Some were good, while others felt e-learning sometimes fell short for their favored learning style, or the topic. 3 articles assessed the particular instruments in mixed learning climate. Akkoyunlu and Yılmaz-Soylu expanded the assessment of students' perspectives on mixed learning also, its usage cycle by creating and approving a target evaluation instrument.

Barnard, et al. given proof toward the dependability and legitimacy of the instrument and demonstrated that the OSLQ is a worthy proportion of self-guideline in the on the web and mixed learning conditions. Dias and Diniz presented another model, to be specific FuzzyQoI that, by utilizing fluffy rationale builds, it quantitatively appraises the clients' (teachers' and understudies') QoI with the LMS Moodle inside a b-learning climate. 3 articles featured the issues or issues to be thought of. Azerbaijan and Troudi introduced issues that must be considered prior to utilize on the web conversation in mixed courses[6]. Hussain and Huey introduced the issues confronted while the understudy gives input, and consequently how can be dealt with resolve the issues? Ramakrishnan, et al. recognized the issues confronted utilizing e-realizing which as it were cover the extent of investigating understudy revenue in learning and take a gander at the exploration model that is connected and show the discoveries of the proper methods of learning[7].

3 articles contrasted mixed learning with face-with face learning. Smith investigated the effect of mixed versus up close and personal educational cost more than one year in a K-12 school in Auckland, New Zealand. Yigit, et al. gave execution assessment of understudies in conventional and mixed instruction for Computer Engineering. Barrios, et al. portrayed the association of the mixed course in correlation with the customary vis-à-vis course and introduced fundamental information on understudy evaluation, the utilization of instructive assets, and the scholastic outcomes acquired in the two enlisted gatherings article assessed three mixed learning designs and finished up the best example among the three examples.

There are 25 exploration articles which are clear in their system in our information base. 16 of them are contextual analyses, in which 8 of them picked one college as the case. Schmidt, et al. created and incorporated a novel virtual magnifying instrument, My Microscope, in a mixed learning model at Ulm University. Holley and Oliver built up a model through cross case

examination of understudies' learning encounters at a post-1992 University. Taylor and Newton gave a contextual investigation of an Australian territorial college that examined institutional cycles and instructing and learning approaches that would encourage different understudies' fair admittance to learning[8]. Moskal, et al. utilized the advancement of mixed learning at the University of Central Florida as a model and delineated that with appropriate help and arranging, mixed learning can bring about sure institutional change.

Wai and Seng utilized a contextual investigation plan also, 120 business college understudies selected at a private college being examined. Koraneekij and Khlaisang built up a model dependent on the overview of 360 understudies, and the meeting from 3 managers and 12 educators at Staff of Education, Chulalongkorn University, Thailand. Nazarenko introduced a contextual investigation research dependent on the experience of actualizing a mixed learning way to deal with a college address course for understudies of FLT strategy at the Faculty of Foreign Languages and Area Studies at Moscow State University. Park, et al. utilized an information driven way to deal with separate basic action highlights of 612 courses in a huge private college situated in South Korea.

CONCLUSION

It tends to be seen from the extents that articles about assessment of mixed learning is the most (38 articles), and at that point the plan of mixed learning (29 articles). It shows that the examination of mixed learning is as yet going through the start period so that most articles pointed toward distinguishing the adequacy of mixed learning and planning the mixed learning. Survey articles are the most UN-in our data set, which mirrors the importance and need of our exploration. For the articles which are about mixed learning configuration, most articles attempted to build up a model that is reasonable for mixed learning, there is no normal endorsed model till now, which perhaps the motivation behind why this sort of exploration is the normal interest for the specialists.

A few articles underline on the web segment, in which moodle is right now the most utilized on the web instrument for investigates. For the articles which use mixed learning as a system, just four subjects are concerned, this shows that mixed learning ought to be utilized as a procedure in more subjects later on. For the articles which concern about components impacting mixed learning, a large portion of them concern student factors, there should be more factors which ought to be concentrated later on like educator factors, head factors, strategy factors, social elements, and so forth For the articles worried about assessment of mixed learning, most articles got the end that mixed learning is successful. Just three articles are about issues and issues in mixed realizing, which ought to be concentrated more to improve the mixed learning later on.

For the strategy, near examination and contextual analysis were generally utilized in mixed learning investigates and we concur that similar examination and a contextual analysis might be the most reasonable examination philosophy for mixed learning till now. For the audit articles in our information base, there are just 10 articles, some of them just audit 3 or 8 articles, which isn't sufficient for audit of mixed learning. More audit articles for mixed learning are required, which mirrors the meaning of this paper. While there are as yet potential restrictions that exist, one of them is that it is difficult to cover all the examination articles accessible for mixed learning, so this paper must be taken Global Journal of Information and Education Technology, as a kind of

perspective and further audit including more exploration articles and from different viewpoints are as yet required in the future.

REFERENCES:

1. WalshK.Blended learning.BMJ, 2005;330:829. doi: 10.1136/bmj.330.7495.829.
2. Garrison DR and KanukaH.Blended learning: Uncovering its transformative potential in higher education.Internet High. Educ., 2004; 7(2):95-105. doi: 10.1016/j.iheduc.2004.02.001.
3. Moskal P, Dziuban C, HartmanJ.Blended learning: A dangerous idea? Internet High. Educ., 2013; 18:15–23. doi: 10.1016/j.iheduc.2012.12.001.
4. Idaho Digital Learning. 6 Models of Blended Learning. 2014.
5. Oliver M and TrigwellK.Can ‘Blended Learning’ Be Redeemed?.E-Learning, 2005; 21: 17-26. doi: 10.2304/elea.2005.2.1.2.
6. Stockwell BR, Stockwell MS, Cennamo M, JiangE.Blended Learning Improves Science Education.Cell. 2015 Aug 27;162(5):933-6. doi: 10.1016/j.cell.2015.08.009.
7. Sjukur SB.Pengaruh blended learning terhadap motivasi belajar dan hasil belajar siswa di tingkat SMK. J. Pendidik. Vokasi, 2013;2(3). doi: 10.21831/jpv.v2i3.1043.
8. Mohamad R, Building A, Ismail NA.Journal of Internet Banking and Commerce.J. Internet Bank. Commer., 2010, doi: 10.1007/978-3-531-92534-9_12.

THE ROLE OF THE GIUNTI PUBLISHING HOUSE IN DISSEMINATION OF WORKS OF MEDIEVAL EASTERN SCHOLARS IN EUROPE (ON THE EXAMPLE OF "AL-QANUN FIT-TIB" BY ABU ALI IBN SINA)

Rakhimov Rasulbek*

*Basic Doctoral (PhD) Student,
Fergana State University, UZBEKISTAN
Email id: uzbrasulrahimov@mail.ru

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ABSTRACT

In the article based on the careful analysis of the scientific literature devoted to history of the publishing in Medieval Europe, highlighted the role of the Giunti Publishing House, located in Venice, in the publishing industry of Europe and dissemination of works of medieval eastern scholars in Europe. Researchers conducted by historians of science shows that the rise of science and culture in Europe in the 15th–17th centuries was in many ways closely linked with the Eastern Renaissance in the 9th–12th centuries. In the close acquaintance of Europeans with the scientific heritage of medieval Eastern scholars, the role of many publishing houses across the continent, which emerged in 1445 after the discovery of a printing press by Johann Guttenberg in Mainz, Germany, was incomparable [14, p. 12].

KEYWORDS: *Printing Press, Publishing House, The Giunti Family, Florance, Venice, Lucantonio, Renaissance, Science, Development, "Al-Qanun Fit-Tib", Gerard Of Cremona, Andrea Alpago.*

INTRODUCTION

Researchers conducted by historians of science shows that the rise of science and culture in Europe in the 15th–17th centuries was in many ways closely linked with the Eastern Renaissance in the 9th–12th centuries. In the close acquaintance of Europeans with the scientific heritage of medieval Eastern scholars, the role of many publishing houses across the continent, which emerged in 1445 after the discovery of a printing press by Johann Guttenberg in Mainz, Germany, was incomparable [1]. In particular, the Giunti Publishing House, founded in 1489 in Venice, Italy, was very active in this process. This article covers the history of the publishing house, the expansion of its activities, its role in the dissemination of oriental scholarly works in Europe, and the analyses of 9 Latin editions of the great central asian scholar Abu Ali ibn Sina (Avicenna)'s "Al-Qanun fit-tib" ("The Canon of Medicine").

RESULTS OF THE RESEARCH

The name Giunti comes from the "Giunti" family of Florence, Italy, and the first mention of the family is in a tax statement from 1427 [2]. The three brothers, Lapo, Giunta, and Jacopo, were living with their mother in the suburban Santa Lucia de Ognisanti area, where their father had

died and their eldest son, Lapo, was critically ill, according to the document. The family's property was not very valuable, but it did feature an income-generating pair who earned 11 Florentine florins each year. The names Lapo and Yakopo weren't referenced again in historical records after then. There is just information on Giunta and his seven sons. Giunta's sons, Filippo (1456–1517) and, in particular, Lucantonio (1457–1538), who were original weavers, later founded a network of publishing and book-selling activities that spread throughout Western Europe.

In 1477, Lucantonio left Florence and headed for Venice. During this period, book publishing and publishing activities in Venice were developing rapidly. The following figures, quoted by Federica Benedetti of the Biblioteca Nazionale Marciana in Venice, confirm that alongside Manutius and the Aldine Press there were other publishing houses with great potential (<https://www.bbc.com/travel/article/20190708-the-city-that-launched-the-publishing-industry>):

“Other prestigious publisher families established themselves [in Venice] – the Sessa, the Giunta, the Scoto and the Giolito. In the 15th and 16th Centuries, it was the main city in publishing, covering between 48.6% and 54% of the total [Italian book production].” Close to 250 publishers – both large and small – operated in the city during the 16th Century, resulting in the printing of at least 25,000 editions of books and making Venice the de-facto center of European publishing.

Lucantonio apparently met with success in the stationery trade in Venice, for in 1489 he began to publish under his own name, supplying the capital for three books. He chose the field of religious publishing as his main focus, a wise decision, as it turned out, which was based on the wide market for such titles and on the fact that buyers of these books, that is, the church and clergy, usually possessed funds to pay for their purchases without great delays [3].

In 1491, a contract was signed between Lucantonio and his brother Filippo, and the family gradually began to expand its publishing network. In 1497, Filippo also established a new publishing house in Florence. Nuovo Angela gives the information in her book entitled "The Book Trade in the Italian Renaissance" that "the partnership begun in 1491 was not officially renewed until 1499, at which time the original investment of 4,500 florins had grown to 11,032 florins, nearly tripling the assets even after all living expenses and other debts had been deducted [12]. He soon specialized in liturgical books, inaugurating a predominance in that area that the Giunti family never lost during the entire sixteenth century" [4].

As the Giunti family's power increased, publishing and trade firms sprung up in various European towns. It has been suggested that the Giunti family's authority may be evaluated just by the geographical spread of their liturgical productions. Nuovo Angela writes that "Luc'Antonio printed missals and breviaries for the dioceses and local rites of Aquileia, Messina, Vallombrosa, Valencia, Augsburg, Würzburg, Majorca, Gran, Passau, Salzburg, Zagreb, and many other cities of the Catholic world [5].

On December 11, 1504, the Italian publisher Scipio Carteromacho (1466–1515) wrote to the famed Venetian publisher Aldus Manutius, mentioning Jacopo Giunti, a Rome bookseller. This was the first indication that the Giunti family would join the Rome book industry [6]. The son of Lucantonio's brother Badjo, not Yakopo, who was named in the 1427 tax statement, was Yakopo Giunti. Of course, it was an important task for Giunti Publishing House, one of the leaders in the production of books on religious content, to establish its activities in Rome.

After Jacopo's death in 1528, Benedetto, the son of Francesco, another brother of Lucantonio, took over the Giunti family's activities in Rome. In 1536, a contract was negotiated between the Giunti Publishing House and Antonio Blado, the Vatican's official publisher, and Antonio Salamanca, another important publisher in Rome, thanks to Benedetto's intercession. All three publishers were given the right to publish the holy book "Quifionez breviary" under the terms of the agreement. In exchange, Lucantonio covered all of the book's expenditures, and half of the 2,000 copies will be sent to Roman partners. The goal of Lucantonio's maneuver was to secure the ability to freely trade in Vatican-controlled territories while also being protected in court by the Vatican in the case of piracy. However, the Giunti family's publishing ventures in Rome were a failure. There is no information regarding the family's publishing house in Rome beyond 1551 in historical sources.

In Lyon, France, the Giunti Publishing House, founded in 1517 by Lucantonio and his brother Badjo's son Giuntino, was more successful. The publishing firm soon gained a significant presence in the publishing business and the book trade in Lyon, with a charter capital of 32,153 Venetian ducats. After Giuntino's death in 1521, Lyon was ruled by Giacomo, another of Francesco's sons. The Giunti family's effort in Lyon during his time was significant. In Lyon, the family took the lead in collaborating with several publishers to print law publications. He published 108 volumes of 30 distinct works between 1519 and 1542 [12, p. 345]. After Giacomo, who had no sons, died in 1547, his daughter entrusted Filippo Ting, a native of Florence, with continuing her father's work. Filippo served in this position until 1572. There would be no further information on Giunti's activities in Lyon after then.

In Spain, too, the Giunti family was committed to expanding its book trade and publishing activities. Giovanni (1494–1558), son of Filippo, brother of Luke Antonio, arrived in Spain in 1513 to defend the interests of the family and explore the Spanish market, which had great potential. Burgos and Salamanca, north and west of the Iberian Peninsula, are the main Spanish cities where the Giunti family was engaged in publishing and trade. Giovanni, who worked in the book trade in Salamanca until 1525, relocated to Burgos the same year, marrying Isabel, the daughter of the famed publisher Fadrique de Basilea, who died in 1517. This marriage enabled him to establish a publishing business in Burgos, and soon his first publishing work was Garcia Rodriguez de Montalivo (1450–1505), entitled "Las Sergas de Esplandián" ("The Adventures of Esplandian"). Giovanni's name appeared in the book under the name Juan de Junta (Juan de Juna), and he continues to publish under that identity [7]

In addition to bringing and selling books published in Venice, Florence, and Lyon to Spain, Giovanni (Juan de Junta) also runs the Giunti Publishing House here. In 1532 a publishing house was also established in Salamanca, headed by Alexandro de Canova, a publisher appointed by Giovanni.

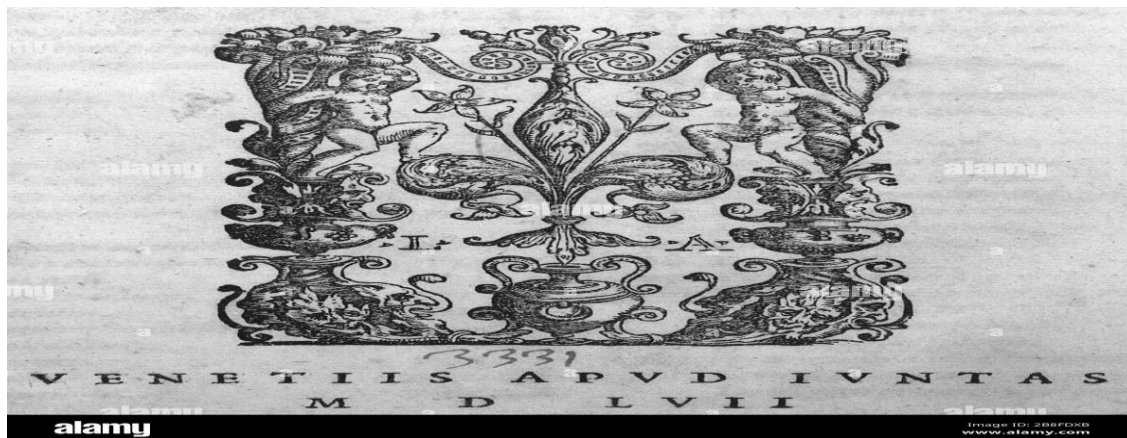
The death in 1538 of Lucantonio, founder of the Giunti Publishing House, who played an important role in the family's leading position in Europe, was a sharp blow to the growing power of the Giunti family. His sons Tommaso and Jovanmaria Giunti inherited the glorious legacy left by him. At such a difficult time, Giovanni left Salamanca for Venice to be with his family. Alexandro de Canova in Salamanca and his son-in-law Mattias Gast in Burgos will continue his work.

According to the list of books kept in the warehouse of the publishing house in Burgos in 1557, there were 15,837 books of 1579 editions in the warehouse[8]. these figures show how much power the Giunti family had with Europe in publishing and book trade at that time.

Even after Lucantonio's death, his sons were able to develop a publishing company and a book distribution network. During this time, a multitude of objective and subjective factors led to the financial crisis. The epidemic that ravaged Europe from 1547 to 1552, in particular, wiped out more than 30 million people, which was a tremendous blow to the book trade. In addition, the business experienced a financial problem in 1553, and it became indebted in the amount of 100,000 ducats. A fire in 1557 caused extensive damage to the publishing house building and warehouse. However, the Giunti family could manage to change the situation for the better. In any case, a will written by TommasoGiunti on July 27, 1564, allows us to draw such a conclusion. Although the total amount of property of the Giunti family was not specified, it stated that TommasoGiunti had paid all the debts of the firm in connection with the financial crisis of 1553 and that it was still financially stable as before [9]. It is also recalled that he bequeathed 4,000 ducats to his daughter Franceschina, born to his illegitimate wife [10].

After Tommaso's death in 1566, the family's authority fell to Lucantonio the Younger, Giovanmaria's son. Lucantonio the Younger now had the arduous job of competing not only with Italian publishing firms, but also with fast-growing French, Swiss, and notably Dutch publishing houses, despite his strong managerial abilities and mature knowledge. Conflicts with the Medici dynasty, who dominated Florence at the time, increased the dynasty's pressure on the Giunti, and by the end of the 16th century, the publishing company in Florence had fallen into a grave crisis and had nearly ceased to exist. As we have seen, the city of Rome became alien to the Giunti as early as the middle of the century, and things had started to go awry in Lyon around the same time.

Lucantonio the Younger set up a joint-stock company called "Societas Aquilae renovantis" with the participation of publishers and booksellers to rectify the current situation, and retained its largest shareholding. Since then, the society has become one of the largest in the book industry in Italy. The trade network was active in Italian cities such as Verona, Milan, Parma, Verchelli, Turin, Bologna, Pisa, Perugia, Rome, Naples, Melfi, Bari, Messina, Palermo[11].



Picture No.1. The symbol of the Giunti Publishing House.

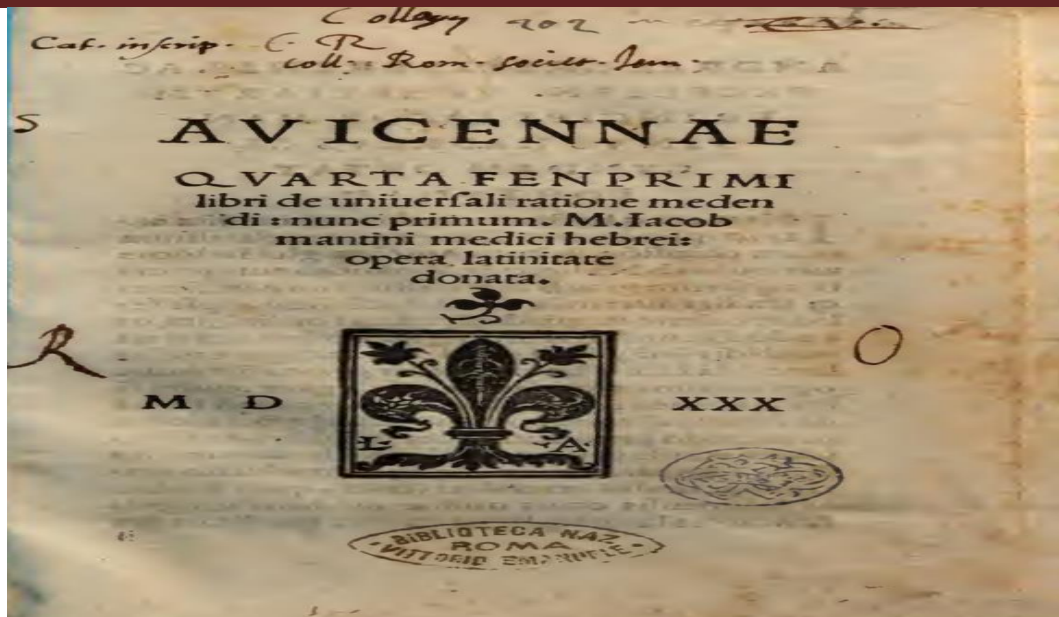
The Giunti family's publishing and book-selling enterprises came to a symbolic end with the death of Lucantonio the Younger in 1602. In 1604, his sons sold the Giunti Publishing House and bookshops to Francesco Manolesi, a wealthy trader. However, it must be noted that the Giunti Publishing House did not cease to exist after 1604, and volumes were still published under the same name. This is something we will discuss later.

As noted in the introductory part of the article, the Latin translation of "Al-Qanun fit-tib" ("The Canon of Medicine") has been published nine times in the Giunti Publishing House for nearly a century.

Most of these works, which were published between 1527 and 1608, had one commonality: they were all translated into Latin by Gerard of Cremona (1114–1187) and edited by Italian physician Andrea Alpago (1450–1521). It is known that this work of Abu Ali ibn Sina was first translated into Latin in the second half of the twelfth century by Gerard of Cremona, a famous representative of the Toledo school of translation, and for many years Europeans used this translation. On the end of 15th century Andrea Alpago edited Gerard's Latin translation and made some corrections. Andrea was a native of Belluno, northeastern Italy, studied medicine at the University of Padua and in 1487 began working as a physician at the embassy of the Republic of Venice in the Syrian capital, Damascus. He worked here until 1517, acquiring the Arabic language and comparing Gerard's Latin translation to various Arabic manuscripts of "Al-Qanun fit-tib" obtained from Arabic academics. As a result, Alpago added 12 new revisions to the Latin translation, commenting on Gerard's abstract parts. Andrea also prepared a technical terminology dictionary. It didn't take long for Alpago's efforts to be recognized. The University of Padua, one of Italy's and Europe's most prominent universities, formally recommended that Alpago's 1521 translation be used as a textbook in higher education [12].

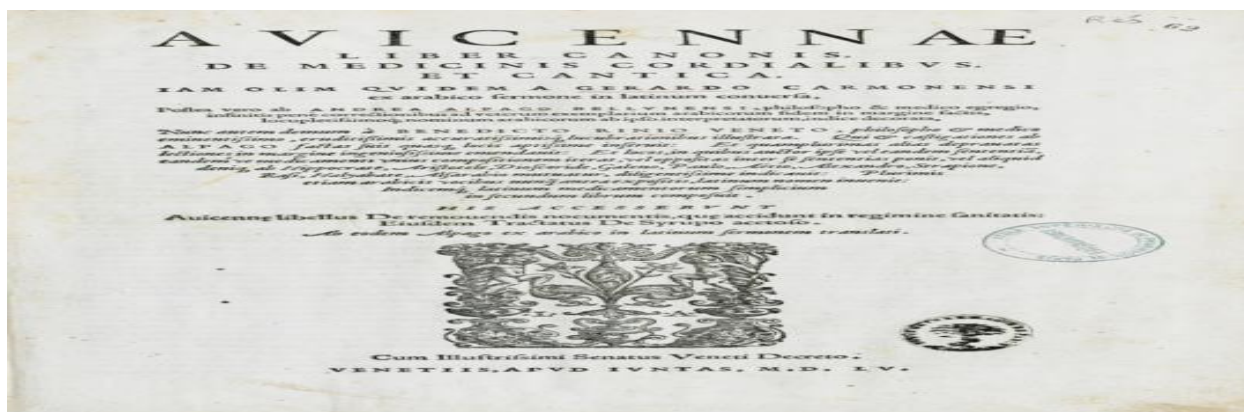
In 1527, 1530, 1544, 1555, 1557, 1562, 1582, 1595, and 1608, the Giunti publishing house in Venice published "Al-Qanun fit-tib" nine times in Latin under the titles "Principis Avicennae libri Canonis" and "Avicennae liber Canonis." The fact that "Liber Canonis" was published 9 times in 81 years in one publishing house and 60 times in all publishing houses across Europe between 1516 and 1574 [13] is a clear indication of the high degree of attention and demand for the book during the Middle Ages.

On the basis of a translation by Gerard & Alpago, the work was first published in 1527 at the Giunti Publishing House. In it, Gerard's translation was provided first, and next to Gerard's words, which are contentious, the translation of Alpago was given in the margins of the cover. The name Alpago appears in the book's title as "ANDREAS ALPAGUS BELLUNENSIS," with the term "BELLUNENSIS" referring to Alpago's birthplace. A Venetian Jewish physician named Jacob Mantino, who had access to a copy of this edition, compared it to the Hebrew version of the book published in Naples in 1491 and added his own modifications and additions to the Latin text. The Mantino edition was later published four times in three other European cities: Etlingen in 1531, Paris in 1532 and 1555, and Hague in 1533 [14]. However, following Giunti Publishing House publications did not utilize the Mantino translation; instead, the Gerard & Alpago version was used as the foundation for all of them.

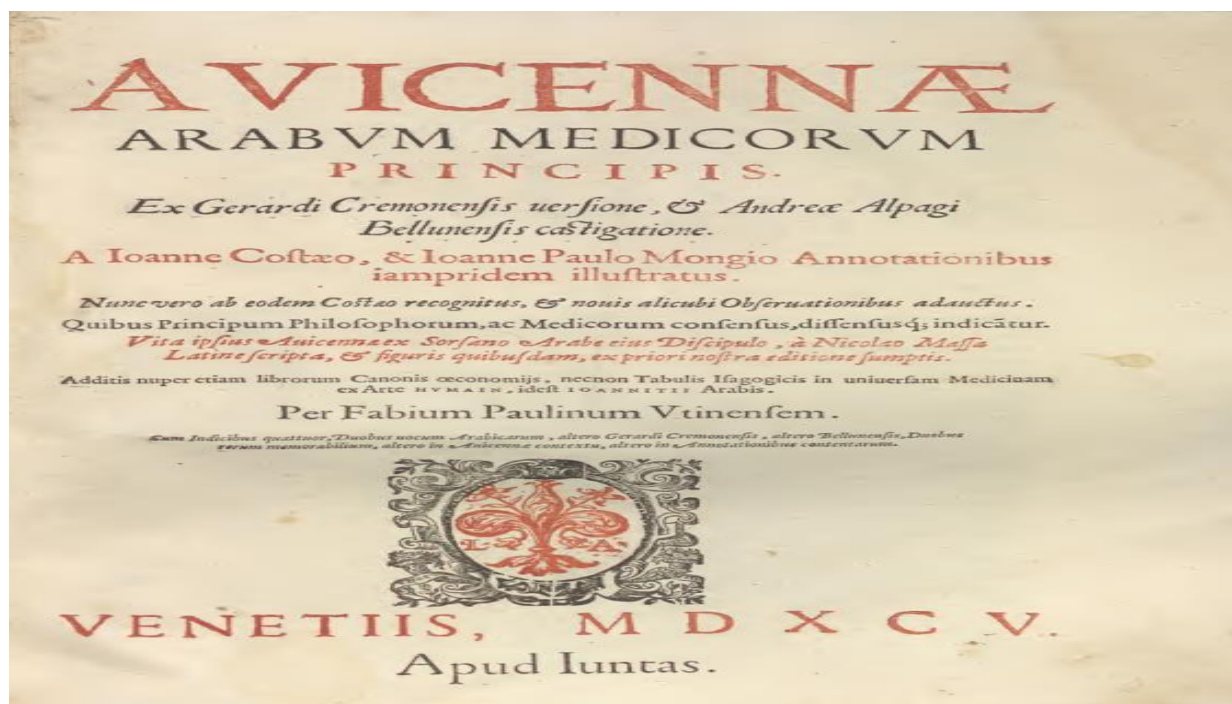


Picture No. 2. The 1530s edition.

The edition of 1544 did not differ much from that of 1527, and included only a brief biography of Ibn Sina in Latin. In the next edition, published in 1555, there were many changes, one of the most important of which was that the name of the Venetian publisher Benedetto Rinio, who was in charge of its preparation, was mentioned in the title page of the book as "BENEDICTO RINIO VENETO". That is, the name of the publisher was the first among the publications we are considering. Another important aspect of this edition is that in it the translation of the Alpago was not mentioned separately in the margins of the cover, but was added between the main text. This publication was printed in Basel a year after its rapid success, and again after two, six, and twenty-seven years later at the Giunti Publishing House.



Picture No. 3. The 1555s edition.



Picture No. 4. The 1595s edition.

The Rinio edition, which was a big hit, was quickly followed by a rival. A new version of the "Liber Canonis" was prepared in 1564 by Giovanni Costeo, who subsequently joined the University of Bologna, and Giovanni Mongio, who practiced medicine in Venice and Pauda. This edition was created in Venice as well, although not at the Giunti Publishing House. It was published in Valgriso Publishing House, a direct rival of the Giunti family. In compiling the edition, Costeo and Mongio used both Gerard and Alpago's translations as well as Mantino's. The distinctiveness of this publication was decided by this aspect.[15]

The last two editions of "Liber Canonis" which printed in 1595, and in 1608 at the Giunti Publishing House were made during the re-editing of Costeo&Mongio. Fabio Paolino, a professor at the University of Bologna, was in charge of the procedure. The 1608 edition is recognized as the last major edition of Abu Ali ibn Sina's work made in Italy.[16]

We have noted that the publishing house's activities did not halt in 1604 with the sale of the Giunti family's land. This conclusion was reached after reading the 1608 edition of "Liber Canonis." Because the name of the publishing house was written in Latin at the bottom of the book's title page. It is possible that Francesco Manolessi, who purchased the Giunti Publishing House, chose to operate under the Giunti brand, which held a significant position in the printing press at the time, and sought to make more money under that name. [17]



Picture No. 5. The 1608s edition.

CONCLUSION

In brief, despite the fact that the printing press was invented in Germany in the mid-fifteenth century, the book publishing industry thrived in Italy during the fifteenth and sixteenth centuries. Venice rose to the top of the Italian cities in terms of publication activity. Among the hundreds of publishing houses that have sprung up, the Giunti Publishing House gained a place and position in Europe, successfully operating not only in printing but also in the book trade on a large geographical scale. The Giunti Publishing House also published works by eastern scholars and catered to the requirements of the European people during the cultural Renaissance. On the continent, the work of the famous eastern scholar known in the medical world as Avicenna was published multiple times in Latin. The Giunti Publishing House has left a significant spiritual legacy in its more than a century of activity.

REFERENCES

1. Brown H. Giunti T. The Will of ThomasoGiunti. The English Historical Review, 1891; 6(21):154-161.
2. Hasse N. Success and suppression. Arabic Science and Philosophy in the Renaissance. – Harvard University Press, 2016. pp. 660.
3. Makhmudov OV. The Toledo School – early center of investigation of the works Central Asian scholars in the Europe. – Saarbrücken: Lambert Academic Publishing, 2017. pp. 187.
4. Nuovo A. The Book Trade in the Italian Renaissance. – Leiden, Brill: 2013. pp. 492.
5. Pettas W. An international renaissance publishing family: the Giunti. The Library Quarterly. 1974; 44(4):334-339.
1. Pettas WA Sixteenth-Century Spanish Bookstore: The Inventory of Juan de Junta. – Transactions of the American Philosophical Society, New Series, 1995;85(1):1-247

2. Siraisi N. Avicenna in Renaissance Italy: The Canon and Medical Teaching in Italian Universities after 1500. – Princeton University Press, 1987. pp. 424.
3. Isamiddinov M. The history of emergence of Sughd Cities. EPRA International Journal of Research and Development. 2020;5(10):125–128.
4. Mirsoatova ST. New data on the late paleolithic of the Fergana valley. Евразийский союз ученых 2020;10(79/4):25–29.
5. Farmanova GK. The role of the geographic environment and climatic conditions in the formation of economic-cultural type of population when during ancient and antic period. ACADEMICIA: An International Multidisciplinary Research Journal. Vol. 10, Issue 11, November 2020;10(11):1612–1622.
6. Rakhmatillayev H. Ethnodynamics of the city population of the Fergana valley of the first half of the XX century. EPRA International Journal of Research and Development. 2020;5(5):532–535.
7. Arslonzoda R. Memoirs as asource on the history of Uzbekistan in the second half of the 19th – early 20th centuries. EPRA International Journal of Research and Development. 2020;5(10):119–124.
8. Mahmudov O. The beginning of the European renaissance. ERPA International Journal of Research and Development. 2020;5 (7):104–108.
9. Yuldashev S. Visit of chinese ambassador dung wan to Fergana // the history of the Fergana valley in new researches. – Fergana, 2021. P. 123–131. <https://doi.org/10.47100/conferences.v1i1.1240>
10. Yuldashev SB. Ferghana in the VII century: It's development as a powerful state and its collapse. History Reseach Journal. 2019;5(6):2952–2964.
11. Yuldashev SB. Samanids of Ferghana // International journal for social studies. 2020;6(1): 120–135.
12. Yuldashev SB. The impact of the Aksu battle on Ferghana // ERPA International Journal of Research and Development. 2020; 5(8):60–64. DOI: <https://doi.org/10.36713/epra4917>

MEASUREMENTS OF TURBULENCE AT TWO TIDAL ENERGY SITES IN PUGET SOUND, WA

Amit Kumar*

*Assistant Professor,
Department of Civil Engineering,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- amit.engineering@tmu.ac.in

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ABSTRACT

Field turbulence data are given from two locations in Puget Sound, WA, that are being considered for tidal current turbine power production. Time series data from numerous acoustic Doppler sensors is processed to provide statistical measurements of tidal current variations in amplitude and direction. At the hub heights (i.e., the relevant depth) of the proposed turbines, the turbulence intensities (i.e., the turbulent velocity fluctuations normalized by the deterministic tidal currents) are usually 10%. The turbulence's length and temporal scales are also investigated. The turbulent kinetic energy (TKE) spectra are dominated by large-scale; anisotropic eddies, which may be due to each site's proximity to headlands. An isotropic turbulent cascade is seen at small scales and utilized to predict TKE dissipation, which is demonstrated to balance with shear generation. The importance of removing Doppler noise from turbulence statistics is addressed, as well as data quality and sample settings. The findings may be used to predict the performance and fatigue of tidal turbines.

KEYWORDS: *Acoustic Doppler Current Profiler (ADCP), Acoustic Doppler Velocimetry (ADV), Marine and Hydrokinetic Energy, Tidal Energy, Tidal Power, Turbulence, Turbulence Intensity.*

1. INTRODUCTION

The construction of turbines that produce power from tidal currents requires a thorough understanding of the input conditions. Although computational or laboratory models may mimic fundamental flows, it is still not feasible to directly represent turbulence at all important sizes. Rather, field measurements of the flow must be used to estimate turbulence, which are inherently scarce and noisy. This paper examines a set of turbulence measures after presenting field data from two tidal energy locations. The aim is to offer typical design conditions for tidal turbines by focusing on ambient turbulence (i.e., natural turbulence before the construction of turbines). The turbulence intensity (ratio of velocity variations to velocity mean)[1] and turbulence spectra (velocity variance as a function of frequency) recorded at turbines are the important characteristics in the comparable situation of measurements at wind energy installations. The

Office of Energy Efficiency and Renewable Energy—Wind and Water Power Program of the United States Department of Energy funded this research[2].

Turbulence data is critical for improving the design of wind or water turbines. The 3-D structure of turbulence is required by performance and design standards. The FAST code, for example, is an unstable aero structural code driven by the turbid model, which is a turbulent (coherent and incoherent) simulator initialized using field data created by the National Renewable Energy Laboratory (Washington, DC). These and other design standards have aided the wind industry in maturing and becoming more reliable. The application of this knowledge to tidal energy production would be beneficial, but a major gap in creating similar design codes for tidal turbines is a lack of data on ambient turbulence.

There have been few observations of naturally occurring tidal turbulence, and none of turbulence inside a turbine farm (all but one of the global deployments have been single device demonstrations). The majority of prior tidal studies have concentrated on the hydrodynamics of the turbulent kinetic energy (TKE) budget rather than turbine inflow conditions. Several investigations have assessed the essential dynamical parameters of turbulent shear generation, dissipation rate, and transport, starting with an early observational study to validate the theoretical turbulent energy cascade at small scales. Error correction from acoustic Doppler velocity data has been a major component of this research. The usefulness (and limits) of similarity theory in TKE spectra in tidal channels has also been studied recently[3].

Studies that are more directly related to tidal turbines have recently been published. Reynolds stresses, TKE density, TKE generation and dissipation rates, and local eddy viscosity have all been calculated using data from the European Marine Energy Centre (United Kingdom). Previous data from a tidal energy facility in Puget Sound, WA, were utilized to evaluate turbulence strength and show how important it is to account for instrument error (i.e., "noise") in acoustic Doppler measurements. We apply those methods to a new, larger data set, which includes a second location, and investigate the natural turbulence's temporal and length scales. The findings are limited to turbine hub heights for conformity with wind energy literature [1].

Velocity Components Decomposition[4] We provide field measurements of tidal currents from two locations, as well as a breakdown of the observed horizontal currents (Components that are along and across the main axis of the tidal flow, respectively, and change with distance above the bottom form the velocity vector. Because the field observations are fixed in space, variations are ignored. The background (deterministic) tidal flow, which may be represented using harmonic components, but which may also include local harmonic currents, is shown below. On short time periods, this background flow is essentially continuous (i.e., minutes)[5].

Externally induced flows, such as wind- and density-driven (estuarine) fluxes, or surface-wave orbital velocities, which decrease under the surface as, where the wave number comes from linear theory, the distance above the seabed is, and the total water depth is. Finally, turbulent velocity variations exist, which range in length and duration from enormous eddies to tiny isotropic turbulence. This paper focuses on the statistical handling of these variations. 1

We look at variations in velocity magnitude as well as deviations in direction from the tidal flow's main axis. Directional fluctuations may be essential for a turbine's yaw control or, in the case of a fixed-yaw turbine, off-axis power projections. The relative strength of these fluctuations, their frequency spectra and length scales, and the dynamic balance of turbulence

generation dissipation are all investigated. The horizontal component of the currents is the emphasis since it is the most important to tidal turbines, and as demonstrated in the study (Section III-D), horizontal currents include the bulk of the TKE when compared to vertical currents[6].

Acoustic Doppler devices are used to monitor tidal currents, which determine flow speed by measuring the Doppler shift of acoustic pulses along various axes. Acoustic Doppler velocimetry (ADV) use three (or occasionally four) convergent acoustic beams to sample a tiny volume [O(1 cm) diameter] and infer three components of velocity at a location. ADCPs (acoustic Doppler current profilers) capture bigger volumes for compatibility with wind energy research, magnitude variations are utilized rather than component fluctuations. The magnitude variance will be less than the sum of the component variances, which is important for interpretation and comparison of results[7].

Diameter over a set of range bins using three (or sometimes four) divergent acoustic beams to infer three components of velocity at multiple points along a profile. 2 Both devices contain inherent standard errors, which are referred to as "Doppler noise" since they arise from calculating the Doppler shift of finite-length acoustic pulses. Because the Doppler noise in ADCPs is usually considerably higher than in ADVs, multiple observations, or "pings," of ADCP data are frequently averaged to minimize the standard error. Averaging, on the other hand, obscures the[8] velocity variance in turbulence estimates. Rather, the raw pings must be kept, and Doppler noise from the velocity variance must be statistically eliminated. Bottom-mounted ADCP deployments are much more feasible for tidal energy site measurements than hub-height ADV measurements. Increased Doppler noise and higher sample volumes are sacrificed for practicality.

To quantify the effect of Doppler noise in computing turbulence statistics, the measurements here compare a collocated ADV and ADCP, as well as ADCPs with different sampling settings. There is a tradeoff when selecting sample parameters for an ADCP between longer pulses (larger range bins) and lower Doppler noise and shorter pulses (smaller range bins) and greater Doppler noise. Even in the event of ideal constant flow, smaller bins will provide erroneously higher raw turbulence intensities (with no true turbulent fluctuations). Because the theoretical adjustments for Doppler noise are imprecise, it is desirable to select the biggest bins that can be tolerated (reducing the amount of noise that must be eliminated from the turbulence statistics later). Based on a priori knowledge of the tidal flow and a standard turbulence intensity of 10%, one option for selecting a sampling method is to demand Doppler noise values that are much lower than the anticipated turbulent fluctuations. Another alternative is to adjust the bin size to the lowest resolution needed to determine mean flow vertical shear[5].

2. DISCUSSION

For estimating the fatigue of materials used in tidal turbines, accurate turbulence intensity data are critical. Turbulence causes time-varying stress, which causes most materials to wear more quickly than continuous tension. Damage equivalent loads (DELs), which are assessed for each component of a turbine and foundation in the wind power sector, may be used to quantify fatigue. The DEL is a fixed load that is equal to time-varying loads over a certain number of cycles (10 cycles at 1 Hz, for wind). A high DEL indicates that a material will break prematurely, and therefore the DEL is helpful in determining the best turbine for a given

location. DELs are calculated by modeling the stress history of a material component based on observed turbulence intensities, usually using an aero elastic model[9].

Turbulent length scale distributions, or spectra, are also essential to tidal turbines. Two dynamic scales are recognized as a result of these measurements: 1) large-scale eddies, which are mainly horizontal movements at scales larger than the water depth; and 2) small-scale turbulence, which follows an isotropic cascade of diminishing energy as size decreases.

Because turbulence is a continuous motion across various scales, this division is just approximate. Nonetheless, the partitioning is helpful in determining the fraction of total turbulence that is important to tidal turbines. Large sizes, in particular, dominate velocity variance, although they may not be essential scales for tidal turbines. Turbulence will most likely affect tidal turbines on sizes comparable to rotor diameters [O (10) m] or blade cord lengths [O(1) m]. When the fractional turbulence intensity is integrated to the appropriate length scales, the turbulence intensity is decreased relative to the total turbulence intensity. Reduced turbulence will lower DELs and potentially related costs for turbines at a given location. Before this use, further experimental and numerical study is required to better understand the structural and performance response of tidal turbines at various length scales.

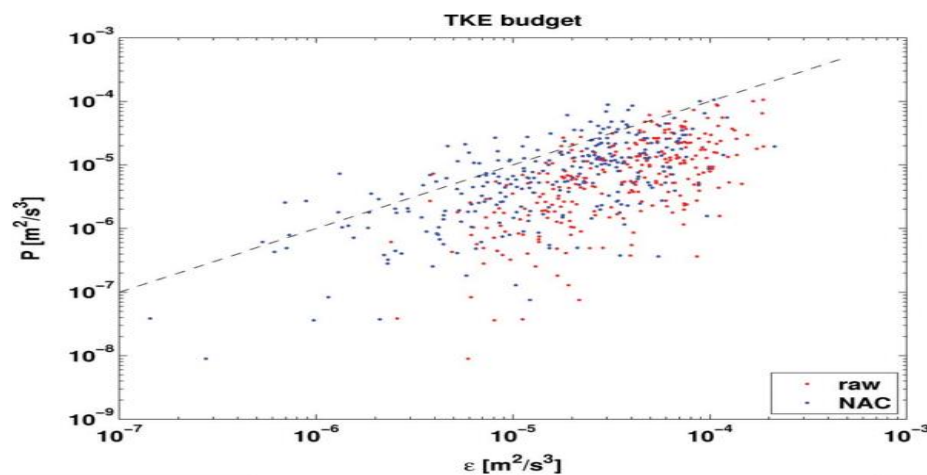


Figure 2: Comparison of Turbulent Shear Production Rate versus Dissipation Rate at Nodule Point (ADV Data Only). The Red Dots Are The Raw Spectra And The Blue Dots Are Spectra Processed Via Noise Autocorrelation.

These findings may also be used to predict turbine performance on short (i.e. turbulent) time scales.

It may be feasible to anticipate the transition from steady to variable power output based on previous information (from experimental or numerical studies) of turbine responsiveness as a function of frequency. Here, is the horizontal TKE, is the turbine efficiency (which may be a function of mean speed), and is the density of seawater. The turbine power output spectrum would scale as across the frequency ranges of isotropic turbulence for a constant turbine response function [where]. Based on the shape, mass, and generator load of a specific turbine, turbine response functions will most likely be highly sensitive on frequency. Figure 1 discloses the Regional map, bathymetry, and locations of two tidal energy sites in Puget Sound. At Admiralty

Head, a Sea Spider was deployed on the seafloor to collect AWAC data. At Nodule Point, the Tidal Turbulence Tripod was deployed on the seafloor to collect ADV and ADCP data. The Sea Spider was ballasted with 800 lb of lead (ingots), and the Tidal Turbulence Tripod was ballasted with 1800 lb of steel (railroad wheels)[3].

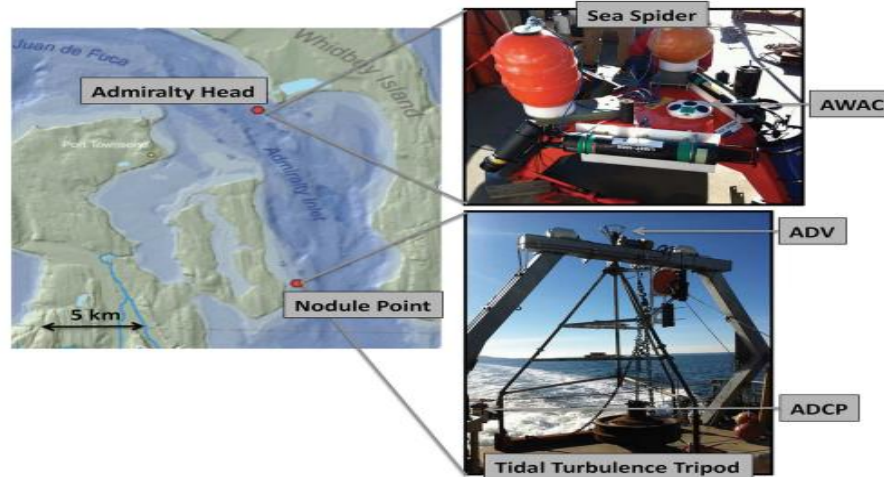


Figure 1: Regional map, bathymetry, and locations of two tidal energy sites in Puget Sound. At Admiralty Head, a Sea Spider was deployed on the seafloor to collect AWAC data. At Nodule Point, the Tidal Turbulence Tripod was deployed on the seafloor to collect ADV and ADCP data. The Sea Spider was ballasted with 800 lb of lead (ingots), and the Tidal Turbulence Tripod was ballasted with 1800 lb of steel (railroad wheels).

3. CONCLUSION

The statistical elimination of Doppler noise and the restriction to length scales larger than the beam spread are major constraints in the analysis of ADCP (and AWAC) turbulence data (or bin size, in the case of a long-beam velocities). Faster sample rates, which would allow for more accurate ADCP (and AWAC) measurements, are a possible future enhancement to the ADCP (and AWAC) measurements. More pings may be averaged while maintaining O (1) Hz data. These quicker raw sample rates, on the other hand, would simply serve to decrease the amount of data collected. Noise produced by the [10]Doppler Effect (by averaging more pings). Smaller scale analysis would be impossible due to the quicker raw sampling (due to the faster raw sampling).

The sample volume is still a constraint).For observations on smaller length scales or with a lower number of variables, ADV measurements are needed because to noise. ADV measurements were used to confirm that the statistical adjustment was effective. Doppler noise was detected in the ADCP data. A bright future hybrid instrument, using convergent technologies, would be an upgrade. Beams and pulse coherence on a bigger scale (as an ADV) an ADCP) to measure precise velocity at the hub height from a platform at the bottom This hybrid device would be more feasible than deploying ADVs on the battlefield.[O(10) m above the seabed] turbine hub heights.

Finally, future measurements may use multi-instrument arrays to test the assumption of coherent length. When evaluating data from a single point, scales are used [i.e., (5)]. Such The overall

structure of eddies at tidal energy sites would be further constrained by array observations. There is an obvious reason for this. Because coherent eddies have been seen, these measurements have been made. In wind turbines, the greatest stresses are produced. The usefulness of ADCP is shown in this article (and AWAC) at tidal energy sites, measurements for observing turbulence are taken. Creates a set of measures to describe turbulence, and findings from two locations where turbines are scheduled to be installed. Since there have been few prior turbulence measurements at tidal energy facilities, particularly those with currents over 1 m/s, this is a unique opportunity. The findings show some of the first actual circumstances at 3 m/s for calculating the fatigue loads and tidal turbine performance. Figure 2 discloses the Comparison of turbulent shear production rate versus dissipation rate at Nodule Point (ADV data only). The red dots are the raw spectra and the blue dots are spectra processed via noise autocorrelation.

REFERENCES:

1. Su M, Wang S, Shen HL, Du X. Numerical and experimental analyses of hydrodynamic performance of a channel type planing trimaran. *J. Hydrodyn.*, 2014;26(40): 549-557.
2. Jiang Z, Xie B. A study on the hydrodynamic performance for a deepwater drilling semisubmersible. In *Proceedings of the International Offshore and Polar Engineering Conference*, 2013.
3. Witte BM, Singler RF, Bailey SCC. Development of an unmanned aerial vehicle for the measurement of turbulence in the atmospheric boundary layer. *Atmosphere (Basel)*, 2017;8(10):195.
4. Yang D, Ren Z, Guo Z, Gao Z. Numerical analysis on the hydrodynamic performance of an artificially ventilated surface-piercing propeller. *Water (Switzerland)*, 2018; 10(11):1499.
5. Sun H, Xiong Y, Zhang K. Influence of geometric parameters on the hydrodynamic performance of controllable pitch propellers. *Wuhan Ligong Daxue Xuebao (Jiaotong Kexue Yu Gongcheng Ban)/Journal Wuhan Univ. Technol. (Transportation Sci. Eng.)*, 2013.
6. Wang C, He M, Guo C, Chang X, Huang S. Steady hydrodynamic performance simulation of integrative energy-saving propulsion system. *Harbin Gongcheng Daxue Xuebao/Journal Harbin Eng. Univ.*, 2013.
7. Muschinski A. et al. Fine-scale measurements of turbulence in the lower troposphere: An intercomparison between a kit-and-balloon-borne, and a helicopter-borne measurement system. *Boundary-Layer Meteorol.*, 2001;98(2): 219-250.
8. Buchhave P, George WK, Lumley JL. Measurement Of The Turbulence With The Laser-Doppler Anemometer. *Annu. Rev. Fluid Mech.*, 1979;11:443-503.
9. Chen L, Zang J, Hillis AJ, Plummer AR. Hydrodynamic performance of a flap-type wave energy converter in viscous flow. In *Proceedings of the International Offshore and Polar Engineering Conference*, 2015.
10. Stiperski I, Rotach MW. On the Measurement of Turbulence Over Complex Mountainous Terrain. *Boundary-Layer Meteorol.*, 2016;159 (1): 97-121.

HEAVY METAL CONTAMINATION AND EVALUATION IN HUIZHOU BAY'S TIDAL FLAT SEDIMENTS

Dr. Varun Kumar Singh*

*Associate Professor,
Department of Chemistry,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- drvarun.engineering@tmu.ac.in

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ABSTRACT

In Huizhou Bay, the heavy metal inventory and ecological danger of tidal flat sediments were studied. The average concentrations of heavy metals in surface sediments surpassed the environment background values of Jiangsu Province coastal soil, indicating that heavy metals were the primary pollutant in the surface sediments (Cd, Cr, Cu, Mn, Pb and Zn). Furthermore, the patterns of heavy metals fluxes may reflect Lianyungang City's socioeconomic growth, and heavy metals inputs have been linked to human activities. In surface sediments, Cr, Cu, Pb, and Zn were mostly found in the non-bioavailable residual form, while Cd and Mn were mostly found in the highly mobile acid soluble and reducible fractions. Cd and Pb were the major sources of ecological danger in the contaminated sediments. However, the harmful biological consequences induced by heavy metals were sometimes seen in tidal flats, according to the Sediment quality guidelines (SQGs).

KEYWORDS: Heavy Metal, Tidal Flat, Environmental Contamination, Sediment Quality, Guidelines Ecological Risk Assessment.

INTRODUCTION

Environmental pollution as a result of increasing urbanization and industrialization has become a major issue throughout the globe. The pollution is particularly severe in estuarine and coastal sediments, which typically serve as a sink for heavy metals, absorbing them via adsorption on suspended particles and subsequent deposition found that sediment-bound heavy metals adsorb and collect on fine-grained particles that ultimately migrate into depositional regions. Because of their toxicity, durability, and bioaccumulation, heavy metal sediment pollution has been identified as a serious issue in the marine environment. Heavy metals accumulate in the top sediment of aquatic environments via biological and geochemical processes, becoming harmful to sediment-dwelling creatures and fish, resulting in mortality, decreased growth, or impaired reproduction, as well as a reduction in species variety. Heavy metals in sediments have been demonstrated to have a substantial effect on the health of marine ecosystems in many studies. Heavy metal toxicity and mobility in sediments vary significantly depending on the chemical form[1].

As a result, heavy metal distribution and speciation provide a more accurate assessment of their true environmental effect. Huizhou Bay is located in Lianyungang, on the western edge of the South Yellow Sea, and gets water from the Linhong River. The bay has an area of about 876.39 km² and is shaped like a trumpet. The shoreline is 86.81 kilometers long and 42 kilometers wide at its widest point.

Haizhou Bay is a significant fishing port. Lianyungang's aquaculture businesses are the primary drivers of economic development, with its area increasing by 4.3 times between 1995 and 2005. Furthermore, in recent years, the sediment quality surrounding fish farming zones has worsened. Lianyungang Harbor, a natural deep-water harbor on the southeast side of Huizhou Bay, is one of China's most significant ports, serving Europe, America, the Middle East, and Northeast and Southeast Asia, and therefore serving as a vital logistics and transportation hub. In the past, the areas around Huizhou Bay had considerable economic growth. Municipal household sewage and industrial waste water were either released directly into the sea along the Linhong River and coastline line at that time, or were discharged after basic aerobic treatment. As a result, residential and industrial waste has collected in the 0025-326X/\$ - see front matter coastal areas. All rights reserved, 2013 Elsevier Ltd.[2]

With a significant part of this effluent deposited and accumulating on the tidal flat. There is some data on heavy metal concentrations and fluxes, as well as past hazardous metal imports in this area, although sampling was limited. This research was carried out to see whether the rapid expansion of economic development around Huizhou Bay has accelerated heavy metal pollution and to evaluate the possible ecological impact of heavy metal sediment contamination. The study's specific goals were to:

- determine the levels of heavy metals (Cd, Cr, Cu, Mn, Pb, and Zn) in tidal flat sediments and identify possible sources of these metals using cluster analysis;
- infer the bioavailability (and mobility) of heavy metals in the sediments by analyzing their chemical speciation using the BCR sequential extraction procedure; and
- infer the bioavailability (and mobility) of heavy metals in the sediments by (SQGs)[3].

Location Of The Study, Sediment Coring, And Sample

Surface sediment samples were collected with a tiny plastic shovel from undisturbed top 5 cm sediments and put in acid-rinsed polypropylene bags at stations HZ1-HZ10. In June of 2007, surface sediment samples were taken. In April 2010, sediment cores were collected using PVC pipes from the tidal flat of Huizhou Bay at stations LH1, LH2, LH3, and LH4. Figure 1 depicts the sample sites.

To acquire subsamples, each sediment core was split into 1-cm length pieces. All samples were freeze-dried for 48 hours at 55 degrees Celsius. Before digestion, the dried sediments were crushed, passed through a nylon filter of 100 meshes to remove fine debris and dead organisms, then thoroughly combined and homogenized. Throughout the tests, triple-distilled lab water was utilized. The solution was made using analytical-grade reagents and tested for trace metal contamination. Before the tests, all plastic centrifuge tubes were soaked in a 10% (v/v) nitric acid solution for 24 hours and then washed with triple-distilled water. The EPA 3052 technique was used to complete total digestion of the sediment samples.

In TeflonPFA containers, accurately weighted sediment samples (0.5 g) were digested using a micro-wave aided digestion technique (1200 W, 180 C, 10 bars for 30 minutes) with concentrated HF, HNO₃, and HClO₄ acids, and then put on a hot platform to evaporate until dry. An inductively coupled plasma-optical emission spectrometer (ICP-OES) was used to measure the amounts of Al, Cd, Cr, Cu, Mn, Pb, and Zn in the final solutions. The modified BCR sequential extraction method [4], as utilized in earlier research, was employed to achieve chemical speciation of heavy metals in the sediments. Supplementary material Table S1 summarizes the stepwise extraction procedure. The acid soluble fraction (F1), reducible fraction (F2), and oxidizable fraction (F3) of heavy metals in sediment samples were extracted sequentially (F3).

The mass balance between the total content and the non-residual fractions determined the residual fraction (F4). The analytical quality was checked using the Chinese national standard reference aquatic material (GBW07312) from the National Research Center for Certified Reference Materials in China. The percentage recovery for each of the tested elements was as follows: Al (97–105), Cd (91–110), Cr (95–103), Cu (95–105), Mn (98–106), Pb (93–108) and Zn (99–105) based on examinations of the standard reference material. The following coefficients of variation (in percentages) were found from three duplicates of each sample: Al, 0.44; Cd, 7.02; Cr, 5.97; Cu, 0.95; Mn, 0.60; Pb, 3.04; and Zn, 2.22. By comparing the sum of the four fractions (F1, F2, F3, and F4) with the total concentrations of heavy metals (CTC) obtained from the aqua regia digestion process, the outcomes of the BCR sequential extraction procedure were checked. The sequential extraction recovery was estimated as follows

Analytical Statistics

In this study, cluster analysis (CA) was used to determine the similarities and differences between the various sample locations in order to determine the impact of pollution sources in Huizhou Bay. The statistical analyses were carried out using the computer program SPSS.

Table shows the average amounts of heavy metals in the surface sediments of a tidal flat. The quantities of heavy metals in the tidal flat and estuary dropped as the distance to the Linhong river estuary increased, according to the findings. The Linhong river estuary is said to be a major sewage outfall, with significant quantities of industrial and residential sewage being discharged into the sea. While all heavy metal concentrations in surface sediments dropped progressively from high to low tidal flats [5]. The findings from the Changing River Estuary's tidal flat revealed a decrease in heavy metals.

DISCUSSION

The fourth sediment cores, which were mostly clayey silt, were taken in Haizhou Bay's tidal flat (Zhang et al., 2013a). A common way to account for the effects of grain size and mineralogy on heavy metal content and determine if anomalous metal exists Normalizing the geochemical data makes a contribution. Using one element as a proxy for grain size Al can be found in a lot of places. It's found in high concentrations in marine sediments and is frequently used for normalization of trace metal concentrations (As, Cr, Cu, etc.) (Daskalakis and O'Connor, 1995; Corelli and Frontload, 1997) (Ni, Pb, Zn, and Cd). We also chose Al as a grain-size proxy in this case. Normalize the Cd, Cr, Cu, Mn, Pb, and Zn concentrations in the watercores of sediment Heavy metal concentration profiles in LH1 normalized Metal distributions were found to be rather irregular and fluctuating. In relation to the depth of the sediment.

The conditions of sedimentation at Due to the effect of tidal movement, high tidal flats were poor, and as a result, the heavy metal distributions in LH1 showed minimal variation. Trend. Heavy metal profiles in cores LH2, LH3, and LH4 which were gathered from considerably superior places. From the bottom to the top of the sedimentary depositional environment, increasing concentrations were observed (hence from past to present). Meanwhile, decreases in metal content have been seen over the most recent years. The last five years have also been noted. Other investigations have shown similar patterns in heavy metal concentration profiles. During the Heavy metal concentrations were at their highest in sediment cores. The highest concentration of heavy metals in core LH1 was found between 3 and 21 cm, while the maximum concentration of heavy metals in core LH1 was found near the surface. The sedimentary fluxes (SF, SF, SF, SF, SF, SF, SF, SF 14 S quid Ci 2 SF 14 S quid Ci 2 SF 14 S quid Ci 2 SF 14 S qi Cohere Ci denotes the concentration of a particular metal in the sample. qi is the dry bulk density of the sediment at depth I (mg/kg dw). the depth of the I (g/cm³) S stands for sediment rate (cm/year), and Sediment 210Pb activity measurements were used to make this determination. LH3 and LH4 cores. The fluxes of heavy metal.

The sedimentary fluxes differed between the two sites, with sampling station LH4 having the greatest heavy metal deposition rates. It seems that heavy metal inputs (Zn, Pb, Cd, and Mn) to In the 1950s, the amount of marine sediments began to rise. Sediment analysis revealed a modest rise in heavy metal fluxes, which may be on the path to China's economic growth after the founding of the People's Republic of China in 1949. However, there was a little drop in heavy metal fluxes in the early 1990s. The Cultural Revolution in China, which lasted from 1966 to 1976, was shown in the 1970s (Fig. 5). Economic growth was interrupted during the period, and industrial output was curtailed. Throughout this period of political change. With the start of the "Reform, "The resuscitation of China's economy began with the establishment of a "Free and Open" policy in 1978. and as a result of this, urbanization and industrializations a consequence, heavy metal discharges have increased, which is consistent [6].

From the late 1970s until 1985, there was a significant rise in heavy metal fluxes. The concentrations, on the other hand, progressively decreased from 1985 to 1993, the economy of Lianyungang remained stagnant in the late 1980s. Since 1994, the economy has grown steadily. Quickly in Lianyungang, in line with the rise in wastewater CO₂ emissions. The fluxes of heavy metals clearly increased until During the years 2003–2006, it reached its peak. In conclusion, Heavy metal's historical contributions may be closely linked to Lianyungang City's socioeconomic growth [7].

Heavy Metal Contamination In Sediments Assessment

Heavy metal contamination in sediments has been assessed using a variety of techniques. The technique and possible ecological risk factor were used in this research. SQGs were chosen and used to the assessment of heavy metal contamination. Degree, as well as the danger it poses to the environment. The assurance of The most important factor in determining sediment quality is a precise comparison of reference values. The research was hampered by a lack of relevant baseline data for unpolluted marine sediment. Cd levels are 0.365, 60.28, 15.84, 570, 24.7, and 64.68 mg/kg, respectively. Cr, Cu, Mn, Pb, and Zn are the elements, were used in this research. The various techniques are described further down [1].

The prospective ecological risk index technique may be used to represent the Heavy metal's unique effect in a particular setting is also important to consider. as a result of their combined effect It also categorizes quantitatively. the dangers of heavy metals on the environment (Hakanson, 1980).materials from Huizhou Bay's tidal flat The potential ecological risk index is represented by RI in this calculation. It is the total of the various possible ecological risk factors of heavy metals in sediments; Either potential ecological risk factor of heavy metal I in the sediments is represented by r_i . T_i is the result of the toxic reaction factor and the pollution factor's stands for the heavy metal's hazardous reaction factor, which was provided is the heavy contamination factor. metal I which is the proportion of determined concentrations to total concentrations in the sediments, as well as the background value hang et al. (2012) claim that the possible ecological danger of Heavy metal-contaminated coastal sediments may be divided into two categories.

The ecological risk of Pb in core LH4 and surface sediment ranged from low to high, while the ecological risk of Cr was considerable's and Zn levels in tidal flat sediment were low. Heavy metals Cd, Cr, Cu, Pb, and Zn provide a possible ecological risk index (RI).

The range of values in sediment cores was 87.03 to 153.21, suggesting that the These heavy metals in sediment cores posed an ecological concern.ranging from mild to high Furthermore, the RI profiles in sediment From the bottom to the top, cores show an increase. indicating an increase in the potential for ecological risks. Gradually over the last several decades In general, the RI in surface sediments is low. The number of tidal flats was greater than 100, indicating that the surface sediments of Huizhou Bay's tidal flats had a high ecological potential. Cd and Pb were the major contributors to the hazards. Metal concentrations in sediments and their ecotoxicological relevance SQGs based on the biological effects database for sediments (BEDS) are also extensively used to evaluate sediment quality.heavy metals' potential ecological har, Roach. A collection of empirical SQGs was created by the National Oceanic and Atmospheric Administration (NOAA).

This yields two results: effects range low (ERL) and effects range high (ERH).high (ERM), which divides each concentration into three ranges. A specific chemical, as well as an estimate of the possible biological impact. The concentrations below ERL are a guideline only. The minimal-effects range is a tool for estimating circumstances. When biological effects are seldom seen Concentrations are the same. A range between ERL and ERM is equal to or higher than ERL but less than ERM.whereby biological consequences occur on a regular basis Concentrations in or around The ERM numbers above indicate a possible impact range. Unfavorable biological consequences are common. This collection of SQGs consists: Although it does not account for chemical bioavailability and was not based on trials in which causation was established, it has been demonstrated to have some predictive power in the last 50 years GIOV and GDP stand for gross industrial output value and gross domestic product, respectively[8].

CONCLUSION

In Huizhou Bay, the tidal flat revealed significant sediment heavy metal pollution. Heavy metal concentrations in surface sediments were higher than Jiangsu Province's background levels. Although most metals (Cr, Cu, Pb, and Zn) were mainly found in coastal soil, Except for Cd and Mn, which are present in a less bioavailable residual form. The concentrations of Cd in the surface sediments were low. Despite the fact that it had the greatest potential for mobility and

bioavailability. Heavy metal pollution in the tidal flat was thought to be caused by aquaculture-related activities, according to cluster analysis. Wastewater, aquaculture operations, and shipyard discharge are all examples. In Furthermore, the profiles of heavy metal fluxes in sediment cores have been studied. From the bottom to the top, there were increasing trends (hence from).from the past to the present), corresponding to the growth of the local economy in Lianyungang. Zn, Cd, Cr, Mn, and Pb were rated as moderately likely to cause adverse effects based on the SQGs, whereas Cu was rated as very likely to cause adverse effects. Pollution levels are low. The findings of the environmental risk assessment[9]

Revealed that surface sediments were regarded as high-potential ecological hazards, with Cd and Pb playing a major role. Comparing the effect-range classification to the effect-range classification for heavy metals, Zn in tidal flat sediments in Huizhou Bay might be potentially harmful to benthic species[10].

REFERENCE:

1. Lavoie P, Avallone G, De Gregorio F, Romano GP, Antonia RA. Spatial resolution of PIV for the measurement of turbulence. *Exp. Fluids*, 2007;43:39–51.
2. Saarenrinne P, Piirto M, Eloranta H. Experiences of turbulence measurement with PIV. *Meas. Sci. Technol.*, 2001;12(1): 1904-1910.
3. Fan Y, Arwatz G, Van Buren TW, Hoffman DE, Hultmark M. Nanoscale sensing devices for turbulence measurements. *Exp. Fluids*, 2015; 56:138.
4. Huq P, Franzese P. Measurements of Turbulence and Dispersion in Three Idealized Urban Canopies with Different Aspect Ratios and Comparisons with a Gaussian Plume Model. *Boundary-Layer Meteorol.*, 2013; 147:103–121.
5. Chen CHK, Wicks RT, Horbury TS, Schekochihin AA. Interpreting power anisotropy measurements in plasma turbulence. *Astrophys. J. Lett.*, 2010.
6. Stiperski I, Rotach MW. On the Measurement of Turbulence Over Complex Mountainous Terrain. *Boundary-Layer Meteorol.*, 2016; 159: 97–121.
7. Meng J, Tabosa E, Xie W, Runge K, Bradshaw D, Manlapig E.. A review of turbulence measurement techniques for flotation. *Minerals Engineering*. 2016.
8. Bonin TA. et al. Evaluation of turbulence measurement techniques from a single Doppler lidar. *Atmos. Meas. Tech.*, 2017.10(8): 3021–3039.
9. Founda D, Tombrou M, Lalas DP, Asimakopoulos DN. Some measurements of turbulence characteristics over complex terrain. *Boundary-Layer Meteorol.*, 1997;83:221-245.
10. Elsner JW, Eisner W. On the measurement of turbulence energy dissipation. *Measurement Science and Technology*. 1996;7:1334-1348.

AN ANALYSIS OF RECYCLING OF WASTE ELECTRIC AND ELECTRONIC EQUIPMENT (WEEE)

Navneet Kumar Vishnoi*

*Assistant Professor,
Department of Computer Engineering,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- navneet.computers@tmu.ac.in

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ABSTRACT

The volume, complexity, and variety of electric and electronic equipment (EEE) are rapidly increasing. It also moves quickly, propelled by innovation and technological development, and relies on a diverse set of resources, some of which are scarce. Waste EEE (WEEE) has become a significant social issue. WEEE recycling and treatment entails both occupational and environmental risks, which are currently understudied. Even yet, in a fragile informal environment, second-hand EEE has been transported and handled in Africa, China, and India. EEE recycling has been maintained in industrialized nations by a variety of efforts and reasons, including sustainability, employment creation, and the value of valuable or rare metals. Current EU directives call for a significant decrease in the amount of WEEE plastics (WEEP) disposed of in landfills. WEEP's mechanical, thermal, and feedstock recycling are investigated, and various alternatives are considered. Plastics recycling should be evaluated against the potential hazards posed by their toxic components, which include brominated flame retardants and heavy metals. Another study is about recycling plastics from automobile shredder waste, which is an issue that is somewhat comparable but involves a different mix of plastics.

KEYWORDS: *Electric, Electronic, Metals, Recycling, Waste.*

1. INTRODUCTION

During the Golden 1960s, the average wealthy household had just a few electric devices: a radio, a black and white television set, a refrigerator, a vacuum cleaner, a washing machine, and a disc player. After thirty years, fast growth and widespread availability have vindicated the statement: 'with the ubiquity and dizzying pace of technical advancement of electronic equipment, the issue of how to dispose of it is becoming more important.' Electrical and electronic equipment (EEE) manufacturing is still one of the fastest expanding worldwide industrial activity, with a turnover that surpasses that of automobile makers. Rapid expansion also leads to an increase in the amount of trash electrical and electronic equipment (WEEE, electronic or e-waste).

The quantities placed on the market (PoM) and the amounts of WEEE recycled in each EU nation (Eurostat) or Japan are both reported with reasonable accuracy. In contrast to most other trash, there may be a significant time gap between equipment decommissioning and its ultimate

reporting to the e-waste stream. As a result, the quantity of trash that is reused, remanufactured, exported, or reported to municipal solid waste (MSW) is unknown. MSW often receives reports from small e-devices (s-WEEE), such as an electric toothbrush, hairdryer, or cell phone. Metal-rich e-waste is sold or even stolen for its metal worth[1].

Obsolescence prompts rapid replacement of telecommunication and information technology (IT) materials; cathode ray tube (CRT) monitors are quickly replaced by liquid crystal display (LCD) and plasma monitors, just as color television (TV) replaced black and white in the 1970s, increasing the amount of waste to be disposed of. E-waste contains at least 1000 distinct chemicals. The close mixing of components, as well as their usage in small amounts, makes it impossible to completely separate and filter these streams; furthermore, e-waste and its composition vary greatly. Heavy metals including mercury, lead, and cadmium, as well as polychlorinated biphenyls (PCBs) in condensers and brominated fire retardants (BFR) in casings and printed circuit boards, are all found in e-waste (pcbs)[2].

WEEE is an electrically powered appliance that no longer serves its original purpose for the current owner. WEEE is defined differently in each country, using inclusive lists and/or legal definitions. The Swiss Ordinance on the Return, Takeback, and Disposal of Electrical and Electronic Equipment (1998) identified four general categories:

- Electronic entertainment appliances
- Office, communication, and information technology appliances
- Appliances in the home
- Electronic components of the appliances (mentioned above).

It was modified in 2004 to align with the EU Directive's categorization of 10 types of e-waste that should not be disposed of alongside regular trash, i.e. MSW. The Indian categorization system has just six classes, while the Japanese system began with televisions, refrigerators, washing machines, air conditioners, and personal computers, or PCs. Individual appliances vary significantly in size, weight, and composition; therefore, stating average numbers is pointless unless the kind of appliance and its manufacturing date are specified. Lighting bulbs are the most numerous. WEEE recycling is essential not only to decrease the quantity of trash that has to be treated, but also to encourage the recovery of valuable materials and the responsible removal of its intrinsically dangerous and environmentally undesirable components and compounds[3].

WEEE is mostly made up of ferrous and nonferrous metals, followed by WEEE plastics (WEEP). WEEP quantity and composition vary depending on the kind of device. From an environmental, occupational, and economic standpoint, managing the disposal or recovery of plastics is critical: WEEP include dangerous chemicals that may result in harmful emissions during incorrect recycling or elimination, or high processing costs in the event of effective treatment. This delicate balance of values and responsibilities raises issues such as who pays for responsible care and how to handle cherry picking[4].

1.1 Metals:

Precious metals recovery (Ag, Au, Platinum group metals) was formerly a significant motivator for pcb recycling: precious metals account for more than 70% of the value of mobile phones, calculators, and pcbs, and still account for 40% of the value of TV boards and DVD players. Copper, zinc, and other metals are next. Indium is utilized in LCD displays, gold, silver, and

palladium are used in non-oxidizing pcb connections, and silver is used in RF identification antennas. Strategic metals include lithium, gallium, tellurium, germanium, and ruthenium. The issue of losing uncommon or valuable components has gotten a lot of attention, especially in Japan. More than half of all ruthenium and indium manufactured is used in EEE manufacturing. Hydrometallurgical or pyrometallurgical techniques are used to recover them. The first set of operations involves acid or caustic leaching or extraction, which is followed by progressive separation. The second category is based on oxidation/reduction reactions and element partitioning between collector elements like lead or copper and slag. The diverse composition explains why certain specialized companies (such as Boliden, Cumerio, Noranda, and Umicore) are interested in processing WEEE in metallurgical plants. Pcb's contain more than 20% copper and may be fed straight into a copper or lead smelting facility if shredded. These smelters' pollution issues (dioxins) were solved more than a decade ago[5].

Batteries are not included by this survey and are the subject of a separate Directive. To reduce pollution and recycle metals, small batteries are gathered. Injection-moulded PP boxes are used in lead batteries, which are either recycled as resins or utilized as fuel in blast furnaces to recover lead and antimony alloys[6].

Plastics are useful as an insulator for electricity and/or heat, as well as a lightweight, readily formable structural component. By adding reinforcing fibers to the resin, a portion of these structures is reinforced and stiffened. Thermosets are very stable and perform a crucial function. Plastics' proportion of EEE has steadily risen from about 14 percent in 1980 to 18 percent in 1992 and 23 percent in 2005. Their contribution to European WEEE is projected to be 20.6 percent (2008). If the WEEE Forum members collected and processed 1.5 million tonnes of WEEE in 2008, they recovered or disposed of 300,000 tonnes of plastic trash, resulting in a complicated combination. Up to six distinct plastic resins may be found in even tiny items. Styrenics (PS, HIPS, ABS, SAN), polyolefins (HDPE, LDPE, PP), engineering plastics (PC, POM, PUR, PA, and PVC), and thermosets are all found in WEEP. Plastics are usually compounded with additives such as thermal and UV stabilisers, antistatic agents, flame retardants, colorants, pigments, plasticisers, fillers, reinforcing glass, and carbon fibres before processing. The majority of concerns center on the presence of brominated flame retardants (BFRs) and heavy metals, both intrinsic and extrinsic, introduced as impurities during WEEE processing[7].

Mechanical/physical processing will very certainly be critical in the upgrade of WEEE. Manual disassembling is the greatest way to get plastics-rich streams, but it comes at a significant cost. Shredding and multistep mechanical separation are an option once all dangerous chemicals have been removed. The embedding of foreign materials into the plastic matrix is an unavoidable result. Due to financial pressures, the shredder operator may optimize for maximum metal recovery, rendering WEEP unsuitable for further recycling.

The following plastic kinds (in decreasing order of share) dominate various WEEE product categories:

- HIPS and ABS are used in consumer electronics, including as television sets.
- ABS, HIPS, ABS/PC, and PPO/PS are examples of information technology devices.
- PP, PUR, ABS, PS, and HIPS for large electrical equipment.
- PP, HIPS, and ABS for small electrical equipment

-
- Air conditioners: ABS and HIPS, PUR, PP, and PVC.

WEEP fractions were tested for four heavy metals (cadmium, hexavalent chromium, mercury, and lead) as well as four brominated flame retardants (PentaBDE, OctaBDE, DecaBDE, DecaBB) that are controlled (i.e. phased out) by the RoHS Directive in an EMPA research. Other flame retardants, such as HBCD and TBBPA, as well as total bromine, total phosphorus, and antimony, were investigated. All fractions included at least one chemical restricted by the RoHS Directive in measurable quantities, suggesting the existence of legacy additions. Such garbage should be disposed of in identified landfill cells with a high degree of environmental protection and the possibility of future landfill mining[8].

1.2 Legal Basis:

The two applicable Directives on WEEE and restriction of hazardous substances (RoHS) were originally conceived as a single Directive, with the goal of minimizing WEEE's environmental effect. Given the waste hierarchy, it was necessary to handle both the beginning and end of the product life cycle. Both the treatment and recycling of WEEE are covered under the WEEE Directive 2002/96/EC. It promotes reuse and recycling, as well as a reduction in the quantity of WEEE discarded. Producers must pay for at least the collection of their goods at end-of-life from central locations, as well as fulfil reuse, recycling, and recovery goals, according to the Directive. Design for recycling and design for the environment help to achieve such objectives even before manufacturing begins. Hazardous chemicals are addressed under the RoHS Directive[9].

1.3 Country Reports:

E-waste was originally mostly produced in OECD nations with almost saturated domestic markets. The EEE market penetration in newly industrializing nations is currently low, but it is increasing at a quicker pace, implying that significant quantities of domestic e-waste may ultimately arise. Several writers discussed the state of e-recycling in Taiwan, Korea, the United States, China, Scotland, Greece, Germany, Switzerland, Sweden, and India. In developing nations, backyard recyclers set fire to e-waste in order to extract metals from the ashes, posing serious health risks to employees and the communities around the operations. Heavy metals contaminate the environment as a result of leaching liquors. These methods are blamed by both official recyclers and Greenpeace; other groups, such as EMPA, attempt to rectify them[10].

1.3.1 Europe:

Early WEEE recycling was mainly based on the experience of a few European countries, where different organizations ran voluntary take-back and recycling programs. EEE manufacturers are now legally liable for the costs of collection and recycling. In 2002, national organizations in charge of WEEE take-back systems formed a WEEE executing forum, which included associations from Austria, Belgium, the Netherlands, Norway, Sweden, and Switzerland at the time. The European Union Directive has been translated into national law, which includes prescriptive criteria such as per capita collection, treatment standards, and recovery goals. The previous Directive's targets could be readily fulfilled by recycling metal, glass, and other materials, thus plastic components were not a pressing concern. Both the landfill directive (which prohibits the disposal of high-calorie waste plastics) and the incineration directive (which

encourages the burning of such trash for energy recovery) should be implemented to promote plastics treatment.

1.3.2 Japan:

Japan became a significant manufacturer of electronics, photography, and information technology in the 1950s and 1960s. The earliest efforts to recycle WEEE were undertaken in the 1970s, but their disassembly proved too expensive. The Home Appliance Recycling Law and the Law for Promotion of Effective Utilization Resources made WEEE recycling a legal obligation in 2001. There was no need to recycle plastics since a recycling rate of 50–60% was needed. However, by 2008, the recycling rate was expected to increase to 80–90%, meaning that plastics would have to be recycled. As a result, creating recycling technology for plastics, including those containing BFRs, as well as preparing for a review of the legal system in collaboration with organizations representing BFR, EEE, and plastics producers, became critical.

1.3.3 China:

China now accounts for a substantial portion of worldwide EEE production. In 2006, China produced 1.7 million tonnes of e-waste, or 1.3 kg per person. Furthermore, there was a massive influx of e-waste, which was handled first by the informal sector and then by authorized businesses. Because of the crude treatment employed during disassembly and processing, as well as the discharge of hazardous compounds such as PBDEs, e-waste quickly became a significant environmental issue. There have been reports of elevated PBDE concentrations in the environment near e-waste sites, as well as in people. Open burning sites, combustion residues, ash, soils, and sediments have all been severely polluted by crude e-waste treatment, as shown in Taizhou (Zhejiang Province) and Guiyu and Chendian (Guangdong Province), where pollutant levels, particularly dioxins, have risen.

1.4 Hazardous aspects of WEEE:

WEEE includes a variety of substances, many of which are hazardous to the environment or to workers, as well as persistent organic pollutants (POPs) or possible precursors to POPs. WEEE recycling presents a slew of workplace and environmental concerns: Phthalates, Pb, Cd, and Hg in batteries, as well as Ba, Pb, Hg, and rare earth elements (REE) in CRTs, may be leached from landfills; legacy BFRs and poly-chloro-biphenyls (PCBs) in capacitors could be ignited and spread into the environment. If hazardous chemicals have been utilized, it is preferable to reuse or recycle the e-waste to minimize its environmental effect.

2. DISCUSSION

Given the constantly expanding quantities of e-waste produced and their composition of both valuable and hazardous elements, treatment and recycling of e-waste is an emergent waste management issue as well as a growing economic opportunity. Due to its contents of rare and dangerous elements, WEEE or e-waste has been taken into account not only by the government, but also by the general people. Because EEE is a significant source of waste plastic, the WEEE Directive (2002/96/EC) has significant consequences for plastic recycling. The Directive establishes design standards that will gradually reduce the number of plastics used in EEE devices. The Directive emphasizes the recyclability of product components, despite the fact that their technological and commercial viability is still in doubt. Plastic recycling from s-WEEE is still unusual: it is significantly influenced by the recovery of the (valuable) metals present, and

the value of ultimately recoverable polymers must be balanced against the environmental hazards associated with its hazardous characteristics. These are mostly due to the prevalence of BFR and heavy metal music.

3. CONCLUSION

In terms of the materials and components utilized, as well as waste streams from manufacturing operations, EEE is varied and complicated. It is critical to characterize these wastes in order to design a cost-effective and ecologically sound recycling solution. Stable material sources are required for the establishment of a stable recycling sector. More study on the applicability, efficacy, and efficiency of different methods and equipment for handling WEEE is required from a policy standpoint. Current methods are not very cost-effective, and recycling is currently reliant on human labour. Furthermore, existing techniques are restricted in their capacity to handle complicated goods with a range of components, such as CRTs and PCs. Finally, via advertising and education, it is essential to raise public knowledge of environmental preservation in order to steer consumer preferences toward goods that are created with and eventually generate minimal hazardous waste.

REFERENCES:

1. Holgersson S, Steenari BM, Björkman M, and Cullbrand K. Analysis of the metal content of small-size Waste Electric and Electronic Equipment (WEEE) printed circuit boards—part 1: Internet routers, mobile phones and smartphones. *Resour. Conserv. Recycl.*, 2018, doi: 10.1016/j.resconrec.2017.02.011.
2. Cui J, Forssberg E. Mechanical recycling of waste electric and electronic equipment: A review. *Journal of Hazardous Materials*. 2003 May 30;99(3):243-63. doi: 10.1016/S0304-3894(03)00061-X.
3. Friege H, Oberdörfer M, and Günther M. Optimising waste from electric and electronic equipment collection systems: A comparison of approaches in European countries. *Waste Manag. Res.*, 2015;33(3): 223-231. doi: 10.1177/0734242X14567500.
4. Ueberschaar M, Dariusch Jalalpoor D, Korf N, and Rotter VS. Potentials and Barriers for Tantalum Recovery from Waste Electric and Electronic Equipment. *J. Ind. Ecol.*, 2017, doi: 10.1111/jiec.12577.
5. Bovea MD, Pérez-Belis V, Ibáñez-Forés V, and Quemades-Beltrán P. Disassembly properties and material characterisation of household small waste electric and electronic equipment. *Waste Manag.*, 2016, doi: 10.1016/j.wasman.2016.04.011.
6. Puype F. et al. Towards a generic procedure for the detection of relevant contaminants from waste electric and electronic equipment (WEEE) in plastic food-contact materials: a review and selection of key parameters. *Food Additives and Contaminants - Part A Chemistry, Analysis, Control, Exposure and Risk Assessment*. 2017 Oct;34(10):1767-1783. doi: 10.1080/19440049.2017.1332430.
7. Sikander A, Savvilotidou V, Jia X, and Nicomel N. The presence of rare earth elements and critical metals in waste electric and electronic equipment: Challenges for recovery. *Glob. Nest J.*, 2018;20(4): 773 - 777. doi: 10.30955/GNJ.002582.

8. Schlummer M, Mäurer A, Leitner T, Spruzina W. Report: Recycling of flame-retarded plastics from waste electric and electronic equipment (WEEE). Waste Manag. Res., 2006 Dec;24(6):573-83. doi: 10.1177/0734242X06068520.
9. Fraige FY, Al-khatib LA, Alnawafleh HM, Dweirj M.K, and Langston PA. Waste electric and electronic equipment in Jordan: willingness and generation rates. J. Environ. Plan. Manag., 2012;55(2): 161-175. doi: 10.1080/09640568.2011.586492.
10. Achilias DS, Antonakou EV, Koutsokosta E, and Lappas AA. Chemical recycling of polymers from waste electric and electronic equipment. J. Appl. Polym. Sci., 2009; 114(1):212 - 221. doi: 10.1002/app.30533.

AN ANALYSIS OF CAPABILITIES AND POTENTIAL BENEFITS OF BIG DATA ANALYTICS

Gulista Khan*

*Assistant Professor,
Department of Computer Engineering,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id-gulista.engineering@gmail.com

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ABSTRACT

The health-care sector has yet to properly appreciate the potential advantages of big data analytics. While the increasing amount of academic research on big data analytics is mostly focused on technology, a deeper grasp of big data's strategic implications is critical. This research investigates the historical evolution, architectural design, and component functions of big data analytics to solve this gap. In addition, we mapped the advantages of big data analytics in terms of IT infrastructure, operational, organizational, managerial, and strategic domains. In addition, we provide five recommendations for healthcare companies thinking about using big data analytics technology. Our results will assist healthcare companies in better understanding the capabilities and potential advantages of big data analytics, as well as in formulating more successful data-driven analytics strategies.

KEYWORDS: *Big Data, Healthcare, Information, Integration, Technology.*

1. INTRODUCTION

Inadequate integration of healthcare systems and poor healthcare information management are stymieing attempts in the US healthcare industry to convert IT value to commercial benefit. The high volume digital deluge of information being produced at ever-faster speeds and in ever-greater variety in healthcare adds to the equation's complexity. The result is an increase in medical expenses and time for both patients and healthcare professionals that is unwarranted. As a result, healthcare companies are looking for IT assets that will help them integrate organizational resources in order to provide a high-quality patient experience, enhance organizational performance, and perhaps even develop new, more successful data-driven business models. The use of big data analytics is one potential advance[1].

Big data analytics, which developed from business intelligence and decision support systems, allows healthcare companies to evaluate a massive volume, diversity, and velocity of data across a broad range of healthcare networks in order to support evidence-based decision making and action. Big data analytics refers to a set of analytical methods, such as descriptive analytics and mining/predictive analytics that are well suited to evaluating huge amounts of text-based health records and other unstructured clinical data[2]. Data may be moved between conventional and

new operating systems using modern database management systems such as MongoDB, Mark Logic, and Apache Cassandra for data integration and retrieval. Apache HBase and NoSQL systems are used to store large amounts of data in a variety of forms. These advanced big data analytics technologies enable clinical information integration and offer new business insights to assist healthcare companies satisfy patients' demands and future market trends, thus improving treatment quality and financial performance[3].

Computer scientists have explored big data analytics from a technical standpoint. However, healthcare companies continue to struggle to reap the advantages of their investments in big data analytics, and others are dubious of its effectiveness, while investing in big data analytics in the hopes of transforming healthcare. Only 42% of healthcare companies questioned are utilizing rigorous analytics methods to assist their decision-making process, and only 16% of them have extensive expertise using analytics across a wide variety of activities. This suggests that healthcare professionals only have a hazy understanding of how big data analytics may benefit their businesses. As a result, there is a pressing need to comprehend the administrative, economic, and strategic implications of big data analytics, as well as to investigate the prospective advantages of big data analytics. This will allow healthcare professionals to fully use the potential of big data analytics[4].

1.1 Big Data Analytics: Past And Present

The history of big data analytics and data science are intimately intertwined. Michael Cox and David Ellsworth used the phrase "big data" in a paper given at an IEEE conference in 1997 to describe data visualization and the difficulties it brought to computer systems. By the end of the 1990s, significant IT breakthroughs and technological advancements had allowed the production of enormous amounts of data but very little usable information. Business intelligence (BI) concepts were developed to emphasize the importance of gathering, integrating, analyzing, and interpreting business data, as well as how this set of processes can assist businesses in making better decisions and gaining a better understanding of market behaviors and trends. From 2001 to 2008, big data development was in its evolutionary stage. Big data was originally described in terms of volume, velocity, and variety (3Vs), after which more complex software could be developed to meet the requirements of managing the information explosion. Extensible Markup Language (XML) Web services, database management systems, and Hadoop are examples of software and application developments that added analytics modules and functions to core modules that focused on enhancing usability for end users and enabled users to process massive amounts of data across and within organizations collaboratively and in real-time. Healthcare organizations began digitizing their medical records and aggregating clinical data in large computerized databases at the same time. This advancement enabled healthcare professionals practice more effective medicine by making health data storable, useable, searchable, and actionable[5].

1.2 Big Data Analytics Architecture:

Data, data aggregation, analytics, information exploration, and data governance are the five main architectural components that make up big data analytics architecture. These logical layers make up the big data analytics components that execute particular tasks, allowing healthcare executives to comprehend how big data implementations may convert healthcare data from different sources into useful clinical information.

- **Data Layer:**

This layer contains all of the data sources required to offer the insights needed to support everyday operations and resolve business issues. Structured data, such as conventional electronic health records (EHRs), semi-structured data, such as logs from health monitoring devices, and unstructured data, such as clinical pictures, are classified into three categories. These clinical data are gathered from a variety of internal and external sources, and will be placed in the relevant databases as soon as possible, depending on the content type[6].

- **Data Aggregation Layer:**

This layer is in charge of processing data from different data sources. Data will be intelligently digested at this layer, which will consist of three steps: data collection, transformation, and storage. Data acquisition's main aim is to read data from different communication channels, frequencies, sizes, and formats. Because the properties of the incoming data may vary greatly, this phase is often a significant stumbling block in the early stages of adopting big data analytics. The expense of creating new data warehouses and expanding their capacity to prevent workload bottlenecks may easily exceed the budget allocated. The transformation engine must be capable of transferring, cleaning, dividing, translating, merging, sorting, and verifying data throughout the transformation phase. Structured data, such as that found in an eclectic medical record, could be extracted from healthcare information systems, converted into a standard data format, sorted by the specified criterion (e.g., patient name, location, or medical history), and the record then validated against data quality rules. Finally, the data is put into target databases for additional processing and analysis, such as Hadoop distributed file systems (HDFS) or a Hadoop cloud. Compliance laws, data governance policies, and access restrictions serve as the foundation for data storage concepts. Methods for storing data may be implemented and finished in batch or in real time[7].

- **Analytics Layer:**

This layer is in charge of processing all types of data and doing relevant analysis. Depending on the kind of data and the goal of the analysis, data analysis may be split into three main components in this layer: Hadoop Map/Reduce, stream computing, and in-database analytics. Mapreduce is the most widely used programming paradigm in big data analytics, since it allows for cost-effective batch processing of huge quantities of data, as well as analysis of both unstructured and structured data in a massively parallel processing (MPP) environment. Stream computing allows for near-real-time or real-time processing of high-performance stream data. Users may monitor data in motion, react to unexpected occurrences as they occur, and rapidly identify next-best actions using real-time analysis. In the case of healthcare fraud detection, for example, stream computing is a critical analytical tool that aids in forecasting the probability of unlawful activities or intentional account abuse. To avoid a variety of frauds in the healthcare industry, transactions and accounts will be examined in real time and alerts will be issued promptly. In-database analytics is a data mining technique based on an analytic platform that enables data to be analyzed directly inside the data warehouse. This component offers a safe environment for sensitive business information, as well as high-speed parallel computing, scalability, and optimization capabilities targeted for big data analytics. However, since the

findings of in-database analytics are neither current nor real-time, reports with a static forecast are likely to be generated. In most healthcare organizations, this analytic component is used to enhance preventive healthcare practices and improve medication management. By evaluating EHRs, patterns of treatment, care experience, and individual patients' behaviors and medical histories, the analytics layer also offers excellent support for evidence-based medical practices[8].

- **Information Exploration Layer:**

This layer provides users in the company with outputs such as different visualization reports, real-time information monitoring, and relevant business insights generated from the analytics layer. Reporting is a key big data analytics function, similar to conventional business intelligence systems, that enables data to be presented in an usable manner to assist users' everyday operations and help managers make quicker, better choices. However, real-time monitoring of information, such as alerts and proactive notifications, real-time data navigation, and operational key performance indicators, may be the most significant output for health care (KPIs). This data is processed from sources like smart phones and personal medical equipment, and it may be emailed to interested users or made accessible in real time in the form of dashboards for monitoring patients' health and avoiding medical errors.

- **Data Governance Layer:**

Master data management (MDM), data life-cycle management, and data security and privacy management are all part of this layer. This layer focuses on the "how-to" of data management in the company. The procedures, governance, rules, standards, and tools for managing data are considered the first component of data governance, master data management. To establish the immediacy, completeness, correctness, and availability of master data for enabling data analysis and decision making, data is appropriately standardized, deleted, and integrated. Data life-cycle management, the second component, is the process of managing business information throughout its lifetime, from archiving data to maintaining data warehouses, testing and delivering various application systems, and finally deleting and disposing of data. Firms are better prepared to deliver competitive solutions to satisfy market demands and support corporate objectives with fewer schedule overruns and costs if they manage data efficiently throughout its lifecycle. The platform for delivering enterprise-level data operations in terms of discovery, configuration evaluation, monitoring, auditing, and protection is the third component, data security and privacy management. Because of the complexity of data management, businesses must deal with ethical, legal, and regulatory issues when it comes to data governance. To avoid security breaches and preserve patient privacy, it is critical to establish strict data standards and control systems for highly sensitive clinical data, particularly in the healthcare sector. By implementing appropriate rules, standards, and compliance requirements to limit user rights, the new system will comply with healthcare laws and provide a secure environment for the correct use of patient data[8].

1.3 Big Data Analytics Capability:

In the literature, many definitions for big data analytics capabilities have been established. Big data analytics capacity, in general, refers to the ability to handle a large amount of heterogeneous data in order for users to do data analysis and reaction. For optimizing enterprise business value, big data analytics capabilities should include speed to insight (the capacity to convert raw data into useful information) and ubiquitous usage (the ability to apply business analytics throughout

the organization). A study classified big data analytics capabilities into three stages using an analytics adoption lens: aspirational, experienced, and transformed. The first two tiers of analytics capabilities are concerned with utilizing business analytics technology to save costs and improve operations. The last level of competence focuses on increasing client profitability and making focused specialized analytics expenditures. Furthermore, a researcher defines big data analytics capability, in terms of adoption benefit, as the ability to collect an enormous variety of data - structured, unstructured, and semi-structured data - from current and former customers to gain useful knowledge to support better decision-making, to predict customer behavior via predictive analytics software, and to retain valuable customers by providing personalized services[9].

1.4 Training Key Personnel To Use Big Data Analytic:

The key to successfully using big data analytics outputs is to educate managers and workers with essential professional abilities, such as critical thinking and the ability to evaluate findings appropriately. Because a faulty interpretation of the reports produced may result in severe judgment mistakes and dubious choices. As a result, it's essential that healthcare companies provide analytical training courses in areas like basic statistics, data mining, and business intelligence to workers who will play a key support role in the new information-rich workplace. Mentoring, cross-functional team-based training, and self-study, according to a recent poll by the American Management Association, are effective training methods to assist workers acquire the big data analytical abilities they will require. Alternatively, healthcare companies may change their hiring criteria to attract candidates who already possess the required analytical abilities[10].

1.5 Generating New Business Ideas From Big Data Analytics:

New idea creation is important not just for organizational innovation, but it may also lead to improvements in company operations that improve efficiency and competitiveness. This may be accomplished with the help of sophisticated big data predictive analytics technologies. These technologies may offer comprehensive data and detect industry patterns, allowing businesses to develop new company concepts faster and think more creatively. Managers should encourage users to utilize outputs such as reports, alerts, KPIs, and interactive visualizations to find new ideas and market possibilities, as well as evaluate the viability of ideas, in addition to utilizing big data analytics to answer known problems.

2. DISCUSSION

As the need for identifying patterns in large datasets grows, big data analytics has gotten a lot of interest from academics and business. Sensor networks, cyber-physical systems, and the widespread use of the Internet of Things (IoT) have resulted in massive data gathering (in areas such as health care, social media, smart cities, agriculture, finance, education, and more). Due to noise, incompleteness, and inconsistency, data gathered from sensors, social media, bank records, and other sources is inherently unreliable. Sophisticated analytical methods for quickly evaluating and/or forecasting future courses of action with high accuracy, as well as advanced decision-making processes, are required for the processing of such enormous quantities of data. As the quantity, variety, and speed of data grows, so does the uncertainty that comes with it, resulting in a loss of trust in the analytics process and the choices taken as a consequence. Artificial intelligence methods (such as machine learning, natural language processing, and

computational intelligence) offer more accurate, quicker, and scalable outcomes in big data analytics than conventional data methodologies and platforms.

3. CONCLUSION

Our study has given a deeper knowledge of how healthcare companies may use big data analytics to change IT and generate business value by evaluating big data scenarios. Our research, like any other, has limitations. The data source is the study's main shortcoming. One issue in the health-care sector is that IT adoption lags behind that of other industries, which is one of the major reasons for the scarcity of case studies. Despite attempts to collect examples from a variety of sources, the bulk of the cases for this research came from suppliers. Since a result, there may be a bias, as suppliers often only promote their "success" tales. Collecting and evaluating original data may lead to more and better discoveries. The sample frame for gathering primary data is becoming bigger as more healthcare companies embrace big data analytics. Examining the effect of big data analytics capabilities on the performance of healthcare organizations using a quantitative analytical technique based on primary data may provide new information. Our research uncovered the need for additional scientific and quantitative studies, concentrating on some of the business analytics capacity components we identified, in addition to needing empirical examination of big data analytics enabled transformation. This is particularly true of analytical and decision-making skills, which are often mentioned in big data situations. With the growing amount of unstructured data, advanced analytic techniques such as deep machine learning algorithms, which allow computers to detect items of interest in large amounts of unstructured data and deduce relationships without the use of specific models or programming instructions, are becoming increasingly important. As a result, we anticipate future scientific research to prioritize the development of efficient unstructured data analysis algorithms and applications. Big data analytics may be a useful IT artefact for developing IT skills and gaining business advantages.

REFERENCES:

1. Wang Y, Kung LA, and Byrd TA. Big data analytics: Understanding its capabilities and potential benefits for healthcare organizations. *Technol. Forecast. Soc. Change*, 2018;126: 3-13. doi: 10.1016/j.techfore.2015.12.019.
2. Wang Y, Kung LA, Wang WYC, and Cegielski CG. An integrated big data analytics-enabled transformation model: Application to health care. *Inf. Manag.*, 2018; 55(1): 64–79. doi: 10.1016/j.im.2017.04.001.
3. Ristevski B and Chen M. Big Data Analytics in Medicine and Healthcare. *J. Integr. Bioinform.*, 2018 May 10;15(3):20170030. doi: 10.1515/jib-2017-0030.
4. Choi TM, Wallace SW, and Wang Y. Big Data Analytics in Operations Management. *Prod. Oper. Manag.*, 2018;27(10): 1868-1883. doi: 10.1111/poms.12838.
5. Wamba SF, Gunasekaran A, Akter S, fan Ren SJ, Dubey R, and Childe SJ. Big data analytics and firm performance: Effects of dynamic capabilities. *J. Bus. Res.*, 2017, doi: 10.1016/j.jbusres.2016.08.009.
6. Tiwari S, Wee, HM and Daryanto Y. Big data analytics in supply chain management between 2010 and 2016: Insights to industries. *Comput. Ind. Eng.*, 2018, doi:

10.1016/j.cie.2017.11.017.

7. Singh D and Reddy CK. A survey on platforms for big data analytics. J. Big Data, 2015;2(8). doi: 10.1186/s40537-014-0008-6.
8. Hadi MS, Lawey AQ, El-Gorashi TEH, and Elmirghani JMH. Big data analytics for wireless and wired network design: A survey. Computer Networks. 2018; 132:180-199. doi: 10.1016/j.comnet.2018.01.016.
9. Kache F and Seuring S. Challenges and opportunities of digital information at the intersection of Big Data Analytics and supply chain management. Int. J. Oper. Prod. Manag., 2017;37(1). doi: 10.1108/IJOPM-02-2015-0078.
10. Sun Z, Sun L, and Strang K. Big Data Analytics Services for Enhancing Business Intelligence. J. Comput. Inf. Syst., 2018;58(2):162-169. doi: 10.1080/08874417.2016.1220239.

AN ANALYSIS OF IMPACT OF IRON ON HEALTH

Dr. Ruchi Choudhary*; Dr. K Gopal**

*Associate Professor,
Department of Pharmacology,
TeerthankerMahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- ruchi.upmanyu@gmail.com

**Professor,
Department of General Medicine,
TeerthankerMahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email id: drvarshney123@gmail.com

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ABSTRACT

It is widely understood that a lack of or excessive exposure to certain elements has a negative impact on human health. Absorption, metabolism, and the degree of interaction with physiological systems are all factors that influence an element's impact. Iron has a role in a number of metabolic activities, including oxygen transfer, deoxyribonucleic acid (DNA) production, and electron transport, and is thus necessary for virtually all living species. However, since iron may produce free radicals, its content in human tissues must be carefully monitored, as too much might cause tissue damage. Iron metabolism disorders are among the most prevalent human illnesses, including a wide range of conditions with a variety of clinical symptoms, ranging from anaemia to iron excess, and potentially neurodegenerative diseases. We cover the most recent advances in iron metabolism and bioavailability research, as well as our current knowledge of human iron requirements, as well as the implications and causes of iron insufficiency. Finally, we go through preventive measures for iron insufficiency.

KEYWORDS: Anaemia, Deficiency, Health, Iron, Oxygen.

1. INTRODUCTION

Man has known the importance of iron in health and illness since the dawn of humanity. Egyptians, Hindus, Greeks, and Romans were among the first to utilize iron as a medicine. Iron was used to cure chlorosis (green illness) in the 17th century, a disorder caused by an iron shortage. However, it wasn't until 1932 that the significance of iron was fully recognized, thanks to conclusive evidence that inorganic iron was required for haemoglobin production. Iron's involvement in haemoglobin synthesis and oxygen transport has piqued nutritional interest for many years. Although low iron intake and/or bioavailability are responsible for the majority of anaemia in developed countries, they only account for about half of anaemia in developing countries, where infectious and inflammatory diseases (especially malaria), blood loss from

parasitic infections, and other nutrient deficiencies (vitamin A, riboflavin, folic acid, and vitamin B12) are also significant[1].

1.1 Biochemistry And Physiology:

Unlike zinc, iron is a plentiful metal on the planet and a physiologically necessary component of all living organisms. Despite its abundance in geology, iron is also a growth limiting force in the environment. This seeming contradiction arises from the fact that when iron comes into contact with oxygen, it produces oxides, which are extremely insoluble and therefore difficult for organisms to absorb. As a result, different cellular processes have developed to collect iron in physiologically relevant forms from the environment. Microbes produce siderophores to trap iron in a highly specific complex, and yeasts have mechanisms to convert iron from the insoluble ferric form (Fe^{+3}) to the soluble ferrous form (Fe^{+2}). Many of the processes seen in lower species, including humans, have similar equivalents in higher organisms.

Iron is found in the human body mostly as heme compounds (haemoglobin or myoglobin), heme enzymes, or nonheme compounds linked to protein (hemoprotein) (flavin-iron enzymes, transferring, and ferritin). Iron is required for the production of heme enzymes and other iron-containing enzymes involved in electron transfer and oxidation-reductions, as well as the synthesis of oxygen transport proteins such as hemoglobin and myoglobin. Almost two-thirds of the body's iron is located in circulating erythrocyte haemoglobin, 25% in an easily mobilizable iron storage, and the remaining 15% is linked to myoglobin in muscle tissue and a range of enzymes involved in oxidative metabolism and a number of other cell activities[2].

Circulating transferrin, a transporter that absorbs iron produced into the plasma mostly by intestinal enterocytes or reticuloendothelial macrophages, delivers iron to tissues. Endocytosis and absorption of the metal payload occur when iron-laden transferrin binds to the cell surface transferrin receptor (TfR) 1. Excess iron is stored and detoxified in cytosolic ferritin, which transports internalized iron to mitochondria for the production of heme or iron-sulfur clusters, which are essential components of many metalloproteins.

1.2 METABOLISM:

1.2.1 Absorption:

Enterocytes absorb iron through divalent metal transporter 1, a membrane transport protein that belongs to the solute carrier family. This mostly occurs in the duodenum and upper jejunum. It is subsequently delivered into the bloodstream through the duodenal mucosa, where it is transmitted to cells or bone marrow for erythropoiesis [the production of red blood cells (RBCs)]. In individuals who are iron deficient, there is a feedback system that helps them absorb more iron. People with iron excess, on the other hand, use hepcidin to reduce iron absorption. Ferroportin, which permits or prevents iron from entering the plasma from the mucosal cell, is now widely recognized as controlling iron absorption. The physical condition of iron as it enters the duodenum has a significant impact on its absorption.

Ferrous iron (Fe^{+2}) is quickly oxidized to the insoluble ferric (Fe^{+3}) form at physiological pH. Gastric acid lowers the pH in the proximal duodenum, enabling ferric reductases to reduce Fe^{+3} in the intestinal lumen, allowing Fe^{+2} to be transported through the apical membrane of enterocytes. This improves ferric iron solubility and absorption. Iron absorption is significantly

decreased when stomach acid production is inhibited (for example, by acid pump inhibitors like the medication prilosec)[3].

1.2.2 Regulation of iron homeostasis:

As iron is needed for a variety of cellular activities, maintaining iron homeostasis requires a continuous balance between iron absorption, transit, storage, and use. Iron balance is primarily controlled at the site of intake since the body lacks a recognized mechanism for active iron excretion. Hepcidin is a peptide hormone produced by the liver that plays an important function in iron homeostasis control. It is the main regulator of systemic iron homeostasis, coordinating iron uptake, utilization, and storage. Hepatocytes generate this hormone, which is a negative regulator of iron entrance into plasma. Hepcidin works by binding to ferroportin, an iron transporter found in intestine duodenal cells, macrophages, and placental cells. Hepcidin binding leads to ferroportin internalization and breakdown. The absence of ferroportin on the cell membrane prevents iron from entering the bloodstream.

Low transferrin saturation occurs as a consequence of decreased iron entry into plasma, and less iron is supplied to the growing erythroblast. Reduced hepcidin expression, on the other hand, leads to increased cell surface ferroportin and iron absorption. The content of iron in biological fluids is carefully controlled in all species to ensure that it is available when it is required and to prevent toxicity, since iron excess may result in the formation of reactive oxygen species. Because there is no excretory route for iron, iron homeostasis in mammals is controlled at the level of *intestinal absorption*[4].

1.2.3 Storage:

The ferritin and hemosiderin concentrations indicate the body's iron reserves. They are found mainly in the liver, spleen, and bone marrow and store iron in an insoluble state. The bulk of iron is linked to ferritin, a widely distributed and highly conserved iron-binding protein. Hemosiderin is an iron storage complex that releases iron more slowly than it is needed by the body. Serum ferritin values correspond strongly with total body iron reserves under steady-state circumstances. As a result, serum ferritin is the most practical laboratory test for determining iron reserves[5].

1.2.4 Excretion:

Apart from iron losses caused by menstruation, other bleeding, or pregnancy, iron is strongly preserved in the body and is not easily lost. The physiologic exfoliation of cells from epithelial surfaces, such as the skin, genitourinary tract, and gastrointestinal tract, leads in some obligatory iron loss from the body. These losses, however, are expected to be minor. Excessive menstrual blood loss is the most frequent cause of iron insufficiency in women, and it may result in significant iron losses.

1.3 Bioavailability:

Heme and nonheme are two types of dietary iron. Heme iron is derived from hemoglobin and myoglobin found in meat, poultry, and fish, while nonheme iron is found in grains, pulses, legumes, fruits, and vegetables. Nonheme iron absorption is considerably lower (2 percent -20 percent) and greatly affected by the presence of other food components. Heme iron is highly bioavailable (15 percent -35 percent) and dietary variables have minimal effect on its absorption.

Nonheme iron, on the other hand, is several times more abundant in the diet than heme iron in most meals. Nonheme iron, despite its reduced bioavailability, contributes more to iron nutrition than heme iron. Phytic acid, polyphenols, calcium, and peptides from partly digested proteins are all major inhibitors of iron absorption. Ascorbic acid and muscle tissue are enhancers because they can convert ferric iron to ferrous iron and bind it in soluble complexes that can be absorbed[6].

1.3.1 Factors Enhancing Iron Absorption:

Iron absorption is influenced by a variety of dietary variables. Iron absorption is aided by ascorbate and citrate, which serve as mild chelators to assist solubilize the metal in the duodenum. These chemicals easily transport iron into the mucosal lining cells. Researchers have discovered that native or added ascorbic acid enhances iron absorption in a dose-dependent manner. Its capacity to decrease ferric to ferrous iron, as well as its ability to chelate iron, contributes to the boosting impact. All inhibitors, including phytate, polyphenols, calcium and proteins in milk products, have a negative impact on iron absorption, and ascorbic acid will enhance the absorption of both native and fortification iron. The boosting impact of ascorbic acid in fruits and vegetables is often counterbalanced by the inhibitory effect of polyphenols. In vegetarian diets, ascorbic acid is the only absorption booster, therefore iron absorption from vegetarian and vegan meals is best maximized by include ascorbic acid-rich vegetables. Cooking, industrial processing, and storage destroy ascorbic acid, removing its iron absorption-enhancing action[7].

1.3.2 Factors Inhibiting Iron Absorption:

Phytate (myo-inositol hexakisphosphate) is the primary barrier of iron absorption in plant-based diets. Phytate's detrimental impact on iron absorption has been found to be dose dependent, beginning at extremely low doses of 2-10 mg/meal. The impact on absorption may be estimated using the molar ratio of phytate to iron. To substantially increase iron absorption in simple cereal or legume-based meals that do not include any enhancers of iron absorption, the ratio should be 1:1 or preferable 0.4:1, or 6:1 in composite meals with specific vegetables that contain ascorbic acid and meat as enhancers. Polyphenols may be found in a variety of plant foods and drinks, including vegetables, fruit, certain grains and legumes, tea, coffee, and wine, in varying quantities. Polyphenols have been found to have an inhibitory impact on iron absorption in black tea and to a lesser degree in herbal teas. Polyphenols enhance the inhibitory impact of phytate in grains and legumes, as shown in a research comparing high and low polyphenol sorghum[8].

1.3.3 Competition With Iron:

Several additional heavy metals may share the iron intestine absorption route, according to competition studies. Lead, manganese, cobalt, and zinc are among them. Because iron deficiency often occurs with lead poisoning, this combination may result in especially severe medical problems in children. When it comes to iron metabolism, lead is especially harmful. Lead is taken up by the iron absorption machinery (DTM1), which then competes with iron to block it. Lead also disrupts a variety of key iron-dependent metabolic processes, including as heme production. This complex impact is most harmful in children, where lead not only causes anemia but also has the potential to impede cognitive development. In certain areas, large amounts of

lead may be found naturally in ground water and soil, posing a hidden threat to children's health. As a result, most paediatricians in the United States regularly screen children for lead at a young age using a simple blood test[9].

1.4 Human Requirements:

Early infancy's iron needs are supplied by the little amount of iron found in human milk. The requirement for iron increases dramatically 4-6 months after birth, peaking at about 0.7-0.9 mg/day for the rest of the first year. Between the ages of 1 and 6, the body's iron content doubles again. Adolescents' iron needs are also very high, especially during growth spurts. Before menarche, most girls have a growth surge, although growth is not complete at that time. During puberty, the bulk and concentration of haemoglobin in males increases dramatically. During this period, iron needs rise to a level that is higher than the norm for menstrual women. Iron is stored in the body of the typical adult in the range of 1-3 g. This equilibrium is maintained by a delicate balance of food intake and loss. Sloughing of cells from skin and mucosal surfaces, including the gastrointestinal tract lining, loses around 1 mg of iron each day. In premenopausal female adults, menstruation raises average daily iron loss to approximately 2 mg per day. The increase in body mass that occurs during new-born and juvenile growth spurts temporarily increases iron needs[10].

1.5 Groups At High Risk:

Those sections of a population with insufficient access to foods rich in absorbable iron during periods of high iron demand have the greatest risk of iron insufficiency. Children, adolescents, and women of reproductive age, particularly during pregnancy, fall into these categories. The increased iron requirement in babies and adolescents is the consequence of fast development. The main cause for this is increased blood loss during menstruation in women of reproductive age. Due to the fast development of the placenta and baby, as well as the expansion of the globular mass, the iron need increases significantly during pregnancy. Adult men and postmenopausal women, on the other hand, are at minimal risk of iron insufficiency, and the quantity of iron in a typical diet is typically enough to meet their physiological needs.

1.6 Consequences And Causes Of Iron Deficiency:

1.6.1 Consequences of iron deficiency:

A situation in which there are no mobilizable iron reserves and indications of a compromised delivery of iron to tissues, including the erythron, is described as iron deficiency. Iron deficiency may occur in the presence or absence of anaemia. Although certain functional alterations may occur in the absence of anaemia, the majority of functional impairments seem to occur when anaemia develops. Iron deficiency anaemia, even mild and moderate types, may cause functional deficits that impact cognitive development, immune systems, and job ability. Iron deficiency during pregnancy is linked to a number of negative consequences for both the mother and the baby, including an increased risk of sepsis, maternal and perinatal death, and low birth weight. Anaemia and iron shortage impair learning capacity and are linked to higher rates of morbidity.

1.6.2 Causes Of Iron Deficiency:

Iron deficiency occurs when iron absorption cannot keep up with the metabolic needs for iron to maintain development and to replace iron loss, which is mainly linked to blood loss, over a

prolonged period of time. Low intake of bioavailable iron, increased iron requirements as a result of rapid growth, pregnancy, menstruation, and excessive blood loss caused by pathologic infections such as hook worm and whipworm, which cause gastrointestinal blood loss and impaired iron absorption, are the main causes of iron deficiency. Because monthly iron losses are combined with the demands of fast development, female teenagers are more likely to be iron deficient. High parity, the use of an intrauterine device, and vegetarian diets are all risk factors for iron insufficiency in young women.

1.7 Anemia And Its Causes:

Anemia describes the condition in which the number of RBCs in the blood is low, or the blood cells have less than the normal amount of hemoglobin. A person who has anemia is called anemic. The purpose of the RBC is to deliver oxygen from the lungs to other parts of the body. The hemoglobin molecule is the functional unit of the RBCs and is a complex protein structure that is inside the RBCs. Even though the RBCs are made within the bone marrow, many other factors are involved in their production. For example, iron is a very important component of the hemoglobin molecule; erythropoietin, a molecule secreted by the kidneys, promotes the formation of RBCs in the bone marrow.

2. DISCUSSION

Iron, by far the most common transition metal in the body, is required for oxygen consumption and is found in a variety of oxidases and oxygenases. The bioavailability of iron is a significant barrier to its absorption by living cells. In aqueous solutions, soluble Fe(II) is easily oxidized to ferric hydroxide, which is practically insoluble (at neutral pH). The body content of 3–4 g is reasonably well balanced among functional compounds, storage complexes, transport chelates, ingestion and excretion in normal individuals who eat a diet devoid of iron supplementation.

The liver (approximately a third), spleen, and bone marrow are the main storage sites for iron. Human dietary habits were formerly thought to produce a high incidence of iron insufficiency and a low rate of iron excess. Iron deficiency, on the other hand, is caused more by excessive bleeding than by dietary causes. Iron overload, on the other hand, is becoming more well recognized, particularly in areas where a combination of cultural and iatrogenic behaviours promote inorganic iron over absorption. Excessive intake of iron through intestinal absorption, parenteral iron, inhalation iron, transfer of iron from bodily compartments into plasma, and decrease of normal monthly iron excretion in premenopausal women are the primary causes of iron overload.

3. CONCLUSION

The quantity of iron in the cell is carefully controlled to ensure that an appropriate level of the micronutrient is provided while avoiding harmful build-up. Oxidative stress, defined as an increase in the steady-state concentration of oxygen radical intermediates, is thought to be caused by an excess of iron. The major features of iron metabolism in cells are briefly discussed here, with a focus on the function of iron in oxidative damage to lipid membranes. In vitro and in vivo models are being investigated. Finally, there is a discussion of iron excess and its effects on human health. Overall, more research is needed to determine more effective ways to limit iron-dependent damage by reducing the formation and release of free radicals in tissues when the

cellular iron steady state concentration is increased, either as a result of disease or as a result of therapeutic iron supplementation.

REFERENCES:

1. Abbaspour N, Hurrell R, Kelishadi R. Review on iron and its importance for human health. *Journal of Research in Medical Sciences*. 2014; 19 (2): 164-174.
2. Puntarulo S. Iron, oxidative stress and human health. *Molecular Aspects of Medicine*. 2005; 26(4-5):299-312. doi: 10.1016/j.mam.2005.07.001.
3. Bogdan AR, Miyazawa M, Hashimoto K, Tsuji Y. Regulators of Iron Homeostasis: New Players in Metabolism, Cell Death, and Disease. *Trends in Biochemical Sciences*. 2016 Mar; 41(3):274-286. doi: 10.1016/j.tibs.2015.11.012.
4. Lane DJR et al. Cellular iron uptake, trafficking and metabolism: Key molecules and mechanisms and their roles in disease. *Biochimica et Biophysica Acta - Molecular Cell Research*. 2015; 1853:1130-44. doi: 10.1016/j.bbamcr.2015.01.021.
5. Shukla AK, Tiwari PK, Abhijit P, and Chandra P. Zinc and iron in soil, plant, animal and human health. *Indian J. Fertil.*, 2016; 12 (11):133-149.
6. Guziałowska-Tic J and Tic WJ. Analysis of the adverse impact of an iron-based combustion modifier for liquid fuels on human health. *J. Clean. Prod.*, 2018, doi: 10.1016/j.jclepro.2017.11.079.
7. Yilmaz B and Li H. Gut microbiota and iron: The crucial actors in health and disease. *Pharmaceuticals*. 2018 Oct 5; 11(4):98. doi: 10.3390/ph11040098.
8. Nouri M, El Rasafi T, and Haddioui A. Levels of Metals in Soils of Ait Ammar Iron Mine, Morocco: Human Health Risks. *Acta Chem. Iasi*, 2017; 25(2): 127–144. doi: 10.1515/achi-2017-0012.
9. Mino Y. Bioinorganic chemistry of iron. *Yakugaku Zasshi*. 2018; 138 (3): 373-387. doi: 10.1248/yakushi.17-00154.
10. Agrawal S, Berggren KL, Marks E, Fox JH. Impact of high iron intake on cognition and neurodegeneration in humans and in animal models: a systematic review. *Nutrition reviews*. 2017 Jun 1; 75(6):456-470. doi: 10.1093/nutrit/nux015.

THE RESULTS OF THE PRELIMINARY RESEARCH OF NEW MONUMENTS DETECTED IN KHANABAD

Abdullaev Bakhtiyor Manopovich*; Kambarov Nasibillo Shukirilloevich**

*Senior Researcher,
Candidate of Historical Sciences.
Institute of Archeology of the Academy of Sciences of the Republic of UZBEKISTAN
Email id: a.bakhtiyor@mail.ru

**Lecturer,
Doctoral Student,
Northwestern University,
Department of World History, Fergana State University,
Email id: drnasibillonwu2007@gmail.com

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ABSTRACT

In the foothills of Khanabad, burial grounds and settlements of the Early Iron and Antique periods have been recorded. A comparative analysis of materials from them allows us to explain the inclusion of elements of ornamentation of the Chust and Sho‘raboshot cultures in the Eilatan hand-painted ceramics. In 2020, field research was conducted to determine the presence of archeological monuments on the slopes¹ of Khanabad in Andijan region. Khanabad is a location on the border of Kyrgyzstan where the Karadarya, a tributary of the Syrdarya, flows. It is known that in the middle of the last century the primary irrigation facilities of antiquity - Shahrihansay and Andijansay - were taken out of this river. This shows that the Khanabad foothills were heavily inhabited in ancient times and served as a crossroads between nomadic and sedentary Fergana cultures. All of the above necessitated a community-based initial archaeological study of the area.

KEYWORDS: *Chust, Eilatan and Sho‘Raboshot Cultures, Burial Ground, Settlement, Hand Painted Ceramics.*

INTRODUCTION

In 2020, field research was conducted to determine the presence of archeological monuments on the slopes [1] of Khanabad in Andijan region. Khanabad is a location on the border of Kyrgyzstan where the Karadarya, a tributary of the Syrdarya, flows. It is known that in the middle of the last century the primary irrigation facilities of antiquity - Shahrihansay and Andijansay - were taken out of this river. This shows that the Khanabad foothills were heavily inhabited in ancient times and served as a crossroads between nomadic and sedentary Fergana cultures. All of the above necessitated a community-based initial archaeological study of the area. Direct contact with the local population on these slopes revealed the location of the ancient hills destroyed in the 90s of the XX century - Khanabad-2 (40.816031°, 73.004146°, 720 meters

above sea level). According to them, all of the handcrafted and painted pottery was discovered when excavating the soil in the hills for the manufacture of raw bricks by the people. In our opinion, these places were the site of ancient burial mounds, and these monuments include Khanabad-1 (40.815532°, 73.009148° 755 meters above sea level) and Khanabad-3 (40.814618°, 73. 732 meters above sea level) was named.

The ancient settlement of Khanabad-2 (area 0.5-1 ha) is located at a distance of 300 m and 50 m from the cemeteries Khanabad-1 and Khanabad-3, respectively, identified on the hills (Picture 1,1). Interviews with village elders revealed that Khanabad-2 was the most common type of hill for Fergana. According to study done at Koshtepa-2 (40.732703, 72.868731) in Kurgantepa district of Andijan region, approximately 20 km to the west [1: 41-p], Khanabad-2, with a height of around 9 and 5 m, respectively, can be considered to consist of a pavilion and a craftsman's quarters.

The pottery discovered during the dismantling of graves and settlements and collected in the house museum [2] chronologically dates back to different periods of the ancient history of the Fergana Valley, containing cycles from the Early Iron Age (7th century BC) to the 11-12 centuries AD. The majority of the collection is made up of handcrafted and painted dishes that date from the second millennium BC to the seventh century AD. Pottery that made on the wheel from the first centuries BC to the 12th century AD is included in the collection. As a result, the foothills of Khanabad in ancient times possessed indications of life that had developed over a period of around two thousand years, taking into consideration periods of decline and depression. This time period is marked by the existence of several ancient Fergana cultures and dynasties in this micro-oasis, all of which went through periods of formation, development, and "passing the baton to future generations".

Description of a set of handmade dishes (Picture 1, 2):

Hemispherical bowls, typically in a "fabric template," are among the earliest handcrafted and painted dishes. Their height is 6-8 cm, and the flange diameter is 16-21 cm. The ornaments are painted in a dark red or dark brown color on a light brown or light red backdrop, just touching the bottom of the bowl. The main motif of the ornament is a branch of horizontal rhombuses (usually 3 or 4) with a sloping inside, usually located in the middle of the body of the bowl. This ornament is a schematic portrayal of a fertility symbol with historical origins in the Middle East [4: 20-22-p, 13: 47-52-p, 12: 107-p], as well as the most widely used pattern in the ornamentation of plates in Chust [14: 131-b], and Shuraboshot [14:42-p, 15:42-p] civilizations. However, a scholar argues that from the Paleolithic period, the image of a "rhombus" has been a symbol of the feminine goddess of fertility in nature [3].

This symbolic meaning, however, was not schematically one of the most extensively employed ornamentation in the Chust culture's earliest handcrafted plates from the Late Bronze Age. The traditional decorative motifs of Chust pottery have been kept and certain adjustments and modifications have been made over the lengthy evolution of Shuraboshot culture, according to a comparative examination of the pottery of Fergana's ancient agricultural civilizations. Indeed, one scholar decided that Shuraboshot was the Chust culture's heir and successor [4]. This decorating tradition was enhanced by a variety of technological advancements and breakthroughs, and it lasted until the end of antiquity. In the last centuries BC and the first

centuries AD, this ornament was used on red engobe embroidered vessels using the technique of scratching [5].

Another integral feature of decorating handmade and painted dishes from the collection is the pattern on their flanges, which is completely and partially given on the outside of the container. Three different patterns are identified on the edges of the vessels of this complex:

The first is in the form of a series of upward-pointing triangular branches, typical of the pottery of Eilat culture [6, 7, 8]. However, this pattern is also found in the vessels of the Chust culture, as the triangle was a symbol of the globe [6].

The second type of ornament is represented by a branch of "crowns" about 2 cm wide, with a pattern in the form of three semicircular lines at the top of the crowns.

The patterns of the third type are given by means of two parallel lines joined by vertical lines.

One of the distinctive patterns is in the form of eight stars, which are recorded in the form of twigs in the pottery of Shuraboshot culture and are usually used as an ornamental border between the body of the vessel.

A distinctive feature of Khanabad's handmade and painted vessels is the intermingling of elements of Chust, Eilat, and Shuraboshot cultures. This shows that there was some relationship between the Chust-Eilat [8:43-p, 11:14-p] and the Eilat-Shuraboshot cultures [5: 16-18-p, 11:19-p, 3:10-p]. The cultural connections of the last two of the above mentioned have led to their synthesis. Considering that the archeological confirmation of this relationship was found in our research on the monument Koshtepa-2, it requires to study in parallel the ancient sites and tombs found on the slopes of Khanabad. However, similar results have been reported in previous researchers [7].



Picture 1: 1 - Location of monuments in the western foothills of Khanabad; 2 - Collection of pottery in the House Museum

The next stage of our group's activity was to reconsider the hills where ancient pottery was found near the Kashkayol address. The western part of the hill has been destroyed as the result of excavations by local people over the past 10 years. During the examination of the western "handmade cut" of the hill, 20-25 m above the modern level, it was discovered that a branch of medium-sized stones which set horizontally under 0.5-2 m thick soil at the top. These horizontal rows of rocks lasted virtually the whole height of the structure, with a little reduction to the south. This shows that the hill was formerly utilized as a cemetery, and the following discovery corroborated this theory. Nasibillo Qambarov's efforts resulted in the discovery of a hemispherical handcrafted bowl without a pattern in the centre of the "handmade cut" formed on the hill (Picture. 2, 1). The vessel's preliminary field analysis revealed the necessity for further excavations in this location.

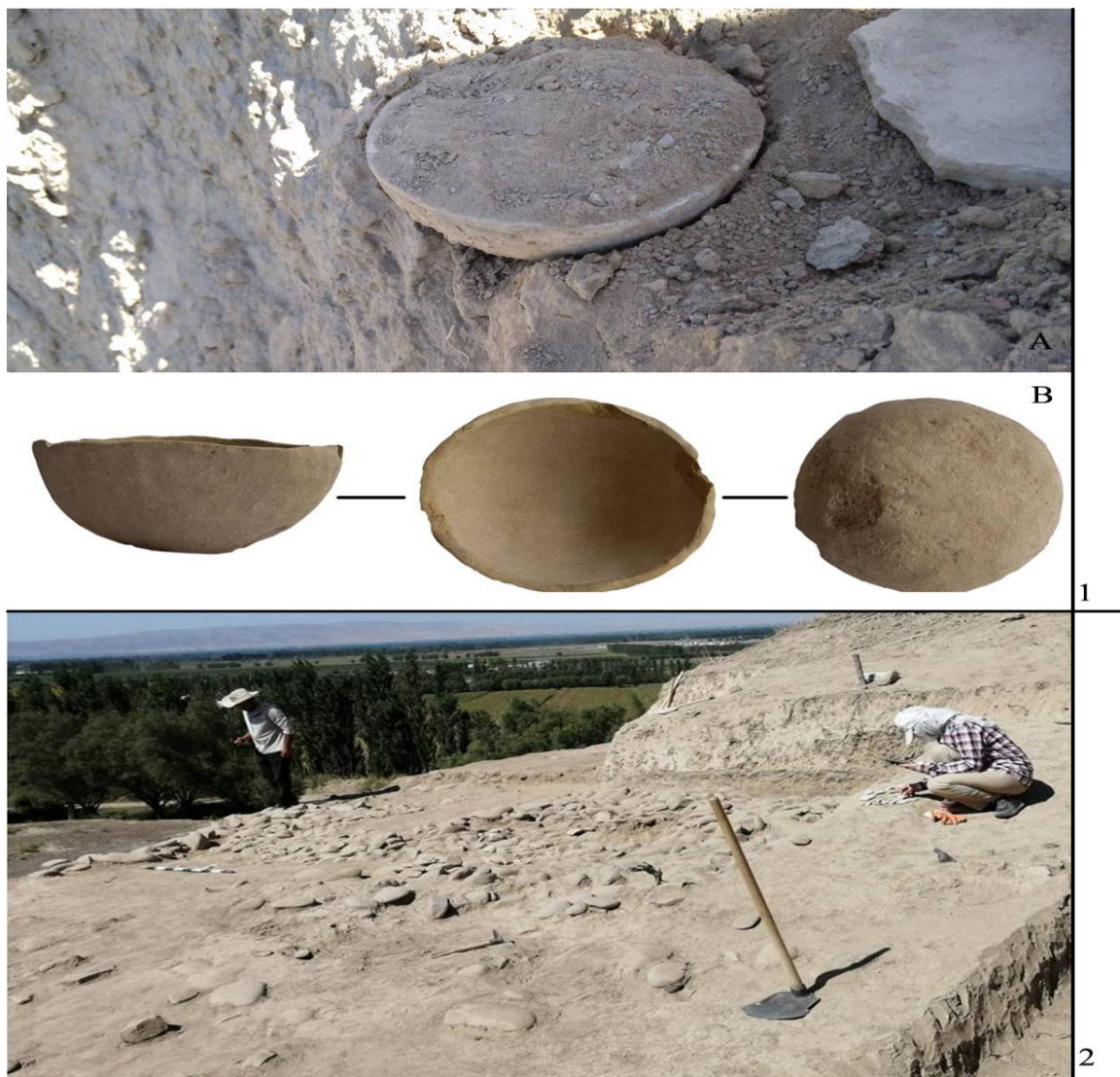
In a heavily populated region like Andijan, the everyday loss of ancient monuments and the rising issues of national heritage protection in a national scale are undoubtedly a typical occurrence. Therefore, it is critical to do field study on a monument that has been designated.

Initially, it was decided to number the monuments on the slopes in accordance with the name of the city of Khanabad. The ancient cemetery near Qashqayol was called Khanabad-1, and the settlement at 300 m west of it was named Khanabad-2. The rocky surface of the ancient cemetery of Khanabad-1 was covered with a 0.5-2 m thick pile of soil during the excavation of a canal on the east side of the monument in the 80s of the last century. Therefore, the part of the

hill surface with the lowest soil cover was selected for field research, and excavation was carried out in an area of 10x10 m. After the excavation was deepened to a depth of 0.5-1.2 m, a pile of stones of medium size, 5-10 cm to 25-30 cm in diameter, was discovered (Picture. 2, 2).

During the cleaning of the tombstone's surface, remnants of handmade ceramics with geometric and floral patterns were discovered among them (Picture 3, 1). The majority of ancient cemeteries are covered with stone heaps, but due to anthropogenic and natural forces, they have expanded and converted into rock deposits.

After photographing and sketching the monument's stone cover, the excavation area was removed of stones, and it was discovered that there was a layer of soil 15-20 cm beneath it.



Picture 2: 1 - Unpainted hemispherical handmade bowl; 2 - The opening photo of the upper stone deposit.



Picture 3: 1 - Pictures of pieces of the handmade and painted pottery taken during the cleaning of the first row of stone deposits; 2 - Pictures of pieces of the handmade and painted pottery taken during the cleaning of the second row of stone deposits; 3 - Photo of stone sickles.

The excavation area was decreased to 10x3 m for some reason. A second layer of rock deposits was discovered beneath the soil layer. Fragments of handmade and painted ceramics were discovered among the stones when they were being cleaned (Picture 3, 2). Also, fragments of two stone sickles, 9-12 cm long, 4-4.5 cm wide, and 0.2-0.8 cm thick, were taken (Picture 3, 3). It is known that the stone sickles of the Fergana Valley were typical of such agricultural

civilizations Chust and Shuraboshot. The Khanabad stone sickles are the same size as those discovered in Chust culture sites, measuring 15x4.2x0.8 cm on average [8].

In the north-eastern part of the excavation, at the edge of the cliff, a device consisting of 7 large stones measuring 50-70x20-30x15-30 cm was found, but its functional purpose is still unknown, there might be other parts of the device in the southern part of the monument destroyed by local people. We hope that in the future, during the study of the surviving parts of the cemetery, a structure similar to this one will be found.

Between the second rows of the rock deposit, in the eastern part of the excavation, medium-sized stones were put in the semicircle shape (Picture. 4, 1). The western edge of the semicircle is cut off from the edge of the cliff, and the eastern side enters the western edge. Of course, this is the southern part of the stone ring that lies around the tomb. Comparative analysis shows that such rings were found in the cemeteries of Eilat culture [7: 173-p, 10: 73-p] and that they were part of a specific burial tradition.

At the eastern edge of the stone ring, a handmade and painted ceramic bowl (Picture. 4, 2) 8 cm high and 21 cm in diameter was found under the soil layer. Excavation research revealed that the surface on which the pottery was found was the surface of the M-1 tomb. The pottery is decorated with geometric and floral patterns.

It is known that during the burials of Eilat culture, sometimes the pottery put on the grave was placed on the right shoulder of the body [10: 74-p]. Also, on the west side of the site where the pottery was observed, a pile of stones bulged and only 40 cm part of the side of the body's head was cleaned, because its eastern part was buried in a 1.4 m thick excavation (Picture. 4, 3).



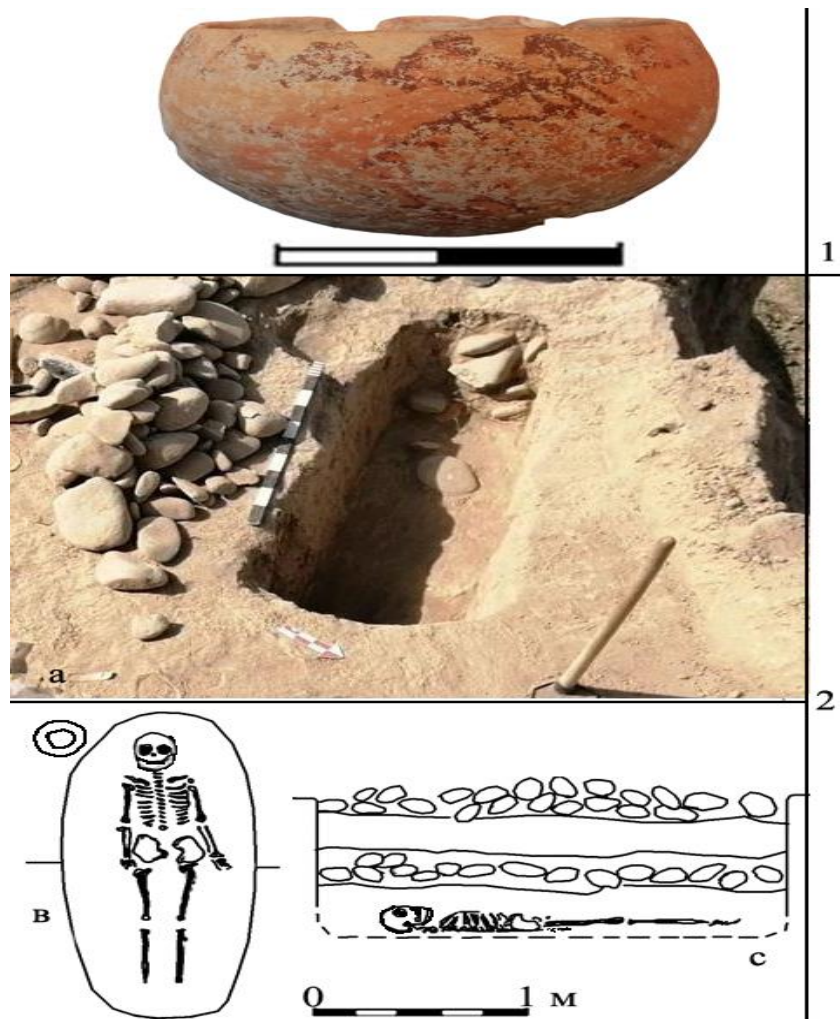
Picture4: 1 - Stone ring photo; 2 - A photograph of a handmade and painted ceramic bowl at the edge of the first tomb; Opening of tombs 3-1.

Nevertheless, the identified part of the tomb made it possible to draw conclusions from the initial approach: the direction of the buried body was from northwest to southeast, that is, with its head facing northwest; the length of the excavated part is 0.8 m, the width is 0.8 m, and the depth of the tomb in its original position is 1-1.10 m when viewed in the lines preserved in the section; the front part of the skull was laid face up. The peculiarity of the tomb is that it was filled with layers of deep soil and stone. The tomb was dug in the form of a simple pit, after which the corpse was put, it was covered with 10-15 cm thick soil, filled with stones 35-40 cm thick, 60 cm

thick with soil, and above the stones 15-20 cm thick with stones. Many pottery fragments were found among the stones on the tomb. It looks as if a stone has been thrown at the vessel. This was also observed on the surface of the stones thrown at the bottom of the tomb, but broken fragments of the burnt cauldron were found here.

During the subsequent cleaning inside the stone ring, a second hemisphere-shaped handmade pottery was placed at a distance of 1.20 m from the head of the M-1 body, in the northwestern part of the ring, and 2 m northwest of the first pottery vessel (Picture 5, 1) presence was observed. According to the analysis, M-1 and M-2 tombs had a tradition of placing a vessel on the right side of the shoulder of the corpse on the upper surface of the pit.

The next stage of the study was to clean the protruding stones on the left side of the bowl, and it was observed that there were pieces of pottery under the stone pile. It turned out that the stone pile belonged to the second M-2 tomb. This pit is also filled with layers of soil and stone. The M-2 is oriented from east to west (Picture 5, 2-3), with the head facing west and the face facing up.



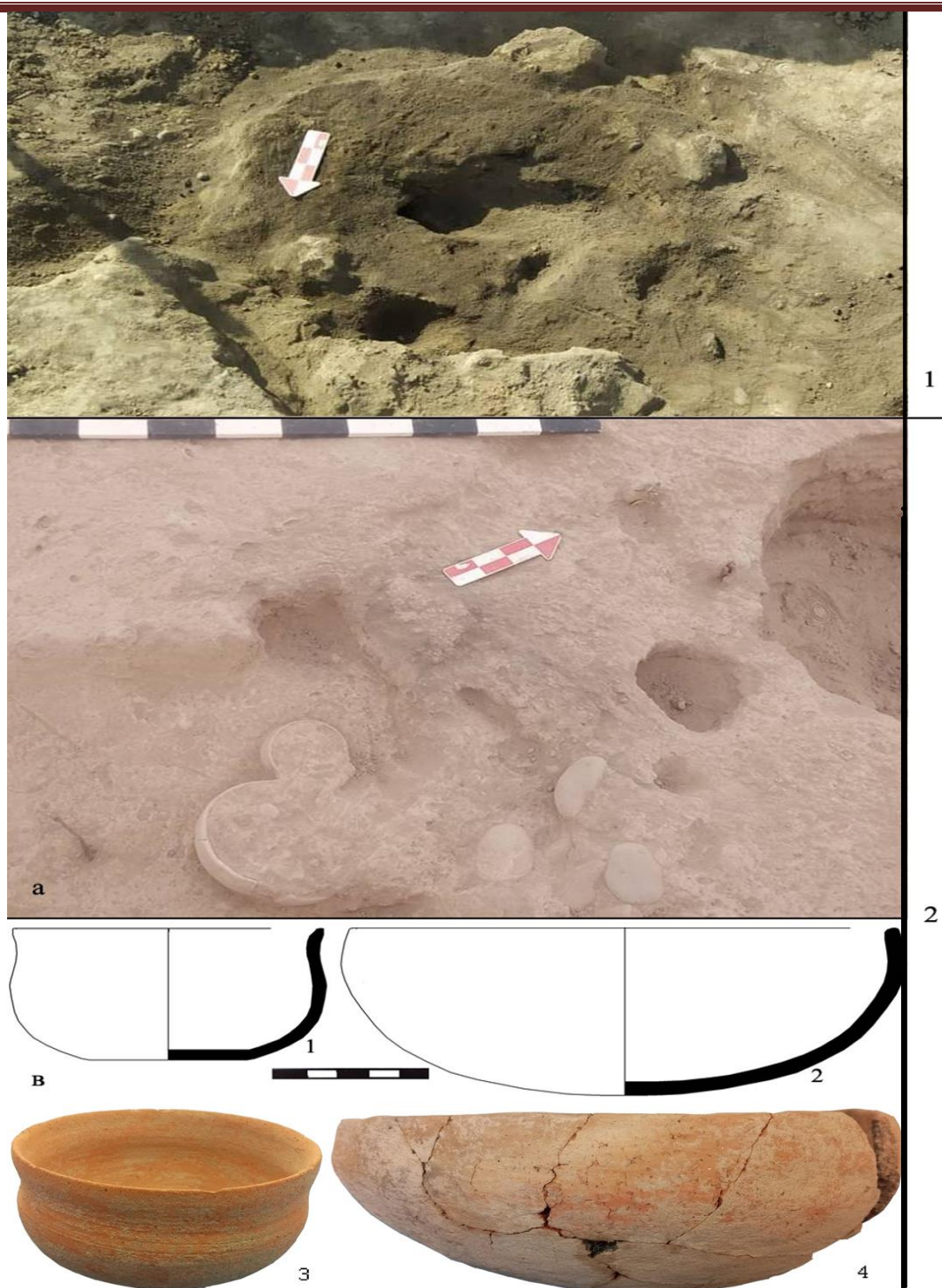
Picture 5: 1 - A photo of a handmade and painted ceramic bowl at the edge of the second tomb; 2 - A photo of opening the second tomb (a) and plan (b), and sketch (c) of the cut.

Due to the westward slope of the hill, the M-2 tomb was located lower than the M-1. Although for some reason the M-2 tomb's excavation was not completed, it was possible to obtain preliminary information about its construction. The dimensions of the tomb are as follows: length 1.9 m, width 0.8-0.85-0.7 m, and depth 0.8 m. The eastern wall of the tomb was excavated 10-15 cm inwards in the form of an arch from top to bottom.

Traces of a temporary kiln with a diameter of 50x60 cm were found among the stones in the center of the excavation (Picture 6, 1), and in the western part of the excavation, there were two pits with a diameter of 9-10 cm on both sides. When the kiln was cleaned, it was discovered that it had been placed on top of the grave's inventories - a handmade hemispherical bowl with a slightly curved flange and a single-wheeled bowl with a vertical flange (Picture 6, 2). The dishes were intact, but the handmade bowl was cracked due to the direct impact of the fire in the oven and the pressure of the stone on the surface.

Traces of a third tomb began to appear to the right of the place where the vessels were found. However, the lack of funding for field research and the suspension of student volunteering due to the pandemic in the region, as well as the cold weather, prevented field research from continuing for this season.

Thus, the first field research in 2020 revealed four new monuments - two ancient tombs on the hills of the foothills of Khanabad and two ancient settlements at the foot of the hill. From the first half of the first millennium to the 12th century AD, life evolved for almost two thousand years. When the area where the tombs and monuments are located was studied by comparative analysis with the surface finds, it was observed that they belong to the same cultural tradition. The peculiarity of the study is that while the constructive structure of the studied tombs belongs to the Eilat culture, the ceramics inventory found in them is largely specific to the Shoraboshot culture. This is also an indication of the intermingling of these cultures, but the full scientific basis for this will be expanded in the new season's research.



Picture 6: 1 - Seasonal oven; 2 - A photo (a) of the opening of the vessels at the edge of the third tomb, and drawing - bowls on wheels (1) and handmade (2).

Subsequent research will shed more light on this issue, and it is expected that data from later periods (early Middle Ages) will be collected in this area when ancient artifacts are found in other parts of the hill. Based on the results of the current study, the following tasks are set for the

next season: a parallel study of the ancient sites and cemeteries on the slopes of Khanabad, followed by a comparative comparison of materials from the Early Iron Age and Antique Period; identification of surviving architectural structures of the settlement; Study of ancient burials in Khanabad; Based on the study of the patterns on handmade pottery from the ancient settlements and cemeteries in the foothills of Khanabad, presenting the reasons for the introduction of color elements in the pottery of the Chust and Shorabashat cultures into the patterns of pottery of the Eilat culture.

REFERENCES:

1. Fettich N. Uber den Sinn der prahistorischen ornamente. Acta Archaeologica Academiae Scientiarum Hungaricae. Budapest, 1958. pp.115-126.
2. Isamiddinov M. The history of emergence of Sughd Cities. EPRA International Journal of Research and Development. 2020;5(10):125–128.
3. Mirsoatova ST. New data on the late paleolithic of the Fergana valley. Евразийский союз ученых. 2020;10 (79/4):25–29.
4. Farmanova GK. The role of the geographic environment and climatic conditions in the formation of economic-cultural type of population when during ancient and antic period. ACADEMICIA: An International Multidisciplinary Research Journal. November 2020;10(11):1612–1622.
5. Rakhmatillayev H. Ethnodynamics of the city population of the Fergana valley of the first half of the XX century. EPRA International Journal of Research and Development. 2020;5(5):532–535.
6. Arslonzoda R. Memoirs as a source on the history of Uzbekistan in the second half of the 19th – early 20th centuries. EPRA International Journal of Research and Development. 2020;5(5):119–124.
7. Mahmudov O. The beginning of the European renaissance. ERPA International Journal of Research and Development. 2020;5 (7):104–108. DOI: <https://doi.org/10.36713/epra4787>
8. Yuldashev S. [Visit of chinese ambassador dung wan to Fergana](#). The history of the Fergana valley in new researches. – Fergana, 2021. P. 123 – 131. <https://doi.org/10.47100/conferences.v1i1.1240>

AN ANALYSIS OF SIDE EFFECTS OF USING PLASTICS ON HUMAN HEALTH AND ENVIRONMENT

Amit Kumar*

*Assistant Professor,
Department of Civil Engineering,
TeerthankerMahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- amit.engineering@tmu.ac.in

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ABSTRACT

Plastics have revolutionized daily life; their use is growing, and yearly output is expected to surpass 300 million tonnes by 2010. Plastics clearly provide many social advantages as well as future technical and medical advancements. However, there are a variety of concerns about usage and disposal, including waste accumulation in landfills and natural habitats, physical problems for wildlife caused by ingestion or entanglement in plastic, chemical leaching from plastic products, and the potential for plastics to transfer chemicals to wildlife and humans. However, the most significant overarching issue, which runs through this book, is that our present consumption is unsustainable. Around 4% of global oil output is utilized as a feedstock for the manufacture of plastics, with a comparable amount of energy used in the process. Despite this, more than a third of current output is spent to create packaging, which is subsequently quickly discarded. This linear use of hydrocarbons through packaging and other short-lived uses of plastic is simply not sustainable, given our diminishing fossil fuel sources and limited capacity for waste disposal to landfill. Material reduction, design for end-of-life recyclability, improved recycling capacity, development of bio-based feedstocks, litter-reduction methods, application of green chemistry life-cycle assessments, and updated risk assessment methodologies are some of the answers. Such efforts will be most successful if the public, industry, scientists, and politicians all work together.

KEYWORDS:Environment, Health, Material, Plastic, Waste.

1. INTRODUCTION

Plastics' durability and potential for a broad range of uses, including widespread usage as disposable goods, were expected, but issues with waste management and plastic debris were not. This article summarizes existing knowledge on the advantages and risks associated with the usage of plastics, as well as future challenges, opportunities, and priorities. The material is based on articles submitted to the Plastics, the Environment, and Human Health Theme Issue, as well as other sources. While we provide a few citations to original sources of information, we mainly direct readers to the Theme Issue articles' treatment of a specific subject and the references that go with it. Plastics as materials, accumulation of plastic waste in the natural environment, effects

of plastic debris in the environment and on wildlife, effects on humans; production, usage, disposal, and waste management solutions, biopolymers, degradable and biodegradable polymer solutions, and policy measures are all addressed in this article[1].

1.1 Plastics As Materials:

Plastics are low-cost, lightweight, robust, durable, corrosion-resistant, and thermally and electrically insulating materials. Polymers' flexibility and diversity of characteristics are utilized to create a wide range of goods that provide medical and technical advancements, energy savings, and a variety of other social advantages. As a result, plastics output has skyrocketed in the past 60 years, from approximately 0.5 million tonnes in 1950 to over 260 million tonnes now. The plastics sector in Europe alone generates more than 300 million euros in revenue and employs 1.6 million people. Plastics are used in almost every area of everyday life, including transportation, telecommunications, clothes, footwear, and as packaging materials for the transportation of a broad variety of food, drink, and other products[2]. Plastics have a lot of promise for new uses that will help people in the future, such as innovative medicinal applications, renewable energy production, and decreasing energy consumption in transportation. Plastic polymers are seldom utilized in their pure form; instead, they are combined with different additives to enhance performance. Inorganic fillers such as carbon and silica strengthen the material, while plasticizers make it flexible. Other additions include thermal and UV stabilizers, flame retardants, and colorants. Many of these additives are used in large amounts in a variety of goods. Some addition compounds are potentially hazardous, however the degree to which additives emitted from plastic goods have negative consequences in animal or human populations is a matter of debate. The main point to consider is the relationship between the kinds and amounts of chemicals contained in plastics and their absorption and accumulation by live beings. Phthalate plasticizers, BPA, brominated flame retardants, and antimicrobial compounds are among the most dangerous additives. Many mass-produced goods, including as medical equipment, food packaging, fragrances, cosmetics, toys, flooring materials, computers, and CDs, include BPA and phthalates, which may account for a substantial portion of the plastic content[3].

1.2 Accumulation of Plastic Waste in the Natural Environment:

Plastic has collected in large amounts in the natural environment and landfills. Discarded plastic also pollutes a variety of natural terrestrial, freshwater, and marine ecosystems, with media reports of plastic waste even on some of the world's highest peaks. There are some statistics on littering in cities, but there is a significant dearth of data on the buildup of plastic waste in natural terrestrial and freshwater environments when compared to the maritime environment. There have been reports of small plastic fragments inadvertently contaminating soils as a result of spreading sewage sludge, of plastic and glass fragments contaminating compost made from municipal solid waste, and of plastic being carried into streams, rivers, and eventually the sea by rain water and flood events. More study on the amounts and impacts of plastic waste in natural terrestrial ecosystems, agricultural land, and freshwaters is clearly needed. As a result, most of the data provided here is inevitably from the maritime environment. The extent of the problem quickly became unmistakable, with plastic debris contaminating oceans from the poles to the Equator, and from shorelines to the deep sea, from the first reports of plastic in the environment, which were reported from the carcasses of seabirds collected from shorelines in the early 1960s. Because most polymers float in water, and because plastic waste like cartons and bottles often

trap air, large amounts of plastic debris collect on the sea surface and may wash ashore. As a result, plastics account for a significant part of beach litter (50–80 percent)[4].

1.3 Effects Of Plastic Debris In The Environment And On Wildlife:

There have been occasional reports of trash from terrestrial environments causing problems, such as the endangered California condor, *Gymnogyps californianus*, ingesting it. However, the overwhelming bulk of research on the environmental effects of plastic waste has been conducted in marine environments, and additional research on terrestrial and freshwater ecosystems is required. Plastic trash is not only unsightly, but it also poses a risk to marine industries such as fishing and tourism. Ghost fishing occurs when fishing nets are discarded, which may result in commercial fisheries losses. Floating plastic trash may quickly be colonized by marine creatures, and since it can float at the surface for long periods of time, it may promote the transfer of non-native or "alien" species. However, the issues that get the greatest public and media attention are those that result in animal ingestion and entanglement. Over 260 species have been documented to swallow or get entangled in plastic waste, including invertebrates, turtles, fish, seabirds, and mammals, resulting in restricted mobility and eating, decreased reproductive output, lacerations, ulcers, and death. Our little monitoring data suggests that entanglement rates have risen over time. Plastics are reported to be consumed by a variety of species with various feeding patterns, including as filter feeders, deposit feeders, and detritivores. Ingestion, on the other hand, is likely to be an issue for animals that choose plastic objects expressly because they mistake them for food. As a result, the rate of ingestion in certain groups may be very high. Plastic has been found in the intestines of 95% of fulmars washed ashore dead in the North Sea, and significant amounts of plastic have been found in the stomachs of other species, including albatross and prions. The amount of trash swallowed by seabirds has been documented from the corpses of dead birds, and there is some very excellent data on the quantity of garbage ingested by seabirds. On regional scales throughout Europe, this method has been used to track temporal and geographical trends in the quantity of sea-surface plastic trash[5].

1.4 Effects On Humans: Epidemiological And Experimental Evidence:

When it comes to the negative impacts of plastic on humans, there is a growing corpus of research on the possible health concerns. A number of compounds used in the production of plastics have been shown to be hazardous. Biomonitoring (e.g., detecting ambient pollutant concentrations in human tissue) gives a comprehensive picture of an organism's exposure to toxins from many sources. This method has shown that chemicals used in the production of plastics are prevalent in the human population, and research using laboratory animals as model organisms have revealed that these compounds may have harmful health consequences. The body loads of chemicals used in plastic manufacturing have also been linked to negative consequences in humans, such as reproductive problems. Biomonitoring data interpretation is difficult, and one of the most important tasks is to put the data into context by comparing it to dosage levels that have been shown to be lethal in laboratory animals. Because the disruption of endocrine regulatory systems necessitates approaches very different from the study of acute toxicants or poisons, the concept of toxicity, and thus the experimental methods for studying the health impacts of chemicals in plastic and other chemicals classified as endocrine disruptors, is currently undergoing a transformation (a paradigm inversion). There is now enough evidence that conventional toxicological methods fall short of showing consequences such as 'reprogramming' of molecular systems in cells as a result of exposure to extremely low levels

during key developmental stages. Experimental animal research provides epidemiologists with information regarding the possibility of harmful effects in humans, and therefore plays an important part in chemical risk evaluations. The need to change our approach to chemical testing for risk assessment is a major conclusion from a researcher's study. As these and other writers have pointed out, endocrinology principles must be included into the assumptions that underpin chemical risk assessment. For both endogenous hormones and drugs with hormonal action, the assumptions that dose–response curves are monotonic and that there exist threshold doses (safe levels) are false[6].

1.5 Production, Usage, Disposal And Waste Management Solutions:

The accumulation of plastic waste in the environment, as well as the problems that come with it, may be avoided to a great extent. Better trash disposal and material management may result in significant immediate reductions in the amount of garbage entering natural ecosystems as compared to landfill. Littering is a behavior problem, and some argue that it has become more prevalent as a result of our increasing use of throwaway goods and packaging. Increased recycling capacity may aid in reversing this tendency, allowing us to see end-of-life materials as useful feedstocks for future production rather than trash. Better education, involvement, enforcement, and recycling capacity will be required to accomplish this. We were unable to find a contribution on education and public involvement, but it is clear that social research on littering behavior may be very useful. Encamps in the UK recently published a study that looked at attitudes against littering in 2001 and 2006. This showed that, despite increasing public knowledge of the issues of littering, the tendency to litter had risen; five important attitudes and behaviors were identified, and they provide useful information for future study. Appropriate education has been shown to affect behavior[7].

End-of-life plastics are disposed away in large numbers in landfills. Statistics on waste production differ by country and by the reason for data collecting. Plastics, for example, make up a tiny percentage of trash by weight but a high percentage by volume. As a result, temporal and geographical comparisons may be muddled, and statistics on trash recycling amounts can be biased based on waste classification. However, landfill space is running limited in many areas. It has also been argued that, due to the long life of plastics, dumping them in landfills may just be storing future issues. Plasticizers and other additional chemicals, for example, have been shown to leak from landfills and references. The degree of this changes depending on the circumstances, especially pH and organic content. However, there is evidence that landfills may be a major source of pollutants in aquatic ecosystems, such as BPA. Treatment methods that are effective are available and are being used in certain countries[8].

The three R's—reduce, reuse, and recycle—are frequently recommended from a waste management viewpoint to decrease the amount of plastic we produce, particularly plastic packaging trash. The advantages and limits of these methods demonstrate that in order to be successful, we must consider the three R's in tandem with one another, as well as a fourth R, energy recovery. Indeed, we must regard the fifth 'R,' molecular redesign, as an emerging and possibly critical approach. As a result, the three R's have been expanded to five: reduce, reuse, recycle, recover, and remodel. There are some possibilities to 'reduce' raw material use through down gauging, as well as some opportunities to 'reuse' plastics, such as in the industrial and domestic transportation of products. However, due of the significant back-haul distances and logistics required in returning empty cartons to suppliers, there is little possibility for widespread

retail package reuse. Incineration can 'recover' some of the energy content of polymers, and acceptable energy efficiency may be obtained via methods like co-fuelling of kilns. Because part of the energy content of plastics is recovered, these methods offer advantages over landfill disposal. Energy recovery, on the other hand, does not decrease the demand for raw materials used in plastic manufacturing, making it less energy efficient than product recovery through recycling. Concerns regarding incinerator emissions may also make this garbage disposal option less appealing. There is now considerable evidence that improving our capacity to properly recycle end-of-life plastic goods has tremendous promise[9].

1.6 Biopolymers, Degradable And Biodegradable Polymer Solutions:

Degradable polymers have long been promoted as a viable replacement to traditional oil-based plastics, and their production has skyrocketed in recent decades. Materials with functionality similar to traditional plastics may currently be manufactured on a large scale; nevertheless, they are more costly than traditional polymers and account for less than 1% of total plastics output. Biopolymers are distinguished from ordinary polymers by the fact that their fuel is renewable biomass rather than oil.

Natural polymers, synthetic polymers produced from biomass monomers, and synthetic polymers made from synthetic monomers obtained from biomass are all possibilities. They're often referred to as renewable polymers since the initial biomass, such as maize cultivated for agriculture, may be replicated. Although the net carbon dioxide emissions are lower than with traditional polymers, they are not zero since agricultural and pesticide manufacturing produce carbon dioxide. Furthermore, due to our fast growing human population, it seems doubtful that there will be enough area to produce food crops, much alone large amounts of packaging in which to wrap it. Recycling waste food into biopolymers is one option; although this has value, it will ultimately be limited by the quantity of waste food available.

There is a widespread belief that degradable and biodegradable polymers provide answers to the issues of plastic waste and the related environmental risks that littering causes. However, in natural environments, most of these materials are unlikely to breakdown rapidly, and there is worry that degradable, oil-based polymers may just crumble into tiny bits that are no more degradable than ordinary plastic. While biodegradable polymers may help with waste management, they have limits and there is a lot of misunderstanding regarding their use among the general population. To get the most out of degradable, biodegradable, and compostable materials, it's crucial to pinpoint particular applications that provide obvious benefits, as well as improve national and international standards and related product labelling to signal proper use and disposal[10].

2. DISCUSSION

Plastic pollution occurs when plastic goods accumulate in the environment, causing harm to animals, wildlife habitat, or people. Plastics are classified as micro, meso, or macro debris depending on their size. Plastic pollution may have a negative impact on land, rivers, and seas. Living creatures and marine animals can also be harmed by ingesting plastic trash. Plastic is one of the few modern chemical compounds that is harmful to the environment. Plastics such as polyethylene, polyvinyl chloride, and polystyrene are widely utilized. Synthetic polymers are flexible and can be moulded into complicated forms. They also have a strong chemical resistance. Fibers or thin transparent films may be made from certain of them. These

characteristics have made them popular in a wide range of durable and disposable products, as well as packaging materials. This paper discusses side effects of using Plastics on human health and Environment.

3. CONCLUSION

Plastics have a lot of potential for the future, but it's clear that our current manufacturing, usage, and disposal methods aren't sustainable and are causing problems for wildlife and human health. We know a lot about a lot of environmental dangers, and we're learning more about how they affect people's health, but there are still a lot of worries and unknowns. There are answers, but they can only be realized via a coordinated effort. Individuals can play a role through proper use and disposal, particularly recycling; industry can play a role through green chemistry, material reduction, and product design for reuse and/or end-of-life recyclability; and governments and policymakers can play a role by establishing standards and targets, defining appropriate product labeling to inform and incentivize change, and funding relevant academic research. These metrics must be evaluated as part of a lifecycle analysis framework, which should include all major phases of plastic manufacturing, including the synthesis of chemicals utilized in production, as well as their use and disposal. These actions, in our opinion, are long overdue and are now required with immediate effect; there are numerous environmental risks associated with the accumulation of plastic waste, as well as growing concerns about the effects on human health, yet plastic production continues to grow at a rate of about 9% per year.

REFERENCES:

1. Urbanek AK, Rymowicz W, and Mirończuk AM. Degradation of plastics and plastic-degrading bacteria in cold marine habitats. *Applied Microbiology and Biotechnology*. 2018 Sep;102(18):7669-7678. doi: 10.1007/s00253-018-9195-y.
2. Xanthos D and Walker TR. International policies to reduce plastic marine pollution from single-use plastics (plastic bags and microbeads): A review. *Marine Pollution Bulletin*. 2017, 118(1-2):17-26. doi: 10.1016/j.marpolbul.2017.02.048.
3. Tokiwa Y, Calabia BP, Ugwu CU, and Aiba S. Biodegradability of plastics. *International Journal of Molecular Sciences*. 2009; 10: 3722-3742. doi: 10.3390/ijms10093722.
4. Hopewell J, Dvorak R, and Kosior E. Plastics recycling: Challenges and opportunities. *Philosophical Transactions of the Royal Society B: Biological Sciences*. 2009 Jul 27;364(1526):2115-26. doi: 10.1098/rstb.2008.0311.
5. Alaerts L, Augustinus M, and Van Acker K. Impact of bio-based plastics on current recycling of plastics. *Sustain.*, 2018;10(5): 1487. doi: 10.3390/su10051487.
6. Qi Y. et al. Macro- and micro- plastics in soil-plant system: Effects of plastic mulch film residues on wheat (*Triticum aestivum*) growth. *Sci. Total Environ.*, 2018 Dec 15;645:1048-1056. doi: 10.1016/j.scitotenv.2018.07.229.
7. Thompson RC, Swan SH, Moore CJ, and Vom Saal FS. Our plastic age. *Philosophical Transactions of the Royal Society B: Biological Sciences*. 2009, doi: 10.1098/rstb.2009.0054.
8. Hahladakis JN, Velis CA, Weber R, Iacovidou E, and Purnell P. An overview of chemical additives present in plastics: Migration, release, fate and environmental impact during their

- use, disposal and recycling. *Journal of Hazardous Materials*. 2018;344:179-199. doi: 10.1016/j.jhazmat.2017.10.014.
9. Law KL. Plastics in the Marine Environment. *Annual Review of Marine Science*. 2017; 9:205-229. doi: 10.1146/annurev-marine-010816-060409.
10. Andrady AL and Neal M.A. Applications and societal benefits of plastics. *Philos. Trans. R. Soc. B Biol. Sci.*, 2009 Jul 27;364(1526):1977-84. doi: 10.1098/rstb.2008.0304.

AN ANALYSIS OF IMPACT OF TEMPERATURE AND CLIMATE ON WEEDS

Sunil Kumar*

*Assistant Professor,
Department of Mechanical Engineering,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id-sunilagro.chaudhary@gmail.com

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ABSTRACT

While it is well acknowledged that climate change would have an effect on long-term interactions between crops and weeds, the extent of this impact is unknown. We believe that a comprehensive knowledge of weed dominance and weed interactions, as they vary based on crop and weed ecosystems and crop sequences within the ecosystem, will be the most important element in weed control effectiveness. Uncontrolled weed establishment in crops, for example, results in a mixed population in terms of C_3 and C_4 pathways, which complicates weed management significantly. When evaluating the effect of climate change on crop-weed competitive interactions, it's important to include all conceivable combinations of crops and weeds since, from a weed management standpoint, C_4 weeds would thrive in the higher temperature scenario and pose significant production penalties. This is especially concerning since C_4 plants make up the bulk of the most competitive weeds. Reduced water availability, as a result of repeated and unforeseeable droughts, would change the competitive balance between crops and certain weed species, increasing crop weed competition pressure. Although it is well acknowledged that climate change-related weed pressure poses a major danger to agricultural output, whether due to higher temperatures, rainfall shifts, or elevated CO_2 levels, current understanding of this impact is limited. This article discusses a few models that have tried to anticipate these interactions, since these models may be useful in designing future management plans for future weed concerns. This study has provided a thorough overview of current research in this field, as well as identifying major flaws that need additional investigation in crop-weed eco-systems in order to develop appropriate management strategies before the actual effects of climate change become apparent.

KEYWORDS: *Climate, Food, Plant, Temperature, Weed.*

1. INTRODUCTION

There is an urgent need to identify vulnerabilities and adaptive strategies in controlled ecosystems in order to maintain food production for the world's growing human population. Food security, whether in terms of availability, accessibility, usage, and/or system stability, is

undeniably linked to climate. Climate change has the potential to jeopardize food security since climate influences the growth, development, and survival of all species. The total of a particular area's weather conditions, measured as long-term statistics of meteorological variables, is referred to as climate. Temperature, wind, precipitation, and sunlight hours are all important factors in the growth, development, and production of plants, as well as human wellbeing. Climate change has had a major effect on natural and human ecosystems in recent decades. These effects of climate change, regardless of their source, demonstrate the vulnerability of natural and human ecosystems to changes in the operation of climatic systems, interactions among their components, or changes in external pressures, whether natural or manmade. Agriculture, in particular, may be endangered by climate change, since climatic variables have a major impact on the development of all plant species, including crops and weeds. Rising CO₂ and temperature in the atmosphere are anticipated to have direct and indirect effects on agricultural output, sustainability, water availability, and, as a result, food security. Extreme weather events linked to climate change, on the other hand, are a more significant issue for farmers in terms of crop management than more subtle changes brought on by real increases in temperature, CO₂ levels, water availability, and related weather events. Future development will need to make adaptations in technology, managerial methods, and laws to deal with these severe shifts[1].

Weeds are regarded as aggressive, problematic, and competing components inside croplands on a more subtle level. Weeds, unlike other pests, have a comparable trophic level to agricultural plants, and by competing for limited nutrients, they reduce crop yields dramatically. The dynamics of weed-crop competition and how they are affected by climate are the subject of this article, since they have significant regional and worldwide consequences for food supply. In India, for example, the continuous rains throughout the kharif season (June–September) have made weed control difficult, especially in soybean-based agricultural systems. Stressed agricultural plants are more susceptible to insect pests and diseases, and they are less competitive against weeds, as a consequence of abrupt changes in environmental factors. It's worth noting that this is a very complicated topic, as shown by Chen and McCarl's findings that higher temperatures increase pesticide cost variation for maize, potatoes, and wheat while reducing it for soybeans. They also found that in the United States, rainfall was closely related to pesticide use costs per unit of land for these crops. Understanding the impact of climate change on agricultural pests remains a significant barrier to corrective efforts due to a lack of accurate knowledge. The consequences of not comprehending these connections on an ecological, environmental, and economic level may be significant. These authors presented a thorough assessment of weed research in a changing climate, with a focus on crop and cropping system vulnerabilities to weed pressure in changing climatic regimes[2].

1.1 Climate Change And Weeds:

The present levels of the two most significant greenhouse gases (carbon dioxide and methane) in the atmosphere are unprecedented, and they have emerged as the most pressing ecological issue of the twenty-first century. Climate change may affect weedy vegetation in a variety of ways, including geographic range expansions (migration or introduction to new regions), changes in species life cycles, and population dynamics. Weed migration will lead to differences in the structure and composition of weed populations in wild and managed environments. Three main kinds of weedy vegetation changes (range, niche, and trait shifts) occur at various sizes

(landscape, community, and population scales) as a result of climate change. In the aftermath of climate change, changes in weed biology, ecology, and interference potential will result in complicated crop-weed interactions, necessitating new adaptation strategies. There is a widespread belief that climate change would result in a growth pattern difference between crops and weeds, since the world's main weeds have the C₄ pathway and will become more competitive, but this is not a simple issue owing to weedy species' adaptation mechanisms.

1.2 Weed Response to Increasing CO₂ Levels:

Despite attempts to decrease CO₂ emissions, there is rising demand to find adaptation mechanisms in agro-ecosystems. Despite the fact that Mauna Loa and other worldwide monitoring sites are located far away from regions of fast CO₂ production, the record of atmospheric CO₂ collected from the Mauna Loa observatory in Hawaii showed a 20% rise from 311 ppm in the mid-1950s to 375 ppm in 2001. Previous research has shown an 80-ppm difference in CO₂ levels between urban and suburban regions. This finding indicates that, although data from the Mauna Loa Observatory reflects worldwide trends, regional increases may be much greater, particularly in Asia, owing to increasing urbanization and intense agriculture. This rise is expected to continue in the near future, with estimates ranging from 600 parts per million to 700 parts per million by the end of the century, according to the Intergovernmental Panel on Climate Change. The increased CO₂ concentration gradient from air to the leaf interior is known to promote net photosynthesis in C₃ by limiting CO₂ loss through photorespiration and raising the CO₂ concentration gradient from air to the leaf interior. Plants with a C₄ photosynthetic pathway, on the other hand, have an internal mechanism that concentrates CO₂ at the site of CO₂ carboxylation, thus they show minimal reaction to increased CO₂. As a result, further increases in atmospheric CO₂ concentrations will have significant consequences for weed-crop competition and agricultural production losses. Many studies have looked at weed-crop interactions by comparing the development and physiology of C₃ crops and C₄ weeds, and have shown that higher CO₂ concentrations promote vegetative growth of C₃ plant species over those with C₄ pathways. However, C₃ routes are not used by all crops, while C₄ pathways are not used by all weeds. As a result, although the above idea applies to C₃ grains like rice, which compete mostly with C₄ grassy and broad-leaved weeds, it is not general. Many economically important C₄ crops, such as maize, sugarcane, and sorghum, face competition from significant C₃ weeds. This means that with increased CO₂, weed-related yield losses in C₄ crops will tend to rise, but not in C₃ crops, where elevated CO₂ will be a critical component in achieving the potential advantages of CO₂ fertilization[3].

1.3 Weed Response to Elevated Temperature:

The distribution of weed species in a geographical region is thought to be influenced by atmospheric temperature. Its increase may have an impact on weed proliferation and competitive behavior in both weedy vegetation and agricultural stands. Because increased CO₂, lower CO₂ solubility, and decreased affinity of RUBISCO for CO₂ will discourage C₃ photosynthesis, the anticipated climatic change may favor C₄ weeds over C₃ weeds. As a consequence, weed distribution changes will have an impact on the world's most significant cropping systems, such as rice-based cropping systems, as weeds move to higher latitudes and altitudes. *Striga* spp. may also expand their range to include mild climate zones. *Striga asiatica* (L.) Kuntze, on the other hand, seems to be rather insensitive to temperature, and changes in the geographical range of the host plants, rather than the direct impacts of temperature, appear to play a major role in its

spread. If this theory is applied to all parasitic weeds in the Orobanchaceae family, these weeds may represent a significant danger to world crop output in the near future, particularly in fodders[4].

1.4 Weed Response to Variation in Rainfall and Drought Spells:

Weed distribution and effect on agricultural productivity may be affected by changes in rainfall patterns and increasing aridity as a result of a warmer environment. Aridity is predicted to rise in many agronomically important regions in the near future, since each doubling of atmospheric CO₂ levels is expected to result in a 1–5°C increase in temperature. Rising temperatures generate more evaporation, and worldwide patterns in rainfall variability indicate that the monsoon regions would grow drier, resulting in an increase of 5–8% in drought-prone areas. Future rainfall trends are impossible to anticipate, save for more irregular rainfall, which would result in drought and flood becoming more common occurrences. In such a situation, weed dispersion and prevalence will be an issue in agricultural ecosystems, and summer droughts will have a negative impact on weed control in spring-sown crops[5].

Hydromorphic weeds would benefit from changes in rainfall patterns, whereas C₄ weeds would gain from extended dry periods. Little or no rainfall, particularly early in the season when the rice is most vulnerable to weed competition, can make proper land preparation for wet season rice difficult due to low water available for flooding in rainfed or dryland settings. Traditional weed control in flooded rice will be limited, necessitating the use of pesticides. Under such conditions, rice yield losses are anticipated to be greater. Drought-tolerant rice cultivars, according to one researcher, would be needed to avoid water stress-induced production losses and to improve rice competitiveness against weeds in rain-fed circumstances. In South Asia, a switch from rice transplanting to direct sowing in order to save water has already resulted in increased weed competition and altered weed dynamics[6].

1.5 Weed Response to the Interactive Effects of Climatic Variables:

Climate change causes extinctions and changes the ranges of flora and fauna, as well as having unavoidable consequences for antagonistic and mutualistic relationships between terrestrial species. As previously stated, the traditional notion that CO₂ enrichment favors C₃ plant species over C₄ plant species by increasing net photosynthesis is influenced by other climatic factors that alter this (simple) response. The CO₂ enrichment's interaction impact will influence weed-crop competition in a complicated fashion, in contrast to its effect on the photosynthetic pathway alone. Previous climate change research has concentrated on altering plant responses to CO₂ concentrations rather than the temperature or drought changes that come with it. These predicted temperature and moisture variations as a result of changing climates have clear consequences for germination and the geographical and temporal emergence of weed seeds and seedlings, which need a more comprehensive study. Due to increased moisture availability and higher temperatures, dormancy, which is regarded one of the main limitations to weed emergence, is anticipated to be broken early or sooner. In temperate settings where water is not seasonally limited, certain species' dormancy cycles are known to be primarily controlled by soil temperature, regardless of their CO₂ response[7].

1.6 Implications Of Climate Change For Weed-Crop Interactions:

Plant-plant interactions, as a result of direct effects of changes in temperature and atmospheric CO₂, or indirect effects at the system level, as a result of shifts in crop–weed interactions and other biotic stresses, can cause uncertainty in agricultural productivity under a climate change scenario[8].

1.6.1 Shifts in Weed Abundance, Distribution, and Competitive Balance:

Water availability and temperature are the primary drivers of species distribution under normal circumstances, but CO₂ concentrations have recently been added to the list as a result of climate change. Changing climatic factors may enable certain non-potent weeds to dominate weed abundance as cropweed interactions favor C₃ weeds, or allow some non-potent weeds to dominate weed abundance in reaction to a shift in air temperature. Aside from geographic distribution, climatic change may have an effect on their population biology, leading them to migrate to new regions at higher elevations and latitudes. *Striga* sp., which is anticipated to expand its geographic range, has been linked to such consequences. The distribution of plant species, as well as the general functioning and production of ecosystems, will be affected by climate change. Increased abundance of woody vines, for example, has been linked to increased tree mortality and decreased tree regeneration in forests all over the globe as a result of increasing CO₂ levels. Similarly, in rainfed agriculture, a rise in parasitic weeds would pose a significant danger to rice and sorghum crop production. Most of the problematic C₃ and C₄ weeds of the arable land are restricted to tropical and subtropical areas, according to a researcher, owing to lower temperatures at higher latitudes. Preliminary research indicates that many weed species are more tolerant of cold temperatures when CO₂ levels are high, implying that many weed species may expand polar ward[9].

1.6.2 Effectiveness of Weed Management and Adoption of Best Agronomic Practices:

Climate change will have an indirect impact on weed control strategy uptake and success. Water shortages are looming as a significant threat to agricultural production, particularly in irrigated rice, with long-term implications for regional and global food security. Irrigated rice requires about 2–3 times the amount of water as any other upland grain. Aerobic rice has the potential to be a water-efficient production system, but its long-term viability has been jeopardized by a high weed infestation, necessitating efficient and cost-effective weed control methods. Droughts and unpredictable rainfall will have an impact on the productivity and long-term viability of upland and lowland rice producing systems. There will be a trade-off between water efficiency and weed control in rice cultivation. Drought resistance will be required in upland rice not only to deal with water shortages, but also to protect output losses due to weeds by preserving or enhancing a competitive advantage. The transition from transplanting to dry-seeded rice, which saves water, causes qualitative and quantitative alterations in rice weed flora. In combination with flooded conditions, the intrinsic size difference of transplanted rice seedlings offered a significant competitive advantage, i.e., faster development and germination over a broad variety of weed species that are normally very troublesome in aerobic rice. Flooding will not be accessible as a possible weed control technique in the near future due to decreasing water supplies and increasingly severe dry periods. When the flooding regime was changed from permanent to temporary flooding, hand weeding increased by 35%[10].

2. DISCUSSION

To find out whether so-called CO₂ fertilization can compensate for other detrimental impacts of climate change on crop-weed competition, further research is required. Furthermore, the response of agricultural and invasive weeds to other climatic factors and associated parameters such as temperature, drought, rainfall, and an extended growing season should be explicitly assessed in conjunction with an expected rise in CO₂ concentration in managed and natural ecosystems to predict a broader picture of competitive outcomes. Climate change's impact on the geographic spread of invasive weeds will be a hot topic in the near future. Adaptive mechanisms/practices that enable crop production with changing circumstances under climate change scenarios, as well as their efficacy, necessary time span, and economic and ecological consequences, need further research.

3. CONCLUSION

Climate change is an impending worldwide problem whose effects on agricultural weeds have yet to be fully investigated. Conventional thinking about carbon pathways in plants and nitrogen management in crops may help to mitigate the effects of climate change, but weed issues could be exacerbated as CO₂ levels rise, temperatures rise, and, most importantly, water stress increases. To improve weed competitiveness, these circumstances may require the implementation of novel agronomic techniques. Because crops and weeds belong to the same trophic level, the stimulatory or inhibitory effects of climatic factors on crops should also apply to weeds. The effects of increased air temperature on weed growth and pesticide effectiveness have been discovered. Despite the prevalence of C₄ weeds in agriculture, significant weeds with C₃ and C₃-C₄ intermediate routes will face serious crop-weed competition in the next years. Importantly, because of species interactions, all possible combinations of plant-weed carbon fixation pathways, such as C₃ crops and C₃ weeds, C₄ crops and C₄ weeds, C₃ crops and C₄ weeds, and C₄ crops and C₃ weeds, must be investigated, as well as the impact of climate change on crop-weed competitive interactions. Under the climate change scenario, many weeds will put increased pressure on crop-weed competition. In the next decades, more adaptive research studies with complicated research settings may offer helpful answers for controlling yield decrease.

REFERENCES:

1. Batlla D and Benech-Arnold RL. Weed seed germination and the light environment: Implications for weed management. *Weed Biology and Management*. 2014;14(2): 77-87. doi: 10.1111/wbm.12039.
2. Rasmussen K, Rasmussen J, and Petersen J. Effects of fertilizer placement on weeds in weed harrowed spring barley. *Acta Agric. Scand. Sect. B Soil Plant Sci.*, 1996;46(3): 192-196 . doi: 10.1080/09064719609413133.
3. Hall DW, Mccarty LB, and Murphy TR. Weed taxonomy. In *Turf Weeds and Their Control*, 2012.
4. Buhler DD and Hartzler R.G. Weed biology and management. In *Soybeans: Improvement, Production, and Uses*, 2016.
5. Holzner W. Weed species and weed communities. *Vegetatio*, 1978, doi: 10.1007/BF00141295.

6. Watanabe H. Development of lowland weed management and weed succession in Japan. *Weed Biology and Management*. 2011; 11: 175–189. doi: 10.1111/j.1445-6664.2011.00419.x.
7. Engel RE and Ilnicki RD. Turf weeds and their control. In *Turfgrass Science*, 2015.
8. Salonen J, Hyvönen T, and Jalli H. Weed flora and weed management of field peas in Finland. *Agric. Food Sci.*, 2005; 14(2):189-201. doi: 10.2137/145960605774826037.
9. Neve P. et al. Reviewing research priorities in weed ecology, evolution and management: a horizon scan. *Weed Research*. 2018 Aug;58(4):250-258. doi: 10.1111/wre.12304.
10. Baraibar B, Hunter MC, Schipanski ME, Hamilton A, and Mortensen DA. Weed Suppression in Cover Crop Monocultures and Mixtures. *Weed Sci.*, 2018, doi: 10.1017/wsc.2017.59.

AN ANALYSIS OF DATA MINING APPLICATIONS

Ramesh Chandra Tripathi*

*Professor

Department of Computer Engineering,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- tripathi.computers@tmu.ac.in

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ABSTRACT

From the design and manufacturing phases through the service stage, data mining (DM) using Big Data has been extensively utilized in the lifespan of electrical goods. A thorough examination of DM with Big Data and a study of its application at various phases of its lifecycle will aid academics in developing strong research topics and identifying gaps in the field, as well as practitioners in developing DM application systems. First, a short explanation of DM-related issues is given in this article. In the electronics sector, Big Data applications are offered from a variety of perspectives, including data management, DM, or Big Data applications at various lifecycle phases, and the software used in the applications. Finally, findings are presented, as well as future study prospects.

KEYWORDS: *Big Data, Data Mining, Electronics, Pre-Processing, Technology.*

1. INTRODUCTION

As the internet of things and sophisticated information technologies (such as radio frequency identification (RFID) tags and smart sensors) are extensively utilized in manufacturing businesses for day-to-day production and administration, product lifecycle management (PLM) procedures generate a lot of data. Furthermore, the accumulation of historical data in enterprise resource planning (ERP), supply chain management (SCM), customer relationship management (CRM), and order management system (OMS), as well as timely data collected by the widely used manufacturing execution system (MES) and distributed control system (DCS), contributed to the dramatic increase in data over the decades. Big Data has arrived in the industrial world. Manufacturing executives are increasingly interested in maximizing the value of Big Data for their businesses. Knowledge discovery in databases (KDD) and data mining (DM) are two big data-related technologies that have been widely used to improve the intelligence and efficiency of design, production, and service processes in a variety of manufacturing settings, including product design improvement, manufacturing process optimization, production management and optimization (PMO), production process monitoring and control. Intel uses Big Data to forecast equipment maintenance, resulting in a significant reduction in equipment downtime and idle time[1].

1.1 Data Mining And Big Data:

1.1.1 Concepts:

There are many concepts such as DM, KDD, and Big Data that are closely related to each other. DM, as an interdisciplinary subject including database design, statistics, pattern recognition, machine learning, and data visualization, can be defined in many different ways. DM is “the nontrivial process of identifying valid, novel, potentially useful, and ultimately understandable patterns in data”. It is the process of discovering interesting patterns and knowledge from large amounts of data”. Many researcher and practitioners treat DM as a synonym for KDD as IBM deems KDD and DM the same as “an interdisciplinary area focusing on methodologies for extracting useful knowledge from data”. However, others think that “KDD refers to the overall process of discovering knowledge from data while DM (in a narrow sense) refers to application of algorithms for extracting patterns from data without the additional steps of the KDD process in which the additional steps include data preparation, preprocessing, incorporation of appropriate prior knowledge, and proper interpretation of the results of mining. Here, we take DM as a synonym for KDD whereas DM in a narrow sense refers only to the step to generate a specific pattern using a particular algorithm within an acceptable computational efficiency limit. There are various definitions of Big Data from 3 Vs to 4 Vs. Volume, velocity, and variety are the well-known 3Vs and the fourth V can be value, variability, or virtual. Wikipedia specifies that “Big Data is data sets that are so voluminous and complex that traditional data processing methods are inadequate to deal with them”. Gartner gives a more detailed definition as follows: “Big Data is high-volume, high-velocity, and/or high-variety information assets that require new forms of processing to enable enhanced decision making, insight discovery and process optimization”. Big Data analysis is strongly connected with classical data analysis and DM approaches to access and process these amounts of data very fast[2].

1.1.2 Data Preparation and Preprocessing:

Clarifying the issue and gathering the necessary data are all part of the data preparation process. Understanding the industrial domain, including important previous knowledge linked to various applications and intended objectives, is necessary for issue explanation. Experiments, historical collected records, online sensor measurements, real-time RFID tag status, and simulation results may all be used to get the desired data. These data sets may be kept in a variety of forms, including data warehouses, marts, databases, files, and so on, with the necessary data collected and chosen prior to data preparation[3].

Data cleansing, transformation, reduction, and discretization are all part of the preprocessing process. Filling in missing values, smoothing out noise, managing outliers, identifying, and eliminating redundant data are all part of the data cleaning process. When data transformation is required, the data is transformed into the proper formats for mining. The goal of data reduction is to get a smaller representation of the original data while maintaining its integrity. The three methods for data reduction are dimensionality reduction, numerosity reduction, and data compression. Dimensionality reduction is a method for identifying and removing characteristics that are unnecessary, weakly related, or redundant. Numerosity reduction substitutes alternate and smaller forms of data representation for the original data volume. Transformations, such as principle components analysis, are used in data compression to produce a reduced or compressed version of the original data (PCA). By gathering and replacing low-level ideas with high-level concepts, discretization decreases the number of levels of an attribute[4].

1.1.3 Data Mining in a Narrow Sense:

The essence of data mining, in the limited sense, is to develop the model and mine the patterns/knowledge in the data. The DM tasks to be conducted are always split into descriptive and predictive DM based on the patterns to be mined. The summarization, clustering, and association/sequential pattern mining functions are all part of the descriptive function, which is used to describe characteristics of data in a target data collection. While the predictive DM uses induction to generate predictions based on current data, it primarily uses categorization, prediction, outlier identification (anomaly detection), and time series analysis. Statistical analysis-oriented (SA-oriented) and knowledge discovery-oriented data mining methods (DMTs) are two types of DMTs that may be used to fulfill various purposes (KD-oriented). SA-oriented methods establish assumptions about data distribution and variable relationships based on previous knowledge and then verify or reject those assumptions. Regression, k-nearest neighbour (k-NN), k-means, Bayesian classifier, and other algorithms are common SA-oriented DMTs. KD-oriented DMTs, on the other hand, look for the connection without making any preconceptions[5].

1.1.4 Performance Indicators:

To get trustworthy outcomes, the collected information must be properly analyzed and interpreted. The comparison of data acquired from different DM techniques using multiple metrics is required for the assessment of DM methods in order to make a final conclusion. On the basis of a confusion matrix, the performance metrics used to assess classifiers[6].

The most frequently used metrics are accuracy (ACC), precision, sensitivity or recall, and specificity. Meanwhile, the receiver operating characteristic curve (ROC) produced by comparing the true positive rate (TPR) against the false positive rate (FPR) at different threshold settings is usually used to demonstrate a binary classifier system's diagnostic capacity as its discrimination threshold is changed. The mean absolute percentage error (MAPE), the mean squared error (MSE), the mean absolute error (MAE), the root-mean-square error (RMSE), the root absolute error (RAE), the mean error (ME), the variance of errors (VARER), the relative error (RE), the goodness of fit (R²), the index of agreement (IA), and so on are some of the performance indicators for prediction. Internal and external criteria are common objective functions used to evaluate the quality of clustering. The Davies–Bouldin index (DBI), Dunn index (DI), and other internal criteria may be used to assess the quality of a clustering, whereas the most often used external criteria include purity, normalized mutual information (NMI), rand index (RI), F measure, and so on. Meanwhile, certain indications such as the quantization error (QE) and topographic error (TE) are reserved for a specific method such as the self-organizing map (SOM). Support, confidence, lift, and conviction are all common association performance markers. Outlier detection may be seen as a binary classification, and the classification performance indicators can be used to assess the findings. Time series analysis may be utilized for clustering, classification, anomaly detection, and forecasting, and the associated indicators for clustering, classification, and prediction can be used to verify the related performance[7].

1.2 . Data Mining with Big Data Applications in the Electronics Industry:

1.2.1 Data Handling:

Data preparation is the first step in DM, in which the feature values are recorded directly from the experimental data and historical observations, or indirectly from the simulation results, where

the experimental data are full factorial or fractional factorial records, and historical observations can be obtained either through online measurements or from historiography.

The process of transforming data from one format or structure to another is known as data transformation. Normalization was the most often used technique for the chosen articles, although variance scaling, text mining, Fisher Z-transformation, binary vector transformation, Box-Cox transformation, and numerical into binary were also used. Dimensionality reduction, as one of the most significant methods to data reduction, involves removing unnecessary and superfluous variables in order to decrease the complexity of the analysis and the models produced, as well as to enhance the overall efficiency of the modeling process. Regression, analysis of variance (ANOVA), GA, Las Vegas filter, Pearson coefficient, Cramer's V correlation coefficients, and other methods are often employed in the evaluated papers. To decrease the data quantity, clustering, aggregation, and sampling-based methods were used. To compress the representation of the original data, PCA or modified PCA were used, as well as multi-dimensional scaling. Only a handful of the researchers discretized continuous characteristics during the preprocessing step[8].

1.3 Application of DM with Big Data in Different Stages:

For various scenarios, such as product design improvement, manufacturing process optimization, PMO, production process monitoring and control, quality management, CRM, SCM, and so on, DM with Big Data has been used in multiple phases encompassing design, production, sale, service, and recycling. The use of DM and Big Data to purchase electronics components at the manufacturing stage has not been investigated in the reviewed papers. Meanwhile, just a few peer-reviewed papers have focused on product distribution and logistics, which mostly covers order processing, inventory management, and product transportation at the point of sale and service, thus we lump them all together under SCM. As an extension of CRM, order management will also be considered CRM. Quality improvement (QI), development time/cost estimation (DTCE), PMO, AEC/APC, CRM, and SCM are the typical knowledge areas considered in the review to improve the intelligence and efficiency of lifecycle management and control, with data-driven QI being closely related to product design improvement, manufacturing process optimization, and quality management. AEC/APC, which is at the heart of the electronics industry's manufacturing process monitoring and control, is also utilized to improve product quality and yield. AEC/APC is always done online throughout the production process, and it has sparked a lot of interest.

1.3.1 Application of DM and Big Data for Design:

The primary uses of DM in product design include product quality improvement, development cost and time prediction, and product customization. Process planning's primary job is to optimize production process parameters, such as stencil printing process (SPP) reflow soldering, fluid dispensing for microchip encapsulation, wave soldering, and hot solder dip for component surface mounting on PCBs. For quality prediction, these models always incorporated ANN, SVR, and regression with GA for parameter optimization. The most commonly used DMT is KD-oriented ANN. Prediction is a ubiquitous function that has been extensively used for parameter optimization and effect determination, followed by clustering and association. Clustering was mostly used to find goods, process plans, and parameters that were comparable,

and no supervision categorization was done to help with more efficient and reasonable production.

1.3.2 Application of DM and Big Data for Production:

In the manufacturing step, the product is given its final form. PMO, AEC/APC, and quality improvement are some of the expertise areas of DM with Big Data use at the production stage. For the use of DM with Big Data in PMO, the following conclusions may be drawn:

- The majority of research has focused on wafer fab scheduling optimization, cycle time, completion time, and output time prediction. It's possible that the explanation is that wafer fabrication takes many months and is a high target for development. As a result, reducing cycle time is always an essential job in wafer fab plant control. Shortening the cycle time of each activity is essential to being an agile supplier.
- Because of the unpredictability of characteristics that need fuzzy expressions, such as release time, average fab utilization, total queue length on the processing path, and cycle time, hybrid methods integrating fuzzy logic/clustering with ANN have been developed for various applications. Because they can't be calculated precisely, a probability distribution is required. Fuzzy-based DM methods make pattern extraction more realistic.
- Ensemble methods combining fuzzy c-means (FCM) or SOM-based clustering with ANN-based prediction performed a wide range of tasks. Clustering is used to categorize items based on their resemblance to one another, taking into account a variety of factors, in order to enhance prediction accuracy.

1.3.3 Application of DM and Big Data for Sale, Service, and Recycling:

The sale, service, and recycling (SSR) stage involves storing manufactured goods in a warehouse and transporting them to consumers through logistics. Customers then utilize the product while a manufacturer offers remote servicing. When something can no longer be utilized, it reaches the end of its useful life, which includes remanufacturing and disposal. The majority of CRM systems include marketing and sales forecasting, customer service, and supply chain management to improve efficiency and effectiveness in providing client value. According to the comprehensive information, one of the study directions is to mine the behavioral features of consumers on product and maintenance, and therefore establish customer requirements for customer attraction and retention. Another is to forecast marketing demand and pricing for client discovery and development, making it easier to optimize production, procurement, and resource allocation plans.

2. DISCUSSION

Data mining is the process of collecting information from large amounts of data that is hidden, unknown, but possibly valuable. Big Data has a significant effect on scientific discoveries and the production of value. This article presents data mining techniques and Big Data technology. Data mining challenges, as well as data mining with large data, are addressed. Data mining and data mining with big data technological advancements are also discussed. Information has a critical role in every aspect of human existence in the Information Technology age. Gathering data from various data sources, storing and maintaining the data, generating information, generating knowledge, and disseminating data, information, and knowledge to all stakeholders is critical. Data gathering is exploding as a result of widespread usage of computers and electronic gadgets, as well as significant increases in processing power and storage capacity. The data

warehouse allows the whole company to have access to a current and trustworthy database. To evaluate such a large quantity of data and make useful findings and inferences, data mining software is required. The purpose of this article is to provide an overview of data mining systems and some of its applications.

3. CONCLUSION

This article provides an in-depth look into DM with Big Data and its applications in the electronics sector. We can observe how Big Data DM has been used in a variety of scenarios, including product design development, manufacturing process optimization, PMO, production process monitoring and control, quality improvement, CRM, and so on. The primary applications for product design improvement and manufacturing process optimization at the stage of design are customer-oriented product development and process plan optimization. In the examined studies, prediction was the most often employed DM function. The most often utilized DMTs for prediction were ANN and regression. Most research has focused on the use of DM in conjunction with Big Data for process monitoring and control, PMO, and quality improvement in the manufacturing stage. On the one hand, sophisticated DM and Big Data-related techniques such as FDC and R2R have been developed for wafer production process monitoring and control in order to reduce defects and improve quality/yield using data collected from manufacturing processes, equipment/tool/environment statuses, and process parameters. For FDC, classification and clustering functions based on related DMTs including DT, SVM and ANN, k-means and SOM, and prediction functions based on ANN, regression, and SVM were extensively utilized, while the prediction function for VM was widely presented. On the other hand, the most often used functions for optimizing scheduling plans and prediction of cycle time/due date based on ANN, FCM, SOM, and a mix of fuzzy logic and ANN include prediction, clustering, and a combination of the two. Furthermore, based on the functions of prediction, classification, clustering, and association, post hoc diagnosis, quality prediction, and classification were performed for future production quality improvement. The majority of DM applications at the SSR stage are linked to CRM for the aim of recruiting and keeping prospective customers and increasing customer value based on transaction data and online feedback from customers. To mine the consumption patterns and forecast the marketing price, ANN, regression, and SVM were used to perform prediction, classification, clustering, and time series analysis functions for sale and service.

REFERENCES:

1. Lv S, Kim H, Zheng B, and Jin H. A review of data mining with Big Data towards its applications in the electronics industry. *Applied Sciences (Switzerland)*. 2018; 8(4): 582. doi: 10.3390/app8040582.
2. Goswami S, Chakraborty S, Ghosh S, Chakrabarti A, and Chakraborty B. A review on application of data mining techniques to combat natural disasters. *Ain Shams Engineering Journal*. 2018;9(3): 365-378. doi: 10.1016/j.asej.2016.01.012.
3. Yuan M. Study on the Application of Data Mining in Bioinformatics. 2016, doi: 10.2991/icmeit-16.2016.21.
4. Ngai EWT, Xiu L, and Chau DCK. Application of data mining techniques in customer relationship management: A literature review and classification. *Expert Systems with*

Applications. 2009; 36 (2009):2592–2602. doi: 10.1016/j.eswa.2008.02.021.

5. Gray GL and Debreceeny RS. A taxonomy to guide research on the application of data mining to fraud detection in financial statement audits. *Int. J. Account. Inf. Syst.*, 2014; 15(4).
6. Varun D and Chadha A. An Empirical Study of the Applications of Data Mining Techniques in Higher Education. *Int. J. Adv. Comput. Sci. Appl.*, 2011; 2(3). doi: 10.14569/ijacsa.2011.020314.
7. Pospieszny P. Application of Data Mining Techniques in Project Management – an Overview. *CEA Ann.*, 2017. pp.200-220.
8. Chelawat A, Agarwal R, Das A, Nalini N. Application of Data Mining in Health Care. *Int. J. Sci. Res.*, 2016;5(4): 262 - 268. doi: 10.21275/v5i4.nov162522.

NANOMATERIALS AND NANOTECHNOLOGY APPLICATIONS IN CONSTRUCTION RESEARCH AND IMPACTS

Omprakash Goshain*; Preeti Yadav; Bhuvnesh Kumar***;
Elphine A Prabahar******

*Assistant Professor,
Department of Pharmacy,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA

**Assistant Professor,
Department of Pharmacy,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA

***Assistant Professor,
Department of Pharmacy,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- bhuvnesh.pharmacy@tmu.ac.in

****Professor,
Department of Pharmacy,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA

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ABSTRACT

Recent studies on nanomaterials or nanotechnologies have shown their potential applications in a variety of areas, including medical, construction, the automotive industry, informatics, energy, and telecommunications. This is owing to the unique properties of nanoscale materials. The building materials sector may benefit greatly from these studies, with applications that enhance the properties of concrete, steel, glass, as well as insulating materials. Improving the materials' resistances as well as improving their durability will help to decrease pollution by lowering the building's carbon footprint. The manufacturing of different building materials, as well as the energy needed during their use, produce the greatest quantity of pollution. Furthermore, nanoparticles applied to the surfaces of building structural components may help clean the environment via photocatalytic processes. This study analyzes and describes nanotechnology-based products that may enhance the construction industry's overall competitiveness. The following applications of nanotechnology in construction will be emphasized: (1) stronger or lighter structural composites, (2) low-maintenance coatings, (3) improved cementitious material properties, (4) reducing the heat dissipation rate of fire retardant and insulation, and (5) building components nano-sensors.

KEYWORDS: *Nanomaterials, Nano Products, Nanotechnologies, Structural Behavior.*

1. INTRODUCTION

The new shapes of today's structures, which are proportionate to mankind's contemporary requirements, are attributable not only to changing designs, but also with the application and just kind of building materials utilized in construction. People's new perspectives on environmental preservation and energy conservation are the result of this viewpoint that there will be no new goods without construction materials. Both technical and aesthetic factors were taken into account in structures constructed in the last two decades[1]. Meanwhile, advances in material engineering have increased technical capabilities, which, like the aesthetic element of building materials, are seen as a design opportunity. Bricks, stones, glass, plaster, steel, as well as concrete are common building materials utilized in today's structures, with the primary impact of natural building materials being considered seriously in recent years. These include translucent concrete, composites, and colored refractory bricks, to name a few. Currently, the use of nanomaterials in construction is decreasing, owing to a lack of knowledge about the best nanomaterials for construction as well as their behavior; a lack of specific benchmarks for the design and execution of nanomaterial-based construction elements; a limited supply of nanoproducts; and a lack of detailed information about nanoproducts.

To be able to utilize nanoparticles in the construction sector on a large scale, the following phases of research must be completed: the selection and research of nanomaterials with potential for application in construction; the behavior analysis of building components containing nanomaterials under different stresses; the creation of particular design and construction standards[2]. This study investigates and analyzes nanotechnology applications that may boost the construction industry's competitiveness. The data and information gathered are based on current research or literature, with an emphasis on nanotechnology fundamentals and applications, as well as nonmaterial in building. By providing specific suggestions, the goal is to point out clear cut path among the nanotechnology development sectors where the building process would instantly harness nanotechnology. Both construction engineering science and training would benefit from the knowledge[3].

1.1.Nano-Materials for Construction:

1.1.1. Carbon Nanotubes:

Carbon nanotubes are a cylindrical type of carbon that get their name from their nanometre diameter. They may be many centimeters long and have one “layer” or wall (single walled nanotube) or several walls (multiwalled nanotube) (multi walled nanotube). Nanotubes, which belong to the fullerene structural family, have exceptional strength and electrical characteristics, as well as being effective heat conductors. They have five times the Young's modulus as well as eight times (theoretically 100 times) the strength of steel, for example, while being one-sixth the weight density. Mechanical durability as well as fracture avoidance in concrete, improved mechanical and thermal characteristics in ceramics, and real-time structural health monitoring capacity are all expected advantages of carbon nanotubes[4].

1.1.2. Nanoparticles of Titanium Dioxide (TiO₂):

The titanium dioxide nanoparticles are used to enhance the characteristics of concrete. Because of its sterilizing characteristics, this white pigment is utilized as a superb reflecting coating or applied to paints, cements, and windows. When titanium dioxide is sprayed on outdoor surfaces, it uses intense photocatalytic processes to break down organic pollutants, volatile organic compounds, and bacterial membranes, decreasing air pollution. Because rain water is drawn to the surface and forms sheets, which gather pollutants including dirt particles already broken down and wash them away, surfaces to which it is applied have self-cleaning characteristics. The resultant concrete surface has a bright white color that lasts for a long time[5].

1.1.3. Nanoparticles of Silicon Dioxide (SiO₂):

By filling the pores between big fly ash and cement particles, nano-SiO₂ may substantially improve the compressive strength of concretes containing high fly ash volumes at an early stage. When compared to silica fume (microsilica), nano-silica lowers mortar setting time and improves cohesiveness, which minimizes bleeding water and segregation.

1.1.4. Nanoparticles of Zinc Oxide (ZnO)

Zinc oxide is a one-of-a-kind substance with both semiconducting and piezoelectric characteristics. Plastics, ceramics, rubber, glass, cement, paints, pigments, adhesives, sealants, pigments, and fire retardants are among the materials and products that include it. ZnO increases the processing time or water resistance of concrete when used in its manufacture.

1.1.5. Nanoparticles of Silver (Ag):

When bacteria, viruses, and fungi come into touch with nano silver, it affects cellular metabolism and inhibits cell development. The nano silver prevents bacteria and fungus from multiplying and growing, causing infection, odor, itching, and sores. The capacity to create very tiny particles and distribute them evenly is at the heart of nano silver's technology. When nanoparticles are placed on the surface of any substance, the surface area increases by a factor of a million over that of regular silver foil[6].

1.1.6. Nanoparticles of Aluminum Oxide, (Al₂O₃):

The calcium hydroxide generated by the hydration of calcium silicates interacts with the alumina (Al₂O₃) component. The amount of surface area accessible for reaction determines the pace of the pozzolanic reaction. The addition of high-purity nano-Al₂O₃ enhances the properties of In terms of split tensile and flexural strength, concretes outperform concretes. Cement may be advantageously substituted in the concrete mixture with nano-Al₂O₃ particles up to a maximum of 2.0 percent with average particle sizes of 15 nm, with 1.0 percent being the optimum amount of nano-Al₂O₃ particles content.

1.1.7. Nanoparticles of Zirconium Oxide (ZrO₂):

Zirconium oxide (or Zirconia) nano powder as well as nanoparticles are white high surface area particles with average diameters of 5...100 nanometers and specific surface areas in the range of 25...50 m²/g. Nano zirconium is an excellent insulator and has good aesthetics (translucency). It also has great physical resistance.

1.1.8. Nanoparticles of 2.8 Wolfram (Tungsten) Oxide (WO₃):

In recent years, tungsten trioxide has been used to make electro-chromic windows, also known as smart windows. These windows include electrically switchable glass that allows them to alter their appearance. When a voltage is supplied, the light transmission characteristics change. The user may tint their windows to control the quantity of heat or light that passes through.

1.2.Nanotechnology in The Construction Industry:

Because nanotechnology-generated products have numerous unique features, it may be utilized for design or building procedures in a variety of fields. These qualities have the potential to substantially improve existing construction issues, as well as alter the building process' requirements and structure. These include items that are used for: Composite structural materials that are lighter and stronger Coating that requires little upkeep Pipe joining materials and methods are being improved. Cementitious materials with improved characteristics Using fire retardants and insulation to reduce the rate of heat transfer Increasing the acoustic absorber's sound absorption Glass with a higher reflection. The following is an abridged list of nanotechnology's uses in building. Below, we'll take a closer look at a few of these applications[7].

1.3.Concrete Nanotechnology:

Concrete is among the most often utilized construction materials. Every year, approximately a ton of concrete is manufactured for every person on the planet. The most significant environmental problems linked to concrete manufacture and usage are energy consumption and carbon dioxide generated during the manufacturing processes of cement, concrete, and wastes. Researchers in the concrete sector have benefited greatly from nanotechnology. New cements, concretes, additives, and nanocomposites have all resulted as a result of this research. According to research, the addition of Like concrete hole fillers, nanoparticles would enhance the durability of concrete via physical and chemical interactions[8].

1.3.1. Carbon Nanotubes (CNTs):

"Nanotubes are one of the most important discoveries in nanotechnology. These tubes are carbon atom plates that rotate within a roller-like chamber and seem to be coated wire screens on one side. Carbon nanotubes are hollow tubes composed mostly of carbon, including such graphite. They have application forms as a catalyst as well as a mechanical booster of polymers and composites, or are used in the manufacturing of electronic parts, due to characteristics such as their large specific surface area, great strength (up to several times that of steel), and exceptional electric and electronic properties. They're 10 times stronger than steel and only weigh a tenth of the weight a sixth of its original weight Steel and Nanotechnology[9].

Copper nanoparticles decrease steel surface unevenness, which lowers the number of stress risers and therefore fatigue cracking, resulting in improved safety, reduced need for monitoring, and more efficient materials usage in fatigue-prone construction. Vanadium and molybdenum nanoparticles help with delayed fracture issues in high-strength bolts by decreasing hydrogen embrittlement and enhancing the microstructure of the steel.

1.3.2. Nanotechnology as a Fire-Resistant Material:

Steel buildings' fire resistance is typically supplied using a spray-on cementitious method, which is no longer common since it requires thick coatings that are brittle and need polymer additives

to enhance adherence. However, research into nano-cement (cement made out of nano-sized particles) has the potential to change the game in this field. This is accomplished by combining carbon nanotubes (CNTs) with cement to create fibre composites that inherit some of the nanotubes' remarkable characteristics, such as strength. Polypropylene fibers are also being explored as a way to improve fire protection, and they are a less expensive alternative than traditional insulation.

1.3.3. Nanotechnology In Green Construction:

Nanotechnology, or the molecular manipulation of matter, is providing new materials and possibilities to sectors as varied as electronics, medicine, energy, and aeronautics. Our capacity to create novel materials from the ground up is having an effect on the construction sector. Nanotechnology-based materials and products may be found in building insulation, coatings, and solar technologies. Nanotech laboratories are now working on novel lighting, structural, and energy technologies, which will be available shortly. Nanotechnology has already delivered self-cleaning windows, smog-eating concrete, and other innovations to the construction sector. However, these advancements and presently accessible goods pale in comparison to what is now being developed in nanotech laboratories across the globe[10].

1.4.Construction Impacts:

Pluses:

1. TiO₂ at the nanoscale has a 500 percent increase in surface area and a 400 percent reduction in opacity when compared to normal TiO₂. Nano-TiO₂ production has reached about 4 million metric tons, with prices ranging from \$45 to \$50 per kilogram, compared to \$2.5 per kilogram for traditional TiO₂.
2. By 2011, the global market for carbon nanotubes is projected to have grown from \$51 million in 2006 to even more than \$800 million.
3. Nano-modified concrete shortens building timelines while decreasing labor-intensive (and expensive) tasks. Activities that are too costly) It may also save money on repairs and upkeep.
4. Nano sensors implanted in infrastructure materials can offer completely integrated and self-powered failure prediction and forecasting systems for high-capital structures, such as reservoirs, nuclear power stations, and bridges, at a low cost.

1.5. Demerits:

1. Because nanoparticles are so tiny, they have the ability to harm the respiratory and digestive systems, as well as the skin and eye surface, putting employees at risk.
2. Due to the newness of nanotechnology-related sectors, workers in construction research and development, as well as certain field applications, must have an interdisciplinary background. The application of nanotechnology is still hampered by low production quantities and expensive costs.

2. DISCUSSION

The new forms of today's buildings, which are proportional to mankind's current needs, are due not only to changing designs, but also to the uses and types of construction materials used. People's new views on environmental preservation and energy conservation stem from the belief

that there will be no new products if building materials are not available. In buildings built in the past two decades, both technical and aesthetic considerations were taken into account. Nanotechnology decreases mankind's demand for scarce resources and reduces environmental degradation through reducing pollution levels in the production of building materials. Nanotechnology in the building industry is expected to result in constructions that are safer, higher-quality, and cost-effective if the proper conditions are created. As a consequence, controlling building and its related performance in sustainable alternatives is important and necessary. Nanotechnology has become a double-edged sword for the construction industry. More study and practice efforts are needed to make construction projects more sustainable, conserving energy, decreasing resource use, and minimizing environmental damage. To avoid the use of hazardous materials in the future, a technique for identifying environmentally acceptable and sustainable building nanomaterials must be developed.

3. CONCLUSION

Because of the novel possible applications of particles at the nanoscale size, nanomaterials as well as nanotechnologies have garnered a lot of scientific attention, and a lot of money and effort has gone into them. Even while building materials are just a tiny part of the total endeavor, they have the potential to provide significant advantages in terms of technical advances and economic gains. Nanotechnology may assist reduce energy usage in a building, which is one of the world's major problems today. Nanotechnology lowers mankind's demand for rare resources and, through lowering pollution levels in the manufacturing of building materials, decreases environmental problems. It is anticipated that by establishing the right circumstances, nanotechnology in the construction sector would result in safer, higher-quality, and cost-effective structures. As a result, it is critical and essential to control building and its associated performance in environmentally friendly ways. For the building sector, nanotechnology has become a double-edged sword. More research or practice efforts are required so that building projects may be made sustainable, saving energy, reducing resource use, and avoiding environmental harm. To prevent the usage of hazardous materials in the future, a method must be established to identify ecologically acceptable and sustainable building nanomaterials.

REFERENCES:

1. Vojdanzadeh L. Nanotechnology Applications in Architecture. Arman. Archit. Urban Dev., 2015; 9(16), 29-38.
2. Niroumand H, Zain MFM. The Role of Nanomaterials in Nanoarchitecture. Procedia - Soc. Behav. Sci., 2013; 89:27-30. doi: 10.1016/j.sbspro.2013.08.804.
3. Forster SP, Oliveira S, and Seeger S. Nanotechnology in the market: Promises and realities. Int. J. Nanotechnol., 2011, doi: 10.1504/IJNT.2011.040193.
4. Teizer J, Venugopal M, Teizer W, and Felkl J. Nanotechnology and Its Impact on Construction: Bridging the Gap between Researchers and Industry Professionals. J. Constr. Eng. Manag., 2012; 138(5):594-604. doi: 10.1061/(asce)co.1943-7862.0000467.
5. Chatterjee AK. Nanoparticulate matters in cement, concrete & construction - Performance &EHS perspectives. Indian Concrete Journal. 2017.
6. Agrawal SS and Prajapati R. Nanosensors and their Pharmaceutical Applications: A Review.

Int. J. Pharm. Sci. Nanotechnol., 2012, doi: 10.37285/ijpsn.2011.4.4.2.

7. Jewett MC and Patolsky F. Nanobiotechnology: Synthetic biology meets materials science. Current Opinion in Biotechnology. 2013, doi: 10.1016/j.copbio.2013.06.003.
8. Yasin LSB, and Atiyat DI. The Effect of Nano Technology on Architecture. Int. J. Res. Chem. Metall. Civ. Eng., 2017[4(3):101-107. doi: 10.15242/ijrcmce.ae0317104.
9. Khitab A and Anwar W. Advanced research on nanotechnology for civil engineering applications. Advances in Civil and Industrial Engineering (ACIE) Book. 2016.
10. Sev A, Ezel M. Nanotechnology Innovations for the Sustainable Buildings of the Future. Int. J. Archit. Environ. Eng., 2014, doi: 10.5281/zenodo.1094379.

TIDAL CURRENTS' POWER POTENTIAL IN CHANNELS

Varun Kumar Singh*

*Associate Professor,
Department of Chemistry,
Teerthanker Mahaveer University, Moradabad, Uttar Pradesh
Email Id- drvarun.engineering@tmu.ac.in

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ABSTRACT

The potential of powerful tidal currents is receiving more attention as interest in renewable energy sources grows. However, there is a limit to the amount of power accessible since too many turbines would simply block the flow, decreasing the amount of power produced. The greatest average power available from a tidal stream through a channel, such as that between an island and the mainland, is calculated and shown to be much less than the average kinetic energy flow in the undisturbed condition across the channel's most restricted cross-section. The highest average power is calculated as 20 to 24 percent of the peak tidal pressure head, from one end of the channel to the other, times the peak of the undisturbed mass flow across the channel, according to a general formula. The placement of the turbine "fences" along the channel has no effect on the maximum average power. The findings may potentially be used to assess the potential strength of stable ocean currents.

KEYWORDS: Channels, Power, Renewable Energy, Tidal Power, Tidal Currents.

1. INTRODUCTION

The tidal stream may be at the mouth of a bay or in a channel between an offshore island and the mainland, for example. In both cases, estimating the maximum average power, i.e. the maximum average rate at which energy can be extracted, is critical, and it is frequently assumed that this is given by the average flux of kinetic energy in the undisturbed state through the most constricted cross-section of a channel where the currents are strongest. Turbines restrict the flow, limiting the power output once again. The optimal number (and location) of turbines, as well as the related maximum average power output, should be able to be determined.

The usage of current turbines at a bay's entrance and found that the average power produced during a tidal cycle need not be substantially less than in a traditional system with a dam. The difference in sea level between outside and within the bay, which is needed to operate the turbines and generate electricity, may be caused by a variation in the times of high and low tides outside and inside the bay, rather than by a change in the tidal range. As a result, acceptable energy generation is consistent [1] with maintaining a tidal range in the bay that is not much decreased from its undisturbed value, allowing for the flushing that may be beneficial for waste dispersion and aquaculture [2].

The sea level outside a bay may be prescribed rather independently of the currents in the entrance, but the sea level within, and therefore the pressure head driving the currents in the entrance, is obviously reliant on the currents. In this article, we examine a different situation with a constrained canal linking two huge bodies of water, with the tides at both ends assumed to be unaffected by the channel's currents.

We look at flow in a channel with a changing cross-section. The current speed $u(x, t)$ is considered to be a function of both time t and channel position x , but independent of cross-channel position. The flow is governed by the dynamical equation $\rho u \frac{du}{dx} = -\rho g \frac{dz}{dx} - \frac{F}{A}$, where the pressure gradient is provided by the slope of the surface elevation z , and $F(x, t)$ represents an opposing force associated with natural friction and potentially the presence of turbines.[3] To make the frictional force of the turbines independent of the cross-channel location, the turbines must be placed in a uniform "fence" across the flow, with all water flowing through the turbines. This is a more efficient system than utilizing separate turbines, which would result in cross-channel current gradients downstream and energy loss due to lateral mixing smoothing these gradients. Of course, multiple gates might be placed along the channel, making the turbine-related portion of F an arbitrary function of x . Volume conservation means that the flow Au along the channel is independent of x and may be expressed as Q if the channel is short relative to the wavelength of the tide (usually hundreds of kilometers, even in shallow water) (t)[4].

Using this in equation and integrating down the channel, we get $c \frac{dQ}{dt} = K g z_0 - \int_0^L F dx - \frac{K}{2} \int_0^L u^2 dx$; where $c = \frac{A}{L}$ and $z_0(t)$ represents the sea level difference between the two basins, assuming that this difference is unaffected by changes in F as turbines are installed. It's worth noting that the geometrical factor c is unaffected by the position of the channel's ends at $x=0, L$ if A is big there. This is the situation at the channel entry, when flow is brought in gradually from a location with a big A , weak currents, and tidal elevation that is specified. However, we allow for flow separation at the channel exit, where the flow is expected to emerge as a jet after the channel expands sufficiently, but the sea level remains constant throughout the jet's borders and matches the prescribed downstream elevation. As a result, c has a low sensitivity to the point of separation's position. However, if $u_e(t)$ represents the current speed at the exit, there is a pressure head loss of $(1/2)\rho u_e^2$, where ρ signifies the density of the water. (The pressure head loss is just g times the elevation change.) The phrase "head loss" will be used to describe either the change in pressure or the drop in sea level.)

Depending on whether the imposed head difference is balanced in the basic state by the acceleration term on the left-hand side of equation or the friction and flow separation terms on the right-hand side, there are clearly different basic states, and thus different problems to consider for tidal power extraction. We look at them in order and seek for broad conclusions. Unless the channel is long $A(x) \gg u_e^2$, the natural frictional term and the head loss associated with separation at the exit are likely to be substantial, if not dominating.

The current in the channel has a speed u at any given time, which is a function of the local cross-sectional area $A(x)$, where x is the along-strait coordinate. The current enters the channel from all directions at the entry, but it may separate as a jet with speed u_e at the departure, surrounded by relatively stagnant water with the same height as the downstream basin.

Rspa.royalsocietypublishing.org and deep were used to get this information. Nonetheless, we begin by assuming that these effects are minor, and that the natural regime maintains a balance between the difference in sea level and acceleration. A sinusoidal tide with amplitude a and frequency ω is $z_0 \cos \omega t$. Of fact, rather than reflecting force from only one end of the channel, this forcing might be the difference in sinusoidal tides at either end. $Q \sin \omega t$, where Q is the corresponding volume flow from equation [2].

The product of water density ρ , current u , cross-section A , and the local frictional force F representing the turbines generates the power produced at the turbines. $P = \int_0^L \rho u F dx$; is the average power taken from the flow by the turbines, with the overbar showing the average over a tidal cycle. To get the average electrical power generated, multiply this by a turbine efficiency factor. The component Q in equation means integrating over the cross-section, and the integral over x allows for the dispersion of the turbine barriers throughout the channel [5].

The peak flow across the channel is thus decreased to $2K^{1/2}$ of its initial value, or 71 percent. The head loss caused by the turbines accounts for 71% of the initial head differential throughout the channel. The highest average power is independent of the placement of the turbine barriers along the channel (albeit the smallest crosssection where the currents are strongest obviously requires the fewest turbines). The linear description of the turbine drag has no bearing on this conclusion [6].

2. DISCUSSION

Where $c \int_0^L A dx$ and $z_0(t)$ denote the difference in sea level between the two basins, assuming that this difference is unaffected by channel flow and therefore untouched by changes in F when turbines are installed. It's worth noting that the geometrical factor c is unaffected by the position of the channel's ends at $x=0, L$ if A is big there. This is the situation at the channel entry, when flow is brought in gradually from a location with a big A , weak currents, and tidal elevation that is specified. However, we allow for flow separation at the channel exit, where the flow is expected to emerge as a jet after the channel expands sufficiently, but the sea level remains constant throughout the jet's borders and matches the prescribed downstream elevation. As a result, c has a low sensitivity to the point of separation's position. However, if $u_e(t)$ represents the current speed at the exit, there is a pressure head loss of $(1/2)\rho u_e^2$, where ρ signifies the density of the water. (The pressure head loss is just g times the elevation change.) The phrase "head loss" will be used to describe either the change in pressure or the drop in sea level.)

Depending on whether the imposed head difference is balanced in the basic state by the acceleration term on the left-hand side of equation (2.2), or the friction and flow separation terms on the right-hand side, there are clearly different basic states, and thus different problems to consider for tidal power extraction. We look at them in order and seek for broad conclusions.

Unless the channel is long $A(x) \gg u x u_e$, the natural frictional term and the head loss associated with separation at the exit are likely to be substantial, if not dominating. Two basins with differing tidal heights are connected by a canal. The current in the channel has a speed u at any given time, which is a function of the local cross-sectional area $a(x)$, where x is the along-strait coordinate. The current enters the channel from all directions at the entry, but it may separate as a jet with speed u_e at the departure, surrounded by relatively stagnant water with the same height as the downstream basin [7].

Nonetheless, we begin by assuming that these effects are minor, and that the natural regime maintains a balance between the difference in sea level and acceleration. A sinusoidal tide with amplitude a and frequency ω is $z_0 Z a \cos \omega t$. Of fact, rather than reflecting force from only one end of the channel, this forcing might be the difference in sinusoidal tides at either end. $Q_0 Z g a (\omega c) K_1$ is the corresponding volume flow from equation[5].

The product of water density ρ , current u , cross-section A , and the local frictional force F representing the turbines generates the power produced at the turbines. $P = \int_0^L \rho u F dx$; is the average power taken from the flow by the turbines, with the overbar showing the average over a tidal cycle. To get the average electrical power generated, multiply this by a turbine efficiency factor. The component Q in equation means integrating over the cross-section, and the integral over x allows for the dispersion of the turbine barriers throughout the channel.

The peak flow across the channel is thus decreased to $2K_1/2$ of its initial value, or 71 percent. The head loss caused by the turbines accounts for 71% of

the initial head differential throughout the channel. The highest average power is independent of the placement of the turbine barriers along the channel (albeit the smallest crosssection where the currents are strongest obviously requires the fewest turbines). The linear description of the turbine drag has no bearing on this conclusion. Background friction and the separation effect have been ignored in the calculations so far. If the friction is quadratic in the current u and expressed in water of depth h by $C_d u^2 / h$, where C_d is the drag coefficient, which may be a function of x , they may be grouped into a single component[8]. Figure 1 discloses the A channel connects two basins with different tidal elevations. At any instant the current through the channel has speed u , a function of the local cross-sectional area $a(x)$, where x is the along-strait coordinate. At the channel entrance the current enters from all directions, but at the exit it may separate as a jet with speed u_e , surrounded by comparatively stagnant water with elevation the same as that in the downstream basin[9].

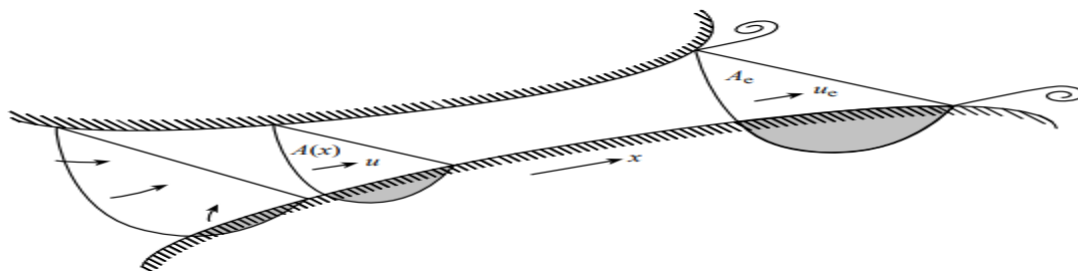


Figure 1. A channel connects two basins with different tidal elevations. At any instant the current through the channel has speed u , a function of the local cross-sectional area $a(x)$, where x is the along-strait coordinate. At the channel entrance the current enters from all directions, but at the exit it may separate as a jet with speed u_e , surrounded by comparatively stagnant water with elevation the same as that in the downstream basin.

3. CONCLUSION

The findings of this study may provide excellent early estimates of the power potential of a number of proposed locations throughout the globe, but further thorough investigation for

specific sites would be required. One typical conclusion is that given a sinusoidal tidal head h and Q_{max} indicating the peak volume flux in the undisturbed state, the maximum average power available is about $0.22\rho g h Q_{max}$ to within 10%. This upper limit on available power assumes that turbines are placed in uniform fences, with all water flowing through the turbines at each fence, but excludes turbine-related losses. The back impact on the forcing of changes in the channel flow is another element we've overlooked. If the basins are vast and deep, the impact is likely to be minor, but there may be a positive feedback effect that increases the head as turbines are installed. This will boost the available power by a little amount. The current is also expected to be independent of the cross-sectional location. We can cope with the average speed in the acceleration term if there is shear vertically and across the channel, but there will be slight modifications in other sections of the theory. These modifications will need to be taken into account when assessing the power potential of sheared unidirectional ocean currents like the Florida Current, for example, but the current theory should help[10].

In instances when the tidal current is not constrained, such as in a channel, but instead flows over an open coast, further research is needed. There should be optimal designs for a tidal barrier, or fences, in portion of the flow here, as well.

REFERENCES:

1. Bryden IG, Couch SJ, Owen A, and Melville G. Tidal current resource assessment. Proc. Inst. Mech. Eng. Part A J. Power Energy, 2007; 221(2).
2. Zhang J and Lu X. Inversion of three-dimensional tidal currents in marginal seas by assimilating satellite altimetry. Comput. Methods Appl. Mech. Eng., 2010;37(3).
3. The SH, Wiedmann T, Castel A, andde Burgh J. Hybrid life cycle assessment of greenhouse gas emissions from cement, concrete and geopolymer concrete in Australia. J. Clean. Prod., 2017; 152, 312-320.
4. Kim SJ, Singh PM, Hyun BS, Lee YH, andDo Choi Y. A study on the floating bridge type horizontal axis tidal current turbine for energy independent islands in Korea. Renew. Energy, 2017.
5. Poulain PM, Menna M, and Gerin R. Mapping Mediterranean tidal currents with surface drifters. Deep. Res. Part I Oceanogr. Res. Pap., 2018.
6. Faez Hassan H, El-Shafie A, and Karim OA. Tidal current turbines glance at the past and look into future prospects in Malaysia. Renewable and Sustainable Energy Reviews. 2012.
7. Lossent J, Lejart M, Folegot T, Clorennec D, Di Iorio L, and Gervaise C. Underwater operational noise level emitted by a tidal current turbine and its potential impact on marine fauna. Mar. Pollut. Bull., 2018 Jun;131(Pt A):323-334.
8. Xuan J, Yang Z, Huang D, Wang T, and Zhou F. Tidal residual current and its role in the mean flow on the Changjiang Bank. J. Mar. Syst., 2016;154.
9. Jing Gu Y., Gang Lin Y., Kun Xu Q, Wei Liu H, and Li W. Blade-pitch system for tidal current turbines with reduced variation pitch control strategy based on tidal current velocity preview. Renew. Energy, 2018;115: 149-158.
10. Sarkar D, Osborne MA, and Adcock TAA. Prediction of tidal currents using Bayesian machine learning. Ocean Eng., 2018;158: 221–231.

FEATURES OF THE APPROACH TO TEACHING FOREIGN LANGUAGE

Sabirova Nazokat Karimbayevna*

*Teacher,
Tashkent Architecture – Construction Institute,
Asaka St, Tashkent, UZBEKISTAN

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ABSTRACT

A foreign language for special purposes assumes that language teaching will be adapted to the specific linguistic and communicative needs of specific students, paying special attention to the professional context. This paper presents some theoretical and methodological foundations for compiling a foreign language course for special purposes.

KEYWORDS: *Special, Professional Activity, Analysis, Course Development, Communication Skills.*

INTRODUCTION

Nowadays, in the era of global scientific and professional cooperation, where English is the leading language, both for communication and for the dissemination of knowledge, the need to learn English for special purposes (ESP) is more urgent than ever before. As a result, English for special purposes has become one of the most important areas of learning English. ESP has two main areas: English for academic purposes, which prepares students to study at foreign universities and communicate in an academic environment, and English for professional purposes, which prepares students to work in a particular profession. This direction involves learning English to work in various professional fields, such as engineering, law, medicine, computer science, tourism, business management and many others. Preparing a student to function effectively in his current or future job depends on a well-thought-out approach. Developing and conducting an ESP course for students at the university level is a very difficult task for English language teachers, as they have to face a number of tasks related to course development, such as: determining the purpose of the course, choosing the content of the course, as well as choosing appropriate teaching methods and techniques. All this will help the specialist to master the vocabulary and functional language necessary for target situations. This article presents some theoretical and practical foundations of the methodology of teaching a foreign language for special purposes of students of higher educational institutions. Experts define ESP as an approach to language learning based on the needs of the learner. At the heart of all ESP is a simple question: why does a student need to learn a foreign language? Thus, ESP is language teaching, in which all decisions regarding the content and method of teaching are based on the motives of the student. Dudley Evans and St. John define ESP in terms of "absolute" and "variable" characteristics. [1]

The absolute characteristics are as follows:

- ESP is necessary to meet the specific needs of students;
- ESP uses the basic methodology and activities of the discipline it serves;
- ESP focuses on the language corresponding to these activities in terms of grammar, vocabulary, discourse and genre. Variable characteristics include the following:
- An ESP course may be associated with specific disciplines or designed for them;
- For ESP, it is necessary to use a methodology different from the general methodology of teaching English in specific learning situations;
- ESP is usually intended for intermediate or advanced level students;

Most ESP courses assume some basic knowledge of the language system by students. Based on this approach, it is possible to develop a course that will prepare students for effective communication in situations that occur or will occur in their lives, professional work or educational activities. The main difference between ESP and General English (EFL) is in choosing a suitable textbook or choosing your own materials. The choice should be made based on an assessment of the needs of their students and learning goals. [2]

ESP students are usually adults who have already learned the basics of English and have some knowledge of professional subjects that ESP teachers may not be familiar with. Students need knowledge of the language in order to master professional communication skills and be able to carry out their professional activities. ESP focuses on language that is used in a real professional context, rather than teaching grammatical structures and vocabulary unrelated to students' core subjects. The ESP content should be integrated into the subject area, present or future professional activities of students. According to Dudley-Evans and St. John ESP courses should reflect the methodology of the disciplines and professions for which they are intended. In this regard, the design of each ESP course should be preceded by an analysis of the needs of students regarding their future or present profession, their plans for the future, as well as an analysis of the language used in their target situations[3]. The methods of analyzing the needs of students include:

- Questionnaires intended for students, university teachers and employers, which are recommended to be filled out before the start of the course, during the course and after its completion;
- Consultation with teachers of profile disciplines about the choice of teaching materials and about the expectations of these teachers and future employers about the contribution of ESP to the development of professional competence of future specialists;
- Language teachers study linguistic, cultural and pragmatic aspects of the present or future workplace of their students. After conducting the above-mentioned studies, the teacher must decide on the content of the training, texts and various linguistic elements to be studied during the course. In addition, it is necessary to choose effective teaching methods; educational materials; the degree to which certain skills should be acquired. The study of the peculiarities of teaching a foreign language for special purposes has shown that its methodology is directly related to three factors, namely: the needs of students, their target situation, as well as the language used in a professional situation. The analysis of these

factors allows the teacher to set learning goals, choose the appropriate curriculum, make the appropriate choice of the content of training and use appropriate teaching methods and materials. ESP teaching should be based on a functional curriculum, the purpose of which is to develop communicative competence in the field of the profession. To achieve this, it is necessary to ensure the cooperation of subject specialists and English language teachers. [4]

Specialists can be a source of information on issues related to the subject discipline, they can provide materials and be invited lecturers, while language teachers can explain linguistic problems to their students and teachers, teaching them various communication skills in a foreign language. Teaching English for special purposes is not an easy task for a teacher who must have knowledge not only of the methods of teaching the language, but also of the special disciplines of his students. In addition, the ESP teacher should be flexible in making decisions and remain open to suggestions and opinions of students. [5]

The progress of society is characterized not only by the development of industrial spheres, but also by the interests and values of the members of society, that is, human capital, human capital refers to the abilities, knowledge and skills (skills) necessary for workers to carry out activities in socio-economic spheres. Such qualities are primarily determined (identified) by the quality of education reflecting the intellectual potential of society, a developed education system offering quality education and the like. A foreign language embodies a great potential that meets the needs of society and occupies an important place in the comprehensive harmonious development of the individual. Teaching foreign languages is not only the provision of knowledge about a foreign language, but also a factor influencing the formation of a person who is ready to master knowledge independently, who is able to think creatively, who is aware of the cultural heritage of his homeland and the country of the language being studied and the place they occupy in world history. [6]

A foreign language is a source that plays an important role in the achievement of intellectual, cultural and professional excellence by a person, as well as a factor that occupies an important place in his cultural development. The training of mature specialists who meet the requirements of the time requires perfect knowledge of foreign languages. Therefore, at present, the development of innovative systems for professionally oriented teaching of foreign languages in higher educational institutions is one of the topical issues for methodologists.

Such a system, in turn, should:

- Meet the interests of society and the individual, strengthen the place that foreign languages occupy in the future professional activities of students and the motivation to study a foreign language among students who are aware of the functional importance of this language;
- To contribute to the improvement of the general degree of knowledge of foreign languages;
- To provide an opportunity to characterize the goals, objectives, methods and means of teaching foreign languages in the system of professional training of students;
- To disclose the features of the professional activities of teachers and students;
- To make it possible to overcome the contradictions that exist in teaching foreign languages in higher educational institutions and professional colleges. The development of a system of professionally-oriented teaching of foreign languages to students shows the interests of the

individual to the maximum extent and at the same time is aimed at fulfilling a new social order. Professionally-oriented teaching of a foreign language should be an impetus to the formation of the personality of a specialist who has an active life point of view (position) throughout his work. To do this, it is necessary to create such an educational and methodological environment that forms and develops the skills and abilities necessary for a future specialist, a future teacher (teacher) of a foreign language, which subsequently, through interest in learning a foreign language, would strengthen the student's interest in his future profession. To achieve a good assimilation of English language materials by students in educational institutions, it is necessary to ensure that[7]:

- Students' passion for learning a foreign language is to the required degree;
- The process of teaching foreign languages was communicative-oriented;
- The teacher creatively approached the choice of teaching methods;
- A favorable psychological environment was created during the classes for performing oral exercises and teaching dialogue in a foreign language;
- Various learning tools were available and opportunities were created for their constant use in the learning process;
- Classroom and extracurricular (classroom and extracurricular) creative work on the study of English was carried out in concert. If we take into account and attach importance to the above requirements in the process of studying and teaching foreign languages, this will lead to a change in the forms and content of the approach to a foreign language as a subject in higher educational institutions. At the present stage of social development in higher educational institutions, as well as in professional educational institutions, the main purpose of the course "Foreign language" is considered to be teaching students the ability to communicate at the place of service in a foreign language.

Teaching professionally-oriented English is a scientific direction born in the late 1960s, and it is considered a type of education that meets the educational needs of those receiving education and the social order of society. The abbreviation ESP (English for Specific Purpose) is currently considered a term that has entered the scientific circle of theorists and practitioners of teaching professionally oriented English. Teaching English as an ESP (English for Specific Purpose) requires not only a new approach to its methodology, but also a new look at the content of a foreign language. In particular, in non-philological higher educational institutions, ESP requires such an approach to the content of teaching English, in which, for example, when teaching professional communication (dialogue), the content of education is planned in stages; at the initial stage, the hours allotted for a foreign language are mainly directed to the formation of lexical, grammatical and phonetic skills and skills in communication, etc.

REFERENCES:

1. Bhatia VK. Genre analysis, ESP and professional practice. English for Specific Purposes, 2008.
2. Jeremy H. The Practice of Teaching English. - Longman, 2000.

3. Richards JC. Approaches and Methods in Language Teaching. - Cambridge Univ. Press. 2008.
4. Ergashev I, Farxodjonova N. Integration of national culture in the process of globalization Journal of Critical Reviews. 2020;7(2):477-479.
5. Muminjon N, Valievichmaster RF. The availability of natural gas and the cost of building power plants. ACADEMICIA: An International Multidisciplinary Research Journal. 2021; 11(30):1769-1771.
6. Nabievna KB. The study of quantitatively in linguistics. ACADEMICIA: An International Multidisciplinary Research Journal. 2021; 11(3):1848-1854.
7. Farxodjonqizi FN, Dilshodjonugli NS. Innovative processes and trends in the educational process in Uzbekistan. ACADEMICIA: An International Multidisciplinary Research Journal. 2020; 10(4):621-626.

AN ANALYSIS OF WEED RELATED CHALLENGES AND OPPORTUNITIES IN INDIA

Sunil Kumar*

*Assistant Professor,
Department of Mechanical Engineering,
TeerthankerMahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id-sunilagro.chaudhary@gmail.com

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ABSTRACT

For almost half of India's population, agriculture is the primary source of income. However, agricultural production is considerably lower than in many other nations, and it must be improved in order to produce 400 million tons of food grains by 2050 to satisfy the requirements of a population of 1.7 billion people. In India, the diverse climatic conditions encourage the most widely used weeds to thrive and inflict significant agricultural production losses. Weeds can impair crop quality, increase production costs, and shelter and act as alternative hosts for a variety of insect pests and illnesses. Weed control in India is important for increasing agricultural production by reducing weed-caused crop yield losses and alleviating other weed-related negative impacts in various ecosystems. Weeds continue to be a problem in a variety of habitats, despite advances in weed control methods for various crops and environments. The real challenges in Indian weed research are: managing weeds in small farms; lack of labour and mechanical tools; insufficient information on weed biology and shifts in weed flora; herbicide resistant weeds; lack of understanding of the impact of climate change on weeds and weed control; popularizing integrated weed management with herbicides by ensuring safe use to avoid adverse effects; and popularizing integrated weed management with herbicides by ensuring safe use to avoid adverse effects. The potential for proper weed control technology to significantly increase agricultural production is the biggest opportunity for Indian weed research. As a result, weed scientists have a larger role to play in the development, popularization, and adoption of location-specific effective, cost-efficient, and environmentally friendly weed control methods for India's many ecosystems.

KEYWORDS: Agriculture, Food, Population, Technology, Weed.

1. INTRODUCTION

India has a huge population and an agricultural economy. Agriculture provides jobs, food security, and industry products and services need. India has a broad variety of temperatures, from arctic cold to equatorial hot, as well as a large range of rainfall, from severe aridity to extreme humidity, with certain places receiving the world's greatest rainfall. The nation is divided into 20

agro-eco regions and 60 agro-eco-sub-regions based on soil, bio climate, and physiography. At the district level, each agro-eco-sub-region was further divided into agro-eco-units in order to create long-term land use plans. At constant prices, agriculture accounted for 17.9% of the Gross Domestic Product (GDP) in 2014-15. The agricultural industry employs 48.9% of the total workforce. India's population is projected to reach 1.7 billion people by 2050, with food consumption expected to increase to 400 million tonnes. To guarantee food security for India's increasing population, agricultural production must be increased. As a result, India's agricultural production sector has a problem in feeding 7.5% of the world's population with just 2.4 percent of accessible land and 4% of available water resources. After China, India is the world's second-largest producer of rice, wheat, and cotton, as well as the world's second-largest producer of sugarcane, after Brazil. India is also the world's second-largest producer of horticulture goods. However, agricultural production is considerably lower than in many other nations, and it must be increased to satisfy the demands of a growing population[1].

Weeds are responsible for about one-third of all agricultural pest losses. As a result, initiatives in India to increase agricultural production should include measures to reduce weed-related losses. Weeds are the most serious and pervasive biological restriction to agricultural production systems, causing harm to both cropped and non-cropped areas. They decrease agricultural output and impair product quality while also increasing production costs. Weeds not only decrease land value by reducing production and nutrient losses, but they also harbor and act as alternative hosts for a variety of insect pests and illnesses. Weeds can pose a health risk and reduce biodiversity in non-cropped areas. Despite advances in weed science research and extension, Indian farmers continue to suffer significant agricultural production losses owing to weed interference. Weed losses in agricultural crops vary because the type, scope, and severity of weed issues are dependent on the ecology in which the crop is produced, as well as factors including hydrology, land topography, the surrounding environment, establishment techniques, and cultural practices. Crop loss predictions are often inaccurate since scientific assessments have not yet been completed. Even the most conservative loss estimate of 10% would result in a loss of around 25 Mt of food grains, valued at about US\$ 13 billion. Similar losses may occur in plantation crops, fruits, vegetables, grasslands, forests, and the aquatic environment. The overall economic costs will be considerably greater if the indirect impacts of weeds on health, biodiversity loss, nutrient depletion, grain quality, and other factors are taken into account. Weeds have grown to alarming proportions in several areas of the nation. Weed issues differ depending on the agro-ecological area and the crops produced. It is critical to control weeds in order to prevent grain losses, decrease soil fertility and production, make more logical and sensible use of natural resources such as sunlight, water, and land, and increase crop yield. Recognizing the significance of weeds, previous studies on weed control in Indian agroecosystems were conducted[2].

1.1 History Of Weed Research In India:

Weeds have been present on the planet from the beginning of time, since they have adapted to various types of settings and thrive in the right ones. Farmers used repeated tillage, hand weeding, cover crops, grazing, rotation, burning, and floods in rice to manage weeds in the past. In India, sodium arsenate was initially employed to control *Carthamusoxicantha* in Punjab in 1937. In India, 2, 4- D was launched in 1948, and many compounds were imported and studied. Certain weeds were effectively controlled by some of them. In India, scientific research on weed control began in 1952 with the establishment of an all-India coordinated research program on

key crops such as rice, wheat, and sugarcane. In the same year, the Division of Agronomy at the Indian Institute of Agriculture Sciences in New Delhi, India, established a weed management division. The first agricultural university was founded in Pantnagar, Uttar Pradesh, in 1960, and subsequently many agricultural institutions were built throughout the nation, all of which include weed science as part of the curriculum and conduct weed science research. The USDA-PL480 project funded the All India Coordinated Research Project (AICRP) on Weed Control, which began with a few centres in 1978 and has now grown to many centres throughout India. In 1989, India created the National Research Centre for Weed Science in Jabalpur, Madhya Pradesh, which was elevated to the Directorate of Weed Science Research in 2009 and renamed to the Directorate of Weed Research in 2014. The institution has been doing fundamental and strategic research on weeds and weed control since its establishment. It also organizes location-specific weed control research, which is carried out by 23 coordinating units throughout the nation. DWR has been effective in raising awareness about the significance of weeds and weed control in agricultural production and sustainability. The "Indian Society of Weed Science" (ISWS) was founded in 1968, and it has been publishing the Indian Journal of Weed Science since 1969, with great Success[3].

1.2 Weeds Of India And Losses Cause:

In addition to loss of biodiversity (displacement of native plant species), potentially productive land, grazing land, and animal production, weeds (terrestrial, parasitic, and aquatic) wreak havoc on crop cultivation and ecosystem resilience. They also harm people and animals, induce erosion after fires in highly infested regions, clog navigational and irrigation canals, and reduce the amount of water accessible in water bodies. The effect or losses produced by weeds in various ecosystems are influenced by the related ecological variables. In India, there is a wealth of knowledge about weeds in rice, wheat, cotton, sugarcane, groundnut, soybean, forests, roadside, aquatic bodies, and fodder crops in various states. The number of most frequently encountered weed species in Indian agriculture varied from 60 to 70 in humid, per-humid, sub-humid, coastal, and island ecosystems, 30–40 in semi-arid, and 15–20 in arid ecosystems, according to data collected over a 20-year period from various Indian agro-ecological regions. Weeds have been found to reduce yields by 5% in commercial agriculture, 10% in semi commercial agriculture, 20% in subsistence agriculture, and 37–79% in dry land agriculture. DWR released a Weed Atlas for main weeds in important crops in 435 districts across 19 states throughout the nation. In India, 826 weed species were found to cause yield losses, with 80 and 198 being classified as extremely severe and serious weeds, respectively. In the DWR's vision paper, the major weed species of India were listed in various circumstances. . Major weeds are:

1.3 Available Weed Management Technologies And Their Adoption In Key Crops And Cropping Systems Of India:

Since the beginning of agriculture, Indian farmers have been fighting weeds using their knowledge and expertise. Herbicide-based weed control methods were the primary focus of Indian researchers. State agencies and universities are developing weed control guidelines, which are then being scaled up by extension agencies. The business sector, particularly merchants, is likewise pushing weed control methods that are in line with state agency recommendations. Integrated weed management, as well as weed ecology and biology, are now receiving more study attention. To make weed control methods safe and environmentally friendly, environmental factors are also considered. Invasive and parasitic species, aquatic weeds, forest

lands and public amenity areas, and invasive and parasitic species control technologies in India were recently evaluated and are not repeated here[4].

1.3.1 Non Chemical Weed Management;

Hand weeding is the oldest technique for keeping weeds under control. Even now, it is a widely used technique in India. Several studies have backed up this assertion. Unwanted plants were taken out by hand and killed in the beginning. Hand tools were later created to gain a mechanical edge in performing this task. When horse power was used for farming, a variety of weeding tools were developed and utilized. Many machine-operated weeders are now available and in use by farmers in India. One of the primary goals of all tillage activities using animal or machine power is to manage weeds, either directly or indirectly. We also examine the advantages of non-chemical weed control versus chemical weed control. Planting in a clean field, mechanical weeding, choosing a strong crop variety, changing planting densities, growing a cover crop, intercropping or relay cropping, fertilizer and water management, allopathy, harvesting and land management, and other variables may substantially increase crop yields[5].

1.3.2 Chemical Weed Management:

Herbicides are utilized across more than 20 million hectares in India, accounting for approximately 10% of the country's total cultivated area. When compared to the worldwide market (US \$ 33 billion), India's pesticide market is very modest (about US \$ 1 billion). Herbicides account for almost 20% of all pesticides used, and this number is projected to rise. Despite the fact that herbicides have been in use for almost three decades, their usage has just lately risen. Herbicide usage is concentrated in wheat, rice, soybeans, and sugarcane, with a proportion of 28, 20, 9, and 7%, respectively. There is a list of herbicides and herbicide combinations that have been authorized for usage in India. Herbicides are recommended for a variety of Indian crops, including semi-dry rice, dry-seeded rice, rice and wheat, aquatic weeds, and other crops. Herbicide residues in soil, water, plants, and non-targeted species, as well as human health consequences, were examined from an Indian viewpoint. Due to growing labor shortages and expense, productivity must be scaled up to improve food security, and herbicide demand is anticipated to skyrocket. The scientific community will have significant difficulties in dealing with the lack of farmer knowledge of herbicides and the technical competency of extension workers. Farmers will require extensive awareness-raising efforts, as well as trainings and seminars for extension staff. Herbicide residues in soil, water, and food, herbicide resistance in weeds, and other problems will become more prominent as herbicide usage increases, and India should be prepared to address them[6].

1.3.3 Integrated Weed Management:

Weeds are more aggressive, adaptable, and persistent than weeds, making single weed management methods (mechanical, chemical, biological, and cultural control techniques) ineffective. As a result, a holistic strategy combining various and integrated weed control techniques is recommended for long-term crop productivity. Weed control in wheat, groundnut, finger millet, maize, maize-based cropping systems, sorghum, cotton, groundnut, groundnut-based intercrops, mustard, vegetable crops, fruit, vegetable, tuber, ornamental, medicinal, aromatic, and plantation crops, as well as dryland crops, has been reviewed. For weeds including *P. hysterophorus*, *Cuscuta* spp., *Orobancha* spp., *Striga* spp., and *E. crassipes*, management issues were examined. In areas of India, such as Karnataka, Andhra Pradesh, Punjab, and

Haryana, the traditional manual transplantation of seedlings is giving way to direct-seeding in response to increasing production costs, particularly for labor and water. When compared to transplanted rice, direct-seeded rice requires 34 percent less overall labor and saves 29 percent on total cost. Direct-seeding of rice has been proven to perform as well as transplanted rice on research farms when weeds are properly managed. However, due to a lack of efficient pesticides and integrated weed management methods for weed control in direct seeded rice, the technology's expansion has been limited, among other things. Herbicides in conjunction with manual weeding were found to be the most cost-effective weed control strategy in India, according to a review[7].

1.4 Challenges And Opportunities:

1.4.1 Managing Weeds Under Small Farms:

In India, resources are scarce for small-scale farmers. Even though pesticides are used to a limited degree in rice, wheat, soybeans, and tea in India, human labor is still the most common method of weeding. With an estimated labor demand of 20 man-days per hectare for weeding, India will need about 5 billion man-days of labor only for weeding. Any labor shortfall will have a significant effect on weed control[8]. The National Rural Employment Guarantee program, which was established in India, has had an effect on the availability of labor in rural India for agricultural activities. If such plans are implemented, regardless of their effectiveness, the labor scarcity will worsen, and salaries will rise even more in the next year. Due to a lack of labor, delayed weeding may result in significant crop losses, prompting farmers to use herbicides in the future to improve crop production by controlling weeds at crucial periods. As a result, herbicide usage is likely to increase in the near future. Because of the labor scarcity, farmers are turning to automation of agricultural operations like as land preparation, weeding, harvesting, and threshing, even on small farms, by renting equipment from bespoke hiring centers in Karnataka. Even a subsistence farmer finds it more cost-effective to use harvesters and tractors. It is recommended that improvised mechanical weeding equipment be developed that are affordable to India's small and marginal farmers[9].

1.4.2 Popularizing Integrated Weed Management Strategies With Safe Use Of Herbicides As A Component:

Since the green revolution, it has been noted that single weed management methods have not proven to be long-term sustainable and successful. Weed management in small farmers can be made more effective and economical by using competitive cultivars, proper agronomy, which includes selecting a vigorous cultivar, appropriate nutrient and water management, diversified rotations, cover crops, mulching, and judicious use of herbicide when needed. It's critical to keep farmers' knowledge up to date with timely, relevant, and accurate weed control technology information. In India, herbicide usage is on the rise. However, in many Indian states, the safe use of herbicides is not practiced. As a result, effectively using herbicides as a component of integrated weed control requires educating farmers on safe herbicide application. Effective popularization of the techniques involved in safe herbicide usage is critical in order to guarantee that farmers in India have access to the finest weed control technology in order to maximize long-term agricultural production[10].

2. DISCUSSION

Weed management technology may be used to control weeds in a variety of environments. The existing technology must be fine-tuned to meet the particular requirements of the agricultural community and others in their respective locations. There is a need to expand infrastructural facilities for weed control research, extension, and adoption. The need of doing need-based fundamental research on weed biology and ecology in order to develop location-specific integrated weed control methods via collaborative research with other agricultural disciplines should be highlighted. Indian scientists must collaborate more with foreign institutions and weed experts from across the globe to solve weed control issues in the face of climate change. The private sector's involvement in large-scale adoption of integrated weed control systems in various crops is important. They must realize that herbicides are just one weapon in the fight against weeds, and that there are many other variables to consider when planning and implementing a weed management strategy. Small farmers in India will benefit from a system-based weed control approach that includes strong cultivars, adequate agronomy and land management, appropriate application technology, and correct herbicide rotation.

3. CONCLUSION

Weed issues are expected to grow and become more complicated in contemporary agriculture, as greater focus is placed on high input systems. With increased knowledge of the negative effects of herbicide residues on human health and the evolution of herbicide-resistant weed biotypes, weed research has turned its emphasis to the development of eco-friendly technologies that rely less on herbicides. Furthermore, with the widespread use of herbicide-resistant crops and the uncertainty of climatic optima as a result of climate change, weed science issues have multiplied. To deal with these complex weed issues, a multi-disciplinary strategy is needed, which includes changes to technology, managerial methods, and laws. For creating sustainable weed management methods, more understanding of weed ecology, biology, genetics, and molecular biology is required. Furthermore, judicious use of sophisticated technology, such as site-specific weed management systems and decision support models, will play a key role in lowering weed control costs. In addition, better connections between farmers and weed researchers will be required to promote the adoption of technology advances. To address these difficulties, research objectives must be established, and the weed science education system must be reoriented. Closer cooperation between weed scientists and other disciplines, in particular, may aid in identifying and addressing the complex weed management problems of the twenty-first century. This paper discusses several opportunities and challenges of weeds.

REFERENCES:

1. Westwood JH et al. Weed Management in 2050: Perspectives on the Future of Weed Science. *Weed Sci.*, 2018; 66:275–285. doi: 10.1017/wsc.2017.78.
2. NeveP. et al. Reviewing research priorities in weed ecology, evolution and management: a horizon scan. *Weed Research*. 2018 Aug;58(4):250-258. doi: 10.1111/wre.12304.
3. Ramesh K, Matloob A, Aslam F, Florentine SK, and ChauhanBS. Weeds in a changing climate: Vulnerabilities, consequences, and implications for future weed management. *Front. Plant Sci.*, 2017, doi: 10.3389/fpls.2017.00095.
4. HolznerW. Weed species and weed communities. *Vegetatio*, 1978; 38: 13–20. doi: 10.1007/BF00141295.

5. Hall DW, Mccarty LB, and MurphyTR. Weed taxonomy. In Turf Weeds and Their Control, 2012.
6. Engel RE and Ilnicki RD. Turf weeds and their control. In Turfgrass Science, 2015.
7. Salonen J, HyvönenT., and JalliH. Weed flora and weed management of field peas in Finland. Agric. Food Sci., 2005; 14(2):189-201. doi: 10.2137/145960605774826037.
8. WatanabeH. Development of lowland weed management and weed succession in Japan. Weed Biology and Management. 2011; 11: 175–189. doi: 10.1111/j.1445-6664.2011.00419.x.
9. Rasmussen K, Rasmussen J, and PetersenJ. Effects of fertilizer placement on weeds in weed harrowed spring barley. Acta Agric. Scand. Sect. B Soil Plant Sci., 1996;46(3): 192-196 . doi: 10.1080/09064719609413133.
10. Batlla D and Benech-Arnold RL. Weed seed germination and the light environment: Implications for weed management. Weed Biology and Management. 2014;14(2): 77-87. doi: 10.1111/wbm.12039.

A REVIEW ON INDUSTRIAL DESIGN REGISTRATION

Dr. Megha Sharma*

*Assistant Professor,
Department of Finance and Marketing,
Teerthanker Mahaveer Institute of Management and Technology,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- drmegha.computers@tmu.ac.in

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ABSTRACT

This article discusses how Trade Related Intellectual Property Rights (TRIPRs) on Industrial Designs (ID) aid the growth of the auto component industry in the context of the World Trade Organization (WTO). Industrial designs are made up of lines, colours, or other three-dimensional shapes that give a product or handcraft a unique look. They preserve the decorative or aesthetic element of an utilitarian item, which typically appeals to the senses of sight or touch and may be mass-produced. "Design" means only the features of shape, configuration, pattern, or ornament applied to any article by any industrial process or means, whether manual, mechanical, or chemical, separate or combined, which in the finished article appeal to and are judged solely by the eye; it does not include any more or principle of construction of anything which is in substance mere mechanical device, and it does not include any more or principle of construction of anything which is in substance mere mechanical device, and it does not include any more or principle of construction of anything which is in A design is anything that is applied to an item rather than the item itself. The item on which the design will be applied must be something that will be delivered to the buyer as completed products. Within the concept of design, buildings and structures are not items. Portable constructions or models, on the other hand that are marketed as completed products may be subject to design registration.

KEYWORDS: Industrial Design, Importance, Features, World Scenario.

INTRODUCTION

IndustrialDesign

Industrial design[1] is the creative process of giving mass-produced goods or articles a decorative or aesthetic look. Two-dimensional or three-dimensional shapes may be used to convey the design. The United Kingdom's Design Act of 1949[2] defines design as a characteristic of form, arrangement, pattern, or decoration. Industrial design encompasses the form, surface, pattern, lines, color, and other appearance-related characteristics of industrial goods such as watches, automobiles, mobile phones, laptop computers, various household appliances, buildings, textile patterns, and handcraft products. Apart from technical excellence and other factors, the aesthetic worth of a thing, or how it appeals, is the most important consideration in marketing.

An industrial design must be fresh or unique, and non-functional, in order to be protected under most national laws. As a result, industrial design is primarily concerned with aesthetic characteristics, and the design registration does not protect any technological features or aspects of the object to which it is applied. Although, if the technological elements are unique, they may be protected by a patent. 8 In addition to this, design that is literary or creative in nature, such as a cartoon, label, pamphlet, map, dressmaking pattern, and so on, is covered by copyrights rather than industrial design. Industrial design rights[3] may last anywhere from 10 to 25 years depending on the nation. Industrial designs in India are protected for ten years under the Design Act of 2000. This period may be extended for an additional five years. By fostering more visually appealing goods for society, industrial design promotes innovation and skill development among individuals and the manufacturing industry. The form and shape of a product not only creates an attractive look, but it is also indirectly linked with ergonomics and plays a significant part in the comfort of consumers in the case of machines, furniture, automobiles, and so on.

Importance of Industrial Design:

The look of the article has an impact on the consumer's decision[4]. Many individuals make the mistake of picking the first item that catches their attention. People are drawn to design that has aesthetic value at the moment of purchasing. Some articles with a unique design may pique the public's interest, and the whole supply may be sold in a short period of time. As a result, product design improves profitability by enticing consumers. Producers are on the lookout for a visually appealing design that would boost sales. Some thinkers put in a lot of effort, time, and money to come up with a design for a certain item that would boost sales. The purpose of design registration is to ensure that the inventor of a lucrative design does not lose out on his reward because others use it without his permission on their products.

The creation of a design for commercial use necessitates a significant investment of time, money, and creative abilities. Originality, freshness, and eye appeal all contribute to the value of a design as an intellectual property right. The Design Act of 1911 stipulates that a design must be fresh or unique in order to be registered. It also shouldn't have been released before. The design right is a new intellectual property that applies to unique, non-commonplace item shapes and configurations. It is not a monopoly right, but rather a right to prohibit duplication, and it lasts for five years from the date of registration, with the option to renew for another five years after paying the required cost. A design right is a property that may be purchased, sold, or licensed, just like any other commercial commodity. All design registration applications must be submitted in writing.

Made to the patent controller by a person claiming to be the design's owner. The look of the article has an impact on the consumer's decision. Many individuals make the mistake of picking the first item that catches their attention. People are drawn to design that has aesthetic value at the moment of purchasing. Some articles with a unique design may pique the public's interest, and the whole supply may be sold in a short period of time. As a result, product design improves profitability by enticing consumers. Producers are on the lookout for a visually appealing design that would boost sales. Some thinkers put in a lot of effort, time, and money to come up with a design for a certain item that would boost sales. The purpose of design registration[5] is to ensure that the inventor of a lucrative design does not lose out on his reward because others use it without his permission on their products.

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Features of an Industrial Design:

There are four characteristics that are important in industrial or product design[6]. Shape, configuration, pattern, and decoration are the four elements. The shape and configuration of an item refers to its form, which is typically three-dimensional. Pattern and ornament are ornamental elements that are usually applied to the surface of an item and are two-dimensional in nature.

The term "design" refers to elements of form that appeal to the eye and should be evaluated purely on the basis of appearance and should not have been previously published. The adjectives 'new' and 'original' imply novelty in terms of design, form, or ornamentation. Expert testimony from the trade is acceptable in determining the issue of novelty or originality. The registration design should not have been previously released. There are two kinds of publications:

- Prior document publication; and
- Prior usage publication

Trips Agreement on Industrial Design.

Industrial Design is included under Section 4 of Part II of the TRIPS Agreement. Industrial designs are subject to obligations that include the protection of independently produced designs that are innovative or unique. They have the option of excluding designs determined by technical or functional considerations from protection, as opposed to aesthetic considerations, which are covered by industrial designs. Early this year, the bill to modify the Industrial Design Act was approved. Industrial designs must be protected for at least ten years under the TRIPS agreement[7].ten years Protected design owners must be able to prohibit products having or embodying a design that is a duplicate of the protected design from being manufactured, sold, or imported.

Members are required by Article 25.1 of the TRIPS Agreement to provide for the protection of innovative or unique industrial designs developed independently. If designs do not substantially vary from existing designs or combinations of known design elements, members may claim that they are neither unique nor original. Members may stipulate that this protection does not apply to designs that are primarily driven by technical or functional concerns. Article 25.2 contains a special provision aimed at taking into account the textile industry's short life cycle and large number of new designs: requirements for securing protection of such designs, in particular in terms of cost, examination, or publication, must not unreasonably limit the ability to seek and obtain such protection. Members have the option of fulfilling this duty via industrial design or copyright law.

Members are required by Article 26.1 to grant the owner of a protected industrial design the right to prevent third parties who do not have the owner's consent from making, selling, or importing articles bearing or embodying a design that is a copy, or substantially a copy, of the protected design when such acts are carried out for commercial purposes.

Article 26.2 allows Members to make limited exceptions to the protection of industrial designs, as long as those exceptions do not unreasonably conflict with the normal exploitation of protected industrial designs and do not unreasonably prejudice the legitimate interests of the protected design's owner, taking into account the legitimate interests of third parties.

The length of available protection must be at least ten years (Article 26.3). The phrase "amount to" enables the term to be split into two five-year intervals, for example.

The Hague Agreement provides international protection for industrial designs. This method allows the owner of an industrial design to have his design protected in many nations by submitting a single application with the World Intellectual Property Organization's (WIPO) International Bureau, in one language, with one set of costs in one currency.

PresentStatus –WorldScenario

Industrial designs can only be protected in most countries if they are registered. Prior to the registration of an industrial design in a number of these nations, no search is conducted and no substance examination is conducted. If an industrial design application has been published and a third party has opposed to its registration by filing a notice of objection, several nations allow for a search and inspection. Unregistered industrial designs may be protected in a small number of nations. Industrial designs, unlike trademarks, are not susceptible to revocation if they are not actively utilized after they have been issued. In today's hyper-competitive global market, a visually appealing design may be enough to entice a demanding and diverse customer. Autocomponent Industries was able to reach out to and appeal to a wide range of consumers, including those of all ages, faiths, and cultures. Having design rights to a product's appealing form or style may provide a much-needed competitive advantage.

IndianScenarioonIndustrialDesign

When a design is registered with the Controller-General of Patents, Designs, and TradeMarks, the registered owner of the design has copyright in the design for ten years from the date of registration, subject to the requirements of this Act.[8]

IndustrialDesigninAuto ComponentIndustries

The study was conducted with Autocomponent Industries in Ambattur, Chennai about 10 Industries out of 100 industries available with well-structured questionnaire and the conclusion obtained is given below

The value of intellectual property (IP) [9] is often not adequately appreciated and its potential for providing opportunities for future profit is widely underestimated by many Auto component Industries. However, when IP is legally protected and there is demand for the IP-protected products and/or services in the marketplace,

- IP can become a valuable business asset.
- IP may generate an income for Autocomponent Industries through

the licensing, sale, or commercialization of the IP-protected products or services that may significantly improve an enterprise's market share or raise its profit margins.

- IP rights can enhance the value or worth of Auto component Industries in the eyes of investors and financing institutions.
- The value of Auto component Industries at times may be the primary or only true asset of value.
- The strategic utilization of IP assets can, therefore, substantially enhance the competitiveness of Auto component Industries.
- Auto components Industry should make sure that they are ready to face the challenge and take measures to exploit their IP and protect it wherever possible.
- Like physical assets, IP assets must be acquired and maintained, accounted for, valued, monitored closely, and managed carefully in order to extract their full value. But before this can be done, Auto component Industries must first acknowledge the value of IP and begin to see it as a valuable business asset.

Using Brands and Designs to Market Goods and Services Abroad

The reasons for protecting trademarks and industrial designs in the domestic market fully apply to foreign markets too. Trademark registration, in particular, enables you to maximize product differentiation, advertising and marketing, thus enhancing recognition of your product or service in international markets and establishing a direct link with the foreign consumers.

Depending on the nature of your service, a franchising agreement with firms abroad, could be a useful alternative way to earn revenue from your Trademark abroad as well.

Companies that export unbranded products will face disadvantages such as:

- Lower revenues as consumers demand lower prices for unbranded goods.
- Lack of customer loyalty largely due to their inability to recognize the product and distinguish it from the products of competitors.
- Difficulties in marketing and advertising products or services abroad in the absence of a suitable symbol or easy identifier that links your products or services with your SME, as marketing an unbranded product is inherently much more difficult.
- With regard to industrial designs, protection in export markets will help not only to strengthen your overall marketing strategy but may also be important for customizing products for specific target markets, creating new niche markets for your company's products, and strengthening your company's image and reputation by linking it to a specific design.

The Paris Convention for The Protection Of Industrial Property

The Paris Convention contains a number of specific provisions relating directly to industrial designs and other more general provisions which are also applicable to industrial designs. Currently, the Paris Convention [10] has ninety-nine countries as members, including the United States.

CONCLUSION:

To sum up, auto component manufacturers should think about how to effectively use the intellectual property system for their own advantage at the lowest feasible cost. It's important to

remember that IP assets can help a company with almost every aspect of its business development and competitive strategy, from product development to product design, service delivery to marketing, and raising capital to exporting or expanding its business internationally through licensing or franchising.

REFERENCES:

1. Wood in small and medium enterprises (SMES) jepara furniture in promoting the protection of intellectual property rights,” *Int. J. Appl. Eng. Res.*, 2017.
2. Intellectual Property Office, “Registered Designs Act 1949,” *Current*, 2006.
3. R. Tiwari, G. Tiwari, A. K. Rai, and B. Srivastawa, “Management of intellectual property rights in India: An updated review,” *Journal of Natural Science, Biology and Medicine*. 2011.
4. H. Peter, “Importance of industrial design in product development,” *Sulzer Tech. Rev.*, 1991.
5. A. Y. Churilov, “Intellectual Property in the Age of 3D Printing,” *Actual Probl. Russ. Law*, 2020.
6. M. A. H. Labetubun, “ASPEK HUKUM PERLINDUNGAN DESAIN INDUSTRI KERAJINAN KERANG MUTIARA DALAM PEMBERDAYAAN USAHA KECIL DI KOTA AMBON,” *SASI*, 2011.
7. A. Taubman, H. Wager, and J. Watal, “A Handbook on the WTO TRIPS Agreement,” in *A Handbook on the WTO TRIPS Agreement*, 2012.
8. L. Jajpura, B. Singh, and R. Nayak, “An introduction to intellectual property rights and their importance in Indian context,” *J. Intellect. Prop. Rights*, 2017.
9. C. Greenhalgh and M. Rogers, “The value of intellectual property rights to firms and society,” *Oxford Rev. Econ. Policy*, 2007.
10. C. A. Horowitz, “Paris Agreement,” *Int. Leg. Mater.*, 2016.

A REVIEW ON NETWORK MONITORING IN SOFTWARE-DEFINED NETWORKING

Ratnesh Kumar Shukla*

*Assistant Professor,
Department of Computer Engineering,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- ratnesh.nitttr@gmail.com

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ABSTRACT

Monitoring is an essential notion in network management because it allows network operators to assess how a network behaves and how its components are performing. Monitoring is also used for decision-making in traffic engineering, quality of service, and anomaly identification. For network provisioning and administration, software-defined networking (SDN) is becoming more prevalent. The SDN idea is now extensively used in a variety of network sectors, including university networks and service providers. According to an IHS Markit study, about 75% of networking providers have implemented or plan to use SDN. It is feasible to orchestrate the application plane, control plane, and data plane to meet management needs since SDN monitoring includes various network measurement techniques. The SDN monitoring findings may be expanded utilizing a variety of innovative network adaption methods thanks to tools to regulate forwarding rules and actions. This article examines the duties and difficulties connected with SDN, as well as the state of SDN monitoring. There are also a number of design ideas, research directions, and unresolved problems addressed.

KEYWORDS: *Measurement, Monitoring, Open flow, Software Defined Networking (SDN).*

1. INTRODUCTION

The goal of network monitoring is to ensure that appropriate management activities are carried out. Monitoring depicts network activity and offers a perspective of network status, which serves as a foundation for other management activities such as traffic engineering, quality of service (QoS), and anomaly detection. The operation model in computer networks is a stacking design with various levels that connects many hosts for data exchange. Network monitoring assists network operators in obtaining operation and use data for a variety of management reasons [1], [2].

As the Internet continues to expand at a rapid rate, new technologies are using more and more network applications to enhance our everyday lives. At the moment, conventional network design is unable to satisfy all of the needs of emerging applications. To guarantee excellent performance in terms of global and regional network transmission, content delivery services, for example, often need flexible and adaptive controls. To serve their audiences, live broadcasting

services may need a high bandwidth capacity at any time. The network resources are no longer needed once the broadcast has finished. Network systems must be clever for adaptation and optimization based on the application needs. Researchers compiled a list of current network structure issues to address this issue. They discussed the inefficiency of collecting monitoring data and the lack of scalability of traditional monitoring techniques [3], [4].

SDN (software-defined networking) has been suggested as a way to progressively eliminate network issues via adaptability and flexibility. By separating the control and data planes, which differentiate data transmission from control activities, SDN enhances network programmability and offers a global view of the whole network. Implementation problems of SDN, such as the balance between data processing and increased transmission costs, as well as security challenges in system control, have been studied in related research. Alternatives and potential SDN implementations were addressed, as well as monitoring and traffic measurement problems inside SDN. They emphasized how challenging it is to balance resources and provide precise real-time metrics through SDN. Traditional optimization techniques such as balancing algorithms and traffic matrices, on the other hand, may struggle to apply traffic engineering in SDN due to changes in network topologies. The problem was identified, and a research framework for allowing traffic engineering in SDN was developed. Their strategy is divided into two sections: traffic measurement and traffic management. They also described an adaptive optimization technique that is anticipated to decrease network maintenance's energy usage [5], [6].

1.1. Basic Network Monitoring Concepts:

The measurement of raw datasets is the initial stage, followed by aggregation and preparation. The datasets are then investigated using a variety of analytics. Finally, the data may be displayed to let network operators understand how things are going. The basic characteristics of contemporary networks are used to understand the detailed process of network monitoring. Analyzed monitoring technology and discovered potential issues. Network monitoring may be divided into two categories: data measurement and data processing. Obtaining and keeping data is part of data measurement. We further split the measurement operation into collection, preprocessing, and transmission based on prior research. We divide data processing into analysis and presentation since it is responsible for arranging the data into usable information [7], [8].

- 1) **Data Collection:** There are three main concerns in this phase: means, goal, and frequency. The method relates to how the data will be gathered. The target refers to the devices that will be monitored, and the frequency refers to how often information will be updated. In addition, measuring techniques may be classified as active or passive. Agents produce probe instructions to conduct a network feature assessment in active measurement. The measurement findings may immediately give network activity information, but if this procedure is done often, there is a risk of increasing system stress. Passive measurement, on the other hand, does not include any artificial activities. By obtaining output data from network components, the agents measure network statistics in an indirect way.
- 2) **Preprocessing:** The raw data is collected and converted into a statistical representation in this step. The data processing system aids in the itemization and tracking of measurement findings. The management information base (MIB), for example, is a hierarchical structure that offers such a framework for handling gathered data. In the MIB hierarchy, each MIB is addressed or recognized by a unique object identifier. This allows the data gathered from each device to be itemized individually.

- 3) **Transmission:** The transmission phase is in charge of transporting itemized data to the analytics station. The simple network management protocol (SNMP), for example, is a common protocol for exchanging messages during transmission. It facilitates the exchange of data between agents and the station. Syslog, which utilizes the connectionless technique for log delivery, is another example of efficient system message transfer.
- 4) **Analysis:** In this step, statistics are generated and specific occurrences are identified. Some techniques classify traffic depending on the payload or the host's activity, while others look at communication patterns. The findings of the study are used by traffic engineering and fault management programs to determine the condition of the network.
- 5) **Presentation:** The findings of the analysis are exported at this step. MRTG and RRDtool, for example, use traffic graphs to visualize data. Both long- and short-term traffic data are frequently shown using graphing solutions such as Cacti. Furthermore, monitoring the network necessitates displaying the state of the network topology. Routing tables and protocols may be used to visualize network reachability.

1.2. Monitoring Differences Between Legacy Networks and SDNs:

A network may execute various monitoring jobs at numerous geographical and temporal dimensions using SDN monitoring. SDN may split bigger traffic and combine smaller traffic based on address prefixes and port numbers at the geographical scale. Statistics may be gathered over a period of time on a temporal scale. Agents in a semi-centralized system may potentially share overhead costs. The stages of traditional network monitoring are compared to those of SDN monitoring [9], [10]. The following are the specifics:

- 1) **Data Collection:** Developing agents to gather measurement data from diverse devices is simple in a traditional network. Periodically, the agents collect data from devices and store it for future study. To enhance this, SDN may determine which devices should be monitored and the exact polling time via the controller, based on a defined scheduler with a global perspective.
- 2) **Preprocessing:** SDN's filtering and itemization techniques are comparable to those used in traditional networks at this step. Because data flows may pass through many SDN devices in the network, legitimate and incorrect data must be distinguished. To prevent capturing redundant data from neighborhood network devices, decisions may be given back to the collecting agents.
- 3) **Transmission:** Standard protocols are frequently utilized for transmission in older networks (e.g., SNMP and syslog). The southbound application programming interface (API) of the SDN architecture, on the other hand, enables network designers to create appropriate data structures for their needs. Open Flow, for example, is a real-world example of SDN. OpenFlow's OFPMT METER component is a built-in controller function for collecting meter data from OpenFlow devices. Through OpenFlow control communication, valid data from the agents will be provided for analytics.
- 4) **Analysis:** The majority of the traditional network status analytics are also accessible for SDN and are linked with the controller. The logging information for large-scale and dispersed SDN systems may be readily examined utilizing the centralized control. Adding interpretation tools for network status analysis is also useful for program developers.
- 5) **Presentation:** The SDN system can simply incorporate the current visualizations. SDN may also offer interactive interfaces to help with application-level development and presentation.

Network activity and abnormalities may be seen instantly using data obtained through the northbound APIs.

When comparing the traditional network to SDN, the former has benefits in terms of customized operations and durability, while the latter provides greater network control adaptability and flexibility. The scalability of the network increases the complexity of monitoring as it grows. Due to the latency and unpredictability of dispersed network devices, measurement findings are often inaccurate. However, coordinating the log collecting from different devices is challenging without effective techniques in the preprocessing and transmission stages. Furthermore, certain new network developments (for example, cloud-based data centers and 5G mobile networks) have generated more complicated operating environments. Traditional monitoring techniques may not be capable of keeping up with rapid, on-demand, and dynamic changes in network activity in such settings, according to many research. Using SDN to implement the monitoring mechanism is a potential improvement in this situation. The controller in the SDN architecture may be used for global network monitoring. SDN's centralized control allows more softwarized network system activities, such as correlating traffic to particular forwarding destinations, identifying end-hosts, locating important nodes, displaying flow statistics, and establishing the topology of and monitoring abnormal traffic. Network monitoring activities may be converted into basic functions integrated in the controller using the SDN approach, and the whole SDN network can be seen using software-based control techniques.

In terms of implementation, there are still a few issues with using the SDN approach for monitoring production networks. Because the majority of the global network is still built on conventional design, the first issue arises at the interface between legacy and SDN. Without the SDN protocol, the SDN controller is unable to manage or view network devices. Furthermore, since SDN isolates the logic of forwarding devices from the data plane, it necessitates additional connection and a longer delay time for centralized control communication. To enhance efficiency, the monitoring tools should appropriately adapt the connection quality and allow bootstrapping communication. Despite its numerous advantages in building network applications, SDN seems to be flawed. SDN provides a new software-control architecture for network builders to alleviate current issues with older networks. From the perspective of network operators, SDN allows for the most efficient management of network resources via the use of softwarized artificial programs. SDN's open standard streamlines network operations while also improving network exploration openness.

2. DISCUSSION

In most instances, network measurement activities use fixed metrics to sample traffic on a regular basis, even though adaptive metrics may be more efficient during real measurements. The SDN controller, for example, may modify the per-flow metrics to approach more fine-grained measurement based on observed network activity. This topic has been the subject of many research. The SDN controller is used by OpenMeasure to update monitoring rules with learning predictions in real time. For adaptive measurements, the Count-Min sketch method was implemented within the NetFPGA. HashPipe can also monitor large flows on SDN switches with great precision, utilizing pipelines and hash tables to handle flow IDs and counters for improved efficiency.

The proposed framework must minimize monitoring overheads while dynamically allocating network resources in order to analyze and display traffic data in real time for complete management. The goal of traffic engineering is to improve performance on both the traffic and resource levels. The path for traffic engineering in SDN networks has been set forth by researchers. Flow management, fault tolerance, topology updating, and traffic analysis were the four indices they defined. We think that the trend of intelligently utilizing flow entries will continue to gain traction, and that future SDN analytics engines will be able to analyze traffic status in near-real time.

The control plane will become the next target for malicious attacks as SDN decouples data and control. By diverting or filtering communication flows depending on the packet header or payload, security measures may be implemented. FleXam, for example, implements packet-level information by redefining sampling as a new action to be assigned to each flow (i.e., OFPAT SAMPLING). FleXam also uses a port scan detection method known as threshold random walk. To build security applications, the OrchSec architecture orchestrates network monitoring and SDN management operations. Security apps in OrchSec may regularly query traffic via the REST API. When the program detects suspicious behavior, it takes steps to remove the malicious packets. Furthermore, a technique for detecting security risks in mobile SDN networks via monitoring and data collecting.

As the use of cloud services grows, there is a need to improve network control capabilities to handle cloud traffic. Neutron, for example, is an SDN-enabled OpenStack development that offers virtual network management. Meridian is a cloud-based prototype SDN controller platform for network services, whereas NetGraph utilizes a topology service module to acquire the underlying network's topology and up-to-date continuous streams to update this information. CloudWatcher employs four routing algorithms in its cloud network monitoring services to divert traffic to preconfigured network security devices for examination.

The notion of quality-of-experience (QoE) has developed to supplement QoS by allowing providers to track user perceptions, experiences, and expectations. SDN can offer comprehensive QoS control for traffic engineering solutions using packet-based or flow-based monitoring data. A general formula to link QoE and QoS parameters is needed because effective QoE control methods need QoS parameters to make choices. Researchers suggested a system architecture for QoE monitoring and management based on two functions: the application layer's QoS matching and optimization function and the control layer's route assignment function. An in-network QoE measurement framework for HTTP adaptive streaming monitoring, as well as QoE methods based on deep packet inspection (DPI) to improve video streaming transmission.

The software-defined Internet exchange (SDX), which connects several SDN domains, was born from the high-level abstraction of network services and management activities. Software may manage activities like network advertising and setup in this manner. This combination of traffic monitoring in SDXs will aid in the management of multidomain networks and the monitoring of collaborative services. SDX is anticipated to become a significant problem in worldwide network research as SDN techniques develop at a rapid pace.

3. CONCLUSION

The present state of the art in SDN monitoring, including design concepts, techniques, and potential enhancements, was examined in this article. Traditional monitoring and SDN

monitoring techniques were contrasted, and integrated views on monitoring problems were presented. SDN has been examined and analyzed in terms of its development ideas, research directions, and outstanding problems. Several research paths and recommendations are making SDN monitoring more efficient for readers who intend to examine it. When evaluating network health and summarizing statistical data, one of the most important objectives in network monitoring is to minimize operating overheads. The operating overheads increase in proportion to the network's size and complexity. Smart algorithms in data selection, scheduling, and sampling are required for large-scale SDN networks. Exploring possible applications to satisfy different use cases in SDN monitoring, as well as enabling future usage situations in advance, is a desired element of development. Because most portions of the global network still use conventional architecture, the hSDN mode is anticipated to remain the deployment option for a while. As a result, selecting competent designs for use in the monitoring environment is critical. Researchers will be able to develop various monitoring mechanisms for achieving more flexible, adaptive, and high-level control characteristics in SDN monitoring, transparency in network virtualization, and the virtual network technology provides a powerful technique for utilizing the network by making good use of programming languages and APIs. The difficulty in network monitoring is to keep track of both physical and logical networks while also ensuring that mapping information is visible. The transparency feature is a practical advancement that enables network monitoring, inspection, and analysis by providing a clear picture of the physical and virtualized components in each slice. It is essential to network operators that the use of both applications and users can be recognized. In terms of inspection, network packet monitoring allows network operators to protect the network while fulfilling the varied and changing activities in a safe manner. Checking layer 2–4 headers, on the other hand, is no longer sufficient to extract the packet. For fine-grained security monitoring, multilayer inspection and DPI are becoming more essential.

REFERENCES:

1. Yan S, Aguado A, Ou Y, Wang R, Nejabati R, and Simeonidou D. Multilayer network analytics with SDN-based monitoring framework. *J. Opt. Commun. Netw.*, 2017;9(2): A271-A279. doi: 10.1364/JOCN.9.00A271.
2. Chen K, Zhao S, and Lv N. Network monitoring information collection in the SDN-Enabled airborne tactical network. *Int. J. Aerosp. Eng.*, 2018, doi: 10.1155/2018/1940842.
3. Zaalouk A, Khondoker R, Marx R, and Bayarou K. OrchSec: An orchestrator-based architecture for enhancing network-security using network monitoring and SDN control functions. 2014;1-9. doi: 10.1109/NOMS.2014.6838409.
4. Fawcett L, Scott-Hayward S, Broadbent M, Wright A, and Race N. Tennison: A distributed SDN framework for scalable network security. *IEEE J. Sel. Areas Commun.*, 2018;36(12): 2805-2818 doi: 10.1109/JSAC.2018.2871313.
5. Van Tu N, Hyun J, and Hong JWK. Towards ONOS-based SDN monitoring using in-band network telemetry. 2017, doi: 10.1109/APNOMS.2017.8094182.
6. Phan XT and Fukuda K. SDN-Mon: Fine-grained traffic monitoring framework in software-defined networks. *J. Inf. Process.*, 2017; 25, 182-190. doi: 10.2197/ipsjjip.25.182.
7. Hu Z and Luo J. Cracking network monitoring in DCNs with SDN. 2015, doi:

10.1109/INFOCOM.2015.7218383.

8. Carvalho LF, Abrão T, Mendes de S, and Proença ML. An ecosystem for anomaly detection and mitigation in software-defined networking. Expert Syst. Appl., 2018, doi: 10.1016/j.eswa.2018.03.027.
9. Shu Z et al. Traffic Engineering in Software-Defined Networking: Measurement and Management. IEEE Access, 2016; 4:1-1. doi: 10.1109/ACCESS.2016.2582748.
10. Zhang H, Cai Z, Liu Q, Xiao Q, Li Y, and. Cheang CF. A Survey on Security-Aware Measurement in SDN. Security and Communication Networks. 2018, doi: 10.1155/2018/2459154.

A REVIEW ON ENVIRONMENTAL SCIENCE

Navneet Kumar Vishnoi*

*Assistant Professor,
Department of Computer Engineering,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- navneet.computers@tmu.ac.in

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ABSTRACT

Heat pumps are a promising invention for household buildings that deliver extremely high performance compared with the combustion of fossil fuels. A billion thermal pumps have been used worldwide in the field, but they are a very recent technology in many regions considering their maturity. This article offers a description of emerging technology and practical challenges that occur as they are mounted and run. It focuses on actual results, by analyzing reported efficiency data for hundreds of air sources and heat sources of the ground. Pumps and a tool to link the findings of recent field studies in the UK and Germany (ASHP and GSHP) Pumps. It also includes trading facets of technology, typical primary energy savings, decreased carbon dioxide emissions and more widespread consequences of their use.

KEYWORDS: AHP, Air Conditioning System, GSHP, Heat Pump, Refrigeration.

1. INTRODUCTION

In refrigerators and air conditioning systems (Figure 1), heat pumps are most widely used. Electricity is used for extracting the heat from a cold place and pumping it to a colder one, which gives food or citizens the optimal temperature. They will provide heating and cooling by reverse: eliminating atmospheric heat from the comparatively cold climate and upgrading their room and water heating temperatures. While high cost and high carbon electricity are important operate, 'renewable' heat from atmosphere is one of the energy being harnessed. This heat is obtained by the light, because it is practically infinite and zero carbon. Heat pumps heating in a highly effective manner. A typical device will provide 15 MW hours of space and water heating with a power of around 5 MW hours of electricity that, in turn, can be generated from about 13 MW hours of primary energy in form of coal, natural gas, uranium, etc. This makes a primary energy usage greater than 1. In contrast with the popular condensing boiler and/or furnace substitute, heat pumps will lower the primary house energy consumption by 15 to 50%.

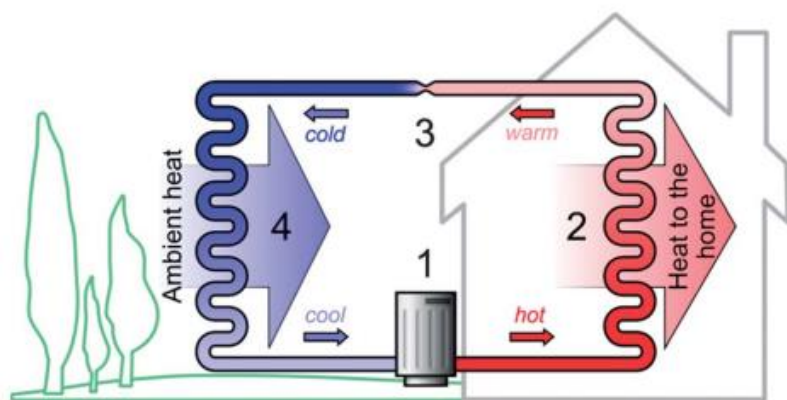


Figure 1: Refrigeration Cycle

The first heat pump, designed in 1856 on the basis of Carnot and Kelvin, had not yet established until the 1930s.¹ By the 1950s the heat pumps and reversible air conditioners in America and Japan had been eliminated, powered by seasonal air conditioning requirements and heating for space. The fundamental architecture remained the same for over a hundred years, with the incremental development of the internal combustion system in order to increase performance and comfort. This article looks at the use of household heat pumps, an environment in which they provide significant advantages, but which is facing heavy competition from incumbent fossil fuels. These sections address the technologies which are appropriate, their operating efficacy and durability; economic considerations (capital, installations and cost of operation); their efficiency, how they can be assessed, the factors that affect them and how they can simply be calculated. Possibility of serving as low-cost storage for management on the demand side[1]–[8].

Environmental science is an interdisciplinary academic field that integrates physical, biological and information sciences (including ecology, biology, physics, chemistry, plant science, zoology, mineralogy, oceanography, limnology, soil science, geology and physical geography, and atmospheric science) to the study of the environment, and the solution of environmental problems. Environmental science emerged from the fields of natural history and medicine during the Enlightenment. Today it provides an integrated, quantitative, and interdisciplinary approach to the study of environmental systems.

Environmental studies incorporates more of the social sciences for understanding human relationships, perceptions and policies towards the environment. Environmental engineering focuses on design and technology for improving environmental quality in every aspect.

Environmental scientists study subjects like the understanding of earth processes, evaluating alternative energy systems, pollution control and mitigation, natural resource management, and the effects of global climate change. Environmental issues almost always include an interaction of physical, chemical, and biological processes. Environmental scientists bring a systems approach to the analysis of environmental problems. Key elements of an effective environmental scientist include the ability to relate space, and time relationships as well as quantitative analysis.

Environmental science came alive as a substantive, active field of scientific investigation in the 1960s and 1970s driven by (a) the need for a multi-disciplinary approach to analyze complex environmental problems, (b) the arrival of substantive environmental laws requiring specific environmental protocols of investigation and (c) the growing public awareness of a need for action in addressing environmental problems.

Atmospheric sciences focus on the Earth's atmosphere, with an emphasis upon its interrelation to other systems. Atmospheric sciences can include studies of meteorology, greenhouse gas phenomena, atmospheric dispersion modeling of airborne contaminants sound propagation phenomena related to noise pollution, and even light pollution.

Taking the example of the global warming phenomena, physicists create computer models of atmospheric circulation and infrared radiation transmission, chemists examine the inventory of atmospheric chemicals and their reactions, biologists analyze the plant and animal contributions to carbon dioxide fluxes, and specialists such as meteorologists and oceanographers add additional breadth in understanding the atmospheric dynamics.

As defined by the Ecological Society of America, "Ecology is the study of the relationships between living organisms, including humans, and their physical environment; it seeks to understand the vital connections between plants and animals and the world around them." Ecologists might investigate the relationship between a population of organisms and some physical characteristic of their environment, such as concentration of a chemical; or they might investigate the interaction between two populations of different organisms through some symbiotic or competitive relationship. For example, an interdisciplinary analysis of an ecological system which is being impacted by one or more stressors might include several related environmental science fields. In an estuarine setting where a proposed industrial development could impact certain species by water and air pollution, biologists would describe the flora and fauna, chemists would analyze the transport of water pollutants to the marsh, physicists would calculate air pollution emissions and geologists would assist in understanding the marsh soils and bay muds.

2. DISCUSSION

The theory behind the operation of a heat pump is the opposite of a heat engine: by means of mechanical activity, heat may be transferred from cold to heat, e.g. outside indoors. For the transport and exploitation of the properties of evaporation and condensation a coolant like compressed CO₂ or hydrofluorocarbon (HFC) portrays the four principal components of a hot pump system.

1. A compressor unit, which raises the refrigerant's pressure and hence its temperature to make cold environmental heat useful.
2. An internal condenser or heat exchanger that supplies the heat to a house or hot water;
3. The refrigerant's expansion valve returning to lower atmospheric temp;
4. The heat exchanger or evaporator external to the atmosphere absorbs heat.

Most heat pumps can replicate the direction of coolant flow as air conditioners. This changes the position and draws heat from the house and expels it to the environment of the two heat exchangers. Hot coolant would be injected outside and then extended to lows to cool the house. Heat pumps are classified into two key groups on the basis of the location of an exterior heat

exchanger. Heat Pumps Air Supply (AHPs), which use a small outside floor or wall mounted unit, as seen in the pictures, are a common sight in many countries. These are easy to update and functional in densely-sized urban areas with limited surrounding areas. The air-to-air and air-to-water networks come in two types. The first one heats the air in a room directly with a slender wall[9]. More than one system allows multi-split schemes indoor access for up to four rooms a single compressor.

In the Gas Heat Pump Engine (GEHPs or GHPs) the compressor is powered by an internal combustion engine rather than an electric engine. It uses the Combined Heat and Power (CHP) concept by shifting the transfer of fuel into mechanical work at the end point of application so that excess heat can be stored instead of wasted. Heat capture from the exhaust gases and the engine compartment increases total production by about 30 percent, particularly in colder climate.⁹ With outdoor air-temperatures below 20 per cent, full heat capacity is maintainable as a direct heat source that eliminates the need for electric heaters and freezing systems[10].

A simple approach is provided, which takes into account atmosphere, heat structure of the building and the auxiliary components of the heat-pump, for the real output assessed in the UK and in Germany. The striking variance resulting from these studies indicates the value for the energy and CO₂ savings that heat pumps can obtain from non-technical factors such as architecture, implementation or operation. There is a lot that can be learned from the best and bad schemes. These problems must be increased consciousness within government, business and homes to reap the tremendous benefits heat pumps can bring.

3. CONCLUSION

The aim of this analysis is to increase knowledge and understanding of domestic heat pumps. The physics, the infrastructure, the modes of action and the functional aspects are discussed in this context, the capital and operational costs taken into account and trade environments studied. The different methods of explaining efficiency are described and used to analyze the success attained during real life operations to provide a clearer understanding of the actual effects of heat pumps. Efficiency statistics released on hundreds of heat pumps of air and soil origin. A simple approach is provided, which takes into account atmosphere, heat structure of the building and the auxiliary components of the heat-pump, for the real output assessed in the UK and in Germany. The striking variance resulting from these studies indicates the value for the energy and CO₂ savings that heat pumps can obtain from non-technical factors such as architecture, implementation or operation. There is a lot that can be learned from the best and bad schemes. These problems must be increased consciousness within government, business and homes to reap the tremendous benefits heat pumps can bring.

REFERENCES

1. Sauv  S, Bernard S, and Sloan P. Environmental sciences, sustainable development and circular economy: Alternative concepts for trans-disciplinary research. *Environ. Dev.*, 2016; 17: 48-56. doi: 10.1016/j.envdev.2015.09.002.
2. Evans LS, Hicks CC, Cohen PJ, Case P, Prideaux M, and Mills DJ. Understanding leadership in the environmental sciences. *Ecol. Soc.*, 2015; 20(1): 50. doi: 10.5751/ES-07268-200150.
3. Ballard HL, Dixon CGH, and Harris EM. Youth-focused citizen science: Examining the role of environmental science learning and agency for conservation. *Biol. Conserv.*,

2017;208: 65-75. doi: 10.1016/j.biocon.2016.05.024.

4. Fortuin KPJ, Van Koppen CSAK, and Leemans R. The value of conceptual models in coping with complexity and Interdisciplinarity in environmental sciences education. Bioscience, 2011, doi: 10.1525/bio.2011.61.10.10.
5. Cox M. A basic guide for empirical environmental social science. Ecol. Soc., 2015; 20(1): 63. doi: 10.5751/ES-07400-200163.
6. Gibert K, Horsburgh JS, Athanasiadis IN, and Holmes G. Environmental Data Science. Environ. Model. Softw., 2018; 106: 4-12. doi: 10.1016/j.envsoft.2018.04.005.
7. Kriebel D. et al. The precautionary principle in environmental science. Environ. Health Perspect., 2001 Sep; 109(9): 871–876. doi: 10.1289/ehp.01109871.
8. James KL, Randall NP, and Haddaway NR. A methodology for systematic mapping in environmental sciences. Environ. Evid., 2016; 5:7. doi: 10.1186/s13750-016-0059-6.
9. Lodge JP. Critical reviews in environmental science and technology,” Atmos. Environ., vol. 1994;28(4):753–754. doi: 10.1016/1352-2310(94)90055-8.
10. Webb JA, Miller KA, Stewardson MJ, de Little SC, Nichols SJ, and Wealands SR. An online database and desktop assessment software to simplify systematic reviews in environmental science. Environ. Model. Softw., 2015;64:72–79. doi: 10.1016/j.envsoft.2014.11.011.

A REVIEW ON DETECTION OF SPEEDY VEHICLES

Rahul Vishnoi*

*Assistant Professor,
Department of Electronic and Communication,
TeerthankerMahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- rahulv.engineering@tmu.ac.in

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ABSTRACT

This article describes a gadget that can identify aggressive driving on roads and notify traffic authorities if it is detected. Many technologies to detect reckless driving on highways have been developed in the past. The majority of the methods require human attention and a significant amount of work, making them challenging to execute. In this article, we will propose a method for detecting and alerting hazardous vehicle driving behaviours associated with rash driving. An IR transmitter, an IR reception, a control circuit, and a buzzer are all required for the complete setup. The speed limit is established by the police, who utilise a method that takes into account the traffic at the time. The control circuit calculates the time it takes the vehicle to go from one fixed point to the next and shows it on seven segment displays. A buzzer also sounds whenever the car exceeds the speed limit, notifying the authorities.

KEYWORDS: Buzzer, 555 Timer, IR Transmitter, IR Receiver, Speed Control.

1. INTRODUCTION

Many road accidents occur as a result of rash driving throughout the globe. In India, a total of 4,73,084 road accidents were recorded in 2001. Because there are no methods to regulate or monitor the speed of cars on Indian roads, the traffic population has grown significantly. This technique has shown to be quite efficient in detecting excessive speeding. It is not essential that such incidents occur as a consequence of driving while inebriated, since even someone who has not taken alcohol may drive recklessly. To address this issue and reduce the number of people killed in car accidents, new and creative speed enforcement technologies is required.[1]

Rash driving poses a significant risk to both the driver and the general public nowadays. Regardless of the fact that reckless driving is a significant issue, existing patrol officer detection techniques are insufficient. To begin with, considering the vast number of driveways, the number of patrol personnel is insufficient to monitor and evaluate each driver's actions. Second, rash driving patterns recommendations are just descriptive and visual observations cannot define the specifics of riding at night or in bad conditions. To identify aggressive driving in the current system, authorities must utilise a portable radar detector and point it at the car to capture its speed. If the car's speed violates the speed limit, the closest police station is notified, and the speeding vehicle is brought to a halt. This is an inefficient procedure since after discovering anything, one must tell others about it, which wastes a lot of time. With the growing number of

cars on the road, this approach cannot be trusted with people's lives. After considering all of these factors, we created a model of a highway over-speeding car detecting circuit that uses various electrical devices such as a timer, counter, logic gates, seven-segment display, and other components to regulate rash driving.

Though the suggested model may also be created using a microcontroller, the usage of a timer is preferred over a microcontroller owing to its high complexity and expense. Inductive loops, video, ultrasonic detectors, microwave detectors, and radar-based detectors are among the sensor technologies accessible. New enforcement methods have a long history in speed enforcement, with negative public response and opposition, and then assuming survival via judicial challenges to these measures. The public's mistrust of law enforcement authorities' use of high technology is often shown by accusations that the technology is just another effort to infiltrate their life, as described in a Time magazine storey titled "Big Brother Is Driving." The benefit of our suggested overspeed driving warning system is that it will be useful for highway traffic cops since it will not only give a digital display of a vehicle's speed but will also sound an alert if the vehicle exceeds the highway's allowed speed. The suggested system would detect reckless driving by estimating a vehicle's speed based on the time it takes to drive between two fixed-distance set locations. A set point is made up of two sensors: an infrared transmitter and an infrared receiver, which are placed on opposite sides of the road. The speed limit is established by the police, who utilise a method that takes into account the traffic at the time. The control circuit calculates the time it takes the vehicle to go from one fixed point to the next. It then estimates the speed based on that time and shows it on seven segment displays. A buzzer also sounds whenever the car exceeds the speed limit, notifying the authorities. This idea may be expanded in the future by including a camera into the system that can take a picture of the vehicle's licence plate and transmit it to the traffic authorities[2].

A photodiode used as a sensor is a photodetector that can convert light into current or voltage, depending on the mode of operation. Photodiodes are identical to ordinary semiconductor diodes, with the exception that they may be uncovered (to detect vacuum UV or X-rays) or packed with a window or optical fibre link to enable light to reach the sensitive portion of the device. Many diodes built especially for use as a photodiode will also utilise a PIN junction instead of the more common PN junction. When a high-energy photon hits the diode, it excites an electron, resulting in a mobile electron and a positively charged electron hole. If the absorption happens in the depletion area of the junction or one diffusion length distant from it, the built-in field of the depletion region sweeps these carriers away from the junction. As a result, holes travel toward the anode and electrons toward the cathode, generating a photocurrent that feeds the Timer. The 555 Timer IC is an integrated circuit (chip) that implements a range of timer and multi-vibrator applications in this instance[3], [4].

The 555 has three modes of operation: Monostable mode: the 555 acts as a "one-shot" in this mode. Timers, missing pulse detection, bounce free switches, touch switches, frequency divider, capacitance measurement, and pulse-width modulation (PWM) are just a few of the applications[5].

The 555 may be used as an oscillator in its astable - free running state. LED and lamp flashers, pulse production, logic clocks, tone creation, security alarms, pulse position modulation, and other applications are all possible[6]. If the DIS pin is not connected and no capacitor is utilised, the 555 may function in bistable mode or Schmitt trigger mode. Bounce-free latching switches,

for example, are one application. The circuit utilises a conventional power supply that includes a 230v to 12v step-down transformer and four diodes that create a bridge rectifier that produces pulsing dc, which is then filtered by a 1000f electrolytic capacitor. Because the filtered dc is unregulated, the IC LM7812 is utilised to provide a 12v constant output at pin 3 regardless of the input dc voltage, which may range from 9 to 14 volts. If the input ac voltage is 230 volts, the input dc must fluctuate[7][1], [8], [9].

The ratio of $v_1/v_2=n_1/n_2$ changes from section to section. A tiny electrolytic capacitor of 0.1 f filters the regulated 12 volts dc for any noise produced by the circuit. This serves as the power source for the circuit's many ICs.

A buzzer, also known as a beeper, is an audio signalling device that is powered by an oscillating electrical circuit or another audio signal source, which is then amplified by a piezoelectric audio amplifier. A click, a ring, or a beep are typical sounds used to signal that a button has been pushed. If the vehicle passes the distance between the IR Diode set-ups faster than the specified speed, the piezo-buzzer emits an alert. The time it takes the vehicle to pass both IR Diode beams is shown on the 7-segment display at the same time[10], [11].

2. DISCUSSION

We used several electrical components such as a timer, counter, logic gates, seven section display, and other components to create a highway speed checker circuit to identify rash driving. Illustrates a typical block diagram of a speed checker that uses a Timer to detect rash driving on roads. The sensor module, logical module, power supply, sound detector, and display module are all shown. Timers, NAND gates, and decade counters are among the other logical modules.

Image processing has been widely applied to traffic analysis for a variety of purposes. As traffic research field is very wide and it has many goals that include detection of queue, detection of incident, classification of vehicles, and counting vehicles. One of the most important of these purposes is to estimate the speed of a vehicle, a vehicle. Traffic congestion poses lot of problems for people. Because of this, many accidents occur. To reduce this problem, new approach has been developed for estimating the speed of vehicle. A radar technology was used to determine the speed on highways. But it has a disadvantage of high cost. Then a lidar detector was designed to detect the infrared emissions of law enforcement agencies lidar speed detection devices and warn motorists that their speed is being measured. Its disadvantage is it has to be held or placed at a static point.

On the other hand, overspeeding is a condition in which an engine is allowed to turn beyond its design limit. This may have a lot of implications on the engine. Overspeeding in an engine can cause engine failure or may even reduce the life span of the engine. If over-speeding is detected, a camera automatically captures the picture of the vehicle and Digital Image Processing (DIP) techniques are applied to extract the license number. MATLAB is used for image processing. Afterwards, the extracted license plate number is sent via email to Toll Plaza. IR sensors are placed on either side of the road, for detecting the speed limit of the vehicle. The microcontroller is programmed by using embedded C programming that calculates the time duration between two sensors, correspondingly gives the speed.

Nowadays, rash driving causes a serious danger to the driver as well as general public. Despite the fact that rash driving is a serious problem, its current methods of detection by patrol officers

lack sufficiency. First of all, given the huge mileage of driveways, the number of patrol officers is far from enough to observe and analyze every driver's behaviors. Second, the guidelines of rash driving patterns are only descriptive and visual observations cannot specify the details of driving at night or in poor weather. In the present system, to detect rash driving police has to use a handheld radar gun and aim at the vehicle to record its speed. If the speed of the vehicle exceeds the speed limit, the nearest police station is informed to stop the speeding vehicle. This is an ineffective process as after detecting one has to inform the same and a lot of time is wasted. With the number of vehicles increasing day by day, this method cannot be trusted with the lives of people. After keeping all these considerations in mind, we have designed a model of highway over-speeding vehicle detecting circuit to control rash driving by the use of different electronic devices such as timer, counter, logic gates, seven segment display and several other components. Though the proposed model can also be designed by using microcontroller but due to its high complexity and high cost, use of timer is preferable over microcontroller. A wide range of sensor technologies are also available, such as inductive loops, video, ultrasonic detectors, microwave detectors and radar based detectors. The history of speed enforcement is replete with examples of new enforcement techniques; subsequent negative public reaction and resistance; and finally, assuming survival through legal challenges to these techniques. The public's distrust of the use of high technology by enforcement officials is often evidenced by claims that the technology is simply another attempt by an article of Time magazine, "Big Brother Is Driving" to invade their lives.

This paper presents a device to detect rash driving on highways and to alert the traffic authorities in case of any violation. In past, lot of devices to detect rash driving on highways has been made. Most of the approaches require human concentration and involve a lot of effort, which is difficult to implement. In this paper we intend to design a system aimed at early detection and alert of dangerous vehicle driving patterns related to rash driving. The entire implementation requires an IR transmitter, an IR receiver, a control circuit and a buzzer. The speed limit is set by the police who use the system depending upon the traffic at the very location. The time taken by the vehicle to travel from one set point to the other is calculated by control circuit and displays that on seven segment displays. Moreover, if the vehicle crosses the speed limit, a buzzer sounds alerting the police.

3. CONCLUSION

Because the accident rate on roads is increasing every day, it is essential to monitor the speed of cars on highways in order to prevent accidents and ensure a safe trip by limiting vehicle speed. It also makes it easier to regulate reckless driving on highways and reduces the problems faced by traffic cops. The police may execute their responsibilities while seated in the control room, allow them to offer more efficient and accurate service. This idea may be expanded in the future by including a camera into the system that can take a picture of the vehicle's number plate and transmit it to the traffic authorities. Since number of accidents on highways increases day by day so it is necessary to check speed of the vehicles on highways so as to remove accident cases and to provide a safe journey by controlling high speed of the vehicle. It also minimizes the difficulties of traffic police department and make ease to control the rash driving on highways. The police can perform their duties while sitting in control room and can provide their service with more ease and accuracy. This concept can be extended in future by integrating a camera

with the system which could capture the image of the number plate of the vehicle to sends that to the traffic authorities.

REFERENCES:

1. Jain M, Kumar P, Singh P, Narayan Arora C, and Sharma A. Detection of Over Speeding Vehicles on Highways. Int. J. Comput. Sci. Mob. Comput., 2015.
2. Sane NH. Real Time Vehicle Accident Detection and Tracking Using GPS and GSM. Int. J. Recent Innov. Trends Comput. Commun., 2016;4(4):479 - 482.
3. Chauhan A, Kumar S, Mahto L, and Jagadish DN. Detection of Reckless Driving using Deep Learning. 2020, doi: 10.1109/ICMLA51294.2020.00139.
4. Sharma SS, Tendulkar S, Kulkarni S, and Prasad EC. Accident Alert and Vehicle Tracking Mechanism. IJIREEICE, 2017;5(3):116-118. doi: 10.17148/ijireeice.2017.5326.
5. Everest F. The characteristics and use of the 555 timer. Electron. Educ., 2000, doi: 10.1049/ee.2000.0051.
6. Lager A. Use a 555 timer as a switch-mode power supply. EDN. 2002.
7. Surekha P, Kamath M, Joseph C, Thomas D, Babu JP, and Babu JP. Automatic Accident Detection and Alerting System Based on IOT. Int. J. Innov. Res. Comput. Commun. Eng., 2017.
8. Malik SM, Iqbal MA, Hassan Z, Tauqeer T, Hafiz R, and Nasir U. Automated over speeding detection and reporting system. 2014; 1104-1109. doi: 10.1109/EPEPEMC.2014.6980657.
9. Tan Q, Ling J, Hu J, Qin X, and Hu J. Vehicle Detection in High Resolution Satellite Remote Sensing Images Based on Deep Learning. IEEE Access, 2020; (99):1-1. doi: 10.1109/ACCESS.2020.3017894.
10. Jain H, Nataraj CV, and Jayagopi DB. Rash Driving Detection Using a Frontal View Camera in Cars. 2018, doi: 10.1145/3293353.3293397.
11. Kumar VP, Rajesh K, Ganesh M, Kumar IRP, and Dubey S. Overspeeding and Rash Driving Vehicle Detection System. 2017; 25-28. doi: 10.1109/TIIEC.2014.013.

A REVIEW ON CURRENT SCENARIO AND FUTURE OF NETWORK SECURITY MONITORING

Gaurav Kumar Rajput*

*Assistant Professor,
Department of Computer Engineering,
TeerthankerMahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- gauravrajput31@gmail.com

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ABSTRACT

The term "Network Security Monitoring" (NSM) refers to the process of detecting security issues by monitoring network activities. Given the increasing complexity of cyberwarfare, an NSM system is critical for the security of today's networks. We examine the current state of the art in NSM and develop a novel taxonomy of functions and modules in an NSM system in this article. For both academics and practitioners, this classification is helpful in evaluating existing NSM installations and tools. We use this new taxonomy to arrange a list of popular tools and highlight difficulties in using NSM in contemporary network deployments such as Software Defined Network (SDN) and Internet of Things (IoT).

KEYWORDS: Network Security, Nsm, Incident Response, Sdn, Security Monitoring.

1. INTRODUCTION

Although the majority of network security efforts are still focused on avoiding attacks, detection and response solutions and methods are becoming more important. Within the Information Technology (IT) Security sector, there is a widespread assumption that attackers will eventually outsmart preventive methods. Detection and reaction systems must then be implemented. One of the most important methods to network security is Network Security Monitoring (NSM). The four stages of the NSM cycle are as follows:

- 1) Monitoring,
- 2) Detection,
- 3) Forensic science/diagnosis
- 4) Reaction/Recovery

Its aim is to continuously monitor the status of a network in order to identify and handle unexpected occurrences as soon as they occur. This is a major issue because, according to the definition of a Big Data problem, communication networks generate a large amount of data at a rapid rate. This job becomes much more challenging when we consider the pervasiveness of current and future situations, such as 5G and the Internet of Things, or the need to adapt to new network technology (e.g., SDN) [1]–[3].

We examine the state-of-the-art in NSM in this article, with the goal of providing a taxonomy and a coherent explanation of its components. In addition, we examine some of the current solutions in light of this taxonomy. Finally, we examine the most important developments in contemporary networks, as well as the (new) problems they bring and how they are addressed from an NSM standpoint [4]–[6]. We assess the applicability of the aforementioned conventional NSM tools to contemporary networks, as well as existing solutions and new work for this new framework. As a result, the following are the major contributions of this work:

- According to the NSM concept, a modular taxonomy for detection and response systems.
- A categorization of certain trade solutions based on the taxonomy provided.
- An assessment of the use of NSM in contemporary networks.
- According to the suggested taxonomy, new network security problems for new communication paradigms exist.

This article approaches the NSM cycle from a different and complementary viewpoint than earlier studies, which only cover a portion of it and do not approach it from a module taxonomy perspective, as this paper does. This modular taxonomy seeks to aid academics and practitioners in comprehending the characteristics, advantages, and shortcomings of existing network security detection and response.

2. MODULAR TAXONOMY OF A NETWORK SECURITY MONITORING SYSTEM

The actions and processes that occur in the network and subsystems under monitoring should be traceable using an NSM system. A typical NSM design is made up of several software and hardware components that are deployed throughout the network to accomplish this objective. These components transmit network event data to a centralized location, where it is recorded and evaluated [7], [8].

Following a thorough examination of the most widely used NSM systems, we have proposed a taxonomy of NSM capabilities. At least one of these functions is implemented in most of these solutions: sensor, parser, integrator, detector, inspector, and actuator.

- A sensor gathers information from a network subsystem.
- The parser changes the data format and produces records or logs as a result.
- Integrator combines data from multiple sources into a single stream.
- A data stream's anomalous events/records are identified by the detector.
- Data exploration is possible using Inspector.
- The network/subsystem setup is automated by the actuator.

These are modular systems by nature, making the scaling of increasingly complicated systems simpler. The outputs of various modules are combined to achieve this. An integrator's output, for example may be used as a second integrator's input, which is also used in conjunction with a detector, thus creating a hierarchical detection structure.

Furthermore, not all NSM systems provide all features. In the monitoring phase, the sensor, parser, and integrator are typically enclosed, whereas the rest of the modules have a one-to-one

relationship with the other stages in the NSM cycle (detection, forensics and response). In the next paragraphs, the NSM modules are described [8]–[10].

2.1. Sensor Module:

A sensor is a software agent or hardware device that gathers data from a network and generates logs or records for a security team to review. This module typically has the capability of sending the gathered data to a centralized place where it may be viewed and evaluated.

Simpler sensors, such as traffic sniffers, are made up entirely of a collection module. Other, more complicated sensors often contain a parser and/or detecting module. We call these sophisticated sensors security sensors when they are full security instruments whose output is collected and used as part of another top system.

2.2. Parser Module:

NSM installations with a large number of different sensors produce huge databases from which it is difficult to identify when and where an attack is taking place. Furthermore, the data format differs greatly across the sensors. As a result, data sources must be processed after collection to make them suitable for purpose.

Despite efforts to provide unification models for the exchange of alert information, such as the Intrusion Detection Message Exchange Format (IDMEF), one of the main problems in data collection is that manufacturers rarely use a standardized format for information logging when designing devices and software. This necessitates the use of a parsing procedure. The process of recognizing and extracting distinct components that make up a log in order to create a logical and ordered data structure is known as parsing. As a result, parsing enables the extraction of valuable information from data and the homogenization of disparate sources into a single format. IP addresses, for example, may be found in various sections of the log file depending on the sensor. In this instance, the parsing procedure is helpful for identifying IP addresses on each accessible log and matching them so that various sources may be combined in a meaningful manner. This procedure is required to provide structured data to detection and visualization technologies.

The parsing procedure may be done on the fly (by security operators), and it's usually done as a separate module or as part of the sensor or integrator modules. Parsing, on the other hand, may be done using either scripts or software. The former relates to Linux commands and scripting-based programming (e.g., python or perl), while the latter refers to applications designed to speed up the extraction of information from large amounts of data.

Finally, there are several difficulties with parsing, including:

- i) The parsing code's sensitivity to format changes in the sensors, which are typically induced by changes in their specifications or even functions;
- ii) A lack of information regarding each manufacturer's format; and
- iii) A lack of synchronization in sensor timestamps, which may be particularly difficult if sensors are located across countries with various time zones and do not utilize synchronization services such as Network Time Protocol (NTP).

2.3. Integrator Module:

To expand the semantic information acquired by the sensors, integrators integrate the data received by the sensors. Integration engines may be used to implement several methods. One or more integration engines may be included in the integration module, which work together to transform heterogeneous data into usable information. The next sections go through some of the most in-depth methods of data integration.

When data is gathered from many sources, duplicated data is a common issue that may be addressed by correlating events. The word correlation is used in IT Security to describe the process of discovering relationships between disparate data sources or IT Security occurrences. When events are repeated owing to various nodes producing events and/or alerts related to the same occurrence, or when they are linked to the same incident in the same sampling time period and can be unified into a single event, correlating events may be especially helpful. As a result, event correlation offers the following advantages:

- i) Extending the semantic information by taking into account the event's context
- ii) Reducing the amount of data that has to be examined, as well as
- iii) Prioritizing and escalating essential events, resulting in fewer false positives.

This provides valuable information for detecting attacks or unusual actions, particularly when they impact many assets.

Pivoting is another method for data integration. Pivoting is the ability to go from one data source to another, which is often accomplished by utilizing links to move between windows that display similar data. As a result, if an event occurs, the security operator will be able to analyze it and collect contextual data. Let's pretend there's a record that has been flagged as unusual. It is possible to pivot from the record to another window containing comprehensive information about the associated IPs, such as reputation information, who is, or domain names, by pivoting from the record. As a result, pivoting significantly lowers the time required to investigate a security issue (especially if the pivoting is graphically assisted).

Finally, when Machine Learning (ML) methods are applied to security data, another kind of integration is employed. Integration is frequently referred to as data fusion in the context of machine learning. Fusion enables you to combine data from many sources into a single stream that the rest of the modules can handle correctly. According on how the process of data fusion and modeling is done via ML, data fusion is often categorized as low, medium, or high. Low-level data fusion is when data fusion is done from raw data before modeling. It's termed middle-level if it's done after some kind of data processing or feature extraction. High-level data fusion occurs after machine learning modeling and integrates the results of multiple machine learning methods.

2.4. Detector Module:

This is a critical component of an NSM system. Detectors are really engines with the aim of detecting abnormal data activity. Filtering or categorizing data, feature extraction (considering just those characteristics that are of relevance), or utilizing a correlation engine may minimize the amount of data to be examined.

Signature-based detection engines employ a library of patterns (e.g. rules or traces of code) to identify known assaults, whereas data-driven detection engines use models of typical behavior to detect anomalous activity. The latter is also possible.

- i) based on statistics,
- ii) based on knowledge
- iii) Machine learning-based

The major disadvantages of signature-based detection are the need for regular signature database updates and the inability to identify zero-day threats. When data-driven detection is ML-based, supervised techniques are also unable to identify zero-day attacks, while having a high detection rate for known assaults. Finally, unsupervised detection may identify zero-day assaults in theory, but it may produce a large number of false alarms. As a result, reducing the number of false alarms is a major issue in unsupervised detection, which may be accomplished by prioritizing and/or visualizing the events. This may also be accomplished using existing lists that include events that are likely to be reported as false positives, allowing such events to be avoided being escalated as alerts.

In general, the quantity of security events, their velocity, and the rate at which they are produced are all so great that security operators are unable to manage them all, necessitating appropriate prioritizing and triaging. This may be accomplished by establishing measures that go beyond those often used to assess detection capabilities (e.g., Receiver Operating Characteristics (ROC) or Area Under the Curve (AUC)). Rather than only identifying whether a particular occurrence is abnormal or not, these metrics should offer information about the significance of the anomaly.

2. DISCUSSION

Network management has become more complicated as a result of 5G networks and new communication paradigms such as the Internet of Things (IoT) and cloud computing. The widespread use of 5G results in enormous data production, which continues to grow at a rapid rate. Some of the major difficulties influencing anomaly detection and, therefore, intrusion detection, which are a key component of the NSM concept, include big data processing, feature extraction, and data correlation. Some studies look at intrusion detection in high-dimensional data from the standpoint of anomaly detection.

Distributed and decentralized networks are also part of the present and future of technology. This has many advantages, but it also introduces new difficulties, particularly in terms of network security. In this part, we'll look at some of today's most popular communication models:

- i) SDN,
- ii) Internet of Things/Industrial Internet of Things (IIoT).

Although there are still outstanding problems to address, NSM may improve each of the communication network sectors under investigation.

The Parser Module is a module that allows you to parse text. From the standpoint of self-feature extraction, this component is addressed in some of the investigated studies. Unification and redundancy reduction are also done in certain instances. There is, however, a research area that

should be devoted to developing a uniform format for event logging and feature extraction from Big Data.

- **Module of the Integrator** Because it enables collecting data from many sources, this is one of the most essential and valuable NSM modules. Integrating is even more important in today's communication paradigms, where a variety of heterogeneous devices transmit and receive data that must be consolidated for monitoring and incident detection. Despite this, just four of the publications examined explicitly address this module. As a result, one of the most difficult tasks for academics is to devise a strategy for integrating, aggregating, and correlating disparate data sources.
- **Detection Module** is a module that detects when anything is wrong. The majority of current research efforts are centered on this module, with the goal of discovering new methods to use machine learning algorithms and therefore improve the capacity of detecting abnormalities and/or assaults. Big Data processing to develop and apply detection models is one of the component's major difficulties. Additionally, prioritizing alerts and minimizing the amount of false positives remain unsolved problems.
- **Module of the Inspector** The goal of this component is to identify an event both physically and chronologically. This is especially essential in decentralized networks (such as the Internet of Things), since the source of the event may not be in the same area as the occurrence, and a number of different devices are likely exchanging information via the network. Despite this, just two of the works evaluated include an inspector module. This component requires more investigation, not only to produce logs and preserve the state after an event, but also to make them understandable. This will aid security operators in comprehending the facts and making their forensic job more efficient.
- **The Actuator Module** is a piece of software that allows you to control a Many of the works under consideration include this module, which defines actions such as preventing malicious connections. Defining and executing self-recovery methods to make communications networks robust are the major difficulties for this component. This is particularly true in critical systems, such as those seen in IIoT settings.

3. CONSLUSION

The author of this article examined the current state of the art in Network Security Monitoring (NSM), giving an overview and a uniform categorization of its major components. Sensors, parsers, integrators, detectors, inspectors, and actuators are all classified in our taxonomy. These modules may be coupled in a variety of ways to create a strong and scalable incident detection system. The strengths and limitations of the selected modules are highlighted in this study. We look at existing NSM sensor and parser modules that are available separately on the market. According to the suggested taxonomy, we also look at some of the most well-known and frequently used multi-module NSM systems. IDSs/IPSs, SEMs/SIEMs, and UTMs are the most well-known instances of these pairings. Finally, we evaluate the NSM philosophy's applicability in contemporary communications networks. This assessment focuses on SDN and IoT/IIoT networks, according to the authors. In connection to new communications paradigms, open problems and future research priorities for each of the NSM modules are outlined.

REFERENCES:

1. Yan S, Aguado A, Ou Y, Wang R, Nejabati R, and Simeonidou D. Multilayer network analytics with SDN-based monitoring framework. *J. Opt. Commun. Netw.*, 2017;9(2): A271-A279. doi: 10.1364/JOCN.9.00A271.
2. Chen K, Zhao S, and Lv N. Network monitoring information collection in the SDN-Enabled airborne tactical network. *Int. J. Aerosp. Eng.*, 2018, doi: 10.1155/2018/1940842.
3. Zaalouk A, Khondoker R, Marx R., and Bayarou K. OrchSec: An orchestrator-based architecture for enhancing network-security using network monitoring and SDN control functions. 2014;1-9. doi: 10.1109/NOMS.2014.6838409.
4. Fawcett L, Scott-Hayward S, Broadbent M, Wright A, and Race N. Tension: A distributed SDN framework for scalable network security. *IEEE J. Sel. Areas Commun.*, 2018;36(12): 2805-2818. doi: 10.1109/JSAC.2018.2871313.
5. Van Tu N, Hyun J, and Hong J W. K. Towards ONOS-based SDN monitoring using in-band network telemetry. 2017;76-81. doi: 10.1109/APNOMS.2017.8094182.
6. Phan XT and Fukuda K. SDN-Mon: Fine-grained traffic monitoring framework in software-defined networks. *J. Inf. Process.*, 2017; 25:182-190. doi: 10.2197/ipsjip.25.182.
7. Verifier SD and Drive AH. Simulink ® Verification and Validation TM Reference. ReVision, 2015.
8. Zisko N. et al. Meso level influences on long term condition self-management: stakeholder accounts of commonalities and differences across six European countries. *PLoS One*, 2015, doi: 10.1186/s12889-015-1957-1.
9. Bobaru M, Borges M, d'Amorim M, and Păsăreanu CS. NASA formal methods: third international symposium, NFM 2011, Pasadena, CA, USA, April 18-20, 2011: proceedings. 2011.
10. Zhang Y. A foundation for the design and analysis of robotic systems and behaviors. 1994.

IMPORTANT FEATURES OF SOCIAL-PHILOSOPHICAL ANALYSIS OF HUMAN FACTORS AND INTERESTS

Farrukh Abdurahmanovich Yuldashev*

*Lecturer,
Fergana State University,
UZBEKISTAN

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ABSTRACT

The article is devoted to scientific, multi-planned factors. The social factors are influenced on all spheres of society; also the peculiarities and laws of phenomena are discussed in article. The multifaceted human activity, especially its interests, plays a central role in the life and development of independent Uzbekistan. The ongoing processes of democratic reforms and modernization in our country are primarily focused on the interests of the individual, his behavior, socio-political movements and lifestyle in general. In his speeches and talks, the first President of the Republic I.A. Karimov's valuable comments "Reforms - not for the sake of reforms, reforms for the benefit of the people" became a practical program of our state and government.

KEYWORDS: *Reforms, Globalization, Activity Human Factor, Socialization Interests Demands, Democratization, Privatization, Relation World View, Culture, Components System, Society, Function of Management, Variation, Personality.*

INTRODUCTION

The multifaceted human activity, especially its interests, plays a central role in the life and development of independent Uzbekistan. The ongoing processes of democratic reforms and modernization in our country are primarily focused on the interests of the individual, his behavior, socio-political movements and lifestyle in general. In his speeches and talks, the first President of the Republic I.A. Karimov's valuable comments "Reforms - not for the sake of reforms, reforms for the benefit of the people" became a practical program of our state and government. On the basis of this idea, President Sh.M.Mirziyoev has also carried out major reforms on the basis of the principle of "human dignity", adopted state programs, and implemented the important tasks set out in the document. The main purpose of these reforms is to pay more attention to our people, every citizen, to improve their lives and livelihoods, to value their labor, to create favorable conditions for the satisfaction of their needs, to develop entrepreneurial and business skills, and, of course, to ensure a peaceful, prosperous life. At the initial stage of the implementation of these tasks, human interests are monitored, studied and their sources are analyzed. It should be noted that human interests are formed over the years and are reflected in the interests of society, the state and the people. Human interests complement each other and contribute to their development. In order to achieve this, each individual must understand the nature, structure, laws and stages of development of society, the domestic and

foreign policy of the state, to have an idea of their importance, the need for reforms, the activities and goals of the people, to follow them and draw appropriate conclusions. The difficulty of this process is that the knowledge and views of individuals cannot be equated. While the majority of the population is in line with the period, another group - in part, the activities of the rest are poorly defined, because their views and actions are limited by personal interests. Self-interest and human interests differ in content and purpose. The scope for the expression of personal interests is narrow, that is, the individual is focused on his own needs, the interests of the individual are expressed in a broad sense, forming a system that is linked to the interests of the family, community, community, other individuals and society in general, and the state. In order to protect the interests of the people as a state-political institution, it conducts spiritual and educational activities among the population on the basis of a clear plan.[1]

MAIN PART

Education is being updated in accordance with the requirements of the time, that is, improving the skills of professors and teachers, Modern technologies are used in teaching, electronic textbooks and manuals are created. Problem situations are created in the course of the lesson in order for students to think independently, distance learning method is used as an experiment, and so on. Graduates with a strong knowledge and information culture form the core of a harmoniously developed generation; their interests in the workplace are first and foremost to apply their knowledge to life, to continue research, to convey scientific achievements to young people, issues such as setting an example for others. Broad interests lead the population to scientifically based goals and plans, socio-political and labor activism. The continuation of democratization processes and reforms in all spheres in the country creates opportunities for the population to expand, especially the interests of young people. Specific tasks are set for their interests to lead to practical action: [2]

- Creating a healthy environment in every enterprise, organization and place of residence;
- In conducting spiritual and educational activities, of course, to take into account the views and wishes of young people;
- To regularly study public opinion and take into account the specific situation in solving existing problems;
- To increase the legal culture of the younger generation by complying with existing laws and promoting the established procedures among the population;
- effective and conscious use of the opportunities of one of the institutions of civil society, the media, especially the widespread Internet system;
- To approach all the leaders in the system of government, to change their working methods in accordance with the requirements of the time, to study their interests and desires in detail and to create favorable conditions for them, and so on.[3]

In carrying out the assigned tasks, our state, government, educational institutions, labor unions, public organizations, together with self-governing bodies, should make a significant contribution to the best of their ability. It should be noted that over time, the tasks set will be updated in accordance with the needs of society. In addition, the protection, respect and esteem of human interests are organized in the political, economic and social spheres of life of the republic. In the

political direction, the political activity, views, attitudes and culture of every citizen are protected by the state and given freedom. As a result, a solid foundation will be laid for the increase of political activity of the population. [4]

In the economic sphere, the protection of the interests of the individual is first and foremost the protection and respect of labor, the creation of appropriate conditions for creative labor. As a result of receiving spiritual nourishment from the activities of employees of the enterprise, the quality, quantity and economy of their products are ensured. In the social sphere - the protection of the interests of the individual through the development of the spiritual heritage of our people and enrichment with new ideas, the possibility of harmonization of national and universal values and their wide-ranging development. In general, one of the laws of society is the development of all spheres as a whole, which means that the directions of human interests are also reflected in the interconnectedness.[5]

If the protection of human interests is organized in a regular and systematic manner, positive changes will take place in his activities. Along with the interests of a person, his views, the responsibility to feel his attitude and his socio-political actions in general change. In this regard, to communicate with the people, to study the life, work and life of each citizen, as a result of good conditions for effective work, human activity will increase, and most importantly - the implementation of new tasks set by our state will accelerate. In the history of mankind, in the present and in the future, first of all, man strives to perform all functions as a leading factor.[6]

Especially in the XXI century, the rapidity and scale of the processes taking place reveal new aspects of the activities of citizens and the way of life in general. The modern man has to take a comprehensive approach to each issue, to study its essence, to determine the cause and effect, to scientifically substantiate its methodological and practical significance - as a priority. The human factor is gradually making a significant contribution to the ongoing market economy and the implementation of democratic reforms in the country. On the basis of human activity, mainly through the acquisition of mental, intellectual potential, a wide range of worldviews, theoretical statistics and empirical data, growing knowledge, attitudes toward changes in the environment, other individuals and groups, especially meaningful, planned labor. The components of the human factor, expressed as a whole, complement each other and express their functional impact on the development of society on the basis of ideological connection. Indeed, "the human factor has always been the basis of the essence and content of human life in the development of any society." [1]. In order to ensure the steady growth of the human factor, our state and government are taking concrete measures, namely:

- At the initiative of the President of the Republic Shavkat Mirziyoyev, the action strategy of the state program for 2017-2021 has been implemented in all spheres of life;
- The tasks set in the national training program are to bring up a harmoniously developed generation on the basis of modern requirements, along with the use of modern technologies in educational institutions, material and spiritual conditions are being created for the development of the scientific potential of professors and teachers;
- Taxation of entities engaged in small business and private entrepreneurship on a regular basis, based on the requirements of a market economy, great privileges are provided in obtaining loans from banks, free organization of work, therefore, "If we can develop entrepreneurship in our

youth, teach them the proper use of funds, we will solve not only economic but also many social problems."[2].

- In order to increase the computer literacy of citizens, special centers are being established in the field, especially in higher education institutions, and theoretical and practical trainings are conducted with the help of leading specialists on the basis of a clear plan.

- Appropriate conditions are created for specialists and employees who are creatively engaged in mental work to use modern technologies with the help of the administration of the enterprise, organization. This measure requires that each person be theoretically and psychologically prepared for the existing conditions in order to achieve high results, to organize the work step by step. As practice shows, each stage has its own advantages and disadvantages. The human factor changes in all directions over time, and is observed to be enriched with new components. For example, the advantage of the current stage is the instantaneous dissemination of an unlimited amount of modern technology and information on any topic through the Internet, which is necessary for the human factor.

Looking back, the great scholars of the East and the West, such as Fales, Anaximander, Democritus, Ibn Sina, and others, pointed out the essence of human life, that is, elements such as water, air, fire, earth, and the atom as substances[3]. From the point of view of dialectics, the change of everything, object, event and process in the human world implies the emergence of a new and new substance. In the era of globalization and the construction of civil society, information is the core and essence of the human factor. Information, on the one hand, strengthens the socio-ideological foundations of human activity, and on the other hand - helps him to realize his noble goals and dreams. In fact, the civic position of a person with all the information is strengthened; he can protect not only himself, but also the interests of his loved ones, neighborhood, and community from any ideological, ideological threats.

At the same time, he achieves his goal quickly. Any development will inevitably consist of cases of deviation or decline, i.e., individuals or even groups are acquiring distracting, mind-numbing information as a result of incorrect or illegal approaches to information. This situation is reflected in the actions of the representatives of the negative, even reactionary current. For example, the manifestation of evil intentions and illegal actions among young people who have become involved in international terrorism, such as religious extremism, is causing serious problems.

International scientific-practical conferences initiated by the President of the Republic Shavkat Mirziyoyev against their evil and selfish goals, meetings of heads of state are being protected from ideological and ideological threats to the human factor by such means as giving privileges to media workers. Also, because some people's knowledge and level did not meet the requirements of the time irresponsibility, indifference, dependency, etc., which have a negative impact on the human factor. Human activity and its foundations therefore manifest as a multifaceted process, i.e., it "Education - in the process of education, labor, communication, social experience, knowledge, various relationships, ethical norms, political ideas, national ideology, lives under the influence of factors, assimilates them and in the process socializes, that is, is formed as a person." In order to activate the human factor and avoid negative situations, attention will be paid to the following issues: [7]

1. Creation of appropriate conditions for the scientific analysis, drawing conclusions and practical application of socio-economic changes taking place in the national and international life;
2. In the process of organizing labor activity, along with the effective use of scientific and technical achievements, to try to build on best practices and connect themselves with the intellectual potential;
3. Systematic organization of entrepreneurship and business-related activities based on the requirements of the time and focus on the implementation of strategic tasks set by the state;
4. Decrees and resolutions issued by the President of Uzbekistan, Conceptual ideas, principles, goals and objectives of the laws being prepared by the Oliy Majlis, the main encyclopedia of our life, the Constitution are constantly mastered by citizens and constantly taught to follow them. It should be noted that the human factor is an integral part of our society, so it will change in all respects, regardless of the circumstances. Citizens' understanding of the content, essence and methodological significance of the set tasks and plans, their connection with their activities, ensures the growth and activity of the human factor. Achieving this is a complex and contradictory process. One of the reasons is that a person can use the existing conditions and opportunities effectively, systematically, partially, from time to time or incorrectly. Psychologically, human individuality, that is, feelings, imaginations, abilities, and other qualities, is manifested in the manifestation of various forms and levels. Therefore, the formation, development, and functional change of the human factor are also manifested to varying degrees. In this regard, democratic reforms in all spheres of life of the republic are primarily in the interests of the people, ensure its well-being, freedom and independent thinking, and transform the human factor in a positive way, it enriches his mind and thinking with new ideas, and most importantly - there is a spiritual satisfaction from his work. When a person is inspired and enjoys his work, he tries to improve his professional skills, to approach his work responsibly, to pay attention to the quality and quantity of the product. "With the development of labor," he said. E. Yusupov - both human nature and its psychophysical (mental-physical) features (mental, cultural) change[4]. Therefore, the achievements of our country are related to the human factor, that is, their meaningful work, intellectual potential, creative approach, a broad outlook are the leading components of the human factor, they form a holistic system with goals, objectives, content and significance. First of all, it is necessary to strengthen social partnership. In turn, the strengthening of cooperation with foreign countries, the introduction of advanced experience, technology and, of course, innovative ideas in our lives have a positive impact on the management system. "Today, 456 projects worth \$ 23 billion are being implemented in our country at the expense of foreign investments," he said[6]. Improving the management system is manifested as an objective process, therefore, at each stage; methods appropriate to the new era are applied, important that their scope expands on a horizontal and vertical basis. Modern specialists and staff are interested in active participation in solving all issues based on democratic principles. Such a situation requires the growth of human consciousness and thinking. Human consciousness and reasoning are based on solid knowledge, belief and creative research ability. People differ from each other physically and spiritually, their activities and lifestyles differ in content and functions, as well as the degree of manifestation, that is, it is determined by its specific features and general aspects. In this regard, as a result of the development of civil society, it is associated with freedom among the population, independent thinking, scientific

outlook, the process of modernization. Therefore, the ability to determine the content, essence, causes and consequences of the socio-economic and political processes taking place in our country is one of the real situations for man. In order to achieve such a situation, the desire of citizens, along with their desires, has a methodological significance of political and spiritual maturity. Observations over the years have shown that in the current favorable environment, the bulk of human factors have contributed to the development of society, and a certain part of it causes unforeseen problems. [8]

The main part of the population has such positive qualities as diligence, responsible approach to certain issues, professional development, and initiative. At the same time, despite the development of a market economy, some people have a sense of dependency, the pursuit of unearned income, indifference to community work, negative qualities such as a superficial understanding of the importance of political, economic issues will to some extent hinder the growth of the human factor and its activism. Such cases have been studied in detail with the involvement of leading experts of our state, and roundtables were held among the population on topical issues of our society, seminars - trainings, analysis of labor and non-labor activities, taking into account the views and wishes of citizens, ideological, spiritual and enlightenment work aimed at the formation of public opinion is carried out on a regular basis. During the development of civil society, the components of the human factor, along with their activities, are improving. The task required of a person today is to understand his inner and outer capabilities, level of knowledge, skills, abilities, Understanding the requirements of the period, the task of applying them in the right place has a special place.[9]

The development of our society requires the proportional representation of the components of the human factor. At the same time, based on the content of historical stages, some component of the human factor is a priority, and once a certain level is reached, the priority development shifts to another component, and their place is constantly changing. For example, in the early stages of a market economy, efforts were made to rapidly increase economic knowledge from citizens, as economic relations rose to a level of stability, attention to spirituality issues grew. The issue of spirituality is manifested in connection with such issues as economic, political, managerial, educational, labor process, life, it brings them closer together, and as a result, human activity increases.[6].The problems that arise in this direction are approached consciously and creatively. Our state begins the issue of spirituality with the consciousness of man, that is, these qualities constitute intellectual capital. Because a set of conceptual ideas, views, science-based knowledge, worldview that meets the requirements of the period ensures the effectiveness of multifaceted activities as the leading components of the human factor, reveals the possibilities of overcoming the problems that arise, and encourages our society to address pressing issues on the basis of a clear plan[7]. There is an inextricable link between the human factor and activity, and on the one hand the individual in strengthening them. On the other hand, the prudent policy pursued by our state plays a role.

CONCLUSION

In conclusion, it should be noted that by combining all the changes taking place in our society in the structure and content of the human factor, converges and strengthens the ideological foundations for their harmonious development. In addition, the impact of the human factor on the development of society and its significant contribution to the upbringing of a harmoniously developed generation is growing.

REFERENCES:

1. Karimov U, & Abdurakhmon, A. Innovative Information Technology In Education. Форум Молодых Ученых, 2017;(5):9-12.
2. Karimov UU. Scientific And Theoretical Foundations Of The Formation Of The Social Environment In The Family. Oriental Journal Of Social Sciences, 2021;37-40.
3. Rayimov AA, Karimova GY. Social Aspects Of The Formation Of Social Activity In Youth. Oriental Journal Of Social Sciences, 2021;29-32.
4. Kuzibaevna OG. Technologies Of Developing The Ecological Culture Of Students In The Process Of Learning A Foreign Languages In Higher Educational Institutions. Solid State Technology, 2020;63(1s):1816-1825.
5. Karimov UU, Karimova GY. The Importance Of Innovative Technologies In Achieving Educational Effectiveness. Журнал Естественных Наук, 2021;1(1).
6. Abdurakhmonova MM, Ugli Mirzayev MA, Karimov UU, Karimova GY. Information Culture And Ethical Education In The Globalization Century. The American Journal Of Social Science And Education Innovations, 2021;3(03)384-388.
7. Karimov U, Ergasheva D. Educational Issues In The Period Of Amir Temur And Temurids. Теория И Практика Современной Науки, 2020;(5):18-20.
8. Yuldashev F, Yuldasheva N. The Role Of Communication Skills And Improving These Skills In Teaching. Scientific Bulletin Of Namangan State University, 2019;1(2):262-266.
9. Abdurakhmanovich Y F. Humanity And Happiness-A Vital Factor In The Independent Life Of The Young Generation. Epra International Journal Of Multidisciplinary Research (Ijmr), 2016;252.

A REVIEW ON PEROVSKITE SOLAR CELLS

Navneet Kumar Vishnoi*

*Assistant Professor,
Department of Computer Engineering,
TeerthankerMahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- navneet.computers@tmu.ac.in

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ABSTRACT

Perovskite Solar Cells (PSCs) have commanded the notice of the analysts overall inferable from their exceptional Photovoltaic (PV) execution. PSCs are the fate of the PV innovation as they are fit for creating power with execution being tantamount with the main Silicon sun oriented cells, with the expense being lower than Silicon sun based cells. The gigantic capability of PSCs is clear from the way that the effectiveness of these cells has ascended from 3.8% to 25.2% inside 10 years, and it is ceaselessly ascending to date. We talk about the highlights making PSCs better than contemporary PV innovations. The depiction of the advancement of proficiency and different models used to date has been introduced. The perovskite film manufacture methods with some enormous scope perovskite sun powered cell producing methods are examined. Regardless of positive attributes, the PSCs have confronted a few issues, for example, debasement within the sight of dampness, oxygen, and UV, harmfulness, and so forth the effect of these variables with different cures embraced by specialists has been examined. In any case, the unsteadiness issue raised by poisonousness isn't of much concern is upheld in this paper. These issues making snags in the way of commercialization of PSCs alongside the commercialization guide are examined altogether.

KEYWORDS: Efficiency, Perovskite, Solar Cell, Silicon.

1. INTRODUCTION

For last such countless years, the humanity has been searching for a wellspring of energy that isn't just naturally supportable yet is financially practical also. Current worldwide force request is about 16TW, and it is assessed that the force request would increment past 30TW by 2050. In this way, thorough exploration is being completed to get a productive force age framework, as the conventional method of consuming petroleum derivative would not have the option to meet the climb in the force necessity. The sustainable power sources, for example, flowing, aqueous, geothermal, wind, sun oriented, and so on will go about as a deliverer in the energy emergencies. Among the different wellsprings of energy, sunlight based energy is accepted to be the most encouraging and proficient one because of its accessibility in wealth. The uniqueness of sun powered energy can likewise be induced from the way that 60 minutes of nonstop light of sun based energy is fit for satisfying our yearly force requests, if all the episode sun based energy is

changed over into power. In this way, utilizing PV sun based cells for power age is by all accounts a promising route as they convert the daylight straightforwardly into power.

In 1839, Edmund Becquerel was the first to change over daylight into power. In 1873, Willoughby Smith found photoconductivity (PC) in selenium. In 1883, Charles Fritts proposed the main plan of PV cell, which depended on the Selenium wafers. The hypothesis of photoelectric impact proposed by Albert Einstein in 1905 clarified how light takes out the electron from the metal surface. Later for this work, he was granted with the Nobel Prize. In 1918, Jan Czochralski laid the establishment of Silicon (Si) based sun based cells by building up a procedure to develop single-precious stone silicon (Si) (The History of Solar Energy, 2013. In 1954, the introduction of PV happened, when the glasslike silicon-based sunlight based cell was created in Bell lab, USA that had power change productivity (PCE) of 4.5% (Chapin et al., 1954). From that point forward, analysts have been effectively looking for an ease gadget structure and some new materials showing the PV impact. Accordingly, second-age sun based cells appeared. These phones were fundamentally founded on III-V gadget structure, GaAs, CdTe, INP, and CIGs sunlight based cells were presented in the field of sunlight based photovoltaic[1], [2].

The mid 1990s thought of the third era of sun oriented cells with Dye-sharpened structure. In 2000s Organic Photovoltaic cells (OPV) were presented. With developing interest in nano materials, concentrated exploration work is being completed for finding new materials in the field of sunlight based gadgets, which are modest as well as requires minimal effort handling conditions as well. Right now, glasslike silicon sun oriented cells rule the market, yet the elements, for example, the necessity of the costly assembling measure and exorbitant crude materials are asking analysts to think of another PV innovation that has the blend of both high proficiency furthermore, minimal effort producing. Cause of the structural similarities of PSCs with both DSSCs and thin-film PVs, the fabrication approaches for both kinds of solar cells, including almost all vacuum and non-vacuum methods, could have a considerable improvement in PSCs as well. But the actual research showed something different: due to relatively easier process and great efficiency output, spin-coating is the most widely used method in the fabrication of PSCs but it is not suitable for large-scale manufacturing. Many other non-vacuum-based approaches were also developed and will be mentioned below. Some of them, such as doctor blading and screen printing, had been also successfully applied for the fabrication of larger-scale perovskite film. However, thermal evaporation is the only vacuum-based methods that ever been demonstrated with a good cell performance. To the best of our knowledge, sputtering was never used possibly due to the lack of appropriate sputtering target and the possible damage of high-energy species to the unstable perovskite materials. According to different preparation procedures, the fabrication approaches of PSCs could be categorized as: one-step process; two-steps process; vapor-assisted process and thermal evaporation process[2]–[4].

One-step deposition was widely used in perovskite cell fabrication due to its easier operation and low cost. The perovskite film could be fabricated with pinhole-free and suitable stoichiometry with wise control of perovskite precursors. Typically, the perovskite precursor solution was prepared with organic halide (MAI/FAI, methylammonium/formamidinium iodide) and inorganic halide (e.g., PbI_2) dissolved in gamma-butyrolactone (GBL), dimethylformamide (DMF), dimethyl sulfoxide (DMSO) or a combination of two or all three solvents. The mixed

precursors were spin-coated and annealed in a range of 100–150 °C to form phase-pure, pinhole-free and dense perovskite layer. Their achievement was accomplished not only due to the complex additive of Li-bis(trifluoromethanesulfonyl) imide, FK209 tris(2-(1H-pyrazol-1-yl)-4-tert-butylpyridine)-cobalt(III) tris(bis(trifluoromethylsulfonyl) imide) and 4-tertbutylpyridine but also a different precursor preparation technique by starting with a mixture of MAI and FAI. Also, the band gap tuning of perovskite would be accomplished by either modifying the organic cations or adjusting halide anion ratios.

2. DISCUSSION

There have been many paper published in the field of solar panel materials among all the papers a paper titled “A review on perovskite solar cells: Evolution of architecture, fabrication techniques, commercialization issues and status” by Priyanka Roya, Numeshwar Kumar Sinhaa, Sanjay Tiwarib, Ayush Kharea discusses For last such countless years, the humankind has been searching for a wellspring of energy that isn't just ecologically maintainable however is economically feasible too. Current worldwide force request is about 16TW, and it is assessed that the force request would increment past 30TW by 2050. In this way, thorough exploration is being done to get a proficient force age framework, as the conventional strategy of consuming non-renewable energy source would not have the option to meet the climb in the force prerequisite. The sustainable power sources, for example, flowing, aqueous, geothermal, wind, sun powered, and so forth will go about as a hero in the energy emergencies. Among the different wellsprings of energy, sun oriented energy is accepted to be the most encouraging and proficient one because of its accessibility in bounty. The uniqueness of sun oriented energy can likewise be surmised from the way that 60 minutes of consistent enlightenment of sun powered energy is equipped for satisfying our yearly force requests, if all the occurrence sun powered energy is changed over into power. Thus, utilizing PV sun oriented cells for power age is by all accounts a promising path as they convert the daylight straightforwardly into power[5], [6].

The first record of perovskite-based solar cell efficiency, however, was reported by Miyasaka et al. only less than one decade ago. They reported an efficiency of 3.8% based on a DSSC structure. Due to the application of liquid electrolyte in the hole-transporting material (HTM), the stability of solar cell was very weak and did not attract much attention. Similar trial was done by Park et al. with the increased efficiency of 6.5% but stability was still the main problem because of the instability of HTM layer due to the liquid medium.

The application of solid-state HTM (2,2',7,7'-tetrakis(*N,N*-di-*p*-methoxyphenylamine) -9,9'-spirobifluorene, i.e., Spiro-OMeTAD), rather than liquid HTM, onto the highly-crystallized perovskite layer triggered the efficiency boosting during the past several years. Lee et al. reported a breakthrough device efficiency of 10.9% in 2012 with the open-circuit voltage higher than 1.1 V. Wang et al. introduced graphene into PSCs and acquired an efficiency of 15.6% in 2013 and the application of another perovskite material, formamidinium iodide (HC(NH₂)₂PbI₃) together with poly-triarylamine (PTAA) as a new HTM brought a remarkable 20.1% efficiency in 2015. The current record efficiency of PSCs was 22.1%, created in 2016 by SeongSik Shin. They also accomplished a long-term and stable efficiency of 21.2% in another work. The perovskite-inserted tandem cell also achieved a promising efficiency of 26.7% by combining with Si cells. During this progress, various HTM and vacuum/non-vacuum fabrication methods have been developed, which would be discussed later in this review. compared the efficiency

progress of PSCs with other 3rd generation photovoltaics up to date. The rapid improvement of the efficiency of PSCs make perovskite being expected to be comparable with the stable performance of c-Si solar cells whereas all other kinds of non-silicon solar cells suffered great barriers in further improvements. According to the theoretical calculation based on the well-known Shockley-Queisser limit, the perovskite devices, which have $(\text{CH}_3\text{NH}_3\text{PbI}_{3-x}\text{Cl}_x)$, could achieve an efficiency around 25–27%. This result indicates that there is still opportunity for the improvement of PSCs.

Although laboratory scale PSCs exhibited a great progress, perovskite-based PVs still needs to overcome several barriers. In general, there are two major problems currently blocking the improvement pathway: device instability of device performance and hysteresis of J-V (current density-voltage) . At present, long-term efficiency measurements (>1000 h) is still not adequate for the commercialization of PSCs. The PSCs must pass a series of testing under harsh conditions and environments for similar duration (>1000 h) . Thus, it is very important to understand the degradation mechanism of both perovskite materials and other device components such as hole transport medium (HTM) and electron transport medium (ETM). The J-V hysteresis was discovered during cell testing when voltage sweeping routine changed. This phenomenon brings problems for standardizing the measurement protocol of PSCs. In addition, the toxicity from lead could be another problem during the manufacturing, using and recycling of perovskite. Currently several trials on applying non-toxic alternative metal ions have been reported but their device efficiency is still not promising. Detail information could be found later in this review. It has been clear that the perovskite could be the next candidate to replace Si due to its outstanding structural, electrical and optical properties. This review, therefore, would start with the discussion from micro-scale observations on the crystal and electrical structures of perovskite materials. The next part is the discussions on device-level investigations: the evolution of device structure, the fabrication methods and their progresses and the exploration of each device component[7]–[9]. We would then focus on the research efforts of device stability and toxicity of PSCs and finally show our suggestions for further directions of the perovskite research. The electronic structure of perovskite, especially the typical MAPbI_3 , was already estimated by DFT (density functional theory) calculations. The calculated band gap had a good agreement with the measured band gap by absorption spectrum even after considering the spin orbit coupling and other interactions like van der Waals interaction. The first reported perovskite device is designed based on the structure of DSSCs, where liquid electrolyte capped both mesoporous TiO_2 particles and perovskite material as the new “dye” molecules. Their work demonstrated the perovskite was not a stable “dye” due to its quick dissolving in the liquid hole-transport layer. The 3.1% and 3.8% device efficiency (depends on different halogen anions) could only last few minutes. To avoid this degradation, a solid-state hole-transport material was applied and the device performance was significantly increased. The PSCs could be fabricated in both sequences rather than thin-film PV, whose device configuration was limited by the properties of absorber materials. Thus, there are four major types of PSCs: substrate/superstrate-configured mesoporous structure and substrate/superstrate-configured planar structure. The most typical n-i-p mesoporous structure is the first demonstrated high-efficient structure for perovskite devices. Started with the TCO cathode (mostly fluorine-doped tin oxide, FTO), a thin compact blocking layer was applied to decrease shunting, a mesoporous metal oxide layer filled with highly crystalline perovskite absorber layer. A layer of HTM was applied and a metal contact layer was deposited on the top of the device[10].

The mesoporous structure is originated from typical DSSCs. The reason for the weak performance of DSSC-based perovskite devices, except the corrosion due to liquid electrolyte mentioned above, was the excess mesoporous TiO_2 part. The widely-spread TiO_2 nano-particles inside the perovskite layer reduced the growth of perovskite crystals and also decreased the distance between separated free carriers, giving extra change for carrier recombination between TiO_2 and HTM layer. The planar PSC is successful because it utilizes thin-film PV structure and excellent optical and electrical properties of perovskite. It is also an extreme case for mesoporous structure, where the thickness of mesoporous layer is zero and unlike the mesoporous structure, this type of structure could be fabricated without high-temperature process.

3. CONCLUSION

Perovskite Solar Cells (PSCs) have grabbed the attention of the researchers worldwide owing to their outstanding Photovoltaic (PV) performance. PSCs are the future of the PV technology as they are capable of generating power with performance being comparable with the leading Silicon solar cells, with the cost being lower than Silicon solar cells. The enormous potential of PSCs is evident from the fact that the efficiency of these cells has risen from 3.8% to 25.2% within a decade, and it is continuously rising to date. We discuss the features making PSCs superior to contemporary PV technologies. The description of the evolution of efficiency and various architectures used to date has been presented. The perovskite film fabrication techniques with some large scale perovskite solar cell manufacturing techniques are discussed. Despite positive traits, the PSCs have faced some issues, such as degradation in the presence of moisture, oxygen, and UV, toxicity, etc. The impact of these factors with various remedies adopted by researchers has been discussed. However, the instability issue raised by toxicity is not of much concern is supported in this paper. These issues creating obstacles in the path of commercialization of PSCs along with the commercialization road map are discussed thoroughly.

REFERENCES:

1. Yao X, Ding YL, Zhang XD, and ZhaoY. A review of the perovskite solar cells. Wuli Xuebao/Acta Phys. Sin., 2015; 64(3). doi: 10.7498/aps.64.038805.
2. Song Z, Waththage SC, Phillips AB, and HebenMJ. Pathways toward high-performance perovskite solar cells: review of recent advances in organo-metal halide perovskites for photovoltaic applications. J. Photonics Energy, 2016; 6(2). doi: 10.1117/1.jpe.6.022001.
3. Green MA and BeinT. Photovoltaics Perovskite cells charge forward. Nat. Mater., 2015; 14: 559–561.
4. Konstantakou M and StergiopoulosT. A critical review on tin halide perovskite solar cells. J. Mater. Chem. A, 2017; 5: 11518. doi: 10.1039/c7ta00929a.
5. Sani F, Shafie S, Lim HN, and Musa AO. Advancement on lead-free organic-inorganic halide perovskite solar cells: A review. Materials. 2018, doi: 10.3390/ma11061008.
6. Kumari MA, Swetha T, and Singh SP. Fullerene derivatives: A review on perovskite solar cells. Materials Express. 2018, doi: 10.1166/mex.2018.1449.
7. Liu C, Li W, Fan J, and MaiY. A brief review on the lead element substitution in perovskite solar cells. Journal of Energy Chemistry. 2018; 27: 971. doi: 10.1016/j.jechem.2017.10.028.

8. Elumalai NK, Mahmud MA, Wang D, and. UddinA. Perovskite solar cells: Progress and advancements.Energies. 2016; 9(11), 861. doi: 10.3390/en9110861.
9. Petrus MLet al. Capturing the Sun: A Review of the Challenges and Perspectives of Perovskite Solar Cells.Advanced Energy Materials. 2017, doi: 10.1002/aenm.201700264.
10. Zuo C, Bolink HJ, Han H, Huang J, Cahen D, and DingL.Advances in perovskite solar cells.Advanced Science. 2016; 3 (7):1500324.doi: 10.1002/advs.201500324.

OVERVIEW ON BENEFITS OF PHYSICAL ACTIVITY ON THE OLDER ADULTS

Dr. Prithpal Singh Matreja*; Dr. V K Singh**

*Professor,
Department of Pharmacology,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- drpsmatreja@yahoo.co.in

**Professor,
Department of General Medicine,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email id: drvksingh.tmu@gmail.com

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ABSTRACT

The goal of this interdisciplinary review article is to critically evaluate data from descriptive, efficacy, and efficiency studies involving physical exercise and older adults. Both fitness levels (aerobic power, strength, flexibility, and functional capacity) and measurements of physical exercise participation decrease as people become older, and the degree to which it's attributable to natural aging processes or use (physical inactivity) is debated. The evidence supporting a causal relationship among sedentary behavior/physical exercise program and cardiac, musculoskeletal, and psychological functioning, independent living, and wellness quality of life in old age will be considered in this study. The study also examines the efficacy of various physical activity treatments for seniors, as well as cost-effectiveness concerns. There is a short discussion of the consequences for current policy in terms of study, healthcare, and training and education.

KEYWORDS: Ageing, Cardiovascular Problems, Exercise, Health Promotion, Quality Life.

1. INTRODUCTION

Physical activity's impacts on the aging process have piqued attention in recent years and with good cause. In context, between 1995 and 2025, the number of individuals in the UK so over age of 80 and 90 is projected to rise by 50% and the double, respectively. In the UK, the National Health Service (NHS) spent approximately 40% of its money on older people in 1998–99, while public care spent about 50%. If these expenses increase in tandem with population shifts, the financial consequences would be significant. It is predicted that if the entire population followed the national physical activity recommendations, health-care expenditures for bone fractures alone might be cut in half. The objective of this essay is to offer a critical assessment of scientific data on the consequences of sedentary behavior on health inside an ageing society, as well as whether

and at what cost trends toward increased sedentary lifestyle may be reversed. Finally, we offer policy suggestions to the government.[1]

In the first part, we pay attention to the quality of data on older people's physical activity habits. Young kids and healthy adults have been given national standards for engaging in physical exercise. Owing to significant variations in the aging process and the capability to participate in physical activity due to impairment, recommending precise amounts of exercise for older individuals remains a controversial topic. For example, a 75-year-old may be able to do just chair-based exercise, which has been shown to have some health advantages, whereas others of a similarly aged may have far more functional capacity and would only benefit from a much higher dose of exercise. Regular monitoring and monitoring, utilizing consistent, accurate, and valid measuring methods, is required if government policy is to be proof (e.g., motivated by data that indicates decreasing physical activity patterns). We use the most recent national data from the United Kingdom to highlight the need for a better knowledge of older people's physical activity habits and secular trends.[2]

Then we go on to the issue of efficacy: What do we understand about the physical and psychosocial consequences of sedentary behavior and exercise training? The distinction between how natural ageing process leads to functional impairment and avoidable change owing to lack of physical activity is a problem for fitness researchers interested in these impacts. Given that cardiovascular disease is the leading cause of premature death and morbidity in the United Kingdom, we concentrate on the consequences for the cardiovascular system. The emphasis then shifts to muscular function and bone density, which has implications for fall prevention and self-sufficiency. Following that, we'll look at how physical inactivity impacts psychosocial aspects of health, such as psychological well-being and wellness quality of life (i.e. emotional, cognitive and social functioning).[3]

Then there's the issue of effectiveness: Will physical exercise treatments function in natural settings where elderly people's behavior change may be difficult? We examine the evidence supporting the efficacy of several treatments targeted at encouraging older adults to engage in physical exercise. We briefly examine cost-effectiveness in relation to this question: How much does it cost to provide suitable opportunities to promote increases in physical exercise that would decrease these costs and have wellness benefits for people if there are recognized costs to society associated with physical inactivity? Of course, understanding a precise dose-response connection between physical exercise and health in older individuals is required for the latter. We don't think about how efficient we are. What is the cost of physical activity treatments, for example, in comparison to other interventions that may have the same effect? Pharmaceutical, surgical, and non-invasive treatments (such as art therapy) may offer comparable advantages, but may cost more or less than physical exercise. Given the wide variety of health-improving benefits of physical exercise on both physical and psychosocial dimensions, the issue of efficiency becomes very complicated, but it is beyond the scope of this paper. Nonetheless, it remains a significant public health problem.[4]

Finally, we take a quick look at the implications of this data for public policy in the fields of research, provision of services, and training and education.

2. DISCUSSION

1. Physical Exercise Is Quite Common:

In this section, we look at the rate of physical exercise among older people in England. The findings are based on the most current cross sectional data from the Health Surveys for England (HSE) in 1998 and 2000. Regular exercise was only measured in care facilities for older people in the HSE of 2000, not in private houses. Residential homes that simply offer board and personal care, as well as nursing homes for the people, who need frequent or continuous daily nursing care, are examples of care homes. The HSE in 1998 surveyed a representative sample of people in England. In both surveys, participants were asked about the regularity, length of time, and intensity (whether or not the activity made them out of breath or sweaty) of various categories of activities (including vocational physical activity, strolling, sport and entertainment, and domestic physical activity) in the four weeks preceding their interview. This section's findings are mostly based on information from the 1998 HSE. Walking is the most common type of physical exercise among adults, and it is also the most adaptable. 3.9 percent of respondents aged 65 and above said that they're unable to move at all. The percentage rose dramatically with age, especially after the age of 80, reaching 13% of people aged 85 and above.

In the four weeks leading up to the interview, 8 out of 10 older people walked for at least 5 minutes, a decrease from 88 percent to 52 percent across age groups. In the four weeks before to being questioned, three-quarters of older people walked for at least 15 minutes, with a substantial decrease with age. The percentage of older people who walk for at least 72 hours per week, regardless of their normal walking speed, and at minimum an hour per week at a reasonably brisk or fast pace to provide an idea of the numbers of elderly persons who walked at a rate that may improve their health. While little over a fifth of older people exercise for a minute or more each week, over half of those who do so do so at a moderately brisk or rapid pace. The average walking speed is likely to have to be at minimum brisk to provide substantial health benefits.[5]

A major article detailing updated physical activity guidelines for health was released in the United States by the American College of Sports Medicine and the Centers for Disease Control. It recommended that all people exercise for 30 minutes at a moderate effort on at least five, but ideally all, nights of the week. Any exercise with a 3–6 MET energy cost was considered moderate intensity. This was defined as any activity that required the same amount of effort as moderate strolling for that individual. In England, the percentage of elderly people who fulfill current public health guidelines for physical exercise is low and falls quickly as they become older. Overall, 9 out of 10 older people are not as active as they should be, with involvement rates dropping dramatically beyond the age of 74. Two-thirds of those aged 85 and above are at this stage, with eight out of ten of those aged 85 and up exercising for less than two hours in the four weeks leading up to their interview.[6]

There is no nationwide trend data for this age group due to the scarcity of data on physical activity habits. Future Health Surveys for England, which concentrate on older people, might get a better picture of physical activity participation if questions on physical activity were not limited to those residing in care facilities. More study is required to better understand how physical exercise participation rates differ by ethnicity and economic status in this age group. This would aid in the creation of much-needed physical activity programs for senior citizens.

2. Cardiovascular Health And Physical Exercise:

2.1 Mortality/Morbidity From Cardiovascular Disease And Aging:

According to the latest data from of the UK National Office of Statistics, circulatory system disorders accounted for 40% of all fatalities in the UK in 2001. While these statistics demonstrate the enormous public and private costs of cardiovascular illness in our society, they also obscure the reality that heart disease is a leading cause of death among the elderly. For example, 96 percent of the 240,267 circulatory fatalities reported in 2001 occurred in those aged 55 and up, and 71 percent in people aged 75 and above, showing that heart disease is mostly linked to aging. Morbidity statistics, which measure the prevalence of cardiac disease in the population, are also of importance. According to these figures, there are presently 1.2 million individuals in the UK who have or have had a heart attack (approximately 63 percent are over 65 years old) and 2 million people who have or have had angina (40 percent are over the age of 75 years). As a result, cardiovascular disease poses a major threat to the care of older people in our society. This section reviews the changes that take place in the cardiovascular system with ageing, the impact that strenuous fitness initiatives have on the cardiovascular health, and the associated benefits, given the demographic shift towards an older and far less active population as well as the fact that inactivity is implicated as a significant risk factor for the development of cardiovascular disease.[7]

2.2 The Cardiovascular System and Aging:

The cardiovascular system deteriorates with age, resulting in decreased cardiac function from of the left and right ventricles, as well as a reduction in oxygen delivery to the tissues. Both the central (heart and coronary circulation) and peripheral (major conduits vessel and vasculature) circulations have changed structurally and functionally as a consequence of this. The combined central and peripheral alterations result in a reduction in cardiac filling, increased afterload (increased resistance to blood ejection from the heart), and altered cardiac function, including diminished catecholamine sensitivity and a slower heart rate. These alterations may seem minor on their own, but when combined, they lead to the well-documented decrease in maximum oxygen absorption (VO_{2max}) and cardiac function seen in older people after maximal activity. The overall decline in levels of physical activity, the increasing incidence of underlining coronary heart disease (and other diseases), and altered body composition that occur with age all confound the interpretation of age-related reductions in endurance capacity. Despite this, it is clear that even seemingly healthy people lose endurance and functional ability of the heart and lungs as they become older.[8]

2.3 Exercise At A Submaximal Level:

The cardiovascular reactions of elderly people to exercise sessions are not the same as those of younger people. Heart rate and stroke volume are both lowered at the same relative labor intensity (percentage VO_{2max}), thereby lowering cardiac output. Cardiac output is decreased during exercise at the same absolute intensity, while arterio venous oxygen discrepancy is slightly greater to compensate for reduced oxygenated blood supply and reduced plasma, red cell, and total blood volume. Furthermore, during exercise, blood pressures in older people are usually greater, raising preload and further reducing pericardial effusion from the left ventricle. Although peripheral vascular resistance decreases with age in both young and old adults during incremental exercise, afterload in older people increases much more with age because total peripheral resistance is usually higher in older people than in younger people at similar labor intensity. This is due to variations in arterial stiffness and blood flow resistance in the peripheral circulations.

2.4 Maximum Exertion:

After the age of 30, endurance capacity, as measured by $\dot{V}O_{2\max}$, declines by 5–15 percent each decade, with the degree of loss being inversely linked to the individual's physical activity level (Heath et al., 1981). Such a decrease, according to the Fick equation, must be attributable to age-related deficits in cardiac output, oxygenation extraction at the tissue, or a mix of both. Indeed, given that maximal heart rate declines by 6–10 beats min^{-1} per decade and that stroke volume of the left ventricle decreases during maximal exercise in populations over 65 years, it is clear that a large portion of the decrease in $\dot{V}O_{2\max}$ can be taken into account for by a reduced cardiac output at maximum. Reduced oxygen extraction, which may be linked to morphologic alterations in muscle tissue and age-associated sarcopenia, accounts for the rest of the reduction in $\dot{V}O_{2\max}$. In addition, a rise in afterload owing to increased preload and arterial stiffness with age compromises the function of the left side of the heart. As a consequence, end systolic volume increases in elderly people, resulting in a decrease in ejection fraction. Many of these alterations have been linked to the aging process and the onset of cardiovascular disease. The finding that aerobic endurance cures most of these age-related modifications emphasizes the link between a physically sedentary lifestyle and the development of the alternation.[7]

3. Physical Exercise With Mental And Social Well-Being:

There have been many definitions of health-related quality of life that include a variety of outcome metrics. We'll look at the effects of physical activity on depression prevention and treatment, as well as its role in preventing untimely loss of emotional, cognitive, social, and perceived physical function, as well as physical symptoms, and improving health-related quality of life in older persons with disabilities and disease.

3.1 Depression:

Depression, according to Copeland (1999), is a strong killer of life quality in the aged. Depression raises the risk of cardiac death in adults with and without heart disease, and symptoms of depression have a significant effect on older folk's well-being and disability, as well as having obvious economic implications. The use of physical exercise in the treatment of depression in older people is gaining traction in the scientific community.[8]

3.2 Mental Health And Emotional Functioning:

The most thorough study of the anxiety-reducing benefits of exercise was written. Only 6 of the 62 treatment effects included in their meta-analysis, which looked at trait anxiety as an endpoint, involved people over 45.[9] This age group's mean impact size was 0.41, which was comparable to other age groups. With a range of psycho-physiological anxiety correlates as the result, 26 of the 138 effect sizes included those over 45, and the impacts tended to be less than in other age groups. Taylor (2000) found that more research had included older individuals, but only half had demonstrated aerobic exercise to decrease anxiety or psycho-physiological indices, based on a study of reviews and a systematic evaluation of current research. There was apparently inadequate data to determine if training had any impact on older people's psycho-physiological response to psycho-social stresses. The majority of research did not take into account co-existing morbidity.[10].

3. CONCLUSION

In conclusion, increasing data supports exercise's depressive impact and its involvement in enhancing emotional, cognitive, social, and subjective physical function in older people, as well as reducing physical symptoms. The assertion that "physical exercise and mental function in older adults are linked" has a lot of evidence to back it up. In terms of their ability to improve psychological well-being, current physical exercise recommendations are widely accepted. Physical exercise and senior citizens 715 downloaded at 00:47 on August 9, 2012 well-being in elderly people. Muscle strength, in particular, has the most positive impact on mood, in addition to its function in possibly reducing the occurrence of falls. More well-designed trials including comparisons to other psychological treatments, as well as clinical and cost-effectiveness problems, are needed. Finally, the function of physical exercise in increasing social connections and lowering the risk of social isolation among older people is an area that may be explored more in the future. Health inequalities care and the climate are especially harmful to the elderly, and more study should be done to see how these issues may be addressed by encouraging physical activity. It is apparent that a comprehensive knowledge of the social context in which older people live is essential, in terms of official and informal social support networks, perceptions of danger, and accessibility within the built environment, to optimize the benefits of physical exercise on quality of life. Only integrated strategies involving a range of organizations (e.g., healthcare and social, housing associations, and planners) may improve feelings of well-being and health-related life quality as a consequence of a more healthy and active lifestyle.

REFERENCES

1. Musich S, Wang SS, Hawkins K, and Greame C. The Frequency and Health Benefits of Physical Activity for Older Adults. *Popul. Health Manag.*, 2017 Jun;20(3):199-207. doi: 10.1089/pop.2016.0071.
2. Whitehead BR and Blaxton JM. Daily Well-Being Benefits of Physical Activity in Older Adults: Does Time or Type Matter? *Gerontologist*, 2017 Nov 10;57(6):1062-1071. doi: 10.1093/geront/gnw250.
3. Reid H and Foster C. Infographic. Physical activity benefits for adults and older adults. *British Journal of Sports Medicine*. 2017;51(19). doi: 10.1136/bjsports-2016-096811.
4. Guo Y, Shi H, Yu D, Qiu P. Health benefits of traditional Chinese sports and physical activity for older adults: A systematic review of evidence. *J Sport Health Sci*. 2016 Sep;5(3):270-280. doi: 10.1016/j.jshs.2016.07.002.
5. Temple B, Janzen BL, Chad K, Bell G, Reeder B, and Martin L. The health benefits of a physical activity program for older adults living in congregate housing. *Can. J. Public Heal.*, 2008;99(1):36-40. doi: 10.1007/bf03403738.
6. Bean JF, Vora A, and Frontera WR. Benefits of exercise for community-dwelling older adults. *Arch. Phys. Med. Rehabil.*, 2004;85(Suppl 3):S31-42. doi: 10.1016/j.apmr.2004.03.010.
7. Belza B, Walwick J, Shiu-Thornton S, Schwartz S, Taylor M, and LoGerfo J. Older adult perspectives on physical activity and exercise: Voices from multiple cultures. *Prev. Chronic Dis.*, 2004 Oct;1(4):A09.

8. Nguyen HQ et al. Impact of a managed-medicare physical activity benefit on health care utilization and costs in older adults with diabetes. *Diabetes Care*, 2007 Jan;30(1):43-8. doi: 10.2337/dc06-1013.
9. Chodzko-Zajko W J. et al. Exercise and physical activity for older adults. *Medicine and Science in Sports and Exercise*. 2009 Jul;41(7):1510-30. doi: 10.1249/MSS.0b013e3181a0c95c.
10. Fern AK. Benefits of physical activity in older adults: Programming modifications to enhance the exercise experience. *ACSM's Heal. Fit. J.*, 2009 Jul;41(7):1510-30. doi: 10.1249/FIT.0b013e3181b46b23.

THE USE OF TRANSGENIC ANIMALS TO ENHANCE PEOPLE AND ANIMAL HEALTH

Shakuli Saxena*

*Assistant Professor,
Department of Agricultural Sciences,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- shakuli2803@gmail.com

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ABSTRACT

Transgenic animals are becoming increasingly extensively utilized for a variety of applications. Animal transgenesis has three main applications: Author obtaining information on gene functioning, as well as human diseases, (ii) obtaining high-value products for human medicine, and (iii) improving animal products destined for human consumption. All of these applications have something to do with human health, whether directly or indirectly. In 1980, animal transgenesis became a reality. Significant advancements in the techniques have been made, and are constantly being made, in order to decrease costs and animal slaughter, as well as to enhance the relevancy of the models. This involves gene transfer and the creation of dependable transgenic expression vectors. From a technical standpoint, this paper summarizes the current status of animal transgenesis. It also discusses some of the medicinal applications based on the usage of transgenic animal studies. The progress in the production of pigs for use as organ donors and the synthesis of medicinal proteins from milk and other potential biological fluids from transgenic animals is discussed. The current initiatives aimed at increasing animal productivity via transgenesis are also shown. Some of the particular biosafety or bioethical issues presented by various transgenesis uses, including transgenic animal protein consumption, are addressed.

KEYWORDS: *Animal Transgenesis, Animal Health, Transgenic Animals, Transgenesis Techniques.*

1. INTRODUCTION

Under the stress of their surroundings, living creatures have the ability to develop quickly. Since the invention of agriculture and breeding, human societies have made extensive use of this characteristic. As a result, our forefathers created the majority of the races and variations that humans may choose from. These carefully chosen varieties are utilized as pets or decorative plants as well as a source of food. The changes that happened as a result of genetic selection are so profound that many domesticated animals would perish without the help of humans. This is shown by a silkworm that has been unable to move, obtain food, or sexual partners. Experimenters are presently utilizing chemical substances or irradiations to generate many and

random mutations in genomes to improve their options. Thanks to the use of a variety of drosophilae mutations, genetics has made considerable progress. Systematic mutations in mice were first accomplished a few years ago using ethyl nitrosourea given to male mice. In the best-case scenario, this results in the emergence of new animal lines with defects that are similar to, but not identical to, human illnesses. Because a number of unknown genes are altered alongside those responsible for the observed phenotypic changes, this method is not exact.

In most cases, conventional genetic choosing does not entail that the genes involved are known. With the increased usage of genetic markers, this technique is improving. A novel characteristic, on the other hand, has a slim probability of appearing in a species within a historical era. Blind selection, on the other hand, may favor the expression of genes that have negative consequences for consumers or the environment[1].

Transgenesis has become a vital tool for researchers studying genome function. It allows researchers to investigate individual genes in their natural, complicated context. Transgenesis has the potential to aid in the development of new relevant models for the study of human illnesses. Transgenesis may also help to decrease the rejection of certain pig organs destined for human transplantation. Transgenic animals' milk is being used to make certain medicinal proteins. Furthermore, transgenesis has the potential to increase animal output. Despite its many achievements, transgenesis is still constrained by technological issues that are being addressed one by one. In certain species, gene transfer is still inefficient, and transgenic expression and interference with the host genome are not completely regulated. The use of transgenic animals as models or sources of goods for humans is still reliant on technological advancement[2].

1.1. Transgenesis Techniques:

Gene availability, gene transfer, vector building for successful transgenic expression, and data interpretation are among issues that transgenesis faces. The full genome sequencing of many animal species, including man, mouse, and rat, has already provided a significant number of genes to researchers and biotechnologists. The genome sequencing of agricultural animals such as cows, chickens, rabbits, and salmon will, of course, add genes to the list. Surprisingly, a newly launched effort seeks to sequence the whole genomes of 15 mouse breeds. These strains were selected from among those that exhibit the most biological variety. Researchers should be able to assess allele effects in transgenic animals using correlations between phenotypic characteristics of animals and gene sequences. In a lot of instances, interpreting data provided from transgenic animals will always be challenging. When genes return to entire live creatures, this will be the price to pay. The development of transgenic animals and the proper expression of transgene is progressing. There is certainly room for improvement in the methods that are now accessible[3].

Gene Replacement and Addition In most instances, foreign DNA is randomly or uncontrollably incorporated into the host genome. When linear DNA is microinjected directly into the nucleus, it is circularized, randomly cleaved, and multimerized by a homologous recombination process, resulting in well-shaped tandem concatemers. When linear DNA is delivered into the cytoplasm by microinjection, transfection, electroporation, or other methods, it creates random head-to-tail and tandem concatemers. DNA rearrangement is often associated with this occurrence. Furthermore, transgenes included as head-to-tail polymers are often under expressed. Foreign DNA sequences may recombine with homologous host sequences with a low frequency, resulting in exact gene substitution.

1.2. Microinjection Of Bogus DNA:

The DNA must be expressed in the embryo at the one cell stage to produce generations of transgenic animals with the foreign gene in all cells. Injecting linear DNA into the pronucleus of one-cell embryos is the most frequent technique. This method was effective for the first time in 1980, but development was slow after that. Transgenic animals may result from up to 3% of mouse microinjected embryos. Using mice strains like FVB/ N may substantially increase this production. This yield is lower or much lower in rabbits, rats, pigs, and ruminants for unknown reasons. This is due to the integration process rather than microinjection. As a result, ruminant gene insertion is currently mostly accomplished via cloning[4].

1.2.1. Transposons Are Used:

Transposons are genomic DNA sequences that can self-replicate and integrate into new genome locations at random. Foreign genes are transferred into genomes via this feature. Transposon P is widely utilized in the production of transgenic drosophilae. In animals where snake DNA does not integrate, a few transposons have shown to be effective in transferring foreign genes. Transposons have been used to make transgenic medaka, silkworms, and a variety of invertebrates. The technique for utilizing transposons is improving. Transposons are effective and dependable tools for producing transgenic animals, however they can only hold 2–3 kb of foreign DNA[5].

1.2.2. Lentiviral Vectors Are Used:

Retroviral vectors have been researched extensively for human gene therapy and have been utilized effectively in certain instances. With the introduction of lentiviral vectors, a substantial improvement has been made. These vectors may penetrate the nuclear membrane and reach the host genome in cells at any stage of their life cycle, including dormant and embryonic cells. The envelope from the Vesicular Stomatitis Virus (VSV) may also be added to the lentiviral particles. This enables for particle concentration through ultracentrifugation and a high infection rate. Furthermore, the VSV envelope detects membrane phospholipids rather than specific receptors.

1.2.3. Episomal Vectors Are Use:

Gene constructs capable of auto replicating and being effectively dispatched in daughter cells may be used as an alternative to integration. Plasmids with a MAR sequence (matrix attached region) may be kept in cell lines for a long time. It's unclear whether these vectors can produce transgenic animals. Chromosome fragments may also be utilized to introduce foreign genes into cells.

1.3. Gametes Are Used:

The experiments mentioned above show that gene transfer into embryos using lentiviral vectors is effective in certain animals, such as cows. A potential option is to transfer genes into gametes. Experiments conducted over a decade ago shown that mouse sperm treated with DNA and then used for fertilization may produce transgenic animals. Due to the presence of DNase I on the surface of sperm, this technique known as sperm to transgenesis is difficult to repeat. It has, however, been verified in pigs and sheep. It also made it possible to transfer genes into rabbit oocytes[6].

1.4. Gene Integration With A Purpose:

Theoretically, homologous recombination here between genomic sequence and a foreign DNA fragment enables any section of a genome to be replaced. The most common use of this method, known as knock out, is to replace an active gene with an inactive one. An active gene in the genome may be replaced with another active gene, similar or unrelated to the targeted gene. This method, known as knock in, enables researchers to assess the biological activity of several alleles in their native locations in the genome. Recent research has shown that when a transgenic is linked with an appropriate promoter, this genomic location favors cell-specific expression of numerous foreign genes. This method is currently widely utilized by a commercial firm that successfully produces transgenic mice with adequate transgene expression[7].

1.5.Vectors For Transgene Design:

Expression multiple signals for transcription, mRNA maturation and transfer to the cytoplasm, mRNA stability, and translation may be found in both transcribed and non-transcribed sections of genes. Gene building is based on trial and error, and it often results in the suppression or inclusion of unknown signals. This limits the transgene's ability to be expressed effectively.

1.6.Conditional Expression Vectors For Transgenes:

It is very desired to regulate the expression of a transgenic using inducers that do not affect on endogenous genes in a variety of circumstances. This may be accomplished using a variety of methods, all of which rely on transcription factors that have been designed to be sensitive to chemicals like antibiotics. In recent reviews, several systems have been detailed. The transgenes' background expression is excessively high in the absence of inducers, which is a drawback of these systems. A number of better systems have been suggested. They refer to the activity of transcription factors that are regulated by inducers and function as enhancers or silencers. The translation level may also be used to regulate transgene expression[8].

1.7.The Uses Of Transgenesis:

Gene function and human illnesses are being studied. Genetically modified creatures are mostly used to learn about gene function and regulation, as well as human illnesses. The tools shown above have been significantly enhanced, and they help us achieve our objective. In the next two decades, up to 300,000 transgenic mouse strains are anticipated to be created. A total of 20 000–25 000 genes in mice will be knocked out or suppressed. In less than 5 years, ES cell lines with virtually all mouse genes knocked out and ready to produce mutant animals should be accessible.

1.8.Transgenic Animals Are Used To Produce Therapeutic Proteins:

Although the use of proteins as medicines seems intuitive, it did not become a reality until the early half of the twentieth century. Our forefathers, who relied mostly on plant extracts ingested as medicines, could not have imagined that proteins might play a significant role in patient treatment. The therapeutic protein market is now seeing rapid growth. Some scientists believe that the demand for pharmaceutical proteins will grow so rapidly in the next decade that all current manufacturing methods will be unable to satisfy it. Proteins may be isolated from human blood or organs, however this technique is not always morally acceptable and may be inadequate or dangerous for patients. Human proteins were first generated by recombinant bacteria in the early 1980s. When it was discovered that gigantic transgenic mice contained up to microgram amounts of human growth hormone in their blood, the concept of utilizing transgenic animals as bioreactors was born[9], [10].

2. DISCUSSION

Transgenic animals are becoming more widely used for a wide range of purposes. Animal transgenesis serves three objectives: (i) collecting knowledge on gene function and regulation, as well as human illnesses, (ii) getting high-value goods for pharmaceutical reasons, and (iii) enhancing animal intended for personal consumption. All of these applications, whether directly or indirectly, have something to do with human health. Animal transgenesis became a reality in 1980. Significant technological improvements have been made, and continue to be made, in order to reduce expenses and animal slaughter while also improving the relevance of the models. The current transgenesis-based efforts for improving animal production are also shown. Some of the specific biosafety and bioethical concerns raised by different transgenesis applications, such as the eating of transgenic animal products, are discussed. Animals used for organ harvesting or therapeutic protein production are in the same boat. Commissions with considerable experience in this field with conventional chemical medications evaluate medical problems emerging from the use of pharmaceutical proteins. It seems that transgenesis for animal production is more challenging to implement.

3. CONCLUSION

Animal transgenesis has had a modest but substantial effect on human health. In each of the domains, progress is being achieved. Recent technological advancements, like as cloning-based gene insertion and substitution, have opened up new possibilities. Researchers are discovering new genes of interest thanks to the full genome sequencing of many farm animal species. This will also increase the likelihood of generating useful new animal lines. The use of transgenic animals to research human illnesses has no specific ethical issues. The cost of transgenic farm founders remains high, despite recent advances in gene transfer methods. A transgene's characteristics of interest cannot be disseminated as quickly and easily as they are in most plants. Transgenes must thus provide a reasonably large profit in order to be useful. Because embryo manipulation and transgenes themselves may decrease animal suffering, animal transgenesis poses certain ethical concerns. There are no easy solutions to these issues, however the categorization below may help to explain the situation. Class 1 – laboratory animals: mostly employed for research rather than direct profit, exhibit frequent and unexpected adverse effects, and are utilized in restricted numbers based on tolerance for pain. Class 2 – animals used as sources of organs or pharmaceuticals: directly utilized for human health, may produce significant profit, may suffer from known and repeatable adverse side-effects, used in small numbers with a case-by-case tolerance for suffering Class 3 – farm animals: not absolutely necessary for human existence in most instances, may produce profit, have known and reproducible negative side-effects, and are employed in huge numbers by people who have little tolerance for pain.

REFERENCES:

1. Lipiński D, Zeyland J, and Słomski R. Biopharmaceutical production in transgenic animals. Med. Weter., 2007.
2. Sandøe P and Holtug N. Transgenic animals - which worries are ethically significant? Livest. Prod. Sci., 1993, doi: 10.1016/0301-6226(93)90145-8.
3. Cavagnari BM. Transgenic animals: Uses and limitations in the 21st century medicine. Arch. Argent. Pediatr., 2010 Aug;108(4):343-9. doi: 10.1590/S0325-00752010000400009.

4. Tadesse T and Koricho D. Biomedical Application and Future Prospects of Transgenic Animal: Review. J. Nat. Sci. Res. www.iiste.org ISSN, 2017.
5. Petters RM and Sommer JR. Transgenic animals as models for human disease. Transgenic Research. 2000;9(4-5):347-51. doi: 10.1023/a:1008926303533.
6. Lu Y, Deng J, Xiao C, and Ma Q. MAR: A new element of gene expression in transgenic animal. Prog. Biochem. Biophys., 1997.
7. Cavagnari BM. Transgenic animals generation. Regulation of gene expression. Arch. Argent. Pediatr., 2010 Oct;108(5):438-44. doi: 10.1590/S0325-00752010000500010.
8. Ma N and Gao X. The application of transgenic animals in microRNA research. Progress in Biochemistry and Biophysics. 2009, 36(9): 1095-1100. doi: 10.3724/SP.J.1206.2009.00091.
9. Houdebine LM. Transgenic animal bioreactors. Transgenic Research. 2000;9(4-5):305-20, doi: 10.1023/a:1008934912555.
10. Pinkert CA. Introduction to Transgenic Animal Technology. In Transgenic Animal Technology: A Laboratory Handbook: Third Edition, 2014.

A REVIEW STUDY ON ADVANTAGES AND NUTRITIONAL VALUE OF ORGANIC FOOD ON HUMAN HEALTH

Dr. Prithpal Singh Matreja*; Dr. V K Singh**

*Professor,
Department of Pharmacology,
TeerthankerMahaveer University,
Moradabad, Uttar Pradesh, INDIA

**Professor,
Department of General Medicine,
TeerthankerMahaveer University,
Moradabad, Uttar Pradesh, INDIA

Email Id- drpsmatreja@yahoo.co.in; drvksingh.tmu@gmail.com

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ABSTRACT

Organic food intake may lower the incidence of allergic illness, overweight, and obesity, but the data is inconclusive owing to probable residual confounding, since organic food consumers generally live better lives. Animal studies, on the other hand, indicate that similarly constituted feed from organic or conventional agriculture affects growth and development in distinct ways. When it comes to health benefits, organic diets have been shown to expose consumers to less pesticides linked to human illness. Organic farming has been shown to have a lower environmental effect than traditional methods. However, there is no evidence that eating organic foods provides any significant nutritional benefits or deficits when compared to conventionally grown foods, and there are no well-powered human studies that directly demonstrate health benefits or disease protection as a result of eating an organic diet. Pesticide usage is limited in organic agriculture, whereas residues in conventional fruits and vegetables are the primary source of human pesticide exposure. The nutritional value of organic food and the health benefits of organic food are discussed in this article. This article focuses on the health benefits of organic food as well as the environmental benefits of organic food production.

KEYWORDS:*Ecological Balance, Farming, Health, Nutritional, Organic Food.*

1. INTRODUCTION

Organic food produced using organic agricultural techniques that meet organic farming criteria. Organic farming is characterized by methods that recycle resources, maintain ecological balance, and protect biodiversity. The use of certain pesticides and fertilizers in agricultural techniques used to create organic goods may be restricted by organizations that regulate organic products. Irradiation, industrial solvents, and synthetic food additives are seldom used in organic food processing. Organic food demand is mainly driven by customer concerns about their own health and the environment. There is insufficient evidence in the scientific and medical literature to

support claims that organic food is either safer or healthier to eat than conventional food, according to scientists and consumers[1]–[5].

There is no scientific proof that dying thigh in organic food is beneficial or harmful to human health, and performing any kind of thorough trial on the topic is very difficult. In a review of the literature on organic food published in 2001, the American Academy of Pediatrics concluded that "current evidence does not support any meaningful full nutritional benefits or deficits from eating organic compared to conventionally grown foods, and there are no well-powered human studies that directly demonstrate health benefits or disease protection as a result of eating an organic diet." An organic diet has also been shown in studies to have no harmful disease-promoting effects. Despite the fact that organic goods are often more expensive, well-designed agricultural experiments show that costs may be competitive and yields similar to conventional farming methods[6]–[9].

Animal Reproduction Benefits from Organic Food Ten out of fourteen animal studies found that animals do better when given organic food. They didn't demonstrate any differences, and one even improved with normal meals. It should be emphasized that female rabbits given organic food produce twice as many eggs as those fed conventional food, and chickens fed organic food produce 28 percent more eggs. Rabbits given conventional diet had lower fertility across three generations, while rabbits fed organic food had no such problems. Meanwhile, many human couples are having difficulty conceiving a child.

According to a new research, organic food aids in the prevention of cancer, stroke, and heart disease. Salicylic acid levels in organic vegetable soups are almost six times higher than in non-organic vegetable soups. Eleven organic soup brands contained 117 Nano grams per gram, compared to only 20 Nano grams in 24 non-organic soup brands. Aspirin's primary component, salicylic acid, helps to prevent artery hardening and bowl cancer, and it's generated naturally in plants as a stress and disease defense. Because pesticide usage causes plants to lose their ability to fight pests, they produce less salicylic acid and pass it on to humans.

1.2.Organic Food Is Richer in Nutrients Than Non-Organic Food:

According to a recent research by the Globe and Mail and CTV News on the nutritional content of fruit and vegetables, today's ordinary fruit and vegetables have much less vitamins and minerals than they did 50 years ago. The typical potato has lost 100% of its vitamin A, 57% of its vitamin C and iron, 28% of its calcium, 50% of its riboflavin, and 18% of its thiamin. Only niacin levels rose among the seven essential nutrients examined. 24 additional fruits and vegetables had similar findings. All seven minerals decreased in broccoli, including calcium, which fell by 63 percent, and iron, which fell by 34 percent. Drought-resistant organic farming provides greater harvests. Organic farmers generated greater yields in drier regions and during droughts, and comparable yields in normal circumstances, according to a study of comparative studies of grain and soybean production in the US Midwest. The Rodale experiment had the same findings. Organic matter makes the soil less compact and moisture retentive, enabling roots to reach deeper into the soil in search of water.

1.3.Organic Food Has a Better Taste:

Some individuals are convinced that organic food is superior to non-organic food in terms of flavor. The fact that it is manufactured utilizing organic methods is a major factor in this view.

Furthermore, since organic food is often sold locally, fresh produce is readily available in the market, which typically tastes better than fruit that has been frozen, packed, and carried over great distances.

1.4. Organic Food with a Great Taste:

Organic food tastes great, and it's easy to see why: healthy soil and plants produce the best-tasting food. People who have participated in taste tests nearly always prefer the excellent flavor of organic food to processed and chemically contaminated foods, according to a number of studies. Fruits and vegetables produced organically taste much more vivid and robust, which is simply another advantage of the beneficial qualities of organic meals.

Food that is grown organically is safer than food that is grown conventionally. Organic farming creates more jobs and does not contaminate ground water, as well as avoiding all of the dangers connected with genetically modified crops. Farmers that use the herbicide 2, 4-D in Canada, Kansas, and Nebraska have a higher incidence of non-lymphoma. Hodgkin's (a cancer). Dogs that go around on sprayed lawns are in the same boat. Exposure to phenoxy herbicides has been linked to a six-fold rise in lymphomas in Sweden.

1.5. Human Health and Pesticide Contamination:

The food quality protection act (FQPA) regulates pesticide residues in food, however the tolerance limits given to some pesticides, although judged "allowable," nevertheless pose health concerns. Switching to organic foods is the only method to prevent pesticide residues. Pesticide residues are lower in certain foods, either because fewer pesticides are used in their manufacturing or because their skins are thicker and, when peeled, contain less pesticides than thin-skinned foods.

Children are especially sensitive to the effects of pesticide exposure because their organ systems are still growing and are less able to detoxify harmful substances. Pesticides are also ingested via food, therefore switching to an organic diet is a good way to cut down on your pesticide exposure. Children's exposure to organophosphates, a family of pesticides that contains both common and dangerous pesticides, is dramatically reduced when they convert to an organic diet, according to research.

1.6. Preserving the Immune System:

Genetic modification has been one of the most important initiatives for farmers in recent decades. Making r may seem to be a viable solution to hunger problems. In animal tests, genetically modified food resulted in a significant decrease in immune system strength, an increase in newborn mortality, as well as sexual dysfunctions, malignancies, and allergen sensitivity. Organic food supporters object to a lack of solid information regarding the long-term consequences of genetically modified foods, despite the fact that they have certain advantages.

1.7. Resistance to Antibiotics:

People are extremely concerned about their health, and they often take measures to ensure that they stay healthy, such as receiving different vaccinations and taking antibiotics as soon as a new strain of bacteria causes them to get sick. Antibiotics are also used to feed animals in non-organic food sources, such as cattle and feed houses. This additional dosage of antibiotics may be weakening the human immune system by essentially overdosing on antibiotics, altering our

immune system so many times that it becomes unable to protect itself. Antibiotics are not used by organic food producers or dairy farmers in their procedures.

1.8.Antioxidant Potency Increased:

Antioxidants are essential compounds present in fresh fruits and vegetables that have been proven to provide a variety of health advantages, including cancer prevention. According to several research, organic foods contain more antioxidants than commercial ones. Organic broccoli has more antioxidants, particularly vitamin C, than conventional broccoli, according to a 2012 research published in the "Journal of the Science of Food and Agriculture.

1.9.Pesticide Exposure is Reduced:

Many people select organic food to reduce their exposure to pesticides present in commercially grown produce. Pesticide residues are not present in certified organic food. The bulk of organophosphorus (OP) pesticide exposure in humans comes through food consumption, according to a 2008 research published in "Environmental Health Perspectives." When commercial output was drastically reduced.

1.10. Antibiotic Exposure Is Reduced:

Antibiotic resistance is becoming a worry for many Americans as the use of antibiotics on dairy farms and feed lots increases. Antibiotic additions are not provided to organically reared animals, therefore organic dairy and meat products are free of harmful residues. Low-dose antibiotic residue exposure may also alter the natural flora of the human stomach, decreasing the quantity of beneficial bacteria and making people more susceptible to dangerous bacteria and disease.

1.11. Organic Food Must Meet High Standards:

Organic foods must satisfy very strict criteria in order to be labeled as such. This is why most food is organic, since businesses do not follow the rigorous procedures that are needed of them in order to get certification. Foods are intended to ensure that the public is grown in the correct manner as well as in the ways that the certification standard suggests. Organic food production actually lowers the risk of health issues for the general population. Many of the harmful chemicals and pesticides that we started using decades ago to preserve our food and extend its shelf life were authorized before there was sufficient study to demonstrate that they were harmful. Many of these same substances have now been linked to cancer and other severe medical issues. While initially the worries were limited to cancer-causing chemicals, these chemicals have recently been linked to other serious medical issues such as Alzheimer's disease and birth abnormalities.

1.12. Wildlife and Organic Cooperation:

Organic farms, in addition to focusing on the whole ecosystem in their agricultural operations, recognize that we are not the only ones on this earth who benefit from what the ground has to offer. Animals and insects are a natural component of organic farming, according to organic producers. They grow specialized crops to meet the requirements of wildlife on their farms, and they also maintain wetlands, ponds, and other animal preserves as part of their agricultural operations.

1.13. Affirmation of the Farming Community:

Organic farms and individuals who pledge to purchase organic goods are almost the sole sources of support for small-scale, local farmers. The vast majority of agricultural and animal goods are produced by a limited number of massive factories and industrial sites that barely resemble farms, and most small rural farmers are being displaced because they are unable to sustain themselves financially. Despite the fact that their goods are of far better quality and standards, the emphasis on mass-produced, lower-cost food has nearly completely eliminated the small-scale farmer. Buying organic food supports smaller farmers that depend on farming for a living, the local economy, and the employment of local farm employees. Supporting organic farming is a vote of confidence in small businesses and the development of jobs in your community.

1.14. Organic Food And Water:

Organic farmers do not pollute the earth or the water supply since they do not use hazardous chemicals in their cultivation. This contributes to soil conservation initiatives as well. Because organic foods are produced without the use of chemicals, there is no risk of hazardous chemical runoff or destructive chemicals contaminating our water supply. While our drinking water is usually pasteurized before entering the water system, it does not capture everything, and some of that water is released into the sky and subsequently rains down on us. Eliminating the use of toxic chemicals would improve the health of our whole ecosystem.

1.15. Organic Food Production Innovation

Organic farmers are at the leading edge of science, as they strive to produce high-quality crops without the use of chemicals that are detrimental to our health and the environment. These farmers have utilized new methods to substitute potentially harmful pesticides, and they have funded their own research.

1.16. Environment Protection

When you consider the environment, organic food facts are particularly apparent. Traditional agricultural practices erode soil and utilize hazardous chemicals that may take millennia to degrade. Consider DDT, which was believed to be safe but turned out to be very harmful to your health. Despite the fact that this pesticide has been banned for many years, it is still present in almost all waterways, humans, and animals throughout the globe.

2. DISCUSSION

Production According to conventional food producers, there is insufficient scientific proof that organic food production is healthier for the environment. Although this is possible, the facts speak for themselves. Because organic farming rigorously avoids the use of any synthetic chemicals, it poses no danger of soil and subterranean water pollution, unlike conventional farming, which employs tons of artificial fertilizers and pesticides. Organic food production contributes to the conservation of local wildlife. Organic farming offers a refuge for local wild species by avoiding harmful pesticides, utilizing rotations of mixed planting as a natural pest management technique, and preserving field borders and hedges, rather than removing it from its natural environment as conventional agriculture does. Biodiversity conservation is aided by organic food production. The adoption of alternative, all-natural agricultural techniques instead of chemicals has been shown to help preserve biodiversity by encouraging a natural balance within the ecosystem and preventing the dominance of one species over another.

The development of organic foods aids in the battle against global warming. As a consequence, most organically proud locals consume less energy, which lowers carbon dioxide emissions, which are thought to be the primary cause of global warming. Erosion is reduced through organic food production. Except for crops, organic agricultural production techniques do not call for the eradication of all other plants. As a region with plant that prevents the highest rich soil layers from being reached. Despite the absence of scientific research and the presence of some who dispute organic food production's environmental benefits, there is no doubt regarding which food production technique does the most environmental damage. It's enough that organic agricultural techniques rigorously exclude the use of any synthetic chemicals.

Organic food production contributes to the conservation of local wildlife. Organic farming offers a refuge for local wild species by avoiding harmful pesticides, utilizing mixed planting as a natural pest management technique, and preserving field borders and hedges, rather than removing them from their natural habitat as conventional agriculture does. Biodiversity conservation is aided by organic food production. The adoption of alternative, all-natural agricultural techniques instead of chemicals has been shown to help preserve biodiversity by encouraging a natural balance within the ecosystem and preventing the dominance of one species over another. The development of organic foods aids in the battle against global warming. As a consequence, most organically proud locals consume less energy, which lowers carbon dioxide emissions, which are thought to be the primary cause of global warming.

3. CONCLUSION

Organic food has many benefits and nutritional worth for human health. According to several studies, organic foods have more beneficial elements, such as antioxidants, than their conventionally produced equivalents. Furthermore, when individuals with sensitivities to foods, chemicals, or preservatives consume exclusively organic foods, their symptoms typically subside or disappear. Furthermore, organic food has less pesticides. Fungicides, herbicides, and insecticides are examples of pesticides. These chemicals are often used in traditional agriculture, and residues may be found in and on our food. Food that is grown organically is usually fresher. Food that is freshly prepared tastes better. Organic food is often fresher since it lacks preservatives that extend its shelf life. Organic food is often available, but not always, so check to see whether it was grown on tiny farms near where it is sold. Organic farming is more environmentally friendly. Organic agricultural methods help to minimize pollution, save water, and improve soil fertility.

REFERENCE:

1. Manzi P and DurazzoA.Organic vs. Conventional milk: Some considerations on fat-soluble vitamins and iodine content.Beverages. 2017; 3(3): 39. doi: 10.3390/beverages3030039.
2. AghbashloM. et al., Hot dehulling.Energy, 2015.
3. Nielsen SuzanneS. Food analysis Laboratory manual, 2nd Edition. 2009.
4. Possingham JV.Fruit and vegetable quality in 21st century - The influence of Japan. 1998, doi: 10.2503/jjshs.67.1250.
5. Horwitz GWJ, Latimer W, Horwitz W. Latimer GW. Jr. 2005. Official methods of analysis of AOAC International. 18th ed. AOAC Interna- tional, Gaithersburg, MD.J. Nutr., 2009.

6. Arısoylı.Wagner ve Keynes Hipotezleri Çerçevesinde Türkiye’de Kamu Harcamaları ve Ekonomik Büyüme İlişkisi.Çukurova Üniversitesi Sos. Bilim. Enstitüsü Derg., 2005.
7. NurainiM.Pemberantasan Korupsi Melalui Good Governance.J. Lex Spec., 2011.
8. Mendes CH.Judicial Review of Constitutional Amendments in the Brazilian Supreme Court.Fla. J. Int. Law, 2005; 449: 451-52.
9. Cajas Castillo JO.Polen transportado en el pelo de murciélagos nectarívoros en cuatro bosques secos de Guatemala.Inf. tesis, 2005.

AN ANALYSIS OF RECYCLING OF WASTE ELECTRIC AND ELECTRONIC EQUIPMENT (WEEE)

Navneet Kumar Vishnoi*

*Assistant Professor,
Department of Computer Engineering,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- navneet.computers@tmu.ac.in

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ABSTRACT

The volume, complexity, and variety of electric and electronic equipment (EEE) are rapidly increasing. It also moves quickly, propelled by innovation and technological development, and relies on a diverse set of resources, some of which are scarce. Waste EEE (WEEE) has become a significant social issue. WEEE recycling and treatment entails both occupational and environmental risks, which are currently understudied. Even yet, in a fragile informal environment, second-hand EEE has been transported and handled in Africa, China, and India. EEE recycling has been maintained in industrialized nations by a variety of efforts and reasons, including sustainability, employment creation, and the value of valuable or rare metals. Current EU directives call for a significant decrease in the amount of WEEE plastics (WEEP) disposed of in landfills. WEEP's mechanical, thermal, and feedstock recycling are investigated, and various alternatives are considered. Plastics recycling should be evaluated against the potential hazards posed by their toxic components, which include brominated flame retardants and heavy metals. Another study is about recycling plastics from automobile shredder waste, which is an issue that is somewhat comparable but involves a different mix of plastics.

KEYWORDS:*Electric, Electronic, Metals, Recycling, Waste.*

4. INTRODUCTION

During the Golden 1960s, the average wealthy household had just a few electric devices: a radio, a black and white television set, a refrigerator, a vacuum cleaner, a washing machine, and a disc player. After thirty years, fast growth and widespread availability have vindicated the statement: 'with the ubiquity and dizzying pace of technical advancement of electronic equipment, the issue of how to dispose of it is becoming more important.' Electrical and electronic equipment (EEE) manufacturing is still one of the fastest expanding worldwide industrial activity, with a turnover that surpasses that of automobile makers. Rapid expansion also leads to an increase in the amount of trash electrical and electronic equipment (WEEE, electronic or e-waste).

The quantities placed on the market (PoM) and the amounts of WEEE recycled in each EU nation (Eurostat) or Japan are both reported with reasonable accuracy. In contrast to most other trash, there may be a significant time gap between equipment decommissioning and its ultimate

reporting to the e-waste stream. As a result, the quantity of trash that is reused, remanufactured, exported, or reported to municipal solid waste (MSW) is unknown. MSW often receives reports from small e-devices (s-WEEE), such as an electric toothbrush, hairdryer, or cell phone. Metal-rich e-waste is sold or even stolen for its metal worth[1].

Obsolescence prompts rapid replacement of telecommunication and information technology (IT) materials; cathode ray tube (CRT) monitors are quickly replaced by liquid crystal display (LCD) and plasma monitors, just as color television (TV) replaced black and white in the 1970s, increasing the amount of waste to be disposed of. E-waste contains at least 1000 distinct chemicals. The close mixing of components, as well as their usage in small amounts, makes it impossible to completely separate and filter these streams; furthermore, e-waste and its composition vary greatly. Heavy metals including mercury, lead, and cadmium, as well as polychlorinated biphenyls (PCBs) in condensers and brominated fire retardants (BFR) in casings and printed circuit boards, are all found in e-waste (pcbs)[2].

WEEE is an electrically powered appliance that no longer serves its original purpose for the current owner. WEEE is defined differently in each country, using inclusive lists and/or legal definitions. The Swiss Ordinance on the Return, Takeback, and Disposal of Electrical and Electronic Equipment (1998) identified four general categories:

- Electronic entertainment appliances
- Office, communication, and information technology appliances
- Appliances in the home
- Electronic components of the appliances (mentioned above).

It was modified in 2004 to align with the EU Directive's categorization of 10 types of e-waste that should not be disposed of alongside regular trash, i.e. MSW. The Indian categorization system has just six classes, while the Japanese system began with televisions, refrigerators, washing machines, air conditioners, and personal computers, or PCs. Individual appliances vary significantly in size, weight, and composition; therefore, stating average numbers is pointless unless the kind of appliance and its manufacturing date are specified. Lighting bulbs are the most numerous. WEEE recycling is essential not only to decrease the quantity of trash that has to be treated, but also to encourage the recovery of valuable materials and the responsible removal of its intrinsically dangerous and environmentally undesirable components and compounds[3].

WEEE is mostly made up of ferrous and nonferrous metals, followed by WEEE plastics (WEEP). WEEP quantity and composition vary depending on the kind of device. From an environmental, occupational, and economic standpoint, managing the disposal or recovery of plastics is critical: WEEP include dangerous chemicals that may result in harmful emissions during incorrect recycling or elimination, or high processing costs in the event of effective treatment. This delicate balance of values and responsibilities raises issues such as who pays for responsible care and how to handle cherry picking[4].

4.1 Metals:

Precious metals recovery (Ag, Au, Platinum group metals) was formerly a significant motivator for pcb recycling: precious metals account for more than 70% of the value of mobile phones, calculators, and pcbs, and still account for 40% of the value of TV boards and DVD players.

Copper, zinc, and other metals are next. Indium is utilized in LCD displays, gold, silver, and palladium are used in non-oxidizing pcb connections, and silver is used in RF identification antennas. Strategic metals include lithium, gallium, tellurium, germanium, and ruthenium. The issue of losing uncommon or valuable components has gotten a lot of attention, especially in Japan. More than half of all ruthenium and indium manufactured is used in EEE manufacturing. Hydrometallurgical or pyrometallurgical techniques are used to recover them. The first set of operations involves acid or caustic leaching or extraction, which is followed by progressive separation. The second category is based on oxidation/reduction reactions and element partitioning between collector elements like lead or copper and slag. The diverse composition explains why certain specialized companies (such as Boliden, Cumerio, Noranda, and Umicore) are interested in processing WEEE in metallurgical plants. Pcb's contain more than 20% copper and may be fed straight into a copper or lead smelting facility if shredded. These smelters' pollution issues (dioxins) were solved more than a decade ago[5].

Batteries are not included by this survey and are the subject of a separate Directive. To reduce pollution and recycle metals, small batteries are gathered. Injection-moulded PP boxes are used in lead batteries, which are either recycled as resins or utilized as fuel in blast furnaces to recover lead and antimony alloys[6].

Plastics are useful as an insulator for electricity and/or heat, as well as a lightweight, readily formable structural component. By adding reinforcing fibers to the resin, a portion of these structures is reinforced and stiffened. Thermosets are very stable and perform a crucial function. Plastics' proportion of EEE has steadily risen from about 14 percent in 1980 to 18 percent in 1992 and 23 percent in 2005. Their contribution to European WEEE is projected to be 20.6 percent (2008). If the WEEE Forum members collected and processed 1.5 million tonnes of WEEE in 2008, they recovered or disposed of 300,000 tonnes of plastic trash, resulting in a complicated combination. Up to six distinct plastic resins may be found in even tiny items. Styrenics (PS, HIPS, ABS, SAN), polyolefins (HDPE, LDPE, PP), engineering plastics (PC, POM, PUR, PA, and PVC), and thermosets are all found in WEEP. Plastics are usually compounded with additives such as thermal and UV stabilisers, antistatic agents, flame retardants, colorants, pigments, plasticisers, fillers, reinforcing glass, and carbon fibres before processing. The majority of concerns center on the presence of brominated flame retardants (BFRs) and heavy metals, both intrinsic and extrinsic, introduced as impurities during WEEE processing[7].

Mechanical/physical processing will very certainly be critical in the upgrade of WEEE. Manual disassembling is the greatest way to get plastics-rich streams, but it comes at a significant cost. Shredding and multistep mechanical separation are an option once all dangerous chemicals have been removed. The embedding of foreign materials into the plastic matrix is an unavoidable result. Due to financial pressures, the shredder operator may optimize for maximum metal recovery, rendering WEEP unsuitable for further recycling.

The following plastic kinds (in decreasing order of share) dominate various WEEE product categories:

- HIPS and ABS are used in consumer electronics, including as television sets.
- ABS, HIPS, ABS/PC, and PPO/PS are examples of information technology devices.

-
- PP, PUR, ABS, PS, and HIPS for large electrical equipment.
 - PP, HIPS, and ABS for small electrical equipment
 - Air conditioners: ABS and HIPS, PUR, PP, and PVC.

WEEP fractions were tested for four heavy metals (cadmium, hexavalent chromium, mercury, and lead) as well as four brominated flame retardants (PentaBDE, OctaBDE, DecaBDE, DecaBB) that are controlled (i.e. phased out) by the RoHS Directive in an EMPA research. Other flame retardants, such as HBCD and TBBPA, as well as total bromine, total phosphorus, and antimony, were investigated. All fractions included at least one chemical restricted by the RoHS Directive in measurable quantities, suggesting the existence of legacy additions. Such garbage should be disposed of in identified landfill cells with a high degree of environmental protection and the possibility of future landfill mining[8].

4.2 Legal Basis:

The two applicable Directives on WEEE and restriction of hazardous substances (RoHS) were originally conceived as a single Directive, with the goal of minimizing WEEE's environmental effect. Given the waste hierarchy, it was necessary to handle both the beginning and end of the product life cycle. Both the treatment and recycling of WEEE are covered under the WEEE Directive 2002/96/EC. It promotes reuse and recycling, as well as a reduction in the quantity of WEEE discarded. Producers must pay for at least the collection of their goods at end-of-life from central locations, as well as fulfil reuse, recycling, and recovery goals, according to the Directive. Design for recycling and design for the environment help to achieve such objectives even before manufacturing begins. Hazardous chemicals are addressed under the RoHS Directive[9].

4.3 Country Reports:

E-waste was originally mostly produced in OECD nations with almost saturated domestic markets. The EEE market penetration in newly industrializing nations is currently low, but it is increasing at a quicker pace, implying that significant quantities of domestic e-waste may ultimately arise. Several writers discussed the state of e-recycling in Taiwan, Korea, the United States, China, Scotland, Greece, Germany, Switzerland, Sweden, and India. In developing nations, backyard recyclers set fire to e-waste in order to extract metals from the ashes, posing serious health risks to employees and the communities around the operations. Heavy metals contaminate the environment as a result of leaching liquors. These methods are blamed by both official recyclers and Greenpeace; other groups, such as EMPA, attempt to rectify them[10].

4.3.1 Europe:

Early WEEE recycling was mainly based on the experience of a few European countries, where different organizations ran voluntary take-back and recycling programs. EEE manufacturers are now legally liable for the costs of collection and recycling. In 2002, national organizations in charge of WEEE take-back systems formed a WEEE executing forum, which included associations from Austria, Belgium, the Netherlands, Norway, Sweden, and Switzerland at the time. The European Union Directive has been translated into national law, which includes prescriptive criteria such as per capita collection, treatment standards, and recovery goals. The previous Directive's targets could be readily fulfilled by recycling metal, glass, and other

materials, thus plastic components were not a pressing concern. Both the landfill directive (which prohibits the disposal of high-calorie waste plastics) and the incineration directive (which encourages the burning of such trash for energy recovery) should be implemented to promote plastics treatment.

4.3.2 Japan:

Japan became a significant manufacturer of electronics, photography, and information technology in the 1950s and 1960s. The earliest efforts to recycle WEEE were undertaken in the 1970s, but their disassembly proved too expensive. The Home Appliance Recycling Law and the Law for Promotion of Effective Utilization Resources made WEEE recycling a legal obligation in 2001. There was no need to recycle plastics since a recycling rate of 50–60% was needed. However, by 2008, the recycling rate was expected to increase to 80–90%, meaning that plastics would have to be recycled. As a result, creating recycling technology for plastics, including those containing BFRs, as well as preparing for a review of the legal system in collaboration with organizations representing BFR, EEE, and plastics producers, became critical.

4.3.3 China:

China now accounts for a substantial portion of worldwide EEE production. In 2006, China produced 1.7 million tonnes of e-waste, or 1.3 kg per person. Furthermore, there was a massive influx of e-waste, which was handled first by the informal sector and then by authorized businesses. Because of the crude treatment employed during disassembly and processing, as well as the discharge of hazardous compounds such as PBDEs, e-waste quickly became a significant environmental issue. There have been reports of elevated PBDE concentrations in the environment near e-waste sites, as well as in people. Open burning sites, combustion residues, ash, soils, and sediments have all been severely polluted by crude e-waste treatment, as shown in Taizhou (Zhejiang Province) and Guiyu and Chendian (Guangdong Province), where pollutant levels, particularly dioxins, have risen.

4.4 Hazardous aspects of WEEE:

WEEE includes a variety of substances, many of which are hazardous to the environment or to workers, as well as persistent organic pollutants (POPs) or possible precursors to POPs. WEEE recycling presents a slew of workplace and environmental concerns: Phthalates, Pb, Cd, and Hg in batteries, as well as Ba, Pb, Hg, and rare earth elements (REE) in CRTs, may be leached from landfills; legacy BFRs and poly-chloro-biphenyls (PCBs) in capacitors could be ignited and spread into the environment. If hazardous chemicals have been utilized, it is preferable to reuse or recycle the e-waste to minimize its environmental effect.

5. DISCUSSION

Given the constantly expanding quantities of e-waste produced and their composition of both valuable and hazardous elements, treatment and recycling of e-waste is an emergent waste management issue as well as a growing economic opportunity. Due to its contents of rare and dangerous elements, WEEE or e-waste has been taken into account not only by the government, but also by the general people. Because EEE is a significant source of waste plastic, the WEEE Directive (2002/96/EC) has significant consequences for plastic recycling. The Directive establishes design standards that will gradually reduce the number of plastics used in EEE devices. The Directive emphasizes the recyclability of product components, despite the fact that

their technological and commercial viability is still in doubt. Plastic recycling from s-WEEE is still unusual: it is significantly influenced by the recovery of the (valuable) metals present, and the value of ultimately recoverable polymers must be balanced against the environmental hazards associated with its hazardous characteristics. These are mostly due to the prevalence of BFR and heavy metal music.

6. CONCLUSION

In terms of the materials and components utilized, as well as waste streams from manufacturing operations, EEE is varied and complicated. It is critical to characterize these wastes in order to design a cost-effective and ecologically sound recycling solution. Stable material sources are required for the establishment of a stable recycling sector. More study on the applicability, efficacy, and efficiency of different methods and equipment for handling WEEE is required from a policy standpoint. Current methods are not very cost-effective, and recycling is currently reliant on human labour. Furthermore, existing techniques are restricted in their capacity to handle complicated goods with a range of components, such as CRTs and PCs. Finally, via advertising and education, it is essential to raise public knowledge of environmental preservation in order to steer consumer preferences toward goods that are created with and eventually generate minimal hazardous waste.

REFERENCES:

11. S. Holgersson, B. M. Steenari, M. Björkman, and K. Cullbrand, "Analysis of the metal content of small-size Waste Electric and Electronic Equipment (WEEE) printed circuit boards—part 1: Internet routers, mobile phones and smartphones," *Resour. Conserv. Recycl.*, 2018, doi: 10.1016/j.resconrec.2017.02.011.
12. J. Cui and E. Forssberg, "Mechanical recycling of waste electric and electronic equipment: A review," *Journal of Hazardous Materials*. 2003, doi: 10.1016/S0304-3894(03)00061-X.
13. H. Friege, M. Oberdörfer, and M. Günther, "Optimising waste from electric and electronic equipment collection systems: A comparison of approaches in European countries," *Waste Manag. Res.*, 2015, doi: 10.1177/0734242X14567500.
14. M. Ueberschaar, D. Dariusch Jalalpoor, N. Korf, and V. S. Rotter, "Potentials and Barriers for Tantalum Recovery from Waste Electric and Electronic Equipment," *J. Ind. Ecol.*, 2017, doi: 10.1111/jiec.12577.
15. M. D. Bovea, V. Pérez-Belis, V. Ibáñez-Forés, and P. Quemades-Beltrán, "Disassembly properties and material characterisation of household small waste electric and electronic equipment," *Waste Manag.*, 2016, doi: 10.1016/j.wasman.2016.04.011.
16. F. Puype *et al.*, "Towards a generic procedure for the detection of relevant contaminants from waste electric and electronic equipment (WEEE) in plastic food-contact materials: a review and selection of key parameters," *Food Additives and Contaminants - Part A Chemistry, Analysis, Control, Exposure and Risk Assessment*. 2017, doi: 10.1080/19440049.2017.1332430.
17. A. Sikander, V. Savvilidou, X. Jia, and N. Nicomel, "The presence of rare earth elements and critical metals in waste electric and electronic equipment: Challenges for recovery," *Glob. Nest J.*, 2018, doi: 10.30955/GNJ.002582.

18. M. Schlummer, A. Mäurer, T. Leitner, and W. Spruzina, "Report: Recycling of flame-retarded plastics from waste electric and electronic equipment (WEEE)," *Waste Manag. Res.*, 2006, doi: 10.1177/0734242X06068520.
19. F. Y. Fraige, L. A. Al-khatib, H. M. Alnawafleh, M. K. Dweirj, and P. A. Langston, "Waste electric and electronic equipment in Jordan: willingness and generation rates," *J. Environ. Plan. Manag.*, 2012, doi: 10.1080/09640568.2011.586492.
20. D. S. Achilias, E. V. Antonakou, E. Koutsokosta, and A. A. Lappas, "Chemical recycling of polymers from waste electric and electronic equipment," *J. Appl. Polym. Sci.*, 2009, doi: 10.1002/app.30533.

MAIN DIRECTIONS OF EFFECTIVE DEVELOPMENT TRANSPORTATION SYSTEM OF UZBEKISTAN

Sharustamov Ayattillo Odilovich*

*Scientific Applicant of Tashkent State Technical University,
Samarkand, UZBEKISTAN
Email id: Ayattillo_2007@mail.ru

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ABSTRACT

The article examines the current state and priority directions for the development of the national transport system, which is one of the largest basic sectors of the economy, the most important component of the production and social infrastructure of the national economy.

KEYWORDS:Transport, System, Communications, Transport Services, Transportation, Digitalization, Integration Processes, Commodity Movement, Transport Logistics.

INTRODUCTION

Currently, transport is one of the largest basic sectors of the economy, the most important component of the production and social infrastructure of the national economy of Uzbekistan. Transport communications unite all regions of the country, which is a necessary condition for its territorial integrity, the unity of its economic space. They connect the republic with the world community, being the material basis for ensuring foreign economic relations of Uzbekistan and its integration into the world economic system.

The place and importance of transport is also evidenced by its significant share in the main production assets of the country (19.5%) percent), a significant share of transport services in the gross domestic product (13.5%), in investments in the development of economic sectors (21-25 %) and in the number of employed workers (7-8%), as well as in the consumption of energy resources and in a number of other important indicators characterizing the country's economy. All these circumstances make it possible to attribute transport among the priority sectors of the economy. Transport plays an important role in the socio-economic development of the country. The transport system provides conditions for economic growth, increasing the competitiveness of the national economy and the quality of life of the population. The geographical features of Uzbekistan determine the priority role of transport in the development of the country's competitive advantages in terms of realizing its transit potential.

Access to safe and high-quality transport services determines the efficiency of work and development of production, business and social sphere. In this regard, the role of transport in the socio-economic development of the country is determined by a number of volumetric, cost and quality characteristics of the level of transport services.

The volumetric characteristics of transport services directly affect the completeness of the implementation of economic ties within the republic and abroad, as well as the ability to move all segments of the population to meet production and social needs.

The geographical and technological accessibility of transport services determines the possibilities for the territorial development of the economy and social sphere. The cost characteristics of the transportation of any product (transport tariff) are directly reflected in its final price, added to production costs, and affect the competitiveness of products and the area of their marketing. The cost of transportation in passenger traffic limits the possibilities for travel of the population, and in many cases, for a part of the population with low incomes, makes these trips inaccessible. The reduction in the cost of passenger traffic, which mitigates these restrictions, has not only great social, but also economic significance.

The qualitative characteristics of the level of transport services are related to the speed, timeliness, rhythm, safety and environmental friendliness of the functioning of the transport system.

Uzbekistan has a developed transport, which includes such types as rail, road, aviation, pipeline and river.

As can be seen from Table 1., the main place in the transportation of the republic is occupied by road transport, which accounts for more than **90** percent of all cargo transportation and more than **96** percent of the volume of passenger traffic (Table 2.).

TABLE 1.CARGO TRANSPORTATIONCARGO TRANSPORTATION AND CARGO TURNOVER

Name	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Freighttransport ed, milliontons	812,8	879,3	950,4	1078,0	763,1	827,5	858,7	930,0	100,4	107,5	113,5	114,2	124,6	131,3	137,8
includingtransport:															
railway	50,0	58,0	62,8	65,6	56,9	59,2	61,5	63,7	65,7	67,2	67,6	67,9	68,4	70,1	70,4
automobile	689,8	745,2	811,2	959,3	652,5	708,4	732,7	801,3	868,9	943,3	100,8	101,1	110,2	117,7	124,6
pipeline	73,0	76,1	76,4	53,0	53,7	59,9	64,5	65,0	65,8	60,0	62,2	65,1	72,4	72,0	62,8
air,thousandtons	6,6	6,7	6,0	15,9	29,5	30,7	24,0	22,0	23,0	24,6	26,5	26,4	13,1	10,4	5,1
Freight turnover, billion t-km	73,4	78,8	83,8	77,8	60,4	62,6	66,4	65,8	66,2	65,8	65,3	66,9	71,3	72,6	69,1
includingtransport:															
railway	19,3	21,6	23,4	24,2	22,3	22,5	22,7	22,9	22,9	22,9	22,9	22,9	22,9	23,4	24,0

automotive	16,0	18,1	21,0	23,2	9,1	9,1	10,5	11,2	11,9	12,8	13,3	13,6	14,6	15,9	16,1
pipeline	38,0	39,0	39,3	30,3	28,9	30,1	33,0	31,5	31,2	30,0	28,9	30,2	33,6	33,2	28,9
air,milliontons	77,1	76,7	84,0	102,9	168,0	162,5	121,9	116,3	125,1	131,1	132,2	156,9	123,5	119,0	219,1

TABLE 2.PASSENGER TRANSPORTATION PASSENGER TRAFFIC AND PASSENGER TRAFFIC

ne	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	20
sengers	4	4	5	5	4	4	4	4	5	5	5	5	5	6	5
ried	188,5	652,4	264,7	654,5	072,0	507,8	763,0	909,9	169,9	380,0	560,4	679,0	951,5	025,1	24
ion people															
uding transport:															
	12,1	11,5	13,0	14,1	14,5	14,9	15,9	17,4	19,1	20,1	20,5	21,1	22,1	22,9	6,
omobile	4	4	5	5	3	4	4	4	5	5	5	5	5	5	5
	043,6	507,8	126,8	532,8	962,6	410,9	663,9	815,8	079,0	293,2	480,8	591,3	852,8	915,2	19
an electric	131,9	131,7	123,4	106,1	93,0	79,9	80,7	74,3	69,5	64,5	57,0	64,4	74,0	83,8	40
	1,0	1,4	1,5	1,5	1,9	2,1	2,5	2,4	2,3	2,2	2,1	2,2	2,6	3,2	0,
senger															
over															
pass-km	49,8	56,9	64,8	70,3	83,8	92,4	100,2	106,9	113,2	120,1	126,0	130,0	135,3	140,1	11
uding transport:															
	2,1	2,3	2,5	2,6	2,9	3,0	3,4	3,7	3,8	3,8	4,0	4,3	4,3	4,4	1,
omotive	42,2	48,4	55,9	62,1	74,5	82,5	89,3	95,5	101,9	109,1	114,9	117,7	121,6	124,1	11
an electric	0,8	0,8	0,8	0,6	0,6	0,6	0,5	0,5	0,5	0,4	0,4	0,5	0,5	0,6	0,
	4,7	5,4	5,6	4,9	5,8	6,2	7,0	7,2	7,0	6,8	6,7	7,5	8,8	11,0	3,

The length of public roads in Uzbekistan exceeds **42.8 thousand km**. In many areas and populated areas, vehicles are the only mode of transport to meet the needs of the population. This is especially true of mountainous regions, which are almost inaccessible to other types of modern transport (table 3.).

TABLE 3 LENGTH OF COMMUNICATION LINES(AT THE END OF THE YEAR; THOUSAND KILOMETERS)

Name	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020

Railway tracks (operational length) for general use	4,0	4,2	4,2	4,2	4,2	4,3	4,2	4,2	4,2	4,2	4,3	4,6	4,7	4,7	4,7
including:															
Operational length of electrification sections	0,59	0,59	0,59	0,59	0,74	0,74	0,68	0,68	0,68	0,82	1,3	1,5	1,6	1,8	1,8
Public roads	41,6	41,6	41,6	41,6	42,0	42,0	42,0	42,0	42,0	42,0	42,0	42,0	42,1	42,1	42,3
including:															
International significance	3,63	3,63	3,63	3,63	3,98	3,98	3,98	3,98	3,98	3,98	3,98	3,98	3,98	3,98	3,99
Main pipelines	13,1	13,4	13,7	13,7	14,3	14,3	14,3	14,3	14,2	14,1	13,9	13,9	13,9	13,9	13,7

Today, the national transport system of Uzbekistan is developing on the basis of innovative and integration processes in the context of deep structural shifts in the economy. The modern dynamic growth of the national economy leads to a significant increase in the volume of goods movement and, accordingly, both domestic and international freight flows. In the last decade, the stabilization of the length of world transport routes at the level of more than 50 million km has been noted. More than 110 billion tons of cargo and more than 1 trillion tons of cargo are transported annually by all modes of transport in the world. passengers. According to the World Bank, the international transport market is currently estimated at \$ 2.2 trillion (6.8% of world GDP). In the gross domestic product of most countries of the world, its share is 4-9%, and in the employment of the population -3-7%.

Ensuring the sustainable functioning and development of the economy of Uzbekistan is directly related to the transport system of the country.

The adopted Strategy for ensuring sustainable growth of Uzbekistan in five priority areas of the country's development in 2017-2021 provides for the development of transport infrastructure balanced with the growth of the economy. The specifics of the formation and development of the transport system, the existing problems require the creation of a clear system of state regulation of this area, the balance of sustainable socio-economic development.

The current state of development of the country's transport system can hardly be considered modernized and optimal for redistribution of freight and passenger traffic between types of transport, sustainable growth in the share of commercial passenger and cargo car fleet in the republic.

In our opinion, today there are a number of factors that negatively affect the effective development of the transport system of the republic:

- lagging behind in the application of innovative technologies;

- lagging behind the technical and technological development of transport;
- high volumes of transport costs;
- Lack of legal and regulatory framework and legal acts regulating the functioning and development of the transport system;
- not properly worked out organizational, legal economic measures and mechanisms to ensure the necessary level of unity and balance of the transport system of the country.
- low level of development of the competitive environment in the transport services market.

The above factors have a negative impact on the sustainable economic development of the transport system of the republic.

Solving the accumulated problems in the field of transport requires the development and implementation of more effective and systemic measures for the development and deepening of reforms in the transport system in conjunction and interconnection with ensuring macroeconomic stability and growth, which is quite relevant for the current stage of ongoing reforms in Uzbekistan.

Solutions to complex and multifaceted problems of the formation and development of the transport system of Uzbekistan are associated with:

- Substantiation of the criteria for assessing the influence of the transport factor on the sustainability of the growth of the country's economy;
- Determination of priorities and directions of approaches to the development of a long-term strategy for the development of the country's transport strategy;
- The formation of a scientific and educational system in the field;
- Development and adoption of a methodology for calculating the transport capacity of the economy and indices of the competitiveness of transport services.

Currently, the innovative factor is becoming a decisive condition for the sustainable development of the country's transport system. The problem is that along with the need to increase the total volume of investments for the successful functioning of transport, it is necessary to change the very structure of the development of the transport system, that is, to change the structure of financial investments and investments: a significant share of investments must be directed specifically to financing innovative activities.

The qualitative improvement of production in the transport industry is carried out in the form of innovations, which form the basis of the innovation process in the conditions of the transport services market. It should be emphasized that the nature and content of innovation, as well as investment, slightly depend on the industry-specific characteristics of the transport system enterprises. Basically, they depend on the state and characteristics of the functioning of the financial market, in which there is essentially no industry segmentation.

The difference between these two types of activity lies only in the target orientation of innovative activities and the content of innovative activities.

The innovative activity of the transport system of the republic should be aimed at solving the following tasks:

- provision of high quality transport services and transportation;
- reduction of the costs of carrying out transportation and services;
- timeliness of delivery of goods and passengers;
- high safety of goods, both during their transportation and during loading and unloading operations;
- safety and comfort of passenger transportation.
- Application of effective information and communication and digital technologies.

High efficiency of transportation and services implementation presupposes, first of all, low operating costs of rolling stock, which allows the company to pursue an optimal pricing policy.

Thus, the innovative activity of enterprises of the transport system should be aimed, first of all, at improving the organization of the transportation process and reducing the costs of operating the rolling stock.

The need for this activity is explained by the desire of each enterprise in the transport system to create competitive advantages that allow it to successfully operate in the transport services market and make a profit. The competitiveness of transport enterprises, therefore, acts as a kind of engine for innovation. It makes it possible to satisfy the needs for it more efficiently and better in comparison with similar services on this market. In this case, the time factor is of great importance: an untimely and late decision to apply innovations can lead to undesirable results and even losses.

REFERENCES:

1. Decree of the President of the Republic of Uzbekistan dated 07.02.2017. "On the Strategy of Actions for the Further Development of the Republic of Uzbekistan" No.UP-4947 // Lex.uz.
2. Decree of the President of the Republic of Uzbekistan dated 01.02.2019 No. UP-5647 "On measures to radically improve the system of public administration in the field of transport" // Lex.uz.
3. Resolution of the President of the Republic of Uzbekistan from 02.12.2017. No. PP-3422 "On measures to improve transport infrastructure and diversification of foreign trade routes for the carriage of goods for 2018-2022" // Lex.uz.
4. KhagaiYu.A. The economics of a trucking company. Tutorial. Krasnoyarsk, Siberian Federal University, Univ-t, 2011, p. 288.
5. Bychkov V.P. Economics of a motor transport enterprise: textbook. - M .: INFRA-M, 2006.S. 235.
6. Sharustamov A.O. Development of the transport complex of the Republic of Uzbekistan. // "Biznes - Expert", No. 9-10 of 2020, Tashkent, p. 114-116.

AN ANALYSIS OF CHALLENGES AND OPPORTUNITIES OF PLASTIC RECYCLING

Amit Kumar*

*Assistant Professor,
Department of Civil Engineering,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- amit.engineering@tmu.ac.in

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ABSTRACT

Plastics are low-cost, lightweight, and long-lasting materials that may be easily moulded into a variety of items for a broad range of uses. As a result, during the past 60 years, the manufacturing of plastics has grown dramatically. However, present levels of use and disposal result in a slew of environmental issues. Around 4% of global oil and gas output, a non-renewable resource, is utilized as feedstock for plastics, with another 3–4% required to supply energy for their manufacturing. Plastic is used to create throwaway packaging and other short-lived goods that are discarded within a year of production. Simply based on these two facts, we may conclude that our present usage of plastics is unsustainable. Furthermore, due to the longevity of the polymers used, large amounts of wasted end-of-life plastics are collecting as trash in landfills and natural ecosystems all over the globe.

KEYWORDS:*Biodegradable, Environment, Plastics, Polymer, Recycling.*

1. INTRODUCTION

Since the discovery of different methods for producing polymers from petrochemical sources, the plastics sector has grown significantly. In comparison to many other material kinds, plastics offer significant advantages in terms of low weight, durability, and affordability. In 2007, global polymer output, comprising thermoplastics, thermoset plastics, adhesives, and coatings, was projected to reach 260 million metric tonnes per year, but not synthetic fibres. This corresponds to a 9% annual growth rate in the past. Thermoplastic resins account for about two-thirds of total output, and their use is increasing at a rate of approximately 5% per year worldwide. Plastics nowadays are nearly entirely made from petrochemicals generated from fossil oil and gas.

Plastics are made directly from petrochemical feedstock, accounting for around 4% of yearly petroleum output. Because the manufacturing of plastics necessitates the use of energy, it results in the use of a comparable amount of fossil fuels. However, it may be claimed that using lightweight plastics reduces the consumption of fossil fuels, such as in transportation applications where polymers replace heavier traditional materials like steel[1].

As plastics have only been mass-produced for around 60 years, it is impossible to predict how long they will stay in the environment. Because most plastics are not biodegradable and are in

fact very durable, the vast majority of polymers produced today will endure at least decades, if not centuries, if not millennia. Even biodegradable plastics may survive a long time depending on local environmental conditions, since breakdown rates are influenced by physical elements including UV light exposure, oxygen, and temperature, while biodegradable plastics need the presence of appropriate microorganisms. As a result, degradation rates differ significantly across landfills, terrestrial habitats, and marine environments. Even when a plastic object declines due to weathering, it initially breaks down into smaller bits of plastic debris, but the polymer may not breakdown completely in a reasonable amount of time. As a result, large amounts of end-of-life plastics are collecting in landfills and as debris in the natural environment, causing waste management problems as well as environmental harm[2].

Recycling is obviously a waste-management technique, but it may also be viewed as one contemporary example of applying the idea of industrial ecology, where there are no wastes but only products in a natural ecosystem. Plastic recycling is one way to reduce environmental impact and resource depletion. Fundamentally, high levels of recycling, such as reduction in usage, reuse, repair, or re-manufacturing, may allow for a given level of product service with fewer material inputs than would be needed otherwise. As a result, recycling may reduce energy and material consumption per unit of production, resulting in increased eco-efficiency. However, the capacity to maintain whatever residual level of material input, as well as energy inputs and the consequences of external influences on ecosystems, will determine the entire system's eventual sustainability[3].

1.1 Waste Management:

When waste plastics are redirected from landfills or litter, they are recovered. Because of the lightweight nature of both flexible and rigid plastics, plastic packaging stands out as litter. In the first instance, measures that minimize the usage of resources in goods may lower the quantity of material entering the waste-management system (e.g. substitution of heavy packaging formats with lighter ones, or down gauging of packaging). Fewer goods will enter the trash stream if they are designed to be reused, repaired, or remanufactured. Recycling is the process of reusing recovered material to create a new product after it has entered the trash stream.

For organic materials such as plastics, the concept of recovery can be extended to include energy recovery, in which the material's calorific value is used as a fuel through controlled combustion, though this has a lower overall environmental performance than material recovery because it does not reduce the demand for new (virgin) material. In waste management, this approach is the foundation of the 4Rs strategy: reduce, reuse, recycle (materials), and recover (energy), with disposal as the least desired management option[4].

a) Landfill:

Landfills are the traditional method of garbage disposal, however landfill space is becoming limited in certain nations. Beyond the impacts of collection and transportation, a well-managed landfill site causes limited immediate environmental harm, though there are long-term risks of contamination of soils and groundwater by some additives and breakdown byproducts in plastics, which can become persistent organic pollutants. From a sustainability standpoint, one of the main disadvantages of landfills is that none of the material resources required to manufacture the plastic are recovered, and the material flow is linear rather than cyclic. In the United Kingdom, a landfill tax has been implemented, which is scheduled to rise each year until 2010 in order to

enhance the incentive for trash to be diverted from landfill to recovery activities such as recycling[5].

b) Incineration And Energy Recovery:

Although incinerating plastic trash lowers the requirement for landfilling, there are worries that dangerous chemicals may be discharged into the atmosphere as a result of the process. PVC and halogenated additives, for example, are often found in mixed plastic trash, posing a danger of dioxins, other polychlorinated biphenyls, and furans entering the environment. As a waste-management technique, burning of plastic is less common than landfill and mechanical recycling, owing mainly to this perceived contamination concern. With significant incinerator infrastructure in place for dealing with MSW, including plastics, Japan and certain European nations such as Denmark and Sweden are noteworthy outliers. Incineration may be used to recover part of the plastic's energy content. Whether it's utilized for electricity production, combined heat and power, or as solid waste fuel for co-fueling blast furnaces or cement kilns, the amount of usable energy recovered varies significantly. Liquefaction to diesel fuel or pyrolysis gasification are other options, and interest in this method of producing diesel fuel is growing, due to rising oil costs. For heavily mixed plastics, such as certain electronic and electrical wastes and automobile shredder residue, energy-recovery techniques may be the best option[6].

c) Downgauging:

Reduced waste volumes may be achieved by reducing the quantity of packing used per item. Most manufacturers will already utilize close to the bare minimum of material needed for a particular application due to economic considerations. This concept, however, is balanced against aesthetics, convenience, and marketing advantages, which may lead to excessive packaging, as well as the impact of current tooling and manufacturing processes, which can lead to excessive packaging of certain goods[7].

d) Re-Use Of Plastic Packaging:

Reusing post-consumer packaging in the form of glass bottles and jars was widespread forty years ago. The logistical limitations to a wider use of rigid container re-use are at least partly logistical, since distribution and collection locations are often located far from centralized product-filling facilities, resulting in long back-haul lengths. Furthermore, the variety of containers and packs used for branding and marketing makes direct take-back and refilling difficult. Take-back and refilling programs for PET bottles and glass exist in many European nations, although they are usually seen as a niche activity for local companies rather than a viable large-scale plan to decrease packaging waste elsewhere. Plastics used in the transportation of products have a lot of potential for re-use, and certain plastic components in high-value consumer items like cars and electronics have a lot of potential for re-use or re-manufacture. The re-use of containers and pallets in haulage is an example of this on a large scale. There has also been a shift away from single-use plastic carrier bags to reusable bags, both as a result of voluntary behavior change programs, such as those in Australia, and as a result of legislation, such as the plastic bag levy in Ireland or the recent banning of lightweight carrier bags in Bangladesh and China[8].

e) Plastics Recycling:

Because of the broad variety of recycling and recovery operations, the terminology for plastics recycling is complicated and often unclear. Primary (mechanical reprocessing into a product with similar characteristics), secondary (mechanical reprocessing into products with lesser properties), tertiary (recovery of chemical components), and quaternary (recovery of chemical constituents) are the four types (recovery of energy). Closed-loop recycling is generally referred to as primary recycling, whereas secondary recycling is referred to as degrading. When a polymer is depolymerized to its chemical components, tertiary recycling is referred to as chemical or feedstock recycling. Energy recovery, energy from trash, or valorization are all terms used to describe quaternary recycling. Composting biodegradable plastics is another form of tertiary recycling, which is sometimes referred to as organic or biological recycling[9].

f) Alternative Materials:

Biodegradable plastics offer the potential to address a variety of waste-management problems, particularly for throwaway packaging that is difficult to distinguish from organic waste in catering and agricultural applications. Biodegradable plastics may be used in aerobic composting or anaerobic digestion with methane collection for energy usage. When introduced without the proper technological characteristics, handling methods, and consumer information, biodegradable polymers have the potential to complicate waste management. Furthermore, it is apparent that obtaining sufficient biomass to replace a substantial part of present polymer use would be difficult, since just 5% of current European chemical manufacturing utilizes biomass as a feedstock. This is a huge subject that cannot be addressed in this article, save to say that biodegradable and degradable plastics should be properly labeled and utilized in ways that complement, rather than undermine, waste-management systems[10].

1.2 Systems For Plastic Recycling:

Plastics may be recycled in a number of methods, and the ease with which they can be recycled varies depending on the polymer, packaging design, and product type. Multi-layer and multi-component packaging, for example, are more difficult and costly to recycle than rigid containers made of a single polymer. PET, PE, and PP are examples of thermoplastics that have a high mechanical recycling potential. Thermosetting polymers like unsaturated polyester and epoxy resin can't be physically recycled, but they may be used as filler materials after being size-reduced or crushed to small particles or powders. This is due to the fact that thermoset polymers are irreversibly cross-linked during the manufacturing process and therefore cannot be re-melted or re-formed. Cross-linked rubber from vehicle tyres is recycled back to rubber crumb for re-manufacture into other goods, and this is anticipated to increase as a result of the EU Directive on Waste Landfill, which prohibits tyres and tyre waste from being disposed of in landfills.

Because of intrinsic immiscibility at the molecular level and variations in processing needs on a macro-scale, most distinct plastic kinds are incompatible with each other, which is a significant problem for manufacturing recycled resins from plastic waste. A tiny quantity of PVC contamination in a PET recycling stream, for example, would damage the recycled PET resin due to the release of hydrochloric acid gas from the PVC at the higher temperature needed to melt and reprocess PET. PET in a PVC recycling stream, on the other hand, forms solid lumps of undispersed crystalline PET, lowering the recovered material's value considerably. As a result, adding recovered plastic to virgin polymer is often not technically possible without

compromising at least part of the virgin polymer's qualitative characteristics, such as color, clarity, or mechanical capabilities like impact strength.

Most uses of recycled resin are either for use in multi-layer applications, where the recycled resin is sandwiched between surface layers of virgin resin, as is often done with polyolefin films for non-critical applications such as refuse bags and non-pressure-rated irrigation or drainage pipes, or for use in blends of recycled resin with virgin resin, as is often done with polyolefin films for non-critical applications such as refuse bags and non-pressure-rated irrigation or drainage pipes..

a) Collection:

Plastic trash may be collected via 'bring-schemes' or kerbside collection. In the absence of either highly committed public behavior or deposit-refund schemes that impose a direct economic incentive to participate, bring-schemes tend to result in poor collection rates. As a result, the prevailing tendency is for recyclable items to be collected with MSW at the curbside. Most kerbside collections are of co-mingled recyclables (paper/board, glass, aluminum, steel, and plastic containers) to optimize the economic effectiveness of these programs. While kerbside collection programs have been extremely effective in collecting plastic bottle packaging from residences, only 30–40% of postconsumer plastic bottles are recovered in terms of total consumption, since most of this kind of packaging originates from food and beverage eaten away from home. As a result, if total collection rates for plastic packaging are to improve, it is critical to create successful "on-the-go" and "office recycling" collection systems.

b) Sorting:

Both automated and manual techniques are used to sort co-mingled stiff recyclables. Pre-sorting by machine is typically adequate to separate the plastics stream from the glass, metals, and paper streams (other than when attached, e.g. as labels and closures). Clear PET and unpigmented HDPE milk bottles, in general, are definitely recognized and removed from the stream. Many material recovery plant owners, as well as many plastic recycling facilities, now employ automatic container sorting. For polymer type analysis, these systems typically employ Fourier-transform near-infrared (FT-NIR) spectroscopy, as well as optical color recognition camera systems to sort the streams into clear and colored fractions. Clear, light blue, dark blue, green, and other colored PET containers may be distinguished using optical sorters. Multiple detectors and sorting in sequence may improve sorting performance. Other sorting methods include X-ray detection, which is used to separate PVC containers, which have a chlorine content of 59 percent by weight and can readily be recognized.

c) Size Reduction And Cleaning:

Food residues, pulp fibers, and adhesives are usually removed from rigid plastics by grinding them into flakes and cleaning them. The newest generation of wash facilities uses just 2–3 m³ of water per tonne of material, which is approximately half as much as older technology. Dry-cleaning, which cleans surfaces without using water, is one of the most innovative methods for removing organics and surface pollutants from flakes.

2. DISCUSSION

One of the most significant activities presently accessible to minimize these effects is recycling, which is also one of the most active sectors in the plastics business. Recycling reduces oil

consumption, carbon dioxide emissions, and the amount of trash that must be disposed of. In this section, we briefly compare recycling to other waste-reduction methods, such as downgauging or product reuse, the use of alternative biodegradable materials, and energy recovery as a fuel. While plastics have been recycled since the 1970s, the amounts recycled vary depending on the kind of plastic and the use. In a number of nations, recycling of packaging materials has exploded in recent decades. Advances in technologies and systems for collecting, sorting, and reprocessing recyclable plastics are opening up new recycling opportunities, and it may be possible to divert the majority of plastic waste from landfills to recycling in the coming decades if the public, industry, and governments work together.

3. CONCLUSION

One method for managing end-of-life waste from plastic goods is recycling. It makes growing economic and environmental sense, and recent trends show a significant rise in the rate of plastic trash recovery and recycling. These trends are expected to continue, but there are still some major difficulties related to the collection of recyclable trash and the replacement of virgin material, arising from both technical reasons and economic or social behavior concerns. Recycling a broader variety of post-consumer plastic packaging, as well as waste plastics from consumer products and ELVs, can help to increase plastic waste recovery rates and landfill diversion. Recycling waste plastics is an efficient method to enhance the polymer industry's environmental performance when combined with initiatives to expand the usage and specification of recycled grades as replacements for virgin plastic.

REFERENCES:

1. Hopewell J, Dvorak R, Kosior E. Plastics recycling: Challenges and opportunities. *Philosophical Transactions of the Royal Society B: Biological Sciences*. 2009 Jul 27; 364(1526):2115-26. doi: 10.1098/rstb.2008.0311.
2. Milios L, Davani AE, and Yu Y. Sustainability impact assessment of increased plastic recycling and future pathways of plastic waste management in Sweden. *Recycling*, 2018; 3(3): 33. doi: 10.3390/recycling3030033.
3. Cheung TY, Fok L, Cheang CC, Yeung CH, So WM.W, and Chow CF. University halls plastics recycling: a blended intervention study. *Int. J. Sustain. High. Educ.*, 2018, doi: 10.1108/IJSHE-10-2017-0175.
4. Miller L, Soulliere K, Sawyer-Beaulieu S, Tseng S, and Tam E. Challenges and alternatives to plastics recycling in the automotive sector. *Materials*. 2014; 7: 5883-5902. doi: 10.3390/ma7085883.
5. Gao G. et al. Up-Conversion Fluorescent Labels for Plastic Recycling: A Review. *Advanced Sustainable Systems*. 2017; 1(5):1600033. doi: 10.1002/adsu.201600033.
6. Goodship V. Plastic recycling. *Science Progress*. 2007; 90(4): 245-268. doi: 10.3184/003685007X228748.
7. Eriksen MK, Pivnenko K, Olsson ME, and Astrup TF. Contamination in plastic recycling: Influence of metals on the quality of reprocessed plastic. *Waste Manag.*, 2018; 58(3):444-494. doi: 10.1016/j.wasman.2018.08.007.

8. Buekens A and Yang J. Recycling of WEEE plastics: A review. *Journal of Material Cycles and Waste Management*. 2014; 16:415-434. doi: 10.1007/s10163-014-0241-2.
9. Pivnenko K, Jakobsen L.G, Eriksen MK, Damgaard A, and Astrup TF. Challenges in plastics recycling. *Proc. Fifteenth Waste Manag. Landfill Symp. Sardinia 2015*, 2015.
10. Alaerts L, Augustinus M, and Van Acker K. Impact of bio-based plastics on current recycling of plastics. *Sustain.*, 2018; 10(5):1487. doi: 10.3390/su10051487.

AN ANALYSIS OF CONTAINER-BASED VIRTUALIZATION TECHNOLOGIES

Dr. Priyank Singhal*

*Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- priyanksinghal1@gmail.com

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ABSTRACT

Container-based virtualization is a lighter virtualization idea than hypervisor technologies since it is a newer concept. It has a significantly reduced overhead and excellent isolation since it does not emulate any hardware. Instead of creating separate containers for each virtual machine, the fundamental concept is to create isolated containers that utilize the same kernel as the host system. Virtualization at the operating system level, often known as container-based virtualization, is a lightweight virtualization technique. Instead of replicating hardware, the emphasis is on creating a more efficient environment by utilizing the same kernel across all operating systems. As a result, virtualized apps or systems must share the same kernel. Such technology may help networking testbeds like Tomato since it enables multiple virtual computers to operate in parallel. Three Linux container-based virtualization solutions will be discussed in this paper. These are OpenVZ, Linux-VServer, and LXC. Each technology's major characteristics and ideas will be addressed.

KEYWORDS: Container, Linux, Operating System, Tomato, Virtualization.

1. INTRODUCTION

As computers grow more powerful, new methods for efficiently using resources are needed in order to minimize energy and hardware costs. Operating system (OS) virtualization enables several systems to operate in parallel on a single physical server. Typically, a software abstraction layer between the hardware layer and the operating system is implemented as a hypervisor. To keep hardware access hidden from the OS, it will be mimicked and managed by the hypervisor. It is feasible to run a hypervisor like this on top of a host operating system. This allows several operating systems to run on a single piece of hardware by dividing it into logical units known as virtual machines (VMs). Hardware emulation generates a lot of overhead, therefore a lightweight approach is required(1–4).

This problem can be solved using container-based virtualization. A (modified) OS Kernel generates separate so-called containers for each VM instead of utilizing a hypervisor and virtualized hardware. This virtualization method is based on the notion that several comparable operating systems are utilized, allowing common system calls to be performed and resulting in a considerably lower overhead than complete virtualization. As a result, all guests must be able to run the same kernel version. Container-based virtualization may help network testbeds like the

Topology Management Tool (Tomato). Tomato combines a variety of virtualization methods to enable researchers to utilize a high degree of parallelism when feasible and realism when necessary. Full virtualization provides a high degree of realism in a virtual environment, but it also consumes a lot of resources. For complete virtualized VMs, Tomato supports KVM via Qemu . Compatibility is an essential feature of a testbed, in addition to parallelism. To be as useful as feasible for academics, a container-based virtualization solution with excellent performance and little or no kernel changes is desired(5–8).

OpenVZ is an operating system-level virtualization solution that includes virtualization, isolation, resource management, and checkpointing for Linux-based virtual machines. Linux-VServer is based on Linux kernel changes. Linux-VServer provides a less isolated virtualized environment with excellent performance by using existing Linux capabilities and adding necessary changes, such as an expanded capability system. LXC creates isolated containers by using existing Linux capabilities without the need for further kernel changes. It's built on cgroups, a Linux kernel feature that lets you group activities and utilize subsystems to do things like resource and namespace separation. Processes are completely isolated from the operating environment and any other processes.

1.1 Container-Based Virtualization:

Virtualization at the operating system level, often known as container-based virtualization, is a lightweight virtualization technique. Instead of replicating hardware, the emphasis is on creating a more efficient environment by utilizing the same kernel across all operating systems. The systems will be put in virtual environments (VEs), or so-called containers, that are more or less isolated. This method enables isolation, resource management, and security to be handled using normal system calls and operating system procedures. All resources are controlled by the kernel, and all containers share the same resources such as CPU, memory, storage, and network. As a result, resources are managed on a container-by-container basis. They will be restricted, but not pre-allocated, for each container. As a result, resource management is fluid, and free resources may be shared across containers. This results in more efficient resource use. The disadvantages are that all operating systems must be compatible with the shared kernel, and the host kernel must usually be changed(9–12).

1.2 Tomato:

The Topology Management Tool is a networking testbed that enables network topologies to be completely virtualized. As a result, it is topology-oriented. It integrates several virtualization technologies such as KVM, OpenVZ, and Repty to provide researchers the freedom to select between high realism and high virtualization efficiency as required. In Tomato, a topology is made up of devices and connections. Devices are virtual computers that may be completely virtualized, resulting in high realism, or container-based, resulting in low resource use. Data may be manipulated and sent via connectors. Network interfaces are present on all devices and may be linked to connectors. It is feasible to build topologies with thousands of devices operating at the same time thanks to Tomato's ability to utilize various virtualization methods and a big infrastructure with numerous hosts. This figure might be much higher if highly efficient container-based technologies were used. Furthermore, Tomato may significantly benefit from systems based on non-modified Linux kernels. This would expand the number of compatible distributions supported by the environment. It would also make testbed maintenance simpler(13).

Tomato's design allows for the addition of additional technologies in a modular fashion. This enables for the discovery and integration of new technologies while maintaining compatibility with existing ones. As a result, it is feasible to upgrade hosts one by one to enable new technologies without requiring a large-scale deployment. This is a necessity for Tomato since the hosts come from a variety of sites and organizations, making it impossible to update them all at the same time(14–16).

1.3 Open VZ:

OpenVZ is a virtualization technique for Linux that uses containers to create virtual machines. Server automation and virtualization are combined using a customized kernel. Many virtual private servers (VPS) may be created on a single physical server using OpenVZ. The VPSs sit on top of the host system as containers. Although they are each separated, the underlying hardware is nevertheless efficiently shared across the management effort. IP addresses, RAM, processes, file systems, applications, system libraries, configuration files, and user management may all be set for each container (including container-specific root access). As a result, the VPSs function as full-fledged servers on their own. OS virtualization, network virtualization, resource management, and check pointing are some of OpenVZ's most important features(17).

1.3.1 Linux Kernel Features:

To accomplish these design objectives, OpenVZ requires a customized Linux kernel. It provides a virtualization layer that includes separated file systems, processes, inter-process communication, sysctl variables, and user management, among other things. To provide each container its own separate collection of resources, namespaces are utilized. A namespace is a collection of identifiers with a specific function that provides a degree of indirection between identifiers with the same name but distinct meanings. A virtual private server (VPS) is made up of the following namespaces(18–21):

- The chroot utility, which moves a process's root directory to a certain new directory, provides the file system namespace. As a result, it generates a separate filesystem for each container, complete with its own root directory, and isolates it from the rest of the filesystem. Except in rare situations, Chroot prevents access to other folders on the host's file system. It does, however, enable the host to quickly access the container's files.
- The process ID (PID) namespace has been introduced to ensure that each container only sees its own processes and does not interact with the processes of other containers in any manner. Each PID of a process within a container differs from the host PID for this process, and each PID of a process inside a container starts with 1. Another reason for this design choice is that most systems need a PID of 1, which is required during the init procedure.
- The IPC namespace was introduced to build an isolated system V IPC. It enables processes in each container to interact with shared memory segments, semaphores, and messages, but only inside their own container. As a result, an isolated inter-process communication system is established.
- Each VPS has its own network devices, including IP addresses, network caches, routing, and firewall rules, thanks to the network namespace. This namespace will be discussed further on(22).

- Each container has its own set of /proc and /sys namespaces.

1.4 Linux-V Server:

Linux-VServer is another container-based technology. It provides a lightweight virtualization solution by using current Linux infrastructure and adds kernel changes to address particular problems. This section will use the term context to define attenuated container since LinuxVServer uses more context separation rather than container-like isolation. Linux-VServer takes a variety of security measures provided by current Linux kernels and changes or extends them to create separate units on a single, shared kernel. The Linux capability system, resource restrictions, file attributes, and the changing root environment are the major features utilized in current kernels. This section concentrates on these features, followed by Linux-kernel VServer's changes.

1.4.1 Linux Kernel Features:

A capability-based security mechanism called Linux Capability System is included in recent Linux kernels. A capacity, sometimes known as a key, is a symbol of authority that is linked to specific access permissions for an item. POSIX Capabilities are the foundation of the Linux Capability System. It gives a process three capabilities in the form of bitmaps: inheritable, allowed, and effective. Each capacity is represented by a bit in the bitmaps. A process must have the appropriate capability to use a privileged operation. The operation system will verify this by checking for the correct bit set in the effective bitmap. The capabilities that a process is allowed to utilize are included inside the authorized set. Because processes may temporarily deactivate bits in their effective set, they can vary from the effective set. This enables privilege-required actions to be bracketed. Only capabilities that are also in the authorized set may cause this. The inheritable capabilities are an identical duplicate of the parent process's capabilities and will be inherited by a program run by the current process(23).

1.5 Linux Containers (LXC):

LXC (Linux Containers) is a lightweight virtualization technique that runs on an unmodified Linux kernel. Because container technology is built into the Linux kernel, it is compatible with a wide range of applications and Linux distributions. By combining various Linux kernel capabilities, it is possible to create isolated systems or application containers.

1.5.1 Linux Kernel Features:

For resource management and isolation, LXC employs cgroups [1]. Processes are grouped together in a control group that may be limited and controlled by various criteria and subsystems. Task refers to processes or threads in the context of a cgroup component in the following. Each job can only belong to one cgroup, and each cgroup can only be assigned to one hierarchy. Various hierarchies may be created for different reasons. Many more features are specified as subsystems and may be accessed through the cgroup interface. Subsystems may be classified into two groups(24):

- Isolation and specific control: Usually subsystems that improve isolation or enable various jobs to be observed.
- Resource management: restrict or specify access to various resources such as the CPU, memory, I/O activities, and network devices.

1.5.2 Resource Control:

CPU, Memory, and Disk I/O are the resource-controlling subsystems. CPU enables you to specify phrases like the amount of time a container spends on a CPU between rescheduling actions by setting various parameters. Each container's CPU parameters may be customized by administrators. Memory allows you to specify a variety of memory and swap parameters for each container, such as the maximum user memory for the whole container or the maximum memory for each job inside it. The blkio (Block I/O) subsystem is in charge of disk I/O. It provides for the collection of specific information about a container's I/O operations as well as the limitation of I/O operations per second for containers. It's also possible to specify a weight for a container in general and for a container's block I/O access to a specific device in particular. To balance workload, a weight is a factor for all apps accessing a device. LXC is compatible with LVM but only provides disc space limitations for ZFS or btrfs filesystems. The latter necessitates the administrator manually managing disc space. An administrator has a lot of options for configuring and managing resources for individual containers thanks to the combination of these subsystems.

1.6 Comparison:

The three technologies described in this article are very lightweight and perform almost as well as a native system. Various elements have been put to the test:

- Single-node computing performance to demonstrate that container-based systems do not mimic any computer hardware and, as a result, do not generate overhead. This theory is supported by the findings.
- Different vector operations with data fields bigger than the RAM were used to evaluate memory performance. It demonstrates that, thanks to memory scheduling techniques that enable unused memory to be returned to the host system or other containers, the systems operate almost identically once again.
- When compared to LXC or Linux-VServer, disk performance testing revealed that OpenVZ outperforms them. This is due to various I/O scheduling methods, according to Xavier et al. For I/O operation scheduling, OpenVZ utilizes the CFQ method, while LXC and Linux-VServer use the Linux deadline scheduling algorithm.

2. DISCUSSION

As a newer concept, in comparison to hypervisor technologies, container-based virtualization is a rather lightweight virtualization concept. By not emulating any hardware it has a much lower overhead with good isolation. The basic idea is to generate isolated containers which use the same kernel as the host system, instead of individual ones per virtual machine. Hence the virtualized applications or systems have to be compatible to the same kernel. Networking testbeds like Tomato can benefit from such technology, since it allows to run many virtual machines in parallel. In this paper, three representatives of Linux container-based virtualization technologies will be presented: OpenVZ, Linux-VServer and LXC. The main features and concepts of each technology will be discussed, followed by a comparison about performance, security, virtualization system integration and client software.

3. CONCLUSION

OS virtualization is a low-cost virtualization method that does not need the use of a hypervisor. This drastically lowers costs and enables for the hosting of many virtual systems while maintaining isolation and efficiency. OpenVZ, LinuxVServer, and Linux Containers were the three virtualization technologies addressed in this article (LXC). It was shown that they utilize distinct isolation and virtualization techniques yet produce almost identical results. The main differences are in terms of security and the requirement for kernel changes, which may lead to reduced interoperability across Linux distributions in certain instances. Both OpenVZ and LXC have a high level of isolation, while OpenVZ has additional administration features. All of the technologies described enable you to restrict CPU and memory use in various ways, however Linux-VServer lacks I/O management. OpenVZ is the only technology that supports disc quotas natively. As a result, OpenVZ seems to be a suitable option for public servers that need isolation, security, and a comprehensive set of administration tools. Because it does not need kernel changes, LXC is simple to install and maintain. It's simple to set up on a regular Linux distribution. In a sandbox mode, a high degree of isolation allows for on-demand testing of applications and systems. Although Linux-VServer offers excellent performance, it suffers from a lack of isolation and administration features. It may be a viable option if just speed is needed, rather than isolation and security for each VM. Tomato chose to introduce LXC as a new technology since it currently supports OpenVZ and wants a lightweight technology that doesn't need kernel changes.

REFERENCES

1. Silva VG da, Kirikova M, Alksnis G. Containers for Virtualization: An Overview. Appl Comput Syst. 2018;
2. Sharma RK, Sharma J, Rai D V., Zafar M. Cod reduction from industrial wastewater using thermal liquid-phase oxidation technique. Int J Chem Sci. 2013;
3. Lata S, Mittal SK. Identification of flavonoid glycosides of methanol extract from cucumis dipsaceus ehrenb. (fruit) by using HPLC-UV-ESI-MS methods. Int J Pharm Qual Assur. 2017;
4. Sheikh RQ, Yadav V, Kumar A. Stabilization of red soil used as a sub-base material. Int J Sci Technol Res. 2020;
5. Eder M, Kinkelin H. Hypervisor- vs. Container-based Virtualization. Netw Archit Serv. 2016;
6. Chandra H, Singh C, Kumari P, Yadav S, Mishra AP, Laishevtcev A, et al. Promising roles of alternative medicine and plant-based nanotechnology as remedies for urinary tract infections. Molecules. 2020.
7. Khatri M, Kumar A. Stability Inspection of Isolated Hydro Power Plant with Cuttlefish Algorithm. In: 2020 International Conference on Decision Aid Sciences and Application, DASA 2020. 2020.
8. Virk JPS. Use of genetic Algorithm in capacitor placement and sizing for optimal power system operation. In: Proceedings of the IASTED International Conference on Modelling and Simulation. 2011.

9. Xavier MG, Neves M V., Rossi FD, Ferreto TC, Lange T, De Rose CAF. Performance evaluation of container-based virtualization for high performance computing environments. In: Proceedings of the 2013 21st Euromicro International Conference on Parallel, Distributed, and Network-Based Processing, PDP 2013. 2013.
10. Arora M, Som S, Rana A. Predictive Analysis of Machine Learning Algorithms for Breast Cancer Diagnosis. In: ICRITO 2020 - IEEE 8th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions). 2020.
11. Gaurav A, Gautam V. Identifying the Structural Features of Pyrazolo[4,3-c]Quinoline-3-ones as Inhibitors of Phosphodiesterase 4: An Exploratory CoMFA and CoMSIA Study. *Curr Enzym Inhib.* 2013;
12. Isha, Rana P, Saini R. Performance of different bit loading algorithms for OFDM at PLC channel. In: Proceedings - 2012 2nd International Conference on Advanced Computing and Communication Technologies, ACCT 2012. 2012.
13. Lee K, Kim Y, Yoo C. The Impact of Container Virtualization on Network Performance of IoT Devices. *Mob Inf Syst.* 2018;
14. Li Z, Kihl M, Chen Y, Zhang H. Two-stage performance engineering of container-based virtualization. *Adv Sci Technol Eng Syst.* 2018;
15. Kumar R, Ailawalia P. Moving load response in micropolar thermoelastic medium without energy dissipation possessing cubic symmetry. *Int J Solids Struct.* 2007;
16. Sehgal A, Kaushik AK, Choudhary S, Saini S. Prewett Edge Detector Method for Content Extraction in Moving Pictures or Images. In: 2019 2nd International Conference on Power Energy Environment and Intelligent Control, PEEIC 2019. 2019.
17. Xavier MG, Neves MV, Rose CAF De. A performance comparison of container-based virtualization systems for MapReduce clusters. In: Proceedings - 2014 22nd Euromicro International Conference on Parallel, Distributed, and Network-Based Processing, PDP 2014. 2014.
18. Wüst S, Schwerdel D, Müller P. Container-based virtualization technologies. *PIK - Prax der Informationsverarbeitung und Kommun.* 2017;
19. Gupta S, Mishra T, Varshney S, Kushawaha V, Khandelwal N, Rai P, et al. Coelogen ameliorates metabolic dyshomeostasis by regulating adipogenesis and enhancing energy expenditure in adipose tissue. *Pharmacol Res.* 2021;
20. Singla N, Singla S, Thind PS, Singh S, Chohan JS, Kumar R, et al. Assessing the Applicability of Photocatalytic-Concrete Blocks in Reducing the Concentration of Ambient NO₂ of Chandigarh, India, Using Box-Behnken Response Surface Design Technique: A Holistic Sustainable Development Approach. *J Chem.* 2021;
21. Kumar L, Thakur I, Verma A, Bhatia BS, Mangat CK. Degradation and Decolourization of Methyl Orange Dye Using Fe-TiO₂ Hybrid Technology (Photo-Fenton and Photocatalysis) in Fixed-Mode. In: *Lecture Notes in Civil Engineering.* 2021.
22. Noronha V, Lang E, Riegel M, Bauschert T. Performance evaluation of container based virtualization on embedded microprocessors. In: *Proceedings of the 30th International*

Teletraffic Congress, ITC 2018. 2018.

23. Scheepers MJ. Virtualization and Containerization of Application Infrastructure: A Comparison. 21st Twente Student Conf IT. 2014;
24. Huang M, Liu Z. CBVMI: A container-based virtualization method for instruments. Meas J Int Meas Confed. 2018;

AN ANALYSIS OF CONTAINERS AND CLUSTERS FOR EDGE CLOUD ARCHITECTURES

Dr. Shambhu Bhardwaj*

*Department of Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email id- shambhu.bhardwaj@gmail.com

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ABSTRACT

As shown by IoT (Internet of Things) and network integration in the context of edge cloud and fog computing, cloud technology is evolving toward greater dispersion across multi-clouds and the incorporation of different devices. In general, lightweight virtualization solutions are useful for this architectural context, which includes smaller, but still virtualized devices to host application and platform services, as well as the logistics needed to operate them. Containerization is being considered as a lightweight virtualization option at the moment. Containers are particularly important for platform issues usually addressed by Platform-as-a-Service (PaaS) clouds, such as application packaging and orchestration, in addition to having space and flexibility advantages over conventional virtual machines in the cloud. Application and service orchestration may assist manage and orchestrate applications in the edge cloud environment by using containers as an application packaging method. We look at edge cloud needs and examine the appropriateness of container and cluster technologies for facilitating applications via distributed multi-cloud platforms made up of a variety of networked nodes ranging from data centers to tiny devices, which we refer to as edge cloud.

KEYWORDS:*Cloud Computing, Clusters, Containers, Edge Cloud, Iot (Internet Of Things).*

1. INTRODUCTION

Cloud computing is shifting away from centralized, large-scale data centers and toward a more dispersed multi-cloud environment made up of a network of bigger and smaller virtualized infrastructure runtime nodes. Virtualization penetrates the network, allowing for the integration of Internet-of-Things (IoT) infrastructures. Edge clouds, edge computing, and fog computing are terms used to describe these systems and their environments. We need more lightweight alternatives than the existing virtual machine (VM)-based virtualization technologies to address the distribution issue. Additionally, coordination of lightweight virtualized runtimes is required as a challenge. The cloud depends on virtualization methods to provide elasticity of large-scale shared resources, which is the first hurdle. Virtual machines (VMs), which provide virtualized operating systems, have been at the heart of the compute infrastructure layer. We'll look at containers, which are a kind of lightweight virtualization that uses less resources and takes less time. Virtual machines (VMs) and containers are both virtualization methods, although they

address distinct issues. Containers are a solution for more interoperable cloud application packaging, and therefore should answer PaaS issues(1–4).

Containers, in contrast to virtual machines (VMs), may be thought of as more flexible tools for packaging, distributing, and orchestrating both software infrastructure services and applications, i.e. activities that are usually the domain of PaaS (Platform-as-a-Service). Containers are based on recent advancements in virtualization, allowing for a more portable method of achieving more interoperability while still adhering to operating system (OS) virtualization principles. VMs, on the other hand, are about managing and allocating hardware (machines that are switched on and off and provisioned). There is an IaaS (Infrastructure-as-a-Service) emphasis on hardware virtualization with them. Containers as a substitute for VMs is a particular use case in which hardware resources are allocated via containers by componentizing applications across clouds. Containerization is based on three fundamental concepts: a lightweight portable runtime, the ability to create, test, and deploy programs to a large number of servers, and the ability to link containers. Concerns with cloud PaaS are addressed by containers. They were also linked to IaaS at the level of sharing and isolation, which illustrate the development of operating systems and virtualization technologies(5–7).

1.1 Edge Clouds:

Cloud edge computing relocates computing applications, data, and services from centralized cloud data center designs to the network's edges. The goal is to enable analytics and knowledge creation services to be deployed at the data source. Cloud computing at the network's edge connects to the internet of things (IoT). The core cloud offers a global perspective; edge clouds are in charge of localized views (to host services near to or at network endpoints), on-device, private cloud-like infrastructures, and on-device, private cloud-like infrastructures. Distributed clouds may be classified into three architectural types, ranging from closely linked to widely disperse(8–11):

- Multi-datacenter clouds, which have several yet closely linked data centers under the same provider's management.
- Loosely linked multi-service clouds integrate cloud services from many vendors.
- Decentralized edge clouds make use of edge resources to distribute data and computing resources widely.

1.1.1 Edge Cloud Technology Requirements:

For example, we require location-awareness and compute placement, replication, and recovery to enable edge clouds particularly. Consider a content analysis program that analyzes digital multimedia material that is distributed over the Internet. To handle the broad data dispersion, edge resources would be needed for both computing and data storage. Dedicated resources distributed across content distribution networks may provide the required edge resources. In this scenario, there are a variety of virtualized resources that may support edge clouds, all of which are programmable but vary in size and kind, such as nodes and edges (the latter are actually nodes of the network itself). As a consequence, new resource constraints arise, necessitating the use of a lightweight virtualization method. Platform services and applications must be managed, i.e. packaged, deployed, and coordinated, in center and edge clouds, as well as the IoT devices connected to computing and storage resources. Virtualization capacity is also needed for the network – see studies on software-defined networks (SDN). We need to be able to move data

across virtualized resources as well as offer compute, storage, and network resources between end devices and conventional cloud computing data centers(12–15).

Location awareness, low latency, and mobility support are concrete needs for managing cloud end points with rich (virtualized) services.

- To effectively deploy portable services at edges, SDN-virtualized nodes, as well as virtualized edges and connectors, need a lightweight virtualization technology. • This kind of virtualized infrastructure may offer end-user access and IoT connections – potentially via private edge clouds (which are technically miniclouds).
- These must be set and updated in a secure manner, especially in the case of service management. To supply and manage apps on these infrastructures, we'd also need a development layer on top. Common topology may be used as a solution(5).

The following levels (from bottom to top) may be used to organize an architecture that addresses the challenges:

- A smart things network (smart sensors, wireless sensor and actuator networks, mobile and ad-hoc networks – perhaps with a MQTT protocol on top with a pub/sub model) at the bottom.
- A field area network (such as 3/4G, LTE, or WIFI), followed by an IP core infrastructure
- A virtual computing, storage, and network cloud with applications on top of it(1).

Service providers will push out (i.e., deploy) services in appropriate application packages (such as containers) to clustered edge clouds as part of the architecture's operation and management. While certain solutions exist, such as Docker container designs for clouds, a topology definition and associated orchestration/choreography plans are still required. Kubernetes is one of the existing solutions in this area, but as we'll see, it leaves certain orchestration issues unresolved(16–18).

1.2 Virtualisation Principles:

Virtualization addresses the requirement for processes to be scheduled as manageable container units. The file system, memory, and network are examples of processes and resources at the operating system level. We go through these technological fundamentals so that we can assess the system's potential for edge clouds later. The virtualization mechanism (Ms) is at its heart. We take a look back at how virtualization has progressed over time. Over time, VMs have advanced in terms of scheduling, packaging, and resource access (security). VM instances as guests store their file system in segregated big files on their host and execute a single, large process on the host. Isolation is used to solve certain issues, such as security. However, there are still certain restrictions. For example, each VM requires complete guest OS images in addition to binaries and libraries required by the applications, which is a space issue that necessitates extra RAM and disk storage. It also has a negative impact on performance since it is sluggish to start (boot). Multi-tenant clouds also need the sharing of storage space and CPU. This must be handled in a virtualized environment so that the underlying platform and infrastructure may be shared in a safe, portable, and interoperable manner(19).

Container technology is an advancement that satisfies the requirements. A container is a self-contained, ready-to-deploy collection of application components that may include middleware and business logic in the form of binaries and libraries to execute the applications. A Web

interface component running on a Tomcat server is a good example. Container frameworks, such as Docker, are built around container engines. Containers provide a portable method to package programs for use in containers. A container contains an application layer in a tiered application (or node in a tier). However, there are two obstacles to overcome(20–23):

- In multitier systems, managing dependencies between containers is a challenge that arises. An orchestration plan, as previously said, may define components, their dependencies, and their lifetime. Agents on a PaaS cloud may then put the plan's processes into action (which could be a container runtime engine).
- The second issue is to design, install, and run cross-platform competent cloud services utilizing a lightweight virtualization method such as containers employing software platform services. There's also the requirement to move cloud installations across cloud providers in a dispersed environment, which necessitates the use of lightweight virtualized clusters for container orchestration. In this respect, certain PaaS are lightweight virtualization solutions.

1.3 Container Virtualisation for Lightweight Application Packaging:

As virtualization has progressed, more lightweight solutions have emerged. This is especially important when it comes to software platform and application packaging. Multi-tenancy capabilities, or the capacity to share a resource in the cloud, have increased as a result of recent virtualization advancements(24).

1.3.1 LXC Linux and Docker Containers:

Docker is a container solution based on Linux's LXC technologies. Docker is now the most common container solution, and it will be used to demonstrate containerization. A Docker image is built up of layered file systems, similar to how the Linux virtualization stack uses the LXC techniques. Containers are started as application processes by system, a container-aware daemon. It serves as the starting point for the user's process tree.

- Boot process: During a standard Linux boot, the kernel mounts the root file system as read-only before verifying its integrity. The roots volume is then set to read-write mode. Instead of converting the file system to read-write mode (as in a typical Linux boot), Docker utilizes a union mount to create a writable file system on top of the read-only file system.
- Mounting: This enables you to stack several read-only file systems on top of each other. Several file systems may be mounted on top of each other using union mount. This feature may be used to construct new pictures on top of existing ones. The container engine loads each of these file system layers as a distinct image for execution.
- Container: Only the top layer, which is the container itself, is editable. The container has state and may be executed. It functions as a kind of directory for all of the files required for operation. Containers may be converted into stateless images and reused in more sophisticated builds, despite the fact that they are usually stateful (25).

1.3.2 Application Containerisation and Container Management:

Through the image stacking and extension process, containers may encapsulate a variety of application components. A container may hold a variety of user applications and platform components. A container solution consists of two major components: an application container engine for running images and a repository/registry for transferring images to and from host-based container engines through push and pull operations.

- These repositories are critical for accessing potentially reusable private and public container images, which may number in the tens of thousands. Platform components like MongoDB and Node.js are examples of popular imagery.
- The container API enables life-cycle activities such as container creation, definition, composition, distribution, running/starting images, and executing commands in images.
- Application containers are created by assembling separate pictures, which may be base images retrieved from repositories(26).

1.4 PaaS Clouds and Containerisation:

At the infrastructure layer, VMs are the format of choice for provisioning platform and application components. Containers, on the other hand, seem to be an excellent choice for application packaging and administration in PaaS clouds. PaaS solutions include methods for delivering apps, developing apps for the cloud, pushing apps to their deployment environment, utilizing services, moving databases, mapping custom domains, IDE plugins, and a build integration tool. Built farms, routing layers, and schedulers are examples of PaaS components that send workloads to virtual machines.

1.4.1 Evolution of PaaS:

Container frameworks use interoperable, lightweight, and virtualized packaging to solve application deployment issues. Interoperability is provided by containers for application development, deployment, and administration (through a runtime). Containers are interoperable, which means that applications created outside of a PaaS may be moved in since the container wraps the application. Containerization and standardized application packaging are becoming commonplace in certain PaaS. Docker is used by many PaaS, and some even have their own container foundation for executing platform tools. This advancement is part of PaaS's progression toward container-based, interoperable PaaS.

- Traditional fixed proprietary systems like Azure or Heroku were part of the initial PaaS generation.
- The second PaaS generation is based on open source solutions like Cloud Foundry or Open Shift, which enable customers to build their own PaaS (on premise or in the cloud) with built-in container support. Open shift, like Cloud Foundry, has switched from its own container approach to the Docker container paradigm.
- Platforms like Dawn, Deis, Flynn, Octohost, and Tsuru, which are built from the ground up on Docker and can be deployed on private servers or public IaaS clouds, make up the current third generation of PaaS.

2. DISCUSSION

One of the most popular cloud computing technologies is container-based virtualization. Containers virtualize at the operating system level, making them more lightweight than conventional hypervisor virtualization. The Internet of Things (IoT), edge computing, and container-based virtualization will make systems more efficient, cost-effective, and dependable. We want to build a full set of edge computing architectures based on containerization in an IoT context in this study. Several concepts related to edge cloud and container have been discusses in this paper.

3. CONCLUSION

Edge clouds shift the emphasis away from heavy-weight data center clouds and toward more lightweight virtualized resources that are deployed to provide services to consumers. They do, however, provide difficulties. We recognized lightweight virtualization as a major issue, as well as the necessity to coordinate the deployment of these services. We focused on platform as a service (PaaS) since application service packaging and orchestration is a major issue in PaaS. Our goal was to conduct a technical assessment of newly developed container technologies and container cluster management in order to evaluate the appropriateness of these methods for edge clouds. The findings here confirm the current excitement for this technology, but they also point out certain drawbacks. Some PaaS providers have begun to address programming (such as orchestration) and DevOps for clusters constraints. Some observations may be made based on the examples given above. To begin with, containers are widely used in PaaS clouds. Second, standardization is taking place, albeit at a slower rate, via the adoption of new de facto standards such as Docker or Kubernetes. Third, development and operations are still in their infancy, especially when it comes to sophisticated orchestrations on dispersed topologies. We can see that cloud management systems are still in the early stages of development compared to the container platforms on which they are built. While clusters are about dispersion in general, the issue of how far this distribution reaches the edge of the cloud with tiny devices and embedded systems arises. A hypothetical issue is whether devices running tiny Linux distributions like Debian-based DSL (which needs about 50MB of storage) can handle container host and cluster administration. Recent 3rd generation PaaS are also lightweight, with the goal of supporting the build-your-own-PaaS concept as a first step. Because of its light weight ness and interoperability, container technology has the potential to significantly progress PaaS technology towards distributed heterogeneous clouds. However, we may also infer that substantial improvements in data and network management, as well as the provision of an abstract development and architectural layer, are still needed. Insofar as it is provided in actual cluster systems, orchestration is ultimately insufficient.

REFERENCES

1. Pahl C, Lee B. Containers and clusters for edge cloud architectures-A technology review. In: Proceedings - 2015 International Conference on Future Internet of Things and Cloud, FiCloud 2015 and 2015 International Conference on Open and Big Data, OBD 2015. 2015.
2. Kaushal G, Singh H, Prakash S. High temperature corrosion behaviour of HVOF-sprayed Ni-20Cr coating on boiler steel in molten salt environment at 900°C. Int J Surf Sci Eng. 2011;
3. Zaheer A, Naveen M, Santosh MK, Imran K. Solubility enhancement of poorly water soluble drugs: A review. International Journal of Pharmacy and Technology. 2011.
4. Jain N, Awasthi Y. WSN-AI based Cloud computing architectures for energy efficient climate smart agriculture with big data analysis. Int J Adv Trends Comput Sci Eng. 2019;
5. Pahl C, Helmer S, Miori L, Sanin J, Lee B. A container-based edge cloud PaaS architecture based on raspberry Pi clusters. In: Proceedings - 2016 4th International Conference on Future Internet of Things and Cloud Workshops, W-FiCloud 2016. 2016.
6. Mathur G, Ghai W, Singh RK. A totalitarian technique for wormhole detection using big data analytics in iot network. Int J Sci Technol Res. 2020;

7. Gupta D, Rana A, Tyagi S. A novel representative dataset generation approach for big data using hybrid Cuckoo search. *Int J Adv Soft Comput its Appl.* 2018;
8. Xiong Y, Sun Y, Xing L, Huang Y. Extend cloud to edge with KubeEdge. In: *Proceedings - 2018 3rd ACM/IEEE Symposium on Edge Computing, SEC 2018.* 2018.
9. Saidi AHKS Al, Hussain SA, Hussain SM, Singh AV, Rana A. Smart Water Meter using Power Line Communication (PLC) Approach for measurements of Accurate Water Consumption and Billing Process. In: *ICRITO 2020 - IEEE 8th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions).* 2020.
10. Agarwal N, Rana A, Pandey JP. Proxy signatures for secured data sharing. In: *Proceedings of the 2016 6th International Conference - Cloud System and Big Data Engineering, Confluence 2016.* 2016.
11. Al-Bahri B, Noronha H, Pandey J, Singh AV, Rana A. Evaluate the Role of Big Data in Enhancing Strategic Decision Making for E-governance in E-Oman Portal. In: *ICRITO 2020 - IEEE 8th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions).* 2020.
12. Chen Y, Patel VM, Phillips PJ, Chellappa R, Poon TWK, Friesen MR, et al. An Optimizing and Differentially Private Clustering Algorithm for Mixed Data in SDN-Based Smart Grid. *IEEE Access.* 2018;
13. Srivastava R, Sharma PK, Das KJM, Manjhi J. A hybrid approach for head and neck cancer using online image guidance and offline adaptive radiotherapy planning. *J Radiother Pract.* 2019;
14. Goyal AK, Singh R, Chauhan G, Rath G. Non-invasive systemic drug delivery through mucosal routes. *Artificial Cells, Nanomedicine and Biotechnology.* 2018.
15. Nanda AK, Singh J. Relationship Between Compressive Strength and Split Tensile Strength for Sustainable Concrete—A Case Study. In: *Lecture Notes in Civil Engineering.* 2021.
16. Taherizadeh S, Stankovski V, Grobelnik M. A capillary computing architecture for dynamic internet of things: Orchestration of microservices from edge devices to fog and cloud providers. *Sensors (Switzerland).* 2018;
17. Khan UJ, Oberoi A, Gill J. Hybrid Classification for Heart Disease Prediction using Artificial Intelligence. In: *Proceedings - 5th International Conference on Computing Methodologies and Communication, ICCMC 2021.* 2021.
18. Kaushal G, Singh H, Prakash S. Comparative high temperature analysis of HVOF-sprayed and detonation gun sprayed Ni-20Cr coating in laboratory and actual boiler environments. *Oxid Met.* 2011;
19. Ismail BI, Mostajeran Goortani E, Ab Karim MB, Ming Tat W, Setapa S, Luke JY, et al. Evaluation of Docker as Edge computing platform. In: *ICOS 2015 - 2015 IEEE Conference on Open Systems.* 2016.
20. Yin L, Luo J, Luo H. Tasks Scheduling and Resource Allocation in Fog Computing Based on Containers for Smart Manufacturing. *IEEE Trans Ind Informatics.* 2018;

21. Hasan MR, Hassan N, Khan R, Kim YT, Iqbal SM. Classification of cancer cells using computational analysis of dynamic morphology. *Comput Methods Programs Biomed.* 2018;
22. Kaushal G, Singh H, Prakash S. Surface engineering, by detonation-gun spray coating, of 347H boiler steel to enhance its high temperature corrosion resistance. *Mater High Temp.* 2011;
23. Kumar N, Singh A, Sharma DK, Kishore K. Novel Target Sites for Drug Screening: A Special Reference to Cancer, Rheumatoid Arthritis and Parkinson's Disease. *Curr Signal Transduct Ther.* 2018;
24. Yu Z, Wang J, Qi Q, Liao J, Xu J. Boundless application and resource based on container technology. In: *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*. 2018.
25. Ahmed A, Pierre G. Docker container deployment in fog computing infrastructures. In: *Proceedings - 2018 IEEE International Conference on Edge Computing, EDGE 2018 - Part of the 2018 IEEE World Congress on Services.* 2018.
26. Kaur K, Dhand T, Kumar N, Zeadally S. Container-as-a-Service at the Edge: Trade-off between Energy Efficiency and Service Availability at Fog Nano Data Centers. *IEEE Wirel Commun.* 2017;

A REVIEW PAPER ON CHILD LABOR IN CHINA

Amit Verma*

*Department of Law,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email id- amit.law@tmu.ac.in

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ABSTRACT

The first comprehensive research of child labor in China is presented. Child labor is not a minor social issue in China; in 2010, 7.74 percent of children aged 10 to 15 worked, working for an average of 6.75 hours per day and spending 6.42 hours less per day on study than other children. Around 90% of child workers were still in school and were combining work and education. Our findings indicate that child work involvement is linked to a higher incidence of school dropout. A kid that grows up in a rural setting is more likely to work. The gender of a kid is less significant than the location of residency. The household head's educational degree and how it interacts with his or her gender seem to be unimportant. However, the prevalence of child labor is inversely linked to family assets per capita and domestic participation in non-agricultural activities. A kid who grows up in a home with more adults has a lower likelihood of working. In China, there are substantial geographical differences in the incidence of child labor. The prevalence of child labor is linked to each area's degree of development: the Western region has the greatest proportion of children working, followed by the Eastern and Central regions.

KEYWORDS: Child Labour, Economy, Government, Household, Worker.

1. INTRODUCTION

The first comprehensive research of child labor in China is presented. Child labor is not a minor social issue in China; in 2010, 7.74 percent of children aged 10 to 15 worked, working for an average of 6.75 hours per day and spending 6.42 hours less per day on study than other children. Around 90% of child workers were still in school and were combining work and education. Our findings indicate that child work involvement is linked to a higher incidence of school dropout. A kid that grows up in a rural setting is more likely to work. The gender of a kid is less significant than the location of residency. The household head's educational degree and how it interacts with his or her gender seem to be unimportant. Household assets per capita and home prices, on the other hand(1–3).

Child labor is an issue that is important both academically and politically throughout the globe; it is also essential for policy development since it has significant consequences for the welfare of children and families, as well as the economy as a whole. A vast number of research indicate that child work has a substantial negative impact on children's human capital. It has a detrimental impact on children's school enrolment and academic performance as well as their health.

Furthermore, these negative impacts seem to persist a long time; for example, even after adjusting for educational level, an adult earns less if she worked throughout her youth. These poor results for children obviously have an impact on the household's well-being. At the macro level, child labor has significant consequences for developing nations' long-term prosperity, since human capital is critical to a country's development. Child labor is inversely proportional to household participation in non-agricultural activities. A kid who grows up in a home with more adults has a lower likelihood of working. In China, there are substantial geographical differences in the incidence of child labor. The prevalence of child labor is linked to each area's degree of development: the Western region has the greatest proportion of children working, followed by the Eastern and Central regions. The problem of child labor has gotten a lot of attention in the economics literature, particularly among development economists. Various elements have been thoroughly investigated, both theoretically and practically(4–7).

Even more empirical research on child labor exists. The impact of parental or household income on child labor, the impact of household wealth on child labor, the impact of financial development on child labor and the impact of economic shocks on the incidence of child conducts a thorough review of the literature on child labor in economics. However, virtually no economic studies of child labor have been conducted in China, despite the fact that, as the world's biggest developing nation, China is classed as presenting an "extreme danger" of child labor. The few exceptions, which have different study objectives, merely cite child labor in China as a side effect. For example, looks at how much time children devote to home production when detecting non-cooperative conduct in Chinese migrant-sending families. We demonstrate in this article that child labor is not a minor societal issue in China. Based on national representative data from the China Family Panel Study, we estimate that 7.74 percent of children aged 10 to 15 years old were working in 2010. ² This proportion was much greater in rural areas and in the generally impoverished Western and Central regions. Around 90% of child workers were still in school and were combining work and education. On average, children who engaged in labor worked 6.75 hours per day and spent 6.42 hours less per day studying than children who did not. The school dropout rate for working-age children was 11.57 percent, which was 9.6 percent higher than the rate for non-working-age children(8,9).

Our results vary from those who used data from Gansu province in 2000 to arrive at his conclusions. Despite the fact that shows that child work has a substantial detrimental impact on a kid's scholastic performance throughout that period, he believes that child labor is not a major issue in China. Part of the reason for the discrepancy between our findings and those are related to the various datasets utilized. Exclusively utilized data from children aged 9 to 13 and from Gansu province; more significantly, the research sample of included children who are currently enrolled in school. We want to provide a broad picture of child labor in China in this article. We will offer a bird's-eye perspective rather than concentrating on causation from important factors (for example, government regulations) to the prevalence of child labor in China since this is the first comprehensive research on the subject. As a result, the focus of this research is on correlations rather than causation. The author will look at child labor involvement, working hours, and school dropouts from a variety of perspectives, including gender and location of residence. The author wants to understand the connections between the likelihood of child labor (working hours) and important factors including child features, home characteristics, and household heads using regression analysis (linear probability model, tobit model, and Heckman

selection model). The author will also look at the link between child work and high school dropout rates(10,11).

Our findings indicate that child work involvement is linked to a higher dropout rate. A kid that grows up in a rural setting is more likely to work. 3 The gender of a kid is less significant than the location of residency. The educational level of a household head, as well as its relationship to the gender of the household head, seem to be irrelevant. However, the prevalence of child labor is inversely linked to family assets per capita and household participation in non-agricultural activities. A kid who grows up in a home with more adults has a lower likelihood of working. In China, there are substantial geographical differences in the incidence of child labor. Child labor is linked to each area's degree of development: the Western region has the greatest proportion of children working, followed by the Eastern and Central regions. When we broaden the definition of child labor to include home chores and caring for family members, we discover that, in contrast to working hours, living in a city has a substantial and favourable relationship with kid time spent on household duties. Child time spent on household duties and caring for family members in general is not substantially linked to per capita household assets or household participation in non-agricultural activities, although females spend considerably more time on such jobs than boys(12,13).

1.1 Information And An Overview Of Child Labor In China:

The China Family Panel Studies data collection was utilized in this study (CFPS). The Chinese government funds the CFPS, which is a nationally representative longitudinal survey performed by Peking University's Institute of Social Science Survey. After many years of pre-testing, the CFPS was officially launched in 2010, and it has amassed a wealth of data about communities, families, and people.

The first wave, i.e. the CFPS baseline survey in 2010, is used in this research. It encompasses provinces, which are home to 95 percent of China's population. The CFPS sample is drawn using a three-stage random procedure that is intended to be nationally representative. The administrative district or county is the main sample unit; the administrative village or community is the second step; and the home is the last level. The first wave includes both urban and rural China, with 14,960 homes and 42,490 people. Face-to-face interviews using computer-assisted personal interviewing technologies were used to gather baseline data(14–18).

For the sake of this research, we will only look at youngsters aged 10 to 15 years old (inclusive). The CFPS includes a kid module that gathers comprehensive information on children aged 10 to 15 years in both urban and rural regions' schooling, job experience, time usage, interpersonal communications, daily living, health, and personal experiences. Individual work; study; entertainment and social activities; transportation; and other. More specifically, children's time use is divided into six categories: personal life (including sleep, meals, personal hygiene, household chores, and caring for family members); individual work; study; entertainment and social activities; transportation; and other. Individual employment, which includes work for compensation (cash or in kind) outside of the home, work in agriculture for the household, and work in a household business, allows us to define the child labor indicator in this article. As a result, the CFPS offers us with an once-in-a-lifetime chance to research child labor in China.

1.2 Child Labor Definition:

In the literature, there is no agreement on what constitutes child work. The majority of research use a strict definition, defining child workers as youngsters who work for a pay. Some academics describe them as children who work in the economy.

A few scholars as all non-school and non-leisure activities that children engage in define Child work. Domestic tasks, such as cooking, housecleaning, or caring for family members, would be considered child labor in this context. The International Labor Organization's (ILO) official definition is based on whether or not the labor is detrimental to a child's health or development, regardless of whether it is economic or non-economic, market or non-market.

Housework and caring for family members are unlikely to damage a child's health or development, and they have no effect on school attendance. As a result, we will concentrate on work for pay (cash or in kind) outside the home, labor in agriculture for the home, and employment in a household business in this article. More precisely, every kid having a positive time in the job category is coded as a child worker, and the variable working hours is constructed only from this category. To take into account as many activities as the data allow, we additionally look at variables related to children devoting time to domestic tasks and caring for family members.

In general, the minimum age for work, which is the age at which obligatory schooling must be completed. In China, three relevant laws prohibit state organs, social bodies, enterprises, institutions, non-governmental not-for-profit organizations, and private businesses from employing minors, namely the Labor Law of the People's Republic of China (Article 15), Regulations Banning Child Labor (Article 2), and the Law of the People's Republic of China on the Protection of Minors (Article 28). Child labor refers to the employment of minors under the age of 16. Employers that employ child labor will be penalized 5000 yuan per month by the labor protection authorities for each child worker exploited (Regulations Banning Child Labor, Article 6). The Law of People's also protects teenage employees (ages 16 to 18) against too hard, toxic, or hazardous labor, as well as any risky operation(19–21).

1.3 A Look At Child Labor In China For The First Time:

Based on the research sample in the article, we offer a first look into child labor in China in this section. Panels A and B look at child labor rates differently depending on where you live (urban or rural) and what kind of hukou you have (urban or rural). These two panels' graphs are quite similar. In general, the frequency of child labor rises with age: by the age of ten, around ten percent of children are working, and this proportion rises to about twelve percent at the age of fifteen. At all ages, children who live in rural regions or who have a rural hukou are much more likely to work; the rural–urban divide may be as big as 6–9%.

In Panel C, we look at geographical trends in the occurrence of child labor. Child labor is, on average, adversely linked with regional economic growth. More precisely, the Western area of China, which is the poorest, has the highest proportion of children engaging in child labor, while the Eastern and Central regions, which are more developed, have the lowest incidence. In Panel D, we look at how the prevalence of child labor differs by gender. Girls are more likely to work while they are younger, but this is reversed by the age of eleven. After the age of 12, the gender

difference in the frequency of child work is insignificant. Overall, the gender gap is less pronounced than the rural–urban divide or geographical disparities.

The precise time allocation for child workers and non-child employees. We mostly concentrate on two activities: job and study. On average, child workers work 6.75 hours each day, which is the same as a full-time employee. Child workers spend approximately 2.0 hours each day studying, compared to 8.4 hours for non-laboring youngsters. There is a significant trade-off between working hours and studying hours. In other words, the majority of child workers' working hours originate from time that would have been spent studying if they did not have to perform market or domestic work. There are also some variations in time allocation for remaining activities; for example, child workers devote more time to home duties and family care, but less time to leisure and transportation. However, the disparities are not as noticeable as the variations in working and studying hours. The time allocation gap between child workers and non-child labourers persists when we look at gender and residency aspects.

We further split children's activities into four groups to better comprehend child work in China: economic activity alone; school only; combine economic activity and school; and neither school nor economic activity. In China, over 90% of child workers are still in school and mix economic activities with education, albeit they study for much less hours. Only 40% of youngsters who have dropped out of school work as children. Approximately 1.7 percent of youngsters are not enrolled in school or working. Because child work involvement diverts so much study time, as demonstrated in Table 1, we look into the connection between child labor and school attendance in more depth in Figure 2. We compare the school dropout rate of child workers and non-child labourers in Panel A. We discovered that the dropout rate for child workers is much greater than that of non-child labourers, particularly among children over the age of 14. Child workers have a dropout rate of up to 40% at the age of 15, compared to just 5% for non-child labourers.

From Panels B through D, we concentrate only on child workers. Panel B indicates that until the age of 12, there is no difference in the dropout rate between boys and girls, but beyond that age, the rate for females is greater than the rate for boys. Panel C splits the child workers into groups based on where they live. The dropout rate in rural regions is greater than in urban areas for child workers younger than 14, but the difference between rural and urban areas narrows after age 14; for example, the dropout rate for child labourers aged 15 is approximately 40% in rural areas and 35% in urban areas. Panel D looks at whether the dropout rate of child workers varies according on their hukou status. The dropout rate for child workers with urban hukou is almost nil (note the dashed line, which is virtually parallel to the horizontal axis). Almost majority of the school dropouts come from rural hukou child workers.

2. DISCUSSION

The author has discussed about the child labour, around 90% of child employees were still in schooling and were working and studying at the same time. Our results suggest that child labor participation is related to a greater rate of school dropout. A child who grows up in the country is more likely to work. The gender of a child is less important than where they live. The educational level of the family head and how it relates to his or her gender seem to be irrelevant. Child labor, on the other hand, is negatively related to per capita family assets and household involvement in non-agricultural activities. A child who grows up in a household with more

adults is less likely to work. There are significant regional variations in the prevalence of child labor in China.

3. CONCLUSION

The author has concluded about the child labour in china, Child labor study has a long history in economics, and the literature on the subject is extensive. Child work has many negative impacts on children's health and scholastic performance, according to existing research. These negative results for child workers obviously affect family welfare and have significant consequences for a country's growth and development. In China, however, there are practically no studies on child labor, which is remarkable considering that China is the world's biggest developing nation. Child work, however, is still a significant social issue in China, even after more than 30 years of rapid economic growth: in 2010, approximately 7.74 percent of children aged 10 to 15 were involved in child labor. In the Western and Central regions, as well as in rural areas, this proportion was considerably greater. The majority of child workers were still in school and juggled work and education. Working children worked an average of 6.75 hours per day and spent 6.42 hours less studying. This emphasizes the need of researching child labor in China. In this article, we look at a number of factors related to child labor involvement, working hours, and school dropouts, such as child, household and household head characteristics. We also look at the connections for other groups, such as those defined by residency or gender.

REFERENCES:

1. Thöni A, Taudes A, Tjoa AM. An information system for assessing the likelihood of child labor in supplier locations leveraging Bayesian networks and text mining. *Inf Syst E-bus Manag.* 2018;
2. Sadioura AS, Singh R, Singh H. Machinability index evaluation: A case study of carbide inserts. In: *Applied Mechanics and Materials.* 2013.
3. Khurana H, Rana A. Leveraging technology to build collaborative learning environment in academic institutes. In: *Proceedings of the 2013 IEEE International Conference in MOOC, Innovation and Technology in Education, MITE 2013.* 2013.
4. Tang C, Zhao L, Zhao Z. Child labor in China. *China Econ Rev.* 2018;
5. Batomen Kuimi BL, Oppong-Nkrumah O, Kaufman J, Nazif-Munoz JI, Nandi A. Child labour and health: a systematic review. *International Journal of Public Health.* 2018.
6. D'Alessandro S, Fioroni T. Child labour and inequality. *J Econ Inequal.* 2016;
7. Hamenoo ES, Dwomoh EA, Dako-Gyeke M. Child labour in Ghana: Implications for children's education and health. *Child Youth Serv Rev.* 2018;
8. Dammert AC, de Hoop J, Mvukiyehe E, Rosati FC. Effects of public policy on child labor: Current knowledge, gaps, and implications for program design. *World Development.* 2018.
9. Ali MA, Ali MV, Abbas F. Hidden hazardous child labor as a complex human rights phenomenon: A case study of child labor in Pakistan's brick-making industry. *Cogent Soc Sci.* 2017;

10. Anderson E. Policy Entrepreneurs and the Origins of the Regulatory Welfare State: Child Labor Reform in Nineteenth-Century Europe. *Am Sociol Rev.* 2018;
11. Coon M. Remittances and child labor in Bolivia. *IZA J Migr.* 2016;
12. Yuningsih Y, Salamah U, Nurwati N. Social protection for child labors. *Int J Eng Technol.* 2018;
13. Krauss A. Understanding child labour beyond the standard economic assumption of monetary poverty. *Cambridge J Econ.* 2017;
14. Mir MA, Verma P. Use of polyethylene waste with stone dust in flexible pavement. *Int J Sci Technol Res.* 2019;
15. Tripathi L, Singh R. Anticonvulsant and neurotoxicity evaluation of some novel cyclohexyl-[4-substituted benzylidene/2-oxo-1,2-dihydro-indol-3-ylidene] thiosemicarbazides. *Asian J Chem.* 2011;
16. Rihan A, Quaisarperween, Gaurav K, Jayanand, Durg VR. Effect of butylated hydroxyanisole on hydrogen peroxide induced oxidative stress on cerebral glioma cell line. *Asian J Pharm Clin Res.* 2014;
17. Gaurav A, Gautam V, Singh R. Exploring the Structure Activity Relationships of Imidazole Containing Tetrahydrobenzodiazepines as Farnesyltransferase Inhibitors: A QSAR Study. *Lett Drug Des Discov.* 2011;
18. Agarwal N, Rana A, Pandey JP. Proxy signatures for secured data sharing. In: *Proceedings of the 2016 6th International Conference - Cloud System and Big Data Engineering, Confluence 2016.* 2016.
19. Lanis K, Covell K. Images of women in advertisements: Effects on attitudes related to sexual aggression. *Sex Roles.* 1995;
20. Weißhuhn S, Hoberg K. Designing smart replenishment systems: Internet-of-Things technology for vendor-managed inventory at end consumers. *Eur J Oper Res.* 2021;
21. Qiu, J., Lin, Z., & Li Y. Predicting customer purchase behavior in the e-commerce context. 2015;

AN ANALYSIS OF DATA MINING WITH BIG DATA

Dr. Priyank Singhal*

*Department of Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email id- priyanksinghal1@gmail.com

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ABSTRACT

Big Data refers to large-scale, complicated, and increasing data collections originating from a variety of independent sources. Big Data is currently quickly growing across all scientific and engineering areas, including physical, biological, and biomedical sciences, thanks to significant advancements in networking, data storage, and data collecting capability.. Data processing is much more difficult than just finding, recognizing, comprehending, and citing information. All of this must be done in a fully automated way for successful large-scale analysis. From a data mining viewpoint, this paper offers a HACE theorem that defines the characteristics of the Big Data revolution and suggests a Big Data processing paradigm. Demand-driven aggregation of information sources, mining and analysis, user interest modelling, and security and privacy concerns are all part of this data-driven approach. We look at the problems with the data-driven paradigm as well as the Big Data revolution.

KEYWORDS:*Big Data, Data Mining, Information, Large, Volume.*

1. INTRODUCTION

2.5 quintillion bytes of data are created every day, and 90 percent of the data on the planet today was created in the last two years. Since the invention of Information Technology in the early nineteenth century, our ability to generate data has never been more powerful or vast. Big Data applications are those in which the amount of data collected has increased dramatically and is now beyond the ability of commonly used software tools to capture, manage, and process in a "reasonable amount of time." Exploration of large volumes of data and extraction of useful information or knowledge for future actions is the most fundamental challenge for Big Data applications. Because storing all observed data is nearly impossible in many situations, the knowledge extraction process must be very efficient and close to real-time. In Radio Astronomy, for example, the Square Kilometer Array (SKA) consists of 1,000 to 1,500 15-meter dishes in a central 5km area. It has a vision that is 100 times more sensitive than any other radio telescope, allowing it to answer fundamental questions about the Universe. The data generated by the SKA, however, is extremely large, with a data volume of 40 gigabytes (GB) per second. Although researchers have confirmed that the SKA data can reveal interesting patterns such as transient radio anomalies, existing methods are incapable of handling this Big Data. As a result, to achieve fast-response and real-time classification for such Big Data, an effective data analysis and prediction platform is required(1).

1.1 Big Data Characteristics: HACE Theorem

Big Data begins with large-volume, heterogeneous, independent data sources with dispersed and decentralized governance, and attempts to understand complex and changing data connections. Because of these qualities, extracting meaningful information from Big Data is very difficult. In a naive sense, we may picture a group of blind guys attempting to measure up a massive elephant, which in this case will be Big Data. Each blind man's objective is to create an image (or conclusion) of the elephant based on the facts he gathered during the procedure. Because each person's field of vision is restricted to his immediate surroundings, it's not unexpected that the blind men would each decide that the elephant "feels" like a rope, a hose, or a wall, depending on which area they are limited to. To make things even more complex, imagine that the elephant is growing quickly and changing its posture all the time, and that the blind men are learning from each other as they share their emotions about the elephant. Exploring Big Data in this situation equates to combining heterogeneous data from many sources (blind men) to help create the finest possible image to show the elephant's actual motion in real time. Indeed, this task is not as simple as asking each blind man to describe his feelings about the elephant and then having an expert draw a single picture with a combined view, due to the fact that each individual may speak a different language (heterogeneous and diverse information sources) and may even be concerned about the messages they deliberate in the information exchange process(2).

1.1.1 Huge Data with Heterogeneous and Diverse Dimensionality:

The massive amount of data represented by heterogeneous and varied dimensionalities is one of the basic features of Big Data. This is due to the fact that various data collectors employ different schemata for data collecting, and the nature of different applications also results in distinct data representations. For example, in a biomedical environment, each individual may be represented using basic demographic data such as gender, age, and family illness history. Images or videos are utilized to depict the findings of each individual's X-ray examination and CT scan because they offer visual information for physicians to conduct thorough exams. Because this is how our current methods collect the data, microarray expression pictures and sequences are utilized to represent the genetic code information for a DNA or genomic related test. In such cases, heterogeneous features relate to the many kinds of representations for the same people, whereas diverse features refer to the wide range of characteristics used to describe each individual observation. Consider that various companies (or health practitioners) may use different schemata to describe each patient; data heterogeneity and dimensionality problems become significant difficulties if we attempt to allow data aggregation by integrating data from all sources(3).

1.1.2 Autonomous Sources with Distributed and Decentralized Control:

Big Data applications are characterized by autonomous data sources with dispersed and decentralized governance. Because each data source is self-contained, it may produce and collect data without requiring (or depending on) any centralized control. This is comparable to the World Wide Web (WWW) setup, where each web server delivers a certain quantity of information and each server may operate independently of the others. On the other hand, if the whole system relies on a centralized control unit, the massive quantities of data render an application susceptible to assaults or failures. A significant number of server farms are installed

across the globe for key Big Data-related applications, such as Google, Flickr, Facebook, and Walmart, to guarantee continuous services and fast answers for local markets. These self-contained sources provide not only technological answers, but also the outcomes of legislation and regulatory regulations in many nations and areas. In terms of seasonal promotions, top-selling products, and consumer behavior, Walmart's Asian markets, for example, are fundamentally different from its North American ones. Local government laws, in particular, have an effect on the wholesale management process, resulting in data representations and data warehouses for local markets(4–7).

1.1.3 Complex and Evolving Relationships:

As the amount of Big Data grows, so does the intricacy and connections that lie underneath it. The goal of early data centralized information systems is to identify the optimum feature values to represent each observation. This is comparable to characterizing each person utilizing a variety of data categories such as age, gender, income, education background, and so on. This kind of sample-feature representation naturally considers each person as an autonomous entity, ignoring one of the most fundamental aspects of human society: social relationships. Friendship circles are formed by people who have similar interests or who are linked by biological ties. Social relationships like this are commonplace not just in our everyday lives, but also in virtual realms. Major social networking sites, such as Facebook and Twitter, for example, are primarily defined by social features such as friend connections and followers (in Twitter). Individual correlations always complicate the whole data representation and any reasoning process. People are considered comparable in the sample-feature representation if they have similar feature values, while in the sample-feature-relationship representation, two individuals may be connected together (through their social ties) even if they have nothing in common in the feature domains. In a dynamic environment, the characteristics that are used to represent people and the social relationships that are used to represent our connections may change with time, space, and other variables. The key to discovering meaningful patterns from Big Data collections is to take into account the complicated (non-linear, many-to-many) data connections, as well as the ongoing changes(8).

1.2 Data Mining Challenges with Big Data:

To handle Big Data, an intelligent learning database system (Wu 2000) must be able to scale up to extremely large volumes of data and provide treatments for the characteristics highlighted by the HACE theorem.

From the inside out, the Big Data processing framework is divided into three tiers: data access and computing (Tier I), data privacy and domain knowledge (Tier II), and Big Data mining algorithms (Tier III) (Tier III). At Tier I, the difficulties are centered on data access and real computing processes. Because Big Data is frequently stored in multiple locations and data volumes are likely to continue to grow, an effective computing platform will need to consider distributed large-scale data storage when computing. While most data mining algorithms require all data to be loaded into main memory, this is becoming a clear technical barrier for Big Data because moving data across multiple locations is costly (e.g., subject to intensive network communication and other IO costs), even if we have a super large main memory to hold all data for computing(9–11).

Semantics and domain knowledge for various Big Data applications are the difficulties at Tier II. Such information may create technological hurdles to Big Data access (Tier I) and mining algorithms, as well as offer extra advantages to the mining process (Tier III). Data privacy and information sharing methods between data producers and data consumers, for example, may vary considerably depending on domain applications. Sharing sensor network data for purposes such as water quality monitoring may not be frowned upon, but releasing and sharing mobile users' location data is obviously unacceptable for the vast majority, if not all, of them. Aside from the privacy concerns mentioned above, the application domains may also offer extra information that might help or influence the design of Big Data mining algorithms. For example, in market basket transaction data, each transaction is regarded independent, and the acquired knowledge is usually represented by locating strongly linked goods, potentially under various time and/or geographical constraints. On the other hand, users in a social network are connected and share dependence patterns. User communities, leaders in each group, and social influence modeling, among other things, are used to represent the knowledge. As a result, both low-level data access and high-level mining algorithm designs need a grasp of semantics and application expertise(12).

The data mining problems at Tier III focus on algorithm designs to address the challenges posed by Big Data quantities, dispersed data distributions, and complex and dynamic data features. At Tier III, there are three levels in the circle. Data fusion methods are used to preprocess sparse, diverse, uncertain, incomplete, and multi-source data. Second, following pre-processing, complicated and dynamic data is mined. Third, the global knowledge gained via local learning and model fusion is put to the test, and appropriate data is sent back into the pre-processing step. The model and parameters are then tweaked in response to the input. Information sharing is not only a guarantee of seamless growth at each step, but it is also a goal of Big Data processing(13–16).

1.3 Tier I: Big Data Mining Platform:

The mining processes in conventional data mining systems need computationally expensive computer units for data analysis and comparisons. As a result, a computing platform must have efficient access to at least two kinds of resources: data and processing processors. For small-scale data mining activities, a single desktop computer with a hard drive and CPU processor is adequate to get the desired results. Many data mining algorithms are specifically developed to deal with this kind of issue. Data for medium-scale data mining jobs is usually big (and potentially dispersed) and cannot be stored in main memory. To sample and aggregate data from many sources, common methods depend on parallel computing or collective mining, and then utilize parallel computing programming to carry out the mining process(5,17–19).

Because the scale of Big Data exceeds the capacity of a single personal computer (PC), a typical Big Data processing framework will rely on cluster computers with a high-performance computing platform, where a data mining task is deployed by running some parallel programming tools, such as MapReduce or ECL (Enterprise Control Language), on a large number of computing nodes (i.e., clusters). The software component's job is to ensure that a single data mining work, such as finding the best match for a query in a database containing billions of samples, is broken down into many smaller jobs, each of which runs on one or more computer nodes. Without the backing of major industry shareholders, a Big Data system that combines both hardware and software components is unlikely to be developed. In reality, businesses have been making choices based on transactional data contained in relational

databases for decades. Big Data mining allows companies to go beyond their relational databases and utilize less structured data such as weblogs, social media, email, sensors, and pictures to extract valuable information. Major business intelligence firms, such as IBM, Oracle, and Teradata, have all released their own solutions to assist clients in acquiring and organizing these disparate data sources, as well as coordinating with current data to uncover new insights and profit on hidden connections(14,20–22).

1.4 Tier II: Big Data Semantics and Application Knowledge:

In Big Data, semantics and application knowledge refer to a variety of factors such as laws, rules, user knowledge, and domain information. Data sharing and privacy, as well as domain and application expertise, are the two most significant concerns at this level.

1.4.1 Domain and Application Knowledge:

The ability to develop Big Data mining techniques and systems requires domain and application expertise. Domain knowledge may assist find the appropriate characteristics for modeling the underlying data in a basic instance. Using Big Data analytical methods, domain and application expertise may also aid in the creation of attainable corporate goals. Stock market data, for example, is a typical domain that produces a significant amount of information, such as bids, buys, and puts, every second. Different variables, such as local and international news, government reports, and natural catastrophes, all have an effect on the market. Designing a Big Data mining system to anticipate market movement in the next one or two minutes is an interesting Big Data mining challenge. Even if the forecast accuracy is just somewhat better than a random guess, such systems will provide substantial economic value to their creators. Finding effective matrices/measures to characterize market movement is a clear challenge without correct domain knowledge, and such knowledge is often beyond the mind of data miners, although some recent research has shown that using social networks, such as Twitter, it is possible to predict stock market upward/downward trends with good accuracies.

2. DISCUSSION

In today's age of information technology, the capacity to efficiently analyze large datasets has become critical to a variety of scientific and academic fields. We are living in a data flood age, and as a consequence, the phrase "Big Data" is being used in a variety of situations. Meteorology, genetics, complicated physics simulations, biological and environmental studies, finance and business, and healthcare are just a few examples. Big Data refers to data streams with a high rate of change and diversity. The infrastructure needed to enable Big Data acquisition must provide low, predictable latency in both data capture and the execution of short, basic queries. To be able to manage large quantities of transactions, frequently in a remote context, and to enable flexible, dynamic data structures. Data processing is much more difficult than just finding, recognizing, comprehending, and citing information. All of this must be done in a fully automated way for successful large-scale analysis. This necessitates the expression of variations in data structure and semantics in computer-understandable and 'robotically' resolvable forms. Data integration, mapping, and transformations have a large body of work. However, achieving automated error-free difference resolution will require a significant amount of extra effort. This article offers a paradigm for Data Mining with Big Data based on current research.

3. CONCLUSION

Managing and mining Big Data has proven to be a difficult but fascinating job, driven by real-world applications and major industry players, and initiated by national funding agencies. While the phrase Big Data refers to large amounts of data, our HACE theorem indicates that the essential features of Big Data are heterogeneous and varied data sources, autonomy with dispersed and decentralized control, and complex and dynamic data and knowledge connections. Such traits indicate that Large Data necessitates the use of a "big mind" to integrate data for maximum value. We examined various difficulties at the data, model, and system levels in order to investigate Big Data. High-performance computing systems that enforce systematic designs to unleash the full potential of Big Data are needed to enable Big Data mining. At the data level, the diversity of data collecting settings and autonomous information sources often result in data with complex circumstances, such as missing/uncertain values. In other cases, privacy issues, noise, and mistakes may be introduced into the data, resulting in data copies that are changed. Creating a secure and reliable information exchange system is a big undertaking. The main difficulty at the model level is to create global models by integrating locally found patterns into a unified perspective. This necessitates the employment of properly developed algorithms to evaluate model connections across distant sites and combine choices from various sources in order to get the optimal model from Big Data. The main difficulty at the system level is that a Big Data mining framework must take into account complicated connections between samples, models, and data sources, as well as their changing patterns over time and other variables. The development of data volumes and item connections should assist create valid patterns to forecast the trend and future, and a system must be properly built so that unstructured data may be connected via their complicated relationships to produce usable patterns.

REFERENCES

1. Wu X, Zhu X, Wu GQ, Ding W. Data mining with big data. IEEE Trans Knowl Data Eng. 2014;
2. Sowmya R, Suneetha KR. Data Mining with Big Data. In: Proceedings of 2017 11th International Conference on Intelligent Systems and Control, ISCO 2017. 2017.
3. DATA MINING AND BIG DATA PROCESSING FOR MARKETING. Rev Econ. 2018;
4. Lv S, Kim H, Zheng B, Jin H. A review of data mining with Big Data towards its applications in the electronics industry. Applied Sciences (Switzerland). 2018.
5. Agarwal N, Rana A, Pandey JP. Proxy signatures for secured data sharing. In: Proceedings of the 2016 6th International Conference - Cloud System and Big Data Engineering, Confluence 2016. 2016.
6. Gupta P, Tyagi N. An approach towards big data - A review. In: International Conference on Computing, Communication and Automation, ICCCA 2015. 2015.
7. Sharma R, Chander R. Market proxies at BSE and weak form efficiency. Indian J Financ. 2011;
8. Shen W, Desnoyers N. Predictive Analytics, Data Mining and Big Data: Myths, Misconceptions and Methods. Interfaces (Providence). 2015;

9. Tseng SF, Won YL, Yang JM. A bibliometric analysis on data mining and big data. *Int J Electron Bus.* 2016;
10. Virk JPS. Use of genetic Algorithm in capacitor placement and sizing for optimal power system operation. In: *Proceedings of the IASTED International Conference on Modelling and Simulation.* 2011.
11. Banerjee K, Prasad RA. Reference based inter chromosomal similarity based DNA sequence compression algorithm. In: *Proceeding - IEEE International Conference on Computing, Communication and Automation, ICCCA 2017.* 2017.
12. Bathla G, Aggarwal H, Rani R. Migrating from data mining to big data mining. *Int J Eng Technol.* 2018;
13. Herland M, Khoshgoftaar TM, Wald R. A review of data mining using big data in health informatics. *J Big Data.* 2014;
14. Sahu PP, Singh M, Baishya A. A novel versatile precision full-wave rectifier. *IEEE Trans Instrum Meas.* 2010;
15. Kumar S, Wahi AK, Singh R. Synthesis, computational studies and preliminary pharmacological evaluation of new arylpiperazines. *E-Journal Chem.* 2011;
16. Jain N, Awasthi Y. WSN-AI based Cloud computing architectures for energy efficient climate smart agriculture with big data analysis. *Int J Adv Trends Comput Sci Eng.* 2019;
17. Mellor JC, Stone MA, Keane J. Application of Data Mining to “Big Data” Acquired in Audiology: Principles and Potential. *Trends Hear.* 2018;
18. Chen Z, Li JS, Poon CS. Combined use of sewage sludge ash and recycled glass cullet for the production of concrete blocks. *J Clean Prod.* 2018;
19. Sharma Y, Kumar S. Effect of power avaricious attack on MANET routing protocols. In: *ICECT 2011 - 2011 3rd International Conference on Electronics Computer Technology.* 2011.
20. Computing M, Yenkar V. Review on “Data Mining with Big Data .” *Int J Comput Sci Mob Comput.* 2014;
21. Al-Bahri B, Noronha H, Pandey J, Singh AV, Rana A. Evaluate the Role of Big Data in Enhancing Strategic Decision Making for E-governance in E-Oman Portal. In: *ICRITO 2020 - IEEE 8th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions).* 2020.
22. Khatri M, Kumar A. Stability Inspection of Isolated Hydro Power Plant with Cuttlefish Algorithm. In: *2020 International Conference on Decision Aid Sciences and Application, DASA 2020.* 2020.

THE INFLUENCE OF DIFFERENT PLANTING SCHEMES ON THE CHANGE IN PHYTOMETRIC PARAMETERS OF THE CROWN OF GRAPE PLANTS

Konysbayev Lesbek Karabayevich*

*Honored Worker of Agriculture,
Academician of the Academy of Agricultural Sciences,
Republic of Kazakhstan, UZBEKISTAN
Email id: akonysbaev55@mail.ru

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ABSTRACT

Experiments on the grape bushes have been conducted to explore the influence of various planting schemes, which significantly improve the photometric parameters of their crown. A positive correlation was revealed between the feeding area of bushes and the number of shoots per bush. In particular, with the increase of the feeding area of bushes from 4.5 m² to 6 m², the number of shoots per bush increased from 57 to 77, and respectively it increased by 2.4 thousands shoots per hectare.

KEYWORDS: Grape Bush, Planting Scheme, Photometric Indicators, Feeding Area, Photosynthetic Activity, Crown Parameters.

I. INTRODUCTION

Considering that the promotion of the maximum use of the main environmental factors should take place during the use of allocated food areas, at the same time during the period of increasing the growth processes of the grape plant, and creating favorable conditions that increase photosynthetic activity in order to obtain the highest yield, we studied various planting schemes and the specifics of the structural organization of grape bushes [1].

It was found that rarely planted grape plantations with a high stem and with the same load of shoots per lineal meter of trellis had a number of advantages in the physiological and optical system of development.

When describing the phytometric indicators of the crown of a grape plant, which are considered to be the number of shoots placed on it and their leaf area, its number on 1 hectare varies significantly, respectively, the elongation of the sleeves occurs as a result of an increase in the load of shoots on the bush, with the same load of shoots on 1 lineal meter, and they have a significant impact on the assimilation process and photosynthesis processes within rare planting [2].

II. METHODOLOGY

Object of study – vineyard, planted with promising frost-resistant “Ili” and “Bereke” grape sorts with a planting scheme of 3 x 1.5 m, 3x2 m and 3 x 2.5 m.

In the autumn, we carried out under-winter ploughing of area. In the spring, we prepared planting pits with the introduction of organic matter into them. After inspection, and pruning of broken roots of seedlings, we dipped them with root system into a chatterbox made of fresh mullein. After laying the vineyard, watering was carried out in the wells. Later, all agrotechnical care of the vineyard was carried out, according to the requirements for the vineyard care.

III. STUDY RESULTS

The data obtained from experiments show that there is a significant fluctuation in the indicators of leaf area density between the above variants of the experiment. This indicator in the variant with a feeding area of 6 m^2 was closer to the criterion of optimal density and amounted to $5.68\text{ m}^2/\text{m}^3$; with a feeding area of 7.5 m^2 it amounted $6.22\text{ m}^2/\text{m}^3$, and in the variant with a denser planting of bushes the indicator it reached $3.85\text{ m}^2/\text{m}^3$, which is significantly lower than the value of the indicator of the leaf area density in previous versions of the experiment.

It was found that with the increase of the feeding area of bushes from 4.5 m^2 to 6 m^2 , the number of shoots per bush increased from 57 to 77, and in per hectare, respectively, it increased by 2.4 thousand. (Table 1).

Thus, it was established in our experience that changing the planting scheme of bushes, increasing the distance between bushes, the load of shoots without simultaneously changing it per unit area does not make it possible to radically bring the photometric characteristics of the crown of bushes to the optimal level. This factor can be eliminated only when the distance between the bushes is increased with the simultaneous use of agrotechnical techniques that contribute to the significant formation and growth of the plant volume of the crown, which in turn, leads to the placement of more shoots of a grape plant per 1 m^2 of trellis, while not causing damage to the optical density of the crown and thereby makes it possible to increase the overall productivity of grape plantations [3].

**TABLE 1 PHOTOMETRIC INDICATORS OF THE CROWN OF BUSHES
“ILI” AND “BEREKE” GRAPE SORT, IN ACCORDANCE WITH THEIR PLANTING
SCHEME**

Landing (schematic), m x m	Sprouts (quantity)		Leaf area (medium)			Crown length (medium), cm	Crown (width)		Crown (height), cm	Leaf area (total density), m^2/m^3
	Per bush, pieces	per 1 hectare, thousand pieces	sprouts, dm^2	bushes, m^2	Per lineal meter of trellis, m^2		Bottom side, cm	Upper side, cm		
3 x 1,5	57	126,6	11,4	6,5	4,3	150	78	110	120	3,85
3 x 2	77	128,2	17,8	13,7	6,9	200	80	114	118	5,68
3 x 2,5	85	113,3	16,9	14,4	6,5	220	75	108	115	6,22
HCP ₀₅			2,3	3,5	1,2		3,4	5,2	6,1	2,5

Also, in order to significantly increase the productivity of grape plantations, in addition to improving the phytometric characteristics of the crown, it is necessary to cover the land area with phytomass of grape plants to the maximum extent possible, since at the same time, the efficiency of headlights entering the vineyard increases significantly. When studying the data obtained as a result of experiment, it turned out that a vineyard with a rarer placement of bushes in a row, in comparison with a vineyard with a large number of bushes in a row, with the same load per unit area of planting, is a more efficient structure due to a higher index of plant phytomass when covering the land area (Table 2).

TABLE 2 THE EFFECTIVENESS OF THE USE OF GRAPE PLANTS WITH DIFFERENT PLANTING SCHEMES OF BUSHES, ALLOCATED TO THEM AREA AND TRELLIS PLANE

Planting (schematic) of bushed, mxm	Land area (index of converage), %	Trellis plane (index of usage), %
3 x 1,5	34	60
3 x 2	38	59
3 x 2,5	36	58

IV. CONCLUSION

The existing methods of maintaining the growth of grape bushes and their identical shape do not make it possible to radically change the value of the horizontal projection of the crown. However, when changing the bush planting scheme at the same load, the proportion of the land area covered with phytomass still increases, which leads to less solar radiation consumption for heating the soil in the aisles, and an increase in solar radiation involved in photosynthesis processes. When calculating the index used by the phytomass of trellis plants, it was found that a decrease in the number of grape plants in a row led to an increase in this indicator by 1%. Therefore, with the same increase in the distance between plants in a row of shoots per unit area, the load, the method of conducting growth and the shape of grape bushes leads to an increase in the amount of solar radiation entering the grape bushes and used by them, due to a decrease in the amount of solar energy entering the aisles.

REFERENCES:

1. Karayev M. K. Photosinteticheskaya deyatel'nost' vinogradnikav zavisimosti ot formy kusta [Photosynthetic activity of the vineyard depending on the shape of the bush] // Wine making i viticulture. - 2002. - №4. - pp.30-32.
2. Kisil M. Ph., & Vladov P. G. Formirovaniye produktivnogo potentsiala vinograda v zavisimosti ot ekologicheskikh usloviy [Formation of the productive potential of grapes depending on environmental conditions] // Wine making i viticulture. - 2010. - №1. - pp.30-31.
3. Pavlyukova T. P. Sistemavedeniye vinogradav Chernomorskoj zone Krasnodarskogo kraja [The system of grape management in the Black Sea zone of the Krasnodar region] // Wine making i viticulture. - 2006. - №5. - pp.36-3.

AN OVERVIEW ON SLEEP

DR S. Nagendran*

*Department of Medical,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email id- drsndran@gmail.com

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ABSTRACT

Sleep is essential for brain function and systemic physiology in a variety of bodily systems. Sleep difficulties are common, and can involve deficiencies in both amount and quality of sleep; sleep disorders that interrupt sleep continuity are referred to as sleep disruptions. Sleep disruption is caused by a variety of reasons, including lifestyle and environmental factors, as well as sleep disorders and other medical problems. Sleep disturbances have serious short- and long-term health implications. To offer a nonsystematic overview of these health effects, a literature search was performed (this review was designed to be nonsystematic to better focus on the topics of interest due to the myriad parameters affected by sleep). Sleep disturbance is linked to increased sympathetic nervous system activity and the hypothalamic-pituitary-adrenal axis, as well as metabolic consequences, circadian rhythm abnormalities, and proinflammatory responses. Short-term effects of sleep disturbance in otherwise healthy people include increased stress reactivity, physical discomfort, decreased quality of life, emotional distress and mood disorders, as well as cognitive, memory, and performance impairments. Sleep disturbance has an effect on teenagers' psychological health, academic performance, and risk-taking behaviors.

KEYWORDS:Adolescents, Adults, Children, Health Status, Sleep Disorders.

1. INTRODUCTION

Sleep is a biological activity that is necessary for survival and good health. Sleep is important for brain function and systemic physiology, such as metabolism, hunger control, and immunological, hormonal, and cardiovascular system function. The lack of sleep disturbances and disorders characterizes normal healthy sleep, which is defined by adequate length, high quality, suitable timing and regularity, and the absence of sleep disturbances and disorders. Despite the significance of sleep, up to 100 million individuals in the United States and 100 million people in Europe suffer from a chronic sleep problem that has a negative effect on their daily lives and health. For example, drowsiness in drivers has been linked to severe injuries in automobile accidents, irrespective of the effects of drinking. Sleep difficulties are caused by a variety of reasons, including lifestyle and environmental factors, psychological concerns, and medical diseases. There are many types of sleep disorders, but they usually show themselves in one of three ways: Sleep deprivation, either in terms of quantity or quality. Inability to keep a consistent sleep pattern, as well as events that occur while sleeping. Sleep problems have a broad range of

consequences on the body, affecting various bodily systems. The clinical implications of sleep disruption, both short and long term, are the subject of this article. In otherwise healthy adults, adolescents, and children, as well as those with an underlying medical problem Basic science and mechanisms of these impacts are covered in this section Offer context for clinical outcomes, but they are rarely extensively examined. Several recent reviews cover the science and processes of sleep disturbance in great depth(1).

1.1 Characteristics of Normal Sleep:

Historically, the phases of sleep have been split into one period of rapid eye movement. There are four phases of sleep. Increased sleep depth is a characteristic of non-rapid eye movement sleep. The latter phases of sleep. Slow-wave sleep is the term for all of these types of sleep. This is the kind of sleep that is thought to be the most restorative, and it usually happens in the first part of the night. REM sleep, on the other hand, rises throughout the night and is at its peak in the final part of a sleep cycle. REM and NREM sleep are distinguished by a variety of physiologic changes, including changes in brain activity, heart rate, and blood pressure. Activity of the sympathetic nervous system, muscular tone, and blood supply to the brain, breathing, airway resistance, renal function, endocrine function, body temperature, and sexual arousal are all factors that influence sexual arousal. When compared to wakeful times, heart rate, blood pressure, blood supply to the brain, and breathing are all lower during NREM sleep. When compared to NREM sleep, these processes are accelerated during REM sleep. During NREM sleep, brain activity declines from waking; activity levels are comparable during REM sleep, with the exception of increases in motor and sensory regions. The suprachiasmatic nucleus helps the circadian rhythms coordinate sleep with the external day–night cycle. This gets direct information from the retina's nerve cells, which function as brightness detectors. The SCN receives light from the retina and sends it to the pineal gland, which controls the production of melatonin. Melatonin receptors are found in almost all tissues and help to synchronize circadian cycles with the environment and the body. The SCN also synchronizes peripheral tissues using a set of clock genes, resulting in daily patterns of activity(2–4).

1.2 Overview of Sleep Disruption:

Sleep disturbances are common. According to a National Sleep Foundation study, the majority of American people evaluated their sleep quality as "bad" or "just fair." At least one night each week, they had trouble falling asleep. Of those that responded. Furthermore. On at least one night in the preceding week, of respondents reported difficulty sleeping, and on five or more nights, of respondents had trouble sleeping. Of those polled, reported snoring. And of those polled, a physician had informed them they had a sleep problem, the majority of which was sleep apnea. Sleep disturbance in children has been the subject of very few research. The total incidence of chronic sleep disturbance was. In a research that included a random sample of Chinese children aged. Sleep disturbance has a wide range of risk factors, including physiological, psychologic, genetic, and social variables. Excessive caffeine use is one of the lifestyle variables. As well as consuming alcoholic beverages. Working in a shift. Being a college student, for example. Is also a cause of sleep disturbance? Circadian rhythms may be disrupted by excessive nocturnal light pollution and underexposure to daily sunshine. Life situations that are stressful, such as being the parent of a small child or caring for a family member who has a chronic, life-threatening, or terminal disease. Are they also factors in sleep disturbances? In addition to the stress and anxiety that comes with caring for a patient with a

complicated drug schedule, caregivers of patients with complex medication regimens have additional challenges. Sleep disturbances occur as a result of having to wake up in the middle of the night to take medicine(5–7).

1.3 Short-Term Health Consequences of Sleep Disruption:

Numerous health effects have been documented as a result of the physiologic alterations associated with sleep disturbance. Increased stress reactivity, somatic issues, and a worse quality of life are all short-term effects of sleep disturbance. Emotional discomfort, mood disorders, and other mental health issues, as well as cognitive, memory, and performance impairments, and behavior difficulties in otherwise healthy people. Sleep deprivation may also have a negative impact on one's health. Of children and teenagers who have medical(8).

A. Psychosocial Issues:

From emotional discomfort and mood problems to cognitive, memory, and performance issues, there's something for everyone. In a real-life case study, Children who are otherwise healthy get lower scores on neurobehavioral functioning tests. Were discovered in youngsters who slept in a fragmented manner. These children's parents also assessed them as having greater behavioral issues than those who slept continuously. Psychiatric symptoms, social difficulties, externalizing symptoms, and self-harm activities are among the other concerns mentioned. Mothers with children undergoing maintenance therapy for acute lymphoblastic leukemia frequently suffered sleep disturbance, according to a qualitative interview-based research by NE et al., because their children awakened and required help or because of concerns about the child's condition. The moms said they were more irritated, impatient, and unproductive after the sickness. Sleep disruption was substantially related with decreased Howl, as assessed by the in a longitudinal, community-based research of midlife women who had a history of depression and/or anxiety but were not presently sick. Item Health Survey (Short Form). Odds ratios are a measure of how likely something is to happen. a variety of with. Across the whole howl domain. This was discovered in a study of 61 maternal caregivers of young children with bronchopulmonary dysplasia. According to self-reporting using the Pittsburgh Sleep Quality Index, of moms reported clinically disrupted sleep. The need to give medicine and offer additional care throughout the night, as well as concern about the child's health, may cause sleep disturbances. Sleep disruption was linked to worse performance. As measured by the World Health Organization's Quality of Life brief in this research. The only independent variable that substantially predicted Quoll was sleep quality(9).

b. Reduced Quoll:

A total of 159 children and adolescents with chronic renal disease took part in the study. The Epworth Sleepiness Scale revealed that she had sleep disruption symptoms. When compared to the other groups, the dialysis group had the greatest sleep disturbances, and sleep disruption was linked to a substantial reduction in the overall total Quoll score on the Pediatric Quality of Life Inventory Version. Pre-dialysis and transplant patients should use generic Core Scales. The effect of sleep difficulties on Howl, as assessed by the Edsel, was examined in a study of juvenile liver transplant patients. Sleep. Breathing problems and excessive daytime drowsiness were common, posing a threat. And, accordingly, of the youngsters in the research. According to the parent proxy and kid self-report, a poor Howl was experienced by of the subjects. Physical symptoms of chronic illnesses, such as chemical imbalances in dialysis patients, as well as

medicines that may disturb sleep, all contribute to sleep disruption and need thorough treatment in order to allow for adequate sleep(6,10–12).

c. Cardiovascular:

Sleep deprivation causes an increase in sympathetic nervous system activity, which has serious long-term implications for adults and adolescents. Adults who had sleep disturbance had a higher chance of getting hypertension, according to the study. The relative risk of incident hypertension was determined to be in a meta-analysis of data from four prospective cohort studies. In adults with sleep disruption, both men and women have the same consequences. Greater PSQI sleep disruption scores were linked to higher cholesterol, a higher body mass index (BMI), a higher systolic blood pressure, and a higher risk of hypertension in adolescents. Two major population-based studies looked at the link between cardiovascular disease and sleep disturbance. Atherosclerosis Risk in Communities is a population-based prospective study. In this study, individuals with sleep continuity disruption, trouble falling asleep, and non-restorative sleep were shown to have an increased risk of CVD. In middle-aged women who took part in the MONICA/KORA Augsburg Cohort Study, there was a link between difficulties sustaining sleep or short sleep duration and incident myocardial infarction. Despite variations in research design and populations studied, these findings add to the growing body of evidence that suggests the effects of sleep disturbance on sympathetic activity, glucose metabolism, and potentially inflammation may lead to negative cardiovascular consequences. Casernes et al. identified a range of biological and behavioral variables that may contribute to a link between sleep disturbance and metabolic diseases, such as obesity and T2DM, in a recent review. Sleep deprivation seems to have an impact on energy metabolism through reducing insulin sensitivity and increasing food intake. Sleep disruption has been linked to weight gain and other weight-related problems in both adults and children. Adolescents, too. An auxiliary research inside the Coronary Artery Risk Development in Young Adults that lasted a year. Sleep fragmentation was shown to be significantly linked to increases in BMI in a study. Shift employment, which has been linked to high blood pressure and stress, is a frequent source of sleep disturbance. In a long-term study of male Japanese employees, it was shown that alternating shift work increased the rate of daily drinking, smoking, and lack of regular exercise, as well as the chance of developing diabetes. Sleep disturbance was linked to a high BMI z-score, being overweight, and having a high waist circumference percentile in Mirin adolescents(13–16).

d. Cancer:

Sleep deprivation and disruption of the circadian cycle have been proven to accelerate tumor development. Furthermore, it has the potential to raise the risk of cancer. The synthesis of melatonin is reduced when exposed to light at night, which may lead to an increase in the production of reproductive hormones. Melatonin has a number of additional useful characteristics, including DNA repair, tumor growth suppression, and free-radical scavenging. The loss of circadian coordination increased malignant development in mice with suprachiasmatic nuclei ablation, suggesting that the host circadian clock regulates tumor progression. And it offers a possible mechanical explanation for the link. In terms of clinical evidence, night shift employment has been linked to an increased cancer risk. Colorectal cancer cases were recorded among the Nurses' Health Study participants. Women who had been followed. Women who worked rotating night shifts were compared to women who never worked rotating night shifts. Rotating night shifts had multivariate relative risks of colorectal cancer of.

These findings indicate that working long nights may raise the risk of colorectal cancer. Furthermore, those who had significant difficulty falling and staying asleep were almost twice as likely to acquire prostate cancer as those who did not have insomnia. Sleep disruption was linked to a greater all-cause mortality risk in males in the GAZEL cohort research, which evaluated sleep disorders using the 5-item sleep component from the Nottingham Health Profile. However, this is not the case with women. Men who reported sleep disturbance on the Nottingham Health Profile in particular. Had a greater risk of death from any cause than those who did not experience sleep disruption? In a research in which the family and friends of teenage suicide completers reported sleep problems for the dead, a history of sleep disturbances, particularly middle insomnia, was shown to be substantially linked with suicide when compared to community controls. When present affective disorders and the severity of depressed symptoms were taken into account, the impact remained substantial(16–20).

2. DISCUSSION

I stop drinking caffeine after 2 p.m.

I wear comfortable pajamas. ...

I take an evening bath. ...

I put my phone down at least an hour before bed. ...

I supplement with magnesium. ...

I use ambient noise. ...

I have blackout curtains. ...

I use the toilet before bed.

Sometimes life calls and we don't get enough sleep. But five hours of sleep out of a 24-hour day isn't enough, especially in the long term. According to a 2018 study of more than 10,000 people, the body's ability to function declines if sleep isn't in the seven- to eight-hour range. Sleep is an essential function¹ that allows your body and mind to recharge, leaving you refreshed and alert when you wake up. Healthy sleep also helps the body remain healthy and stave off diseases. Without enough sleep, the brain cannot function properly. For most people, 4 hours of sleep per night isn't enough to wake up feeling rested and mentally alert, no matter how well they sleep. There's a common myth that you can adapt to chronically restricted sleep, but there's no evidence that the body functionally adapts to sleep deprivation(21,22).

3. CONCLUSION

Disrupted sleep is a pervasive problem, with numerous contributing factors from lifestyle and environmental factors to psychosocial issues and iatrogenic effects. Sleep is vital to most major physiologic processes, and, as such, sleep disruption has vast potential for adverse short- and long-term health consequences in otherwise healthy individuals as well as those with underlying medical conditions. In healthy individuals, short-term consequences include a heightened stress response; pain; depression; anxiety; and cognition, memory, and performance deficits. In adolescents and children, disrupted sleep can lead to poor school performance and behavior problems. Reduced Quoll may be a short-term consequence of sleep disruption in otherwise

healthy individuals and those with an underlying medical condition. Long-term consequences for otherwise healthy individuals include hypertension, dyslipidemia, CVD, weight gain, metabolic syndrome, and T2DM. There is also evidence that sleep disruption may increase the risk of certain cancers and death in males and suicidal adolescents. Long-term sleep disruption may also worsen the symptoms of a variety of gastrointestinal disorders. Ultimately, it has been suggested that the physiologic consequences of disrupted sleep may be just as damaging as those of short sleep duration.⁵ Given the detrimental impact of disrupted sleep, it is important for health care professionals to effectively treat symptoms of underlying medical conditions to optimize sleep continuity. In addition, when possible, health care providers should consider prescribing interventions that minimize disruptions to sleep continuity, such as medications with a long dosing interval.

REFERENCES:

1. Chokroverty S. Overview of sleep & sleep disorders. Indian Journal of Medical Research. 2010.
2. Mantovani S, Smith SS, Gordon R, O'Sullivan JD. An overview of sleep and circadian dysfunction in Parkinson's disease. Journal of Sleep Research. 2018.
3. Senapati R, Nayak B, Kar SK, Dwibedi B. HPV Genotypes distribution in Indian women with and without cervical carcinoma: Implication for HPV vaccination program in Odisha, Eastern India. BMC Infect Dis. 2017;
4. Jain M, Preeti. Availability analysis of software rejuvenation in active/standby cluster system. Int J Ind Syst Eng. 2015;
5. Carter JC, Wrede JE. Overview of sleep and sleep disorders in infancy and childhood. Pediatric Annals. 2017.
6. Saroliya A, Mishra U, Rana A. Performance Evaluation and Statistical Analysis of AUR-Chord Algorithm with Default Working of Structured P2P Overlay Network. In: Advances in Intelligent Systems and Computing. 2018.
7. Singh G, Siddique R. Abrasion resistance and strength properties of concrete containing waste foundry sand (WFS). Constr Build Mater. 2012;
8. Carra MC, Huynh N, Fleury B, Lavigne G. Overview on Sleep Bruxism for Sleep Medicine Clinicians. Sleep Medicine Clinics. 2015.
9. Walia HK, Mehra R. Overview of common sleep disorders and intersection with dermatologic conditions. International Journal of Molecular Sciences. 2016.
10. Kanda T, Tsujino N, Kuramoto E, Koyama Y, Susaki EA, Chikahisa S, et al. Sleep as a biological problem: an overview of frontiers in sleep research. Journal of Physiological Sciences. 2016.
11. Sheikh RQ, Yadav V, Kumar A. Stabilization of red soil used as a sub-base material. Int J Sci Technol Res. 2020;
12. Sharma RK, Sharma J, Rai D V., Zafar M. Cod reduction from industrial wastewater using thermal liquid-phase oxidation technique. Int J Chem Sci. 2013;

13. Ohayon MM. Epidemiological Overview of sleep Disorders in the General Population. Sleep Med Res. 2011;
14. Sharma Y, Kumar S. Effect of power avaricious attack on MANET routing protocols. In: ICECT 2011 - 2011 3rd International Conference on Electronics Computer Technology. 2011.
15. Naaz R, Saxena AK, Ather D. A framework for implementing blockchain with enhanced e2e encryption on ethereum 2.0. Int J Adv Sci Technol. 2019;
16. Agarwal N, Rana A, Pandey JP. Proxy signatures for secured data sharing. In: Proceedings of the 2016 6th International Conference - Cloud System and Big Data Engineering, Confluence 2016. 2016.
17. Walker MP, Stickgold R. Sleep-dependent learning and memory consolidation. Neuron. 2004.
18. Sah MK, Gupta DK, Rani P. Energy Efficient Routing Protocol for Wireless Sensor Networks with Multiple Sinks. In: Proceedings - 2015 2nd IEEE International Conference on Advances in Computing and Communication Engineering, ICACCE 2015. 2015.
19. Mathur G, Ghai W, Singh RK. A totalitarian technique for wormhole detection using big data analytics in iot network. Int J Sci Technol Res. 2020;
20. Ahuja R, Purnima, Haque MJ, Tanwar S, Gautam N, Rana A. Secure and Robust Watermarking Scheme based on Motion Features for Video Object. In: ICRITO 2020 - IEEE 8th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions). 2020.
21. Owens JA. A clinical overview of sleep and attention-deficit/hyperactivity disorder in children and adolescents. Journal of the Canadian Academy of Child and Adolescent Psychiatry. 2009.
22. Vena C, Parker K, Cunningham M, Clark J, McMillan S. Sleep-wake disturbances in people with cancer part I: an overview of sleep, sleep regulation, and effects of disease and treatment. Oncology nursing forum. 2004.

VITAMIN D AND SKIN DISEASES: A REVIEW

Dr Dilip Meena*

*Department of Medical,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email id- dilip.aiims@gmail.com

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ABSTRACT

Vitamin D, which was formerly linked to rickets and osteomalacia, has lately been linked to a variety of medical and dermatological conditions. Most cells in the body, including the skin, have vitamin D receptors and enzymatic machinery capable of converting circulating 25-hydroxyvitamin D [25(OH)D] to the active 1,25-hydroxyvitamin D. Vitamin D analogs are well recognized for their anti-proliferative and pro-differentiating actions on keratinocytes, making them helpful in the treatment of psoriasis vulgaris. However, additional functions for vitamin D in skin have been discovered, including immunomodulatory and anti-apoptotic actions, suggesting that it may be used to treat atopic dermatitis and infections. Increasing data suggests that cutaneous vitamin D production may aid in the prevention of skin cancers, as well as that oral vitamin D supplementation may decrease cancer mortality. Low levels of vitamin D have been related to autoimmune disorders like vitiligo in several epidemiological studies, and topical vitamin D has been used to treat vitiligo. This study examines vitamin D's involvement in a variety of skin diseases, with a focus on both its well-known role in psoriasis and its less well-known role in conditions including ichthyosis, TB, and acne.

KEYWORDS: *Vitamin D, Vitiligo, Ichthyosis, Psoriasis, Skin Diseases.*

1. INTRODUCTION

Vitamin D, known colloquially as the sunshine vitamin, has lately been linked to a number of health problems. The decrease in the prevalence of rickets after the fortification of foods with vitamin D led doctors to think that vitamin D-related health problems were no longer a problem. But, regrettably, rickets seems to be a drop in the ocean of diseases caused by vitamin D insufficiency. The main sources of vitamin D for humans are enough sunshine and a diet rich in fatty fish and fortified milk(1). Vitamin D acts as a hormone, regulating parathyroid hormone, calcium, and phosphorous metabolism, all of which have significant consequences for bone health. The discovery of vitamin D receptors in nearly all cells of the body, as well as enzymes that synthesize the active form of vitamin D, 1,25-dihydroxyvitamin D, in non-renal sites like the skin, has sparked renewed interest in its functions, particularly its role in lowering the risk of several chronic, highly morbid conditions like carcinomas, autoimmune diseases, infectious diseases, and cancer(2–6). Vitamin D's cutaneous production and involvement in the treatment of common skin diseases such as psoriasis has made it a hot subject among dermatologists. Studies

that suggest vitamin D has immunomodulatory properties have paved the way for further research into its therapeutic benefits in atopic dermatitis, psoriasis, and skin cancer(7–11).

1.1 The Vitamin D3 Cutaneous Biosynthesis Pathway:

Pro-vitamin D3 or 7-dehydrocholesterol, which is present mainly in the epidermis' basal and spinous cell layers, undergoes a photochemical reaction to produce pre-vitamin D3. Because melanin blocks UV light, dark skinned people need more UV light exposure to generate comparable quantities of Vitamin D3(12). The vitamin D3 route in human skin is shown in Figure 1. Calcitriol bound to vitamin D binding protein operates on certain additional target tissues that express vitamin D receptors, such as bone, gut, and parathyroid gland, via both genomic and non-genomic processes.

1.2 Calcitriol's Effects On Cutaneous Biology Calcitriol's Effects On Cutaneous Biology:

Calcitriol, which is produced in keratinocytes, controls the epidermal cell population's development, differentiation, apoptosis, and other biological processes through intracranial, autocrine, and paracrine actions. Keratinocytes are affected. Vitamin D stimulates keratinocyte growth in vitro at low doses but inhibits it at larger ones. Effects on the immune system of the skin Several immune cells, including monocytes, T and B lymphocytes, and Langerhans cells, express both vitamin D receptor and 25-hydroxyvitamin D-1-hydroxylase, indicating that vitamin D plays an important role in immune modulation and regulation. Apoptosis of keratinocytes is affected. In a feedback loop, calcitriol stimulates ceramide production by activating the neutral Mg²⁺-dependent sphingomyelinase, and ceramide improves calcitriol's pro-differentiating action on keratinocytes(13–17). Physiological amounts of calcitriol prevent the impact of pro-apoptotic ceramides, UV radiation, and tumor necrosis factor-, while pharmaceutical doses promote apoptosis in keratinocytes and other epidermal cells. Antioxidant properties Vitamin D's photo protection against damaging oxygen radicals produced by UVB radiation may be explained by the production of an antioxidant in keratinocytes in vitro.

1.3 Vitamin D's Impact On Skin Diseases Vitamin D Ole In Skin Diseases:

The connection between vitamin D and psoriasis. Despite the fact that topical vitamin D analogs have a well-established function in psoriasis, the exact processes behind their therapeutic efficacy are yet unknown. Following topical administration of vitamin D analogs, several indicators of epidermal proliferation, such as proliferating cell nuclear antigen and Ki-67 antigen, as well as differentiation, have been seen in situ in lesional psoriatic skin. Due to the decreased absorption of topical formulations in the dermis, topical vitamin D does not assist much in decreasing dermal inflammatory antigens, cytokines, HLA-DR, and other factors observed in psoriasis. Topical vitamin D has therapeutic benefits by inhibiting keratinocyte proliferation via a vitamin D receptor-mediated genomic mechanism. Keratinocyte differentiation is induced by non-genomic processes that raise intracellular calcium levels. Vitamin D also reduces immunoglobulin synthesis by inhibiting T cell differentiation and proliferation in response to interleukin 1. Inhibition of IL-2, IL-6, and interferon-gamma production may also have anti-inflammatory effects. Furthermore, topical calcitriol inhibits human beta defensin, which is present in high quantities in psoriatic lesions, inhibiting the cathelicidin pathway and reversing some of the alterations seen in psoriatic lesions(18).

Sun exposure improved psoriasis, prompting the adoption of 1,25-dihydroxyvitamin D (calcitriol) as a treatment alternative. Oral calcitriol has been suggested as a possible therapy for psoriasis. Unfortunately, owing to the danger of undesirable effects such as hypercalcemia, hypercalciuria, nephrocalcinosis, nephrolithiasis, and a decrease in bone mineral density as a result of its calcemic action, oral vitamin D usage is restricted. Nonetheless, according to a recent study, hypercalcemia may be readily managed and avoided with appropriate dosage and monitoring. A link has also been shown in the literature between low levels of blood vitamin D and increased psoriasis severity. Furthermore, given the increasing knowledge that psoriasis is a systemic illness that affects many organ systems and causes comorbidities, the function of oral vitamin D in the therapy of psoriasis must be reconsidered(19). Perez and colleagues found that oral vitamin D improved the condition of 88 percent of 85 psoriasis patients; 26.5 percent had full clearance, 36.2 percent had substantial improvement, and 25.3 percent had minor improvement. Systemic alphacalcidol has a strong immunomodulatory impact on patients with psoriatic arthroplasty, and it has been suggested as a potential treatment option. A combination of acitretin and oral calcitriol reduced PASI quicker in individuals with persistent plaque psoriasis, according to another research.

United States Food and Drug Administration has authorized topical calcitriol for the treatment of psoriasis due to its low effects on serum calcium. Several studies have shown the efficacy and safety of vitamin D analogs such as calcitriol, calcitriol, tacalcitol, hexafluoro-1,25-dihydroxyvitamin D₃, and maxacalcitol in the topical treatment of psoriasis. They are more effective and have better aesthetic acceptance than previous topical therapies like tar and dithranol, and their efficacy is similar to that of mid-potency topical corticosteroids. Another rationale for their inclusion in the psoriasis treatment arsenal is that they do not cause skin shrinkage or adrenal suppression(20). Calcitriol ointment and betamethasone ointment used together were shown to be less irritating and somewhat more effective than calcitriol alone. Because of its irritancy, calcitriol ointment should generally be avoided on the face and flexures. Calcitriol solution treats scalp psoriasis effectively and without adverse effects. Although calcitriol ointment has been found to work in therapeutically resistant regions like nails, there has yet to be a consistently successful therapy for psoriatic nails.

1.4 Atopic Dermatitis And Vitamin D:

Vitamin D supplementation is a viable therapeutic intervention for atopic dermatitis since it has the capacity to reduce inflammatory responses, improve antimicrobial peptide action, and maintain the integrity of the permeability barrier. Vitamin D's involvement in the development of atopic dermatitis is not well understood(21). Vitamin D supplementation had a non-significant effect in seasonal atopic dermatitis, according to a tiny pilot trial. A research found that a higher vitamin D consumption in childhood is linked to a higher incidence of atopic symptoms. This backed with previous research that suggested vitamin D consumption throughout childhood may have a role in brain development.

Vitamin D's immunomodulatory effects have been linked to the development of atopic dermatitis in many recent studies. The active form of vitamin D was shown to increase the production of antimicrobial peptides, preventing skin infections. Discovered a connection between vitamin D-mediated activation of toll-like receptors, cathelicidin synthesis, and bacterial infection susceptibility. Vitamin D may either promote or inhibit keratinocyte development and the production of proteins like flagging, which are required for the creation of the stratum corneum

barrier, depending on the quantity(22). Vitamin D analogs have also been shown to inhibit immunoglobulin E synthesis and IgE-mediated cutaneous responses in vitro. In comparison to psoriatic skin lesions, Ong et al. found substantially lower immunostaining for cathelicidin in acute and chronic atopic dermatitis lesions. This discovery may explain why individuals with these two illnesses have different skin infections. Cathelicidin levels are substantially lower in individuals with atopic dermatitis who have had herpes simplex virus (HSV) superinfection. Cathelicidin has been found to have antiviral action against the herpes simplex virus in antiviral tests.

1.6 Vitamin D and vitiligo:

Autoimmunity plays an essential part in the pathophysiology of vitiligo, as shown by the coexistence of vitiligo and other autoimmune diseases. As a result, vitamin D levels have been shown to be lower in a variety of autoimmune diseases, suggesting a link involving vitiligo and vitamin D levels. The precise method by which vitamin D affects autoimmunity, however, remains a mystery. The combining of vitamin D analogs with PUVAol for the treatment of vitiligo was originally described by Topical Vitamin D analogs have now been shown to be helpful in the treatment of vitiligo, both alone and in conjunction with other treatments including corticosteroids and UV therapy. According to research, melanocytes and the immune system are the targets of this therapeutic intervention. Vitamin D regulates melanocyte activation, proliferation, and migration by boosting melanogenesis and tyrosine content in cultured human melanocytes via its anti-apoptotic action. Vitamin D also protects melanocytes from autoimmune injury by regulating T-cell activation.

1.7 Ichthyosis and vitamin D:

In the literature, there are many instances of a link between keratinization abnormalities and rickets. Calcitriol inhibits the growth of keratinocytes and aids in the mineralization of new bones by boosting calcium and phosphorus absorption from the gut. As a result, diseases like ichthyosis, which is characterized by aberrant keratinization, may be linked to a change in vitamin D metabolism, resulting in rickets and osteomalacia. Though it is still unclear if this link is causative or coincidental, it is recommended that children with severe ichthyosis in poor nations, particularly those with pigmented skin, have their rickets checked. A patient with a problem of keratinization may develop rickets due to changes in epidermal cholesterol metabolism, avoidance of sunlight to avoid sunburn, related vitamin D deficiency rickets, or increased keratinocyte proliferation resulting in inadequate sunlight penetration of the skin. In individuals of North African ancestry with pigmented skin, the deficit was more severe, and parathyroid hormone (PTH) levels were higher than in European patients. Despite lower 25(OH)D levels, these individuals exhibited normal levels of indicators of bone formation and resorption, as well as normal (OH)² D levels. The authors hypothesized that the degree of insufficiency in their instances was linked to ichthyosis and skin coloring.

1.8 Skin Cancer And Vitamin D:

The discovery of vitamin D receptor expression on both normal and cancerous cells sparked a study into the vitamin D-cancer connection. In the etiology of non-melanoma cutaneous carcinomas, ultraviolet radiation is a well-known culprit. Vitamin D, as previously stated, protects keratinocytes from UV exposure in vitro. Furthermore, the formation of cutaneous tumors in vitamin D receptor defective animals in response to carcinogens has led to the notion

that chronically increased blood vitamin D levels protect against melanoma. Furthermore, adequate serum vitamin D levels may lower the risk of solid organ tumors such as those of the stomach, liver, colorectal, gall bladder, pancreas, lung, breast, prostate, bladder, and kidney, while maintaining the risk of non-melanoma cutaneous tumors due to the similar wavelengths required for vitamin D production and cutaneous photo damage. There's also a link between blood levels and cancer severity, with greater vitamin D levels in stage I melanoma compared to stage IV tumors, according to research.

1.9 Vitamin D And Fibrosis Of The Skin:

Vitamin D has been shown to inhibit normal skin fibroblasts and keloid fibroblasts, suggesting that it may have a therapeutic function in keloids. Because of its impact on immunological modulation, fibroblast proliferation, collagen synthesis, and endothelial cell function, topical vitamin D analogs are a recognized therapeutic method in morphogen and lichen. Calcipotriene positive impact on morphogen may be explained by its suppression of T lymphocytes, which results in lower IL-2 release.

Vitamin D and Infections disclosed a single instance demonstrating a link between vitamin D deficiencies and desquamate inflammatory vaginitis, with both the vaginal discharge clearing when vitamin D levels in the blood returned to normal. Vitamin D deficiency has also been linked to bacterial vaginosis.

1.10 Vitamin D And Tuberculosis:

The lengthy finding of TB improvement after exposure to sunshine was not coincidental. Vitamin D may enhance its therapeutic impact against Mycobacterium TB by inducing antimicrobial peptides, particularly cathelicidin. When infected macrophages are treated with dihydroxycholecalciferol, there is a decrease in the number of viable bacilli. This explains why individuals with present or previous M. tuberculosis infection have low blood vitamin D levels. Combining vitamin D with anti-tubercular treatment has been shown to enhance clinical outcomes more than the latter administered alone.

1.11 Affective Disorders and Vitamin D:

Vitamin D receptor polymorphisms have been linked to an increased risk of autoimmune diseases such as Hashimoto's thyroiditis, inflammatory bowel disease, Graves' disease, rheumatoid arthritis, systemic lupus erythematosus, primary biliary cirrhosis, autoimmune hepatitis, Addison's disease, vitiligo, celiac disease, type I diabetes mellitus, and However, the majority of these findings are based on in vitro and animal research, with only contradictory human evidence. Despite this, vitamin D supplementation for the treatment of autoimmune diseases has been suggested.

1.12 New Vitamin D Analogs Are Being Evaluated New Vitamin D Analogs Are Being Evaluated:

Multiple clinical and laboratory research are ongoing to create novel vitamin D analogs with a better clinical profile, in light of the health advantages of vitamin D. The following are some potential experimental compounds:

1. Analogs with a high cutaneous metabolism and low systemic toxicity; vitamin D analogs made by combining the 20-methyl alteration with physiologically intriguing artificial side chain subunits or 2-substituted calcitriols are potential possibilities.
2. Analogues with a strong cutaneous localization but no systemic side effects
3. Analogs that have a strong effect on the target tissues while having a little impact on calcium metabolism. This may be accomplished by creating compounds with varying affinities for vitamin D receptors and nuclear co-factors, such as the retinoid X receptor.

2. DISCUSSION

Although there is mounting evidence that vitamin D plays an important function in the immune system, particularly in allergic disorders, the magnitude of the effect has yet to be determined. Although numerous research has attempted to establish the impact of vitamin D on allergic illnesses, particularly allergic skin diseases, no large-scale prospective studies have been conducted. Furthermore, the findings of the research are inconsistent, and many of them have severe limitations. The effects of maternal vitamin D consumption during pregnancy on AD in children have been the subject of bigger research to evaluate the connection between vitamin D and allergic skin disorders. Small sample numbers have been used in studies trying to assess the therapeutic impact of vitamin D on allergic skin disorders. Finally, most research, particularly case-control and cross-sectional procedures, did not establish a causal connection between vitamin D insufficiency and Alzheimer's disease. It's impossible to say if low blood vitamin D levels contributed to the development of Alzheimer's disease, whether skin damage caused by the disease led to poor vitamin D absorption from the sun, or whether the two are unconnected in each research.

3. CONCLUSION

Beyond its phosphocalcic impact, vitamin D's involvement in the correct functioning of a variety of tissues and organs, including the skin, has piqued researchers' attention. With its anti-proliferative, pro-differentiate, anti-apoptotic, and immunomodulatory properties, vitamin D has a pleiotropic impact on the skin. It's also implicated in a variety of skin diseases, and it has a favorable impact on the outcome of certain inflammatory dermatopathologies. So far, therapeutic approaches based on vitamin D have been shown to be helpful in the treatment of psoriasis and Alzheimer's disease. Future research will be required to mechanistically and intensively investigate the particular pathways impacted by vitamin D utilizing cutting-edge technologies, as well as to evaluate the safety and effectiveness of vitamin D-based therapy regimens in inflammatory skin disorders.

REFERENCES:

1. Jarrett P, Scragg R. A short history of phototherapy, Vitamin D and skin disease. Photochem Photobiol Sci. 2017;
2. Arora M, Som S, Rana A. Predictive Analysis of Machine Learning Algorithms for Breast Cancer Diagnosis. In: ICRITO 2020 - IEEE 8th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions). 2020.
3. Gaurav A, Gautam V. Identifying the Structural Features of Pyrazolo[4,3-c]Quinoline-3-ones as Inhibitors of Phosphodiesterase 4: An Exploratory CoMFA and CoMSIA Study. Curr

Enzym Inhib. 2013;

4. Kaushal G, Singh H, Prakash S. High-temperature erosion-corrosion performance of high-velocity oxy-fuel sprayed Ni-20 Cr coating in actual boiler environment. *Metall Mater Trans A Phys Metall Mater Sci*. 2011;
5. Ahuja R, Purnima, Haque MJ, Tanwar S, Gautam N, Rana A. Secure and Robust Watermarking Scheme based on Motion Features for Video Object. In: *ICRITO 2020 - IEEE 8th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions)*. 2020.
6. Wadhwa B, Relhan V, Goel K, Kochhar A, Garg V. Vitamin D and skin diseases: A review. *Indian Journal of Dermatology, Venereology and Leprology*. 2015.
7. Benson AA, Toh JA, Vernon N, Jariwala SP. The role of vitamin D in the immunopathogenesis of allergic skin diseases. *Allergy: European Journal of Allergy and Clinical Immunology*. 2012.
8. Nishad AK, Abhishekh. A New Ranking Approach for Solving Fully Fuzzy Transportation Problem in Intuitionistic Fuzzy Environment. *J Control Autom Electr Syst*. 2020;
9. Isha, Rana P, Saini R. Performance of different bit loading algorithms for OFDM at PLC channel. In: *Proceedings - 2012 2nd International Conference on Advanced Computing and Communication Technologies, ACCT 2012*. 2012.
10. Chandel SK, Goyal R, Singla S. Utilization of construction waste as partial replacement of aggregates in cement concrete. *Int J Innov Technol Explor Eng*. 2019;
11. Chen Z, Li JS, Poon CS. Combined use of sewage sludge ash and recycled glass cullet for the production of concrete blocks. *J Clean Prod*. 2018;
12. Umar M, Sastry KS, Al Ali F, Al-Khulaifi M, Wang E, Chouchane AI. Vitamin D and the Pathophysiology of Inflammatory Skin Diseases. *Skin Pharmacology and Physiology*. 2018.
13. Yuan K, Madu CO, Lu Y. Immunological Role of Vitamin D in Skin Diseases and Carcinoma. *Oncomedicine*. 2017;
14. Sharma S, Sharma AD, Arif Naseer MD, Singh R. Formulation and evaluation of self emulsifying drug delivery system of ibuprofen using castor oil. *Int J Pharm Pharm Sci*. 2011;
15. Bansal SC, Khandelwal N, Rai D V., Sen R, Bhadada SK, Sharma KA, et al. Comparison between the QCT and the DEXA scanners in the evaluation of BMD in the lumbar spine. *J Clin Diagnostic Res*. 2011;
16. Kumar S, Wahi A, Singh R. Synthesis and preliminary pharmacological evaluation of 2-[4-(aryl substituted) piperazin-1-yl]-N-phenylacetamides: Potential antipsychotics. *Trop J Pharm Res*. 2011;
17. Banerjee K, Prasad RA. Reference based inter chromosomal similarity based DNA sequence compression algorithm. In: *Proceeding - IEEE International Conference on Computing, Communication and Automation, ICCCA 2017*. 2017.
18. Adelia A, Paramitha L, Sampurna AT, Budianti WK, Zubier F. The role of oral vitamin D in several skin diseases. *J Gen Dermatology Venereol Indones*. 2017;

19. Barrea L, Savanelli MC, Di Somma C, Napolitano M, Megna M, Colao A, et al. Vitamin D and its role in psoriasis: An overview of the dermatologist and nutritionist. Reviews in Endocrine and Metabolic Disorders. 2017.
20. Reichrath J, Zouboulis CC, Vogt T, Holick MF. Targeting the vitamin D endocrine system (VDES) for the management of inflammatory and malignant skin diseases: An historical view and outlook. Reviews in Endocrine and Metabolic Disorders. 2016.
21. Marzano AV, Trevisan V, Cairoli E, Eller-Vainicher C, Morelli V, Spada A, et al. Vitamin D and skeletal health in autoimmune bullous skin diseases: A case control study. Orphanet J Rare Dis. 2015;
22. Pilz S, März W, Cashman KD, Kiely ME, Whiting SJ, Holick MF, et al. Rationale and plan for vitamin D food fortification: A review and guidance paper. Frontiers in Endocrinology. 2018.

A REVIEW OF STUDY ON HYBRID SOLAR PV AND WIND ENERGY SYSTEM

Dr. Pavan kumar Singh*

*Faculty of Engineering,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email id- pavan.engineering@tmu.ac.in

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ABSTRACT

Because solar and wind power are inherently intermittent and unpredictable, increasing their penetration in current power systems may pose significant technological difficulties, particularly for weak grids or stand-alone systems without enough storage capacity. The impact of the fluctuating nature of solar and wind resources may be partly addressed by combining the two renewable resources into an optimal combination, and the entire system becomes more dependable and cost-effective to operate. The difficulties and possibilities / solutions of hybrid solar PV and wind energy integration systems are discussed in this article. Voltage and frequency fluctuation, as well as harmonics, are significant power quality problems for both grid-connected and stand-alone systems, with the latter having a greater effect when the grid is weak. This may be addressed to a great degree via appropriate design, sophisticated rapid response control capabilities, and hybrid system optimization. In terms of optimum size design, power electronics topologies, and control, the article provides an overview of the major research work published in the literature. The article provides an overview of the current status of hybrid solar and wind systems, both grid-connected and stand-alone.

KEYWORDS:*Hybrid System, Power Quality, Renewable Energy, Solar Energy, Wind Energy.*

1. INTRODUCTION

Globally, renewable energy penetration in power networks is quickly growing, particularly for solar photovoltaic (PV) and wind systems. According to the 2014 renewables global status report, renewable energy accounted for approximately 19 percent of global final energy consumption in 2012 and continued to grow in 2013. According to the study, PV installation capacity surpassed wind power capacity for the first time in history. Table 1 highlights several key statistics from that study as well as the previous year's report, demonstrating the worldwide fast growth of renewable energy. Despite the fact that Europe has dominated the global PV industry, the rest of the world is catching up, led by China and India(1–5).

TABLE 1: THE BELOW TABLE SHOWS THE IMPORTANT GLOBAL INDICATORS FOR RENEWABLE ENERGY.

		2010	2011	2012	2013
Renewable power installed capacity (with hydro)	GW	1,250	1,355	1,470	1,560
Renewable power installed capacity (without hydro)	GW	315	395	480	560
Solar PV installed capacity	GW	40	71	100	139
Wind power installed capacity	GW	198	238	283	318
Concentrating solar thermal power installed capacity	GW	1.1	1.6	2.5	3.4

Solar and wind power are inherently intermittent, posing technological difficulties for grid power delivery, particularly when the quantity of solar and wind power integration grows or the infrastructure becomes too weak to manage fast variations in production levels. Furthermore, if solar or wind power is utilized to power a stand-alone system, an energy storage device is required to provide a constant supply of electricity. The amount of the energy storage is determined by the degree of solar or wind intermittency. This study examines the difficulties and possibilities for solar PV and wind hybrid systems. The article summarizes the most recent research on optimum size, power electronics topologies, and control for grid-connected and stand-alone hybrid solar and wind systems(6–10).

1.1. Hybrid Solar PV-Wind Systems:

Hybrid solar PV and wind generating systems are becoming more appealing, especially for stand-alone applications. Combining the two renewable energy sources of solar and wind may improve dependability and make their hybrid system more cost-effective to operate since the weaknesses of one system can be compensated for by the strengths of the other. Integrating hybrid solar and wind power systems into the grid may assist improve the overall economics and dependability of renewable energy production to meet demand. Likewise, combining hybrid solar and wind power in a stand-alone system may decrease the amount of energy storage required to provide continuous electricity. Photovoltaics or concentrated solar power are both used to generate solar energy. The photovoltaics type will be the subject of this article. Many textbooks and articles provide detailed explanations of the many technologies, physics, and fundamentals of PV(11–15).

1.2.Optimization:

Due to the fact that solar PV and wind systems produce energy only on bright and windy days, they cannot offer a continuous supply. As a result, combining these two sources boosts total energy production, particularly if they are linked to the grid. To guarantee that the quantity and size of PV and WT are optimum, adequate optimization is needed. The previous approach for estimating hybrid solar PV and wind systems relied on long-term meteorological data, such as solar radiation and wind speed. Artificial intelligence methods like as fuzzy logic, genetic algorithms, and artificial neural networks are employed since long-term meteorological data is not always accessible. In addition, optimization performance metrics including Net Present Value, Energy Index Reliability, Energy Expected Not Supplied, Cost of Energy, and so on have been utilized and reported(11,16).

1.3.Power Electronics Topologies And Control:

The DC output voltages from individual solar PV, wind, and battery bank streams, through individual DC/DC and AC/DC units, are integrated on the DC side and go through one common DC/AC inverter, which acts as an interface between the power sources and the grid to provide the desired power even with only one source available. As a result, renewable energy sources operate as current sources and may interchange power with the grid, while the DC bus voltage is controlled by a common DC/AC converter. Individual units may be used in maximum power point tracking (MPPT) systems to get the most power from solar PV and wind systems, with the DC bus voltage being controlled by a common DC/AC inverter. When there is excess power, the battery bank is charged, and when there is a power deficit from renewable energy sources, the battery bank is drained (by providing electricity).

1.4.Power Quality:

Increased grid-connected renewable energy penetration has an effect on grid power quality, particularly in fragile networks. Major power quality problems include voltage fluctuation, frequency variation, and harmonics. In addition, intermittent energy sources such as solar PV and wind have a significant effect on network dependability. Accurate forecasting and scheduling systems, on the other hand, may help to mitigate the effects. To predict weather patterns, solar radiation, and wind speed, several statistical forecasting and regression analysis methods and algorithms are employed. To cope with any shortfall or excess power from renewable power production, a system operator may modify other dispatch able generating elsewhere in the system. As a result, the effect of variations in renewable energy production will be reduced. Furthermore, instead of big units concentrating in one location, RES may be distributed in tiny units across a wider geographical area to limit the intermittence impact of power production from RES. Energy storage systems such as batteries or Uninterruptible Electricity Supplies (UPS) may act as balancing devices, providing power when renewable production is insufficient and storing excess energy when renewable output is enough(17–20).

Voltage fluctuation may be caused by changes in solar radiation and wind speed over time. The features of voltage fluctuation are primarily determined by the load type and size, as well as the strength and size of the linked electrical grid. Voltage fluctuation may be resolved with active power filters such as dynamic voltage regulators, static synchronous compensators, and unified power quality conditioners. Power compensators, such as fixed or switched capacitors, may also be employed to address the problem of reactive power. They are the most recent grid-to-consumer appliance interface devices. Changes that occur unexpectedly.

1.5.Stand-Alone System:

The stand-alone or autonomous power system is an ideal option for distant locations where utilities, particularly transmission lines, are not cost-effective to operate or impossible to construct owing to high costs and/or topographical challenges, among other factors. The stand-alone systems may be divided into two categories: common DC bus and common AC bus. The variable nature of solar and wind resources may be partly addressed by combining the two resources in the best possible way, making the system more dependable. During a certain time period, the power of one source may outweigh the weakness of the other. Storage costs are still a significant economic concern for stand-alone applications. Combining PV solar and wind energy may reduce storage needs and, as a result, the system's total cost. Increasing the capacity of solar panels and wind turbines may be a better option than increasing the capacity of batteries, since batteries are considerably more costly and have a shorter lifetime than a PV or WT. However, in high-dependability systems, too few batteries will not satisfy the reliability criteria, resulting in higher costs due to the need for additional PV modules or larger WTs.

1.6.Optimization:

As previously stated, combining solar PV and wind energy sources increases total energy production. However, an energy storage system is needed to provide a constant power supply and to compensate for any shortfalls in renewable energy production. Battery banks, fuel cells, and other storage systems may be used, with an emphasis on battery banks here. There have been many optimization methods described that may be used to achieve a techno-economically optimal hybrid renewable energy system(21–23). Many optimization methods for hybrid systems have been compared. It is not always simple to obtain long-term meteorological data, such as solar radiation and wind speed that are required for sizing reasons in distant locations, which account for the majority of the standalone applications for hybrid solar PV and wind systems. In contrast to the conventional sizing approach based on long-term meteorological data, additional artificial intelligence methods like as fuzzy logic, genetic algorithms, and artificial neural networks are utilized for scaling standalone systems.

1.7.Power Electronics Topologies And Control:

As previously stated, there are two major topologies for stand-alone solar PV and wind hybrid systems: DC-common bus and AC Common bus. One of its major benefits is the inclusion of a DC interface bus for connecting various generation sources that do not need to run at the same frequency or in lockstep. The output voltage of all streams on the DC bus line is fixed, and the output current of each source is regulated separately. Individual DC output voltages from solar PV, wind, and battery bank streams are integrated on the DC side, combined in parallel, and fed through one common DC/AC inverter, which acts as an interface between the power sources and the loads, regulating the AC output voltage to provide the required power to the load. A DC/DC converter interfaces with the battery bank, regulating the DC-link bus voltage by charging (in case of excess power) or draining the battery (in case of shortage of power). Renewable energy sources serve as current sources, supplying loads directly. The magnitude of the load's voltage is controlled by the interface common unit. Individual AC/DC and DC/DC units may be used in MPPT systems to get the most out of solar PV and wind systems, while a common DC/AC inverter controls the magnitude of the load's voltage. By charging or discharging the battery bank, it serves as a voltage source to regulate the common DC bus voltage.

1.8.Power Quality:

Because these loads are not connected to the grid, intermittent energy from solar and wind has a significant effect on load security. As a result, any interruption in power production from those sources may result in the associated loads losing power. Major power quality problems include voltage fluctuation, frequency variation, and harmonics. The PV system may become unstable as a consequence of irradiation variations, which would have an effect on the overall dependability of the hybrid stand-alone solar PV and wind system. The same is true for changes in wind speed, which have an impact on the performance of the wind system and, ultimately, the entire hybrid system. Forecasting and scheduling systems that are accurate may help to mitigate the effects. A generator's frequency stability should be considered depending on load needs and whether or not the generator is linked to AC loads with essential power frequency requirements. The use of storage devices such as electrolytic double layer capacitors may help to reduce high frequency oscillations conducted an experimental study to evaluate the effects of wind on PV modules. The magnitude of the mean pressure on the PV module was measured in both cases: smooth wind exposure and open terrain wind exposure, with the latter having a lower value.

1.9.AC Micro grid:

A solar PV and wind hybrid system with a battery bank linked to an AC Micro grid. The system may operate in two modes: grid-connected and stand-alone. On the AC side, the DC output voltages from separate solar PV and wind streams are integrated and mixed in parallel via individual DC/AC and AC/DC-DC-DC/AC devices to supply power to the grid/loads even when only one source is available. As a result, in grid-connected mode, renewable energy sources serve as current sources, injecting electricity directly into the AC bus. A bi-directional converter interfaces the battery system, which may be charged or drained based on the generation, load, and state of charge. In stand-alone mode, however, renewable energy sources function as current sources, feeding direct loads, while the battery bank works as a voltage source, charging and discharging the AC bus voltage. The magnitude and frequency of the load voltage are controlled by the battery converter. Individual RES units may be used in MPPT systems to get the most electricity from solar PV and wind systems when they are linked to the grid. The same thing may be done in stand-alone mode if the battery bank serves as a voltage source for controlling the AC bus voltage via charging and discharging.

2. DISCUSSION

Challenges faced by grid-connected hybrid solar PV and wind systems, as well as potential solutions and mitigations. Similarly, for stand-alone systems, the key problems and solutions / mitigations. A Solar PV Wind Hybrid Energy System was implemented in this study. A portion of the energy demand for a private home, farm house, small business, educational institution, or apartment house has been met using electricity produced by wind and solar power, depending on the need at the location where it is utilized. It has improved dependability while reducing reliance on a single source. As a result, we were able to increase the system's efficiency when compared to their separate method of production. Renewable energy sources, such as solar, wind, biomass, hydropower, geothermal, and ocean resources, are being explored as a technical alternative for producing clean energy. However, although the energy provided by solar and wind is considerably less than that produced by fossil fuels, electricity output using PV cells and wind turbines has grown quickly in recent years. This article describes a Solar-Wind hybrid

Power system that generates energy by harnessing the renewable energies of the Sun and Wind. The microcontroller is primarily responsible for system control.

3. CONCLUSION

The difficulties and possibilities of combining solar PV and wind energy sources for power production are discussed in this article. The intermittent nature of solar PV and wind sources is the primary issue for both grid-connected and stand-alone systems. The impact of the fluctuating nature of solar and wind resources may be partly addressed by combining the two resources into an optimal combination, and the entire system becomes more dependable and cost-effective to operate. This has a greater effect on the independent generation. Integration of renewable energy production with battery storage and diesel generator backup systems is proving to be a cost-effective stand-alone option. The hybrid wind-battery-diesel design can satisfy the system demand, even during peak periods. Energy management methods should aim for high system efficiency, dependability, and cost effectiveness. The effect of intermittent energy may be reduced by good planning and precise forecasts of weather patterns, sun radiation, and wind speed.

REFERENCES:

1. Sinha S, Chandel SS. Review of recent trends in optimization techniques for solar photovoltaic-wind based hybrid energy systems. *Renewable and Sustainable Energy Reviews*. 2015.
2. Khan MJ, Yadav AK, Mathew L. Techno economic feasibility analysis of different combinations of PV-Wind-Diesel-Battery hybrid system for telecommunication applications in different cities of Punjab, India. *Renewable and Sustainable Energy Reviews*. 2017.
3. Khan MAM, Rehman S, Al-Sulaiman FA. A hybrid renewable energy system as a potential energy source for water desalination using reverse osmosis: A review. *Renewable and Sustainable Energy Reviews*. 2018.
4. Mir MA, Verma P. Use of polyethylene waste with stone dust in flexible pavement. *Int J Sci Technol Res*. 2019;
5. Cha SH, Son JH, Jamal Y, Zafar M, Park HS. Characterization of polyhydroxyalkanoates extracted from wastewater sludge under different environmental conditions. *Biochem Eng J*. 2016;
6. Liu Y, Yu S, Zhu Y, Wang D, Liu J. Modeling, planning, application and management of energy systems for isolated areas: A review. *Renewable and Sustainable Energy Reviews*. 2018.
7. Sawle Y, Gupta SC, Bohre AK. PV-wind hybrid system: A review with case study. *Cogent Engineering*. 2016.
8. Goyal MK, Rai D V., Manjhi J, Barker JL, Heintz BH, Shide KL, et al. Study of dosimetric and spatial variations due to applicator positioning during inter-fraction high-dose rate brachytherapy in the treatment of carcinoma of the cervix: A three dimensional dosimetric analysis. *Int J Radiat Res*. 2017;
9. Chandel SK, Goyal R, Singla S. Utilization of construction waste as partial replacement of aggregates in cement concrete. *Int J Innov Technol Explor Eng*. 2019;
10. Arora M, Som S, Rana A. Predictive Analysis of Machine Learning Algorithms for Breast Cancer Diagnosis. In: *ICRITO 2020 - IEEE 8th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions)*. 2020.

11. Nadjemi O, Nacer T, Hamidat A, Salhi H. Optimal hybrid PV/wind energy system sizing: Application of cuckoo search algorithm for Algerian dairy farms. *Renewable and Sustainable Energy Reviews*. 2017.
12. Aydin NY, Kentel E, Sebnem Duzgun H. GIS-based site selection methodology for hybrid renewable energy systems: A case study from western Turkey. *Energy Convers Manag*. 2013;
13. Turconi R, Boldrin A, Astrup T. Life cycle assessment (LCA) of electricity generation technologies: Overview, comparability and limitations. *Renewable and Sustainable Energy Reviews*. 2013.
14. Naaz R, Saxena AK, Ather D. A framework for implementing blockchain with enhanced e2e encryption on ethereum 2.0. *Int J Adv Sci Technol*. 2019;
15. Srivastava R, Sharma PK, Das KJM, Manjhi J. A hybrid approach for head and neck cancer using online image guidance and offline adaptive radiotherapy planning. *J Radiother Pract*. 2019;
16. Khan MJ, Mathew L. Different Kinds of Maximum Power Point Tracking Control Method for Photovoltaic Systems: A Review. *Arch Comput Methods Eng*. 2017;
17. Dimitriou A, Kotsampopoulos P, Hatziaargyriou N. Best practices of rural electrification in developing countries: Technologies and case studies. In: *IET Conference Publications*. 2014.
18. Niladry G, Ranjit S. Biogenic synthesis of bimetallic nanoparticles using cassia tora leaf extract. *Res J Biotechnol*. 2020;
19. Sah MK, Gupta DK, Rani P. Energy Efficient Routing Protocol for Wireless Sensor Networks with Multiple Sinks. In: *Proceedings - 2015 2nd IEEE International Conference on Advances in Computing and Communication Engineering, ICACCE 2015*. 2015.
20. Shikha D, Kaur R, Gupta R, Kaur J, Chandan, Sapra BK, et al. Estimation of indoor radon and thoron levels along with their progeny in dwellings of Roopnagar District of Punjab, India. *J Radioanal Nucl Chem*. 2021;
21. Singla N, Singla S, Thind PS, Singh S, Chohan JS, Kumar R, et al. Assessing the Applicability of Photocatalytic-Concrete Blocks in Reducing the Concentration of Ambient NO₂ of Chandigarh, India, Using Box-Behnken Response Surface Design Technique: A Holistic Sustainable Development Approach. *J Chem*. 2021;
22. Sehgal A, Kaushik AK, Choudhary S, Saini S. Prewett Edge Detector Method for Content Extraction in Moving Pictures or Images. In: *2019 2nd International Conference on Power Energy Environment and Intelligent Control, PEEIC 2019*. 2019.
23. Kaushal G, Singh H, Prakash S. High-temperature erosion-corrosion performance of high-velocity oxy-fuel sprayed Ni-20 Cr coating in actual boiler environment. *Metall Mater Trans A Phys Metall Mater Sci*. 2011;

THE OVERVIEW ON LIGHT ADHERENCE

Ajay Kumar*

*Faculty of Engineering,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email id- drajay.enginer@tmu.ac.in

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ABSTRACT

Li-Fi is a relatively new and promising technology that allows both short-range and high-speed data transfer. VLC (visible light communication) is a subset of Li-fi, which is often carried out using white light emitting diode (LED) lighting bulbs. By applying an immutable current terminated by an LED, VLCs are often used for lightning and shining. Although, because to the rapid and tiny variations in current, the reported output is likely to vary at very fast speeds. Light fidelity is a cordless optical networking system that uses light emitting diodes (LEDs) to communicate data and information. In this project, a VLC system is used to provide advantageous transmission and reception, with the development taking place under the influence of natural light. When the transmission is finished, the modulation amplifier boosts the data signal to make it clearer and last longer. Photosensitivity is identified as a result of transmission distance in relation to optical power. The amplitude, modulation, and demodulation techniques are used in this project to transmit and receive data.

KEYWORDS: *Light Fidelity (Li-Fi), Light Emitting Diode (Led), Near Field Communication (Nfc), Visible Light Communication (Vlc), (Wi-Fi) Wireless Fidelity.*

1. INTRODUCTION

Communication is the process through which one user establishes a link with another and shares data. Wireless communication, on the other hand, is a kind of communication in which data or information is transmitted between two or more locations without the need of wires(1). This is a broad term that encompasses all causes of action as well as an arrangement of connecting and interacting with more than two devices through a codeless signal produced by wireless communication technologies and devices. With approximately 5 billion cellular phones, about “1.4” million digital radio wave central stations are envisaged (2).

Essentially, cellular phones send and receive about 600 TB of data. The method of communication utilized was wireless. Previously, they were based on radio frequency, and spectrum is one of the most important elements of the cordless transmission and receiving process, so as technology advances and the number of users grows, the radio frequency spectrum is broken down to meet the user's and technology's requirements.

Bluetooth, NFC (near field communication), Wi-Fi (wireless fidelity), and li-fi are the four major types of wireless communication (Light Fidelity). However, the emphasis of this article is on

wireless communication utilizing Li-Fi technology, which addresses the issue with the radio wave spectrum mentioned above. Li-fi is a plagiarized version of an optical cordless communication mechanism that uses light from LEDs with an intensity faster than the human eye as an intermediary to transmit network, cellular, and quick communication that is similar to wireless fidelity.

Professor Harald Haas, who pioneered the concept of "wireless data in every light," created Li-fi, a Visible Light Communication Technology (VLC). Light in the visible zone, i.e. wavelengths between 370nm and 780nm, is used as an intermediate for signal modulation in visible radiation or light communication, a sophisticated detectable cordless communication technology (3). In contrast to common cordless communication technologies such as Bluetooth, Wireless Fidelity, and others, this signal modulation provides extra security and achieves faster data speeds.

The speed of the internet network slows down when using cordless internet with a large number of other devices connected to the same matrix. To overcome this problem, visible light has developed an advanced feature to transmit and receive data that can be postulated as data and information through fluorescence. It uses a tense pulse of light to transmit data and information without the need of wires.

The most important part of the Visible light communication (VLC) system is the spectacular blazing with white LED bulbs that serve as a communication reference, with the silicon photodiode acting as a welcoming factor. LEDs may be turned on and off to provide a digital function of "1" and "0," allowing data and information to be encrypted in the light and produced as a current data string while changing the LED's quivering rate. The LED image may be used as a communication fountainhead by controlling the LED light with a specific data and information wave.

The LED output seems constant to the human eye because the quivering rate is so fast. Using high-velocity LEDs and a proper multiplexing technique, data rates of more than 100 mbps are possible. The data and information rate of visible light communication may be increased by using LED light for collateral data transmission, in which each LED transmits its own data string. LED offers many benefits, including a large and unobstructed bandwidth, sanction-free performance, low-cost electronics, no need for RF systems, and no health risks. As a result, LEDs are expected to replace traditional illumination lights such as fluorescent lamps and a variety of other light bulbs in the future (4).

1.1 Overview of Li-Fi:

Herald Hass created and popularized Light Fidelity (li-fi) in 2011. Herald Hass gave a talk on LED light bulbs, which can transfer data 10 times quicker than any other technology (5). The data transmission speed of light is also extremely high, thanks to the quickest and fastest increasing speeds of light. Data transmission has become one of the most essential activities in our daily lives, and when a large number of people connect their devices to the internet, the internet speed slows dramatically (6). This is because when the number of devices in a given bandwidth available for data transmission grows, this Limited Bandwidth becomes a problem. Make it difficult to transmit data at a rapid rate. To address this issue, the usage of li-fi has been suggested, where li-fi refers to data transfer through LED light that is quicker than the human eye (7).

Li-Fi is a VLC (Visible Light Communications) system, which includes two qualifying components:

- 1) One gadget that can receive light signals and has a photo-diode.
- 2) The combination of a light source and a Signal Processing Unit.

The VLC system signals operate by turning lights on and off in nanoseconds, making them undetectable to human sight. A light source, or transmission source, is a high-bright white LED. The receiving element is a silicon photodiode with a strong responsiveness to visible light. The Figure 1 shows the overview function of a Li-Fi technology. When the light falls on any device an automatic internet is connected to the device.

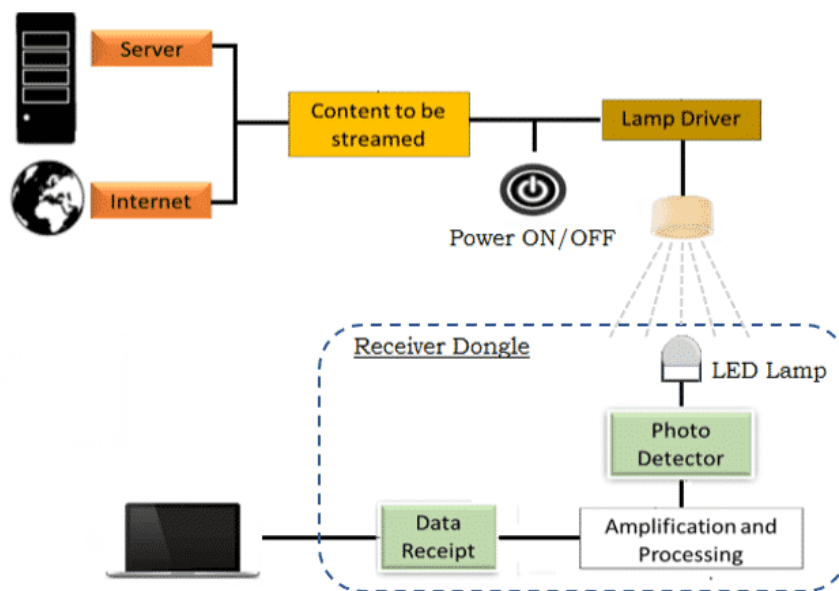


Figure 1: The figure shows the overview function of a Li-Fi technology. When the light falls on any device an automatic internet is connected to the device.

LEDs are turned on and off in order to create digital strings of 1s and 0s. Data is encoded in light by altering the flickering rate of the LED used as the source to create a new data stream. The rapid flashing rate of the LED makes the LED output seem continuous to the human eye.

Parallel data transmission utilizing an array of LEDs, each of which sends a separate data stream, increases the VLC data rate. The ASK signal is created by feeding incoming binary data and a sinusoidal carrier signal into a balanced modulator's product modulator, which produces binary ASK waveforms as a consequence (8–11).

1.2 Amplifier:

The process of converting a lower data signal into a greater data signal is known as amplifier. When a signal is represented by a voltage fluctuation and it goes through an amplifier, we obtain an amplified signal, which has a larger amplitude. It is extremely important in wireless

communication because as a signal or wave travels a longer distance, it becomes weaker, thus amplification is used to overcome this issue.

1.3. White LEDs:

Shuji Nakamura was a pioneer in the development of blue and white LEDs, with white light being the next big thing in lighting, achieved via the use of several layers of light-emitting phosphors or semiconductors. Initially, LEDs were only used for simple applications such as indication, emergency lighting, or display, but white light is now utilized in a wide range of applications including interior illumination, street lighting, and a variety of other things (12–15).

1.4. Photodiode:

A photodiode is a diode that operates in a reverse-bias state at all times. The photodiode has a very wide depletion area due to reverse bias, and when the photodiode light is forced to incident on the intersection, it has a very broad depletion region. The presence of photons at the junction produces electron hole pairs. In the reverse bias mode, the negative terminal of the battery attracts holes in the p-region, while the positive terminus of the battery attracts electrons in the n-region. Simultaneously, we know that in reverse bias mode, reverse saturation current flows through the diode, causing the reverse congestion current to extend.

This current is known as photocurrent. Additional electron hole pairs are introduced and the photocurrent is expanded as the light intensity increases. As a result, the photocurrent is proportional to the amount of light. Only reverse saturation current, which is in the micro ampere range, passes through the diode during reverse bias. Because the photocurrent produced is in the micro ampere region, we can readily detect the change in diode current after the production of a photocurrent. When a diode is operated in the forward bias, however, the diode current is in the mill ampere range. As a result, a photocurrent of a few micro amperes has no impact on the diode current, therefore we always run a photodiode in reverse bias mode. The sensitivity of the light may be enhanced and the operating speed can be increased by employing photodiode (16–19).

1.5. Application of Li-Fi:

The domain of the LED base system is very flexible, extending from materialistic objectives to scholastic and manufacturing experimentation, from spacecraft to military applications, from hospitals to airplanes, and from lighting to automotive LEDs are extremely many (20). In smart buildings, it is utilized for illumination. Because LEDs are in their infancy and provide both safe illumination and communication, this automation may be utilized for communication in hazardous areas like as mines, petrochemical facilities, and others. Because cellular phones and Wi-Fi are prohibited in some sections of hospitals, particularly near MRI scanners and operating rooms, utilizing VLC in hospitals and industrial settings is advantageous. Li-Fi may be utilized securely in every area where Wi-Fi is banned, such as airplanes, hospitals, traffic management, education systems, medical applications, aviation applications, and underwater applications.

2. DISCUSSION

Sleep problems and circadian misalignment affect health and well-being and are highly prevalent in those with co-morbid neuropsychiatric disorders. Interventions altering light exposure patterns of affected individuals are a promising non-pharmacological treatment option, shown by

previous meta-analyses to improve sleep, and often described as minimally invasive. To best translate laboratory-based mechanistic research into effective treatments, acceptability and barriers to adherence should be understood, but these have not yet been systematically evaluated(21–23). Here, we examined evidence regarding adherence and acceptability in studies of light or dark interventions using various delivery devices and protocols to improve sleep in intrinsic circadian rhythm sleep–wake disorders and neuropsychiatric illness. Attrition during intervention was low, and reported experiences were largely positive, but measurement and reporting of self-reported experiences, expectations, and adverse effects were poor. Approaches to management and measurement of adherence were varied, and available light monitoring technology appeared under-exploited, as did mobile technology to prompt or track adherence. Based on these findings we suggest recommended reporting items on acceptability and adherence for future investigations. Few studies assessed baseline light exposure patterns, and few personalised interventions. Overall, many applied studies exhibited an approach to light schedule interventions still reminiscent of laboratory protocols; this is unlikely to maximise acceptability and clinical effectiveness. For the next phase of translational research, user acceptability and adherence should receive increased attention during intervention design and study design. We suggest framing light therapies as complex interventions, and emphasise the occupationally embedded (daily activity routine embedded) context in which they occur.

3. CONCLUSION

The world is moving toward lighting, and as lighting improves, so does the revolution in data communication through light. Li-fi is one of the quickest technologies available, capable of transmitting and receiving data 10,000 times quicker than any other. When a large number of users connect to a single internet module, a significant issue arises, however Li-Fi overcomes this problem of internet speed. Because light can travel through any material, when it reflects on any device, it generates a binary code in the form of "0" and "1," and the gadget is instantly linked to the internet. It may be utilized in a variety of applications in the future for rapid data transmission and reception.

REFERENCES:

1. Wang Y, Haas H. Dynamic Load Balancing with Handover in Hybrid Li-Fi and Wi-Fi Networks. *J Light Technol.* 2015;
2. Goodenough JB, Park KS. The Li-ion rechargeable battery: A perspective. *Journal of the American Chemical Society.* 2013.
3. Khan LU. Digital Communications and Networks. In.
4. Sasi Chandra M, Saleem S, Harish SL, Baskar R, Kishoreraja PC. Li-Fi technology and its applications. *Int J Pharm Technol.* 2016;
5. Rani J, Chauhan P, Tripathi R. Li-Fi (Light Fidelity)-the future technology in wireless communication. *Int J Appl Eng Res.* 2012;
6. Haas H, Yin L, Chen C, Wang Y. What is Li-Fi? *J Light Technol.* 2016;
7. To ES, By S. Li-Fi Technology. *Int J Comput Sci Inf Technol.* 2014;
8. Cotel WI. Ask the Experts. *J Dermatol Surg Oncol.* 1976;

9. Jain RK, Kumar A, Singh BK. Track etch parameters and annealing kinetics assessment of protons of low energy in CR-39 detector. Nucl Instruments Methods Phys Res Sect B Beam Interact with Mater Atoms. 2012;
10. Kumar D, Singh R. Anticataract activity of *Acorus calamus* Linn. against hydrogen peroxide induced cataractogenesis in Goat eyes. Int J Pharm Sci Rev Res. 2011;
11. Tripathi L, Kumar P, Singh R. A Review on Extraction, Synthesis and Anticancer Activity of Betulinic Acid. Curr Bioact Compd. 2009;
12. Ferro E, Potortì F. Bluetooth and Wi-Fi wireless protocols: A survey and a comparison. IEEE Wireless Communications. 2005.
13. Meena AK, Yadav A, Singh U, Singh B, Sandeep, Kiran, et al. Evaluation of physicochemical parameters on the fruit of *Terminalia bellirica* Roxb. Int J Pharm Pharm Sci. 2010;
14. Shaida MN, Singla S. Global biomedical waste management issues and practices. Int J Innov Technol Explor Eng. 2019;
15. Ali MD, Gupta AK, Naseer A, Mirza MA, Afzal S. Evaluation of aqueous fruit extract of *Tamarindus indica* (L) for inhibition of tumor necrosis factor- α and cyclo oxygenase enzymes in experimental animal. Asian J Pharm Clin Res. 2018;
16. Samant S, Salvi M, Gokalgandhi B, Kant R. Li-Fi. Int J Comput Appl. 2014;
17. Gupta P, Tyagi N. An approach towards big data - A review. In: International Conference on Computing, Communication and Automation, ICCCA 2015. 2015.
18. Al-Bahri B, Noronha H, Pandey J, Singh AV, Rana A. Evaluate the Role of Big Data in Enhancing Strategic Decision Making for E-governance in E-Oman Portal. In: ICRITO 2020 - IEEE 8th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions). 2020.
19. Gupta D, Rana A, Tyagi S. A novel representative dataset generation approach for big data using hybrid Cuckoo search. Int J Adv Soft Comput its Appl. 2018;
20. Saraswati P. Li-Fi-Light Fidelity. Int J Adv Nurs Manag. 2016;
21. Sihag J, Prakash D, Yadav P. Evaluation of Soil Physical, Chemical Parameter and Enzyme Activities as Indicator of Soil Fertility with SFM Model in IA–AW Zone of Rajasthan. In: Advances in Intelligent Systems and Computing. 2020.
22. Zafar M, Kumar S, Kumar S, Dhiman AK, Park HS. Maintenance-energy-dependent dynamics of growth and poly(3-Hydroxybutyrate) [p(3hb)] production by *azohydromonas lata* mtcc 2311 using simple and renewable carbon substrates. Brazilian J Chem Eng. 2014;
23. Chen Z, Li JS, Poon CS. Combined use of sewage sludge ash and recycled glass cullet for the production of concrete blocks. J Clean Prod. 2018;

A REVIEW ON ABORTION

Sourabh Batar*

*Teerthanker Mahaveer Institute of Management and Technology,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id-battarsourabh@gmail.com

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ABSTRACT

Abortion has remained among the most contentious issues in biological ethics to this day. It's a topic that's been hotly debated all over the globe, and there are a lot of different perspectives on whether or not it's legal. The question is whether this issue is covered by the Constitution of India or if it has failed to satisfy the requirements for recognition as a basic right. Abortion, which is defined as "causing miscarriage" under the Indian Penal Code of 1860, is a punishable offense. It refers to a 'woman that induces her own miscarriage.' Among the numerous rights provided to women in India, the right to an abortion must be accorded identical values as the right to conceive naturally and become pregnant. The Access to Abortion, like the Right to Live in Dignity and Make Free Choices, comes within the scope of Article 21 of the Indian Constitution, unless it interferes with the present legal process. Except as provided by law, every individual inside the Indian nation's national territory is guaranteed the right to life and personal liberty, according to Article 21 of the Indian Constitution. In the event of abortion, the woman has the same right to life as any other Indian citizen and is free to choose what she wants to do with her body. Furthermore, a fetus isn't a real human person, according to a widely held scientific view. It has the potential to be a human person, yet it isn't one. The primary target populations in this field are women such as uninformed adolescents, sex workers, women bearing abnormally shaped infants, and women whose contraceptive techniques went awry. For these particular categories, abortion must be allowed by the Indian Constitution. This article attempts to investigate the many reasons why abortion should be legalized in India, as well as a comparative examination of abortion legislation in other nations. The goal is to demonstrate that Article 21 of the Indian Constitution protects the right to abortion. Abortion has been examined from the perspective of human rights.

KEYWORDS: Abortion, Article 21, Indian Constitution, Right to Abortion, Right to Life.

1. INTRODUCTION

Abortion is the process of ending a pregnancy by removing or expelling a developing embryo from the uterus, culminating in or causing death. Abortion may be divided into two categories, as shown below.

1. Spontaneous Abortion- Also known as a "miscarriage," this kind of abortion happens accidentally as a result of pregnancy problems.
2. Planned Abortion- This is a kind of abortion that is done on purpose with the use of medicine and a technique. Contraception is further divided into two categories, as follows: -
 - a. Medicinal Abortion- A medicinal abortion is performed when the mother's life is in risk or when the kid born will be handicapped.
 - b. Elective Abortion- This is the type of abortion that is performed for any cause other than those listed above.

Abortion has been a contentious issue throughout the globe including in the United States. Everyone has their own opinion on whether or not a mother should be able to have an abortion her kid and whether or not the Right to Abortion comes within the umbrella of the Right to Life. Abortion, which is defined as "causing miscarriage" under the Indian Penal Code of 1860, is a punishable offense. It refers to a 'woman who induces her own miscarriage.' Among the numerous rights provided to women in India, the right to an abortion must be accorded identical values as the right to conceive naturally and become pregnant(1).

The issue at hand is whether or not the access to abortion comes within the umbrella of the life and liberty. The right to life is a broad term that covers a wide range of issues. It covers a wide range of rights, from the right to a livelihood to the right to privacy, among others. In addition, Article 21 of the Indian Constitution states that "every individual inside the national territory of the Indian nation is guaranteed the right to life and personal liberty, save under process provided by law." According to logic, a woman who has been given the Right to Life likewise has the right to do anything she wants with her body and to alter it in any way she wishes. It should be up to her and no one else to decide whether to keep the pregnancy or terminate it(2).'

On humanitarian and medical reasons, the Shah Committee, established by the Indian government, conducted a thorough study of the socio-cultural, legal, and medical elements of abortion and advocated legalizing abortion in 1966 to avoid the waste of women's health and lives. Although several states saw the proposed law as a means of limiting population increase, the Shah Committee flatly denied that this was its goal. The phrase "Medical Termination of Pregnancy" (MTP) was used to dissuade socio-religious parties opposed to abortion legislation liberalization (3). With the exception of Jammu and Kashmir, the MTP Act, enacted by Parliament in 1971, allowed abortion across India(4).

Despite more than three decades of liberal laws, the majority of Indian women still do not have access to safe abortion treatment. This article examines the history of Indian abortion legislation and policy change (Box 1), as well as epidemiological and quality-of-care research conducted since the 1960s. It analyzes impediments to excellent practice and makes legislative and program recommendations to enhance access to safe abortion care(5).

1.1 Lacking In Current Legislation And Policy:

The MTP Act's significant medical leaning has been a key point of contention. Mid-level health professionals and practitioners of other systems of medicine are excluded from the "physicians only" policy for providers. A second physician opinion is required for a second trimester abortion, which further limits access, particularly in remote regions. The MTP Act requires that all public hospitals offer abortion services. However, since public health institutions do not need clearance, they are free from the same regulatory procedures that apply to the commercial sector.

It is incorrect to assume that since a health institution is in the public sector, it is responsible to the public and has well-functioning regulatory procedures that do not need explanation in legislation and policy. Frequently, such rules are out-of-date or lack transparency. When it comes to low quality abortion treatment in the public sector, the same demanding standards as in the private sector should be imposed and subjected to the same audit processes as in the private sector. Ironically, India's private sector is also largely unregulated, and it often lacks the self-discipline required to comply to the law's quality requirements(6).

1.2 Abortion And Sex Determination Are Two Separate Problems.

The Prenatal Diagnostic Techniques (Regulation and Prevention of Misuse) Act (PNDT Act) of 1994, as amended by the Pre-Conception and Pre-Natal Sex Selection and Determination (Prohibition and Regulation) Act 2002, prohibits the use of antenatal diagnostic tests for the purpose of sex determination that may result in the abortion of female fetuses. These Acts also make it illegal to advertise the use of these tests, require all facilities that use them to be registered, and make it illegal for anyone performing these tests to disclose the fetus's gender(7).

2. LAWS GOVERNING ABORTION IN INDIA

2.1 The Indian Penal Code, 1860:

Induced abortion is banned across India, according to the Indian Penal Code of 1860, which takes into account the social, emotional, and medical consequences of abortion. Abortion is defined as "causing miscarriage" under Section 312 of the Indian Penal Code of 1860. It refers to a lady who intentionally causes a miscarriage. The term "abortion" is not used in this section. Abortion would imbue "miscarriage" with the quality of "intentionality." Miscarriage is a legal term for spontaneous abortion, while inducing a miscarriage deliberately, which is illegal under Section 312, is a legal term for criminal abortion. There is no obvious distinction between the two. Therapeutic abortion, on the other hand, is allowed under the same clause. In the event that the mother's life is in danger, the pregnancy may be terminated. The unborn kid in the womb shall not be killed unless it is for the only purpose of preserving the mother's life(8).

2.2 Medical Termination of Pregnancy Act, 1971:

The Medical Termination of Pregnancy Act of 1971 further specifies the circumstances in which a licensed medical practitioner may perform a therapeutic abortion. The legislation specifies the circumstances in which a pregnancy may be terminated, the time limit for such terminations, the location of such terminations, and who is allowed to carry out such terminations.

According to the legislation, a pregnancy may only be terminated in a limited instance, such as when the mother's life is at danger or when the woman suffers severe bodily or mental harm. The legislation also defines voidable pregnancies, such as those caused by a lunatic. Furthermore, the legislation defines who is a certified medical practitioner and where the pregnancy termination shall take place. The legislation also says that a pregnancy may be terminated in the first 12 weeks of pregnancy, and that if the abortion is performed between 12 and 20 weeks for different reasons, the approval of two or more healthcare professionals is needed(9).

The Act makes it illegal to terminate a pregnancy beyond 20 weeks. According to the legislation, medical opinions must be provided in "good faith." The word "good faith" is not defined in the

relevant Conduct, but it is defined in the IPC, 1860, as an act performed with "with care and caution."

2.3 The Constitution of India:

The Indian Constitution mentions the concept of abortion, but it is vague and confusing. As previously mentioned, if the right to abortion is susceptible to interpretations, it may fall under Article 21. The right to life and personal liberty is guaranteed under Article 21. It's also understandable that a woman who has been granted such a privilege would want to exercise her own freedom and modify her body in whatever manner she sees fit. She has the ability to change her body to suit her needs. She has complete control over her body, and her choice on whether or not to continue her pregnancy should be definitive(10).

3. LAWS GOVERNING ABORTION BEYOND INDIA

3.1 United States of America:

Women in the United States of America had not always have the right to an abortion their children; in fact, the right to do so was only granted in 1973 as a result of a Supreme Court ruling in the Texas case Roe V. Wade. Norma McCovey, an unmarried, pregnant woman in Texas who is also the petitioner, sought an abortion in this historic case. However, due to Texas abortion restrictions, she was refused. Then, under the alias "Jane Roe," she filed lawsuits challenging the Texas statute as unlawful. Roe started by arguing that the Texas legislation, which prevents her from continuing her abortion, is infringing on her right to privacy, and that the law should be reviewed. The Court agreed with Roe's concept by a 7-2 majority, but said that the states' sole goal in this case is to protect the pregnant lady and the future human life. The Supreme Court ruled that the unborn is not a human being protected by the Constitution, allowing abortion to be allowed. The Supreme Court ruled that abortion in the third trimester is illegal because the state's role as a defender of the pregnant lady and her unborn child would trump the woman's right to privacy(11).

Following that, in Family Planning v. Casey, the Supreme Court threw down the meaning of "spousal consent" in the context of abortion. The concept of spousal permission would only further bind women, and it is seen as a "undue burden" that discourages women from obtaining abortions.

3.2 United Kingdom:

The Abortion Act of 1967 governs abortion in the United Kingdom. Therapeutic abortion is permitted for up to 24 weeks under the Act. There is no time limit if there is a significant danger to the pregnant woman's health or if there are any foetal abnormalities. Before an abortion may be carried out, one or more licensed, registered physicians must be consulted to see whether there are any legitimate medical reasons to proceed with the procedure. In practice, however, the Department of Health ensures that physicians approve abortions without real medical grounds when there are other legitimate reasons

4. DISCUSSION

4.1 A Comparative Analysis:

The abortion regulations in the United States and the United Kingdom are very different from those in India. The laws of the United States are more geared toward women. The right to privacy of a woman is accorded more weight than that of society. The Supreme Court ruled that abortions may be performed prior to the third trimester of pregnancy. The foetus begins to experience discomfort and progress throughout the third trimester. In the third trimester, the state's role as a defender of the pregnant woman and her unborn child will exceed the pregnant woman's personal liberty and privacy. In India, however, the final authority rests with medical practitioners, who must approve abortions in "good faith." However, this provides a lot of opportunity for abuse of authority. With the medical judgment of two medical practitioners, an abortion may be performed between 12 weeks of conception and between 12 and 20 weeks of pregnancy. The woman's ability to get an abortion will be restricted in this situation. Abortion is not considered a "right" in India. It is only regarded as something that superior medical practitioners may "sanction" if there is a significant danger to the woman's health. A woman, on the other hand, cannot terminate a pregnancy for any reason other than medical.

Certain target groups, such as uninformed adolescents, sex workers, rape victims, and individuals who prefer the male kid over the female child, are seeking abortions in greater numbers than ever before. It's pointless to continue with a pregnancy if the mother refuses to accept the kid. The life of a female kid is tormented in instances when the parents want a male child. Because the parents were better prepared to provide for a male kid than a girl child, the youngster is deprived of all attention and nourishment. Continuing the pregnancy in situations when the child's mother is a rape victim or an unknowing adolescent would simply put excessive strain on the mother's mental or physical health. The mother will be unable to accept the kid in the early stages of society and will be exposed to a social boycott, which will further disrupt the mother's mental health.

The reported abortions in the United Kingdom were done for reasons other than medical, implying that the country's Wellbeing Department is focused on approving as many abortions as possible in order to protect a woman's physical and mental health. People in India do not comprehend a woman's right to privacy. They don't realize that, even if she's pregnant, a woman is still the ultimate decision-maker over what she wants to do with her own body. It is entirely up to her and no one else's choice whether or not to nurture the unborn kid.' India's laws infringe on her right to life and personal liberty, as well as her right to dignity and privacy. Although it is true that legalizing abortion would lead to its abuse, it is much simpler to terminate an unborn kid than to destroy their life after they are born and grown.

4.2 Barriers In Abortion Service Delivery:

Abortion care, like most of India's health care, is underserved, particularly in the public sector. Ineffective law (or inability to enforce it) has led in an unregulated development of private sector services, which is frequently predatory in character. Although India's abortion policy and legislation are progressive, erroneous and needless procedures often obstruct successful translation into increased access to safe abortion treatment. State governments are given the authority to control abortion services under the law. Despite the fact that states have adopted certain laws and regulations, there are differences in how they are interpreted and implemented. In order to ensure safety and avoid unsafe abortions, several states have added layers of non-essential processes, administrative delays, and needless restrictions to the regulatory process. In Maharashtra, for example, a blood bank must be within 5 kilometers of any abortion clinic,

which is both impracticable and unnecessary. The floor size and architectural designs of the hospital, as well as information of the supply of vehicle parking, are required to be submitted for registration in certain states, such as Delhi and Haryana. 35 These states' general attitude is to restrict rather than promote abortion services. When these rules are only applied to the commercial sector and not the public sector, the discriminatory character of such excessive regulation becomes evident.

5. CONCLUSION

When analysing the abortion laws of the United States, the United Kingdom, and India, the researcher discovered that India's regulations are not flexible enough for women, and therefore offer women little control over their bodies. At this time, India should consider a woman's viewpoint and enact rules that enable a woman to make free and liberal decisions as to what she wishes to do with her body. Any Indian law does not require the existence of an unborn baby. The state should prioritize protecting a woman's life while simultaneously ensuring that she has access to her fundamental rights. Furthermore, it is essential to demonstrate that Article 21 of the Indian Constitution protects the right to abortion.

Since 2000, India has pledged to protect human and reproductive freedom expressed in different international forums via abortion legislation reform. The Indian Parliament passed the Medical Pregnancy termination (Amendment) Act 2002 and revised Rules and Regulations 2003 after a lengthy consultation process including different governmental and non-governmental organizations, professional organisations, and activists.^{26,27} The new Act decentralized control of abortions facilities from the State level to District Committees, which are authorized to approve and regulate abortion clinics in an attempt to minimize the bureaucracy involved in gaining facility permission. Individual providers and owners of institutions that are not authorized or maintained by the government face penalties of 2–7 years in jail.

REFERENCES:

1. Cameron S, Glasier A, Lohr PA, Moreau C, Munk-Olsen T, Oppengaard KS, et al. Induced abortion. Human Reproduction. 2017.
2. Lavelanet AF, Schlitt S, Johnson BR, Ganatra B. Global Abortion Policies Database: A descriptive analysis of the legal categories of lawful abortion. BMC Int Health Hum Rights. 2018;
3. Senapati R, Nayak B, Kar SK, Dwibedi B. HPV Genotypes distribution in Indian women with and without cervical carcinoma: Implication for HPV vaccination program in Odisha, Eastern India. BMC Infect Dis. 2017;
4. Johnson BR, Lavelanet AF, Schlitt S. Global Abortion Policies Database: A new approach to strengthening knowledge on laws, policies, and human rights standards. BMC Int Health Hum Rights. 2018;
5. Conti JA, Brant AR, Shumaker HD, Reeves MF. Update on abortion policy. Current Opinion in Obstetrics and Gynecology. 2016.
6. Medoff M. The impact of state abortion policies on teen pregnancy rates. Soc Indic Res. 2010;

7. Dennis A, Blanchard K. Abortion providers' experiences with medicaid abortion coverage policies: A qualitative multistate study. Health Serv Res. 2013;
8. Hirve SS. Abortion law, policy and services in India: A critical review. Reprod Health Matters. 2004;
9. Patel T. Experiencing abortion rights in India through issues of autonomy and legality: A few controversies. Glob Public Health. 2018;
10. Linskey C. Women's Human Rights and Migration: Sex-Selective Abortion Laws in the United States and India by Sital Kalantry. J Glob South Stud. 2018;
11. Karkal M. Abortion laws and the abortion situation in India. Issues Reprod Genet Eng. 1991;

THE OVERVIEW OF THE BIG DATA ON MOBILE

Dr. Priyank Singhal*

*Department of Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email id- priyanksinghal1@gmail.com

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ABSTRACT

In the previous decade, advanced mobile phone development has accelerated the expansion of the versatile Internet and sparked a new wave of versatile applications, resulting in an unprecedented volume of versatile data generated by cell phones, content creators, and non-organized organization administrators. In this large information period, such disorganized information sections are sorted out with the goal of turning information into a proactive substance that can drive and even create new administrations, as opposed to the traditional practice of administrations deciding and characterizing information. In contrast to the so-called 5V characteristics of traditional enormous data, namely volume, assortment, speed, truthfulness, and esteem, versatile big data is notable for its fascinating multidimensional, customized, multi-tactile, and continuous highlights. In this review, we provide comprehensive coverage of the highlights, sources, and applications of portable large data, as well as the current state of the art, challenges, and opportunities for innovative work in this field, with a focus on client displaying, framework support, information executives, and information revelation perspectives.

KEYWORDS: Algorithm, Data, Fuel, Wireless, Mobile Phone.

1. INTRODUCTION

As cell phones (e.g., PDAs, wearable gadgets) have become the focal point of nearly everyone's day by day life, mining the sheer volume of data from cell phones has drawn extraordinary interest from various exploration networks, such as data mining, insights, exchanges, AI, human science, geology, and so on. This is mostly owing to the diverse characteristics of vast amounts of data. Initially, versatile big data gains the "5V" characteristics of nonexclusive large data, namely volume, speed, assortment, veracity, and esteem. Despite the fact that the concept of big information isn't well defined, its salient features are well recognized, providing enormous data that is distinct from some fundamental giant data. The characterization of the primary "3V" characteristics (volume, speed, and variety) can be traced back to Laney's 2001 study, and the other "2V"s were emphasized in subsequent studies, which are summarized below in relation to versatile big data (1).

- **Quantity:** The term "big information volume" refers to the sheer quantity of the data. In terms of varied information, it is expected that monthly traffic would exceed 15 Exabyte by 2018 (2).

- **Quickness:** The rapidity with which large amounts of data are sent exemplifies the fast-paced information era and streaming. The increasing entry of smart devices these days, such as sophisticated mobile phones, wearable gadgets, and so on, will create and stream recognized data at an incredible rate to promote the creation of thoughtful and personalized applications(3).
- **A Wide Range Of Options:** The collection exemplifies the multidimensional character of flexible big data, which stems from the extreme variety of data kinds, such as multi-tangible data, sound and video recordings, and so on (4).
- **Authenticity:** Even in the same region, the truth suggests that the nature of different wellsprings of huge knowledge may be contradictory. As a result, the information may be raucous, incorrect, or excessive, and it must be cleaned and preprocessed before examination (4).

Big Data of the first generation is just the tip of the iceberg. Mobile operators seeking to grow their markets and replace rapidly declining conventional revenue sources with more attractive revenue from new services, particularly digital services, will realize that their business and operational intelligence needs are rapidly changing. Mobile Operators will need insights that are quite different from the first generation Big Data that they have been gathering and keeping inside their network systems and databases to effectively roll out the new breed of digital services and deliver them on various networks and devices(5–8).

When these old and new data sources are combined, Mobile Operators will have access to massive amounts of data that, if properly mined, studied, and applied, will drive product innovations, marketing and sales strategies, and generate future revenues in the digital services segment, as well as other services they provide. In the long run, as their new companies develop, additional data streams will enter the system, including data on subscribers' data use, content consumption, online behaviors, lifestyles, and spending patterns, enriching the Mobile Operators' ever-growing pool of Big Data as shown in the Figure 1(9).



Figure 1: Mobile Operators and Digital Services: How Big Data Perfects the Equation

Business intelligence and big data analytics are creating a new path for app marketing. Marketers are using big data analytics to better target consumers and achieve greater efficiency than ever before. Mobile app developers and businesses may draw useful conclusions from the data they collect from app users utilizing smart insights gleaned from big data(10–13).

Mobile app development firms may use big data to make app marketing efforts more relevant, which can assist with: Understanding, analyzing, and synthesizing app use data gives you more control over external variables(14). Extracting deep insights and data about the user experience in order to be more relevant to the needs and requirements of the users(15). Using predictive analytics, predicting future app use and success. Creating comprehensive user experience maps in order to create a user interface for a mobile app that is intuitive. Figure 2 shows the symbiotic & co-dependent relationship between big data analysis, mobile app development & marketing worth.

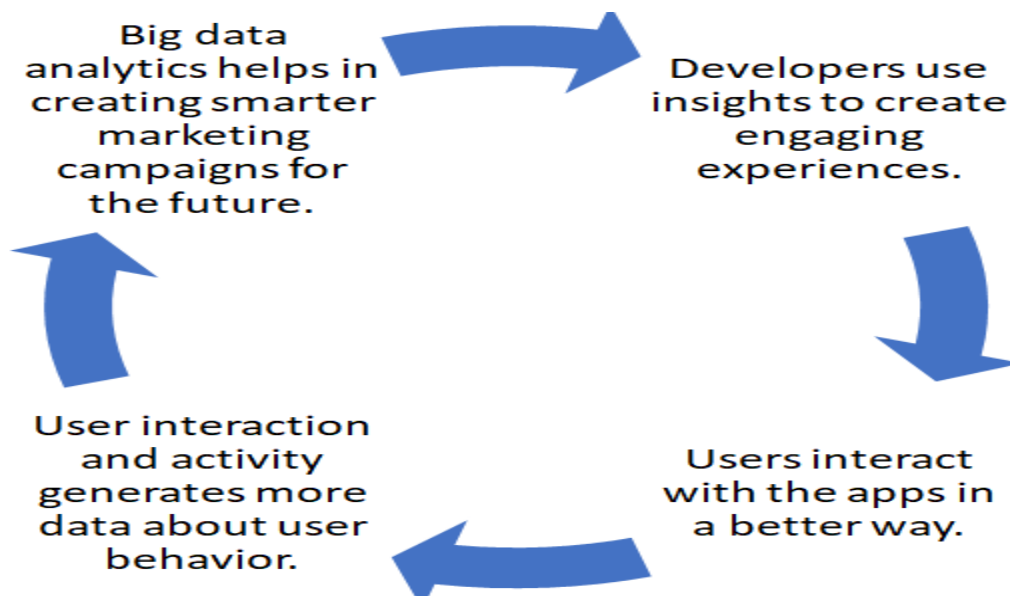


Figure 2: Symbiotic & Co-Dependent Relationship between Big Data Analysis, Mobile App Development & Marketing

The estimate of massive data was originally discussed by Gantz and Reinsel, who said that enormous data advances are dependent on the effective extraction of value from a large volume, high speed, and diverse range of data, as well as the capacity to examine and reveal data. Apart from the 5V characteristics of traditional enormous data, portable huge data has certain unique features, which will be discussed in the subsections below (16–19).

A paper titled “Mobile Big Data: The Fuel for Data-Driven Wireless” by Xiang Cheng, Senior Member, IEEE, Luoyang Fang, Student Member, IEEE, and Liuqing Yang is among the numerous publications published in the area of Mobile Big Data. PDA progress in the past decade has accelerated the proliferation of flexible Internet apps and sparked a new generation of versatile PDA applications. Specifically, GPS is becoming more essential for the default configuration of every smart phone, providing local info instantly available. Indeed, even in the absence of exact area data or when GPS is disabled, the coarse area may now be inferred from

information at the organization level. The area data alone would be capable of enabling a wide range of applications to provide tailored administrations (e.g., establishing mindful proposals, traffic time evaluation based on next area anticipation, and so on) and to aid public assistance planning (e.g., traffic stream investigation, transportation the executives, city zone acknowledgment, and so forth) Individual practices may also be taught and monitored since sophisticated cells are equipped with a variety of sensors. Portable administrators may also collect a great deal of data to monitor the specialized and value-based components of their networks. It has recently been recognized that such data, also known as portable big data, may be an under-utilized gold mine for virtually all cultural fields.

Non-organized information bits were formerly seen as useless outcomes in order to promote the lawful flow of structured data. The purpose behind big data handling these days is to piece together such information pieces in order to get bits of knowledge about client habits and to discover basic routines that may perhaps trigger significantly more informed decisions. In stark contrast to the traditional practice of administrations deciding and characterizing information, information is increasingly becoming a proactive factor that may drive and even create new administrations in the information age (20). In contrast to the so-called 5V characteristics of traditional big data, namely volume, assortment, speed, veracity, and value, versatile big data stands out for its unique multi-dimensional, personalized, multi-tangible, and continuous features. Later study on flexible big data preparation has shown its enormous potential for a variety of applications, including enhancing traffic management, empowering individuals and relevant administrations, and increasing public security, among others.

For instance, information-driven action recognition is critical for medical applications; the use of PDAs as an example may be used to learn about a client's mental state; and versatile data can provide basic data to support asset improvement in correspondences organizations (e.g., upgrading paging productivity, provisioning future information rate, anticipating asset needs, and so on) The unique value of portable big data stems from its pervasiveness as well as its setting richness. It is clear that the portable Internet not only provides the same services as the fixed Internet, but also enables a wide range of new applications that allow the Internet to pervade almost every aspect of our rapidly changing society. To be sure, mobile Internet traffic communicates a much more lavish environment, which pinpoints the time, location, movement, social connection, and overall atmosphere of mobile customers. As a result, flexible big data research is multidisciplinary in nature, requiring a wide range of data from versatile interchanges and sign preparation to AI and data mining. In any event, the examination field of diverse big data has been quickly exploding as of late, and it is to some extent split. This article aims to provide an integrated picture of this emerging area in order to link various disciplines and, hopefully, to drive future research activities forward more clearly (21).

2. DISCUSSION

This paper discusses about the As mobile phones (e.g., PDAs, wearable devices) have become the focal point of almost everyone's day-to-day lives, the sheer amount of data generated by them has piqued the attention of different investigation networks, including data mining, insights, exchanges, AI, human science, geology, and others. This is due to the many different properties of large quantities of data. Initially, flexible big data acquires the nonexclusive large data's "5V" qualities, namely volume, speed, assortment, veracity, and esteem. Despite the fact that the term "big data" isn't clearly defined, its key characteristics are widely understood, resulting in massive

data that is different from certain basic huge data. Laney's 2001 research was the first to characterize the main "3V" qualities (volume, speed, and variety), and the additional "2V"s were highlighted in later studies, which are described below in connection to versatile big data.

The phrase "huge data volume" refers to the sheer amount of data available. Monthly traffic is projected to reach 15 Exabyte's by 2018 in terms of diverse information(17,22). The fast-paced information age and streaming are exemplified by the speed with which huge quantities of data are transmitted. The growing use of smart devices, such as sophisticated mobile phones, wearable gadgets, and other similar devices, will generate and transmit recognized data at an amazing pace, allowing for the development of intelligent and customized applications. There are a lot of choices. The collection illustrates the adaptable big data's multidimensional nature, which comes from the wide range of data types available, such as multi-tangible data, sound and video recordings, and so on.

The reality indicates that the nature of various wellsprings of vast knowledge may be inconsistent even within the same area. As a consequence, the data may be noisy, inaccurate, or abundant, necessitating cleaning and preprocessing prior to inspection. Massive data advancements, according to Gantz and Reinsel, are reliant on the efficient extraction of value from a huge volume, high speed, and varied range of data, as well as the ability to analyze and disclose data.

3. CONCLUSION

We highlighted the one-of-a-kind features of flexible big data, its sources, and many uses in this overview article. Based on these, top-to-bottom discussions of current research findings, as well as research gaps and challenges, are held on client exhibiting, processing foundation, correspondence and systems administration design, information security and protection, and information disclosure. All of them are necessary for turning the anticipated future destiny of diverse massive information applications into reality. We believe that with this comprehensive overview, more analysts and designers will be inspired to contribute to this burgeoning study area with limitless potential.

REFERENCES:

1. Cheng X, Fang L, Yang L, Cui S. Mobile Big Data: The Fuel for Data-Driven Wireless. IEEE Internet Things J. 2017;
2. O'Brien WJ, Ponticelli S, American Society of Civil Engineers. Computing and Information Technology Division. Computing in civil engineering 2015: proceedings of the 2015 International Workshop in Civil Engineering, June 21-23, 2015, Austin, Texas. Congress on Computing in Civil Engineering, Proceedings. 2015.
3. Jou D, Messmer L. A smart scooter for polluted megacities. Wall Street Journal Asia. 2015;
4. Aris I Bin, Sahbusdin RKZ, Amin AFM. Impacts of IoT and big data to automotive industry. In: 2015 10th Asian Control Conference: Emerging Control Techniques for a Sustainable World, ASCC 2015. 2015.
5. Taylor L, Broeders D. In the name of Development: Power, profit and the datafication of the global South. Geoforum. 2015;

6. Zargar K, Singla S. Impact of pet plastic waste on mechanical properties of mix concrete design. *Int J Sci Technol Res.* 2020;
7. Saroliya A, Mishra U, Rana A. Performance Evaluation and Statistical Analysis of AUR-Chord Algorithm with Default Working of Structured P2P Overlay Network. In: *Advances in Intelligent Systems and Computing.* 2018.
8. Khatri M, Kumar A. Stability Inspection of Isolated Hydro Power Plant with Cuttlefish Algorithm. In: *2020 International Conference on Decision Aid Sciences and Application, DASA 2020.* 2020.
9. Fitzgerald M. How to Hire Data-Driven Leaders. *MIT Sloan Manag Rev.* 2015;
10. Hunter P. The big health data sale: As the trade of personal health and medical data expands, it becomes necessary to improve legal frameworks for protecting patient anonymity, handling consent and ensuring the quality of data. *EMBO Rep.* 2016;
11. Kumar L, Thakur I, Verma A, Bhatia BS, Mangat CK. Degradation and Decolourization of Methyl Orange Dye Using Fe-TiO₂ Hybrid Technology (Photo-Fenton and Photocatalysis) in Fixed-Mode. In: *Lecture Notes in Civil Engineering.* 2021.
12. Sah MK, Gupta DK, Rani P. Energy Efficient Routing Protocol for Wireless Sensor Networks with Multiple Sinks. In: *Proceedings - 2015 2nd IEEE International Conference on Advances in Computing and Communication Engineering, ICACCE 2015.* 2015.
13. Kumar R, Ailawalia P. Moving load response in micropolar thermoelastic medium without energy dissipation possessing cubic symmetry. *Int J Solids Struct.* 2007;
14. Voß S. Interview mit Daniel Dolk und Christer Carlsson zum Thema „Entscheidungsanalyse“. *WIRTSCHAFTSINFORMATIK.* 2014;
15. Dobrokhoto A V., Maksenkova IL, Kozyreva L V., Sándor R. Model-based assessment of spatial distribution of stomatal conductance in forage herb ecosystems. *Sel'skokhozyaistvennaya Biol.* 2017;
16. Hua J, Lin X, Xu L, Li J, Ouyang M. Bluetooth wireless monitoring, diagnosis and calibration interface for control system of fuel cell bus in Olympic demonstration. *J Power Sources.* 2009;
17. Agarwal N, Rana A, Pandey JP. Proxy signatures for secured data sharing. In: *Proceedings of the 2016 6th International Conference - Cloud System and Big Data Engineering, Confluence 2016.* 2016.
18. Goyal AK, Singh R, Chauhan G, Rath G. Non-invasive systemic drug delivery through mucosal routes. *Artificial Cells, Nanomedicine and Biotechnology.* 2018.
19. Gupta P, Tyagi N. An approach towards big data - A review. In: *International Conference on Computing, Communication and Automation, ICCCA 2015.* 2015.
20. Andoralov V, Falk M, Suyatin DB, Granmo M, Sotres J, Ludwig R, et al. Biofuel cell based on microscale nanostructured electrodes with inductive coupling to rat brain neurons. *Sci Rep.* 2013;
21. Graham EA, Patange O, Lukac M, Singh L, Kar A, Rehman IH, et al. Laboratory

demonstration and field verification of a Wireless Cookstove Sensing System (WiCS) for determining cooking duration and fuel consumption. Energy Sustain Dev. 2014;

22. Sharma R, Chander R. Market proxies at BSE and weak form efficiency. Indian J Financ. 2011;

THE BRIEF REVIEW ON THE SEPARATION OF THE BIODEGRADABLE WASTE

Ankit Kumar*

*Faculty of Engineering,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- ankitengg2011@gmail.com

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ABSTRACT

India is the world's second-largest country by population. As a result of this expanding suburbanization, waste material is rapidly increasing, including a wide range of materials such as metal, plastic, glass, and many others, resulting in a massive loss of materials in the environment. Overall, we can see that the items listed above are becoming more important in people's lives. But the most significant point is that these minerals, particularly metals, are now found in lower grade in the earth's crust. Massive amounts or parts of metals are wasted or thrown away instead of being recycled in these rare cases. To avoid material drain, many ways are developed at various levels in this article, and one of the systems or approaches is to allow the materials items utilized in our kitchens, hotels, and restaurants to be drained. This technique is based on conventional technologies such as metal detection and lead detection to minimize material drain, resulting in less trash to treat and a more beautiful world to live in. The device is intended to address people's fundamental, day-to-day issues. It is developed and conceived to avoid material items from being lost in restaurants and hotels.

KEYWORDS: Automatic Segregator, LPC2148 Microcontroller, Separate Compartments.

1. INTRODUCTION

Composting, aerobic digestion, anaerobic digestion, or other similar processes may break down organic matter in trash into carbon dioxide, water, methane, or simple organic molecules by microorganisms and other living things. It also contains certain inorganic elements that may be degraded by microorganisms in waste treatment. Gypsum and its derivatives, such as plasterboard, and other simple organic sulfates, for example, may degrade under anaerobic landfill conditions to produce hydrogen sulfide(1).

The definition of biodegradable trash in household garbage collection may be limited to just those degradable wastes that can be handled at local waste disposal facilities. When biodegradable garbage is not adequately managed, it may have a significant effect on climate change, particularly via methane emissions from landfill gas produced by anaerobic fermentation. Reducing the quantity of trash generated, such as via food waste reduction, is another way to lessen the effect. Microbes may readily decompose this kind of trash(2).

It mostly consists of kitchen waste (spoiled food, fruits, and vegetables), ash, dirt, manure, plant pieces, and so on. This trash is mostly organic and is referred to as "wet solid waste" or "wet rubbish." Biodegradable trash is segregated from the rest of the waste stream in many industrialized countries, either via separate curbside collection or waste sorting after collection. Such garbage is often referred to as green waste at the time of collection. By separating such trash from the rest of the waste stream, waste quantities for disposal are reduced significantly, and biodegradable material may be composted(3–6).

By incineration or anaerobic digestion, biodegradable trash may be composted or utilized as a source of heat, power, and fuel. Anaerobic digestion of biodegradable waste is shown by Swiss Kompogas and the Danish AIKAN method. While incineration recovers the greatest energy, anaerobic digestion facilities retain nutrients and produce compost for soil amendment while also recovering part of the stored energy as biogas. In 2009, Kompogas generated 27 million Kwh of energy and 27 million Kwh of biogas(7). In the past 15 years, the company's oldest lorry has traveled 1,000,000 kilometers on biogas generated from domestic garbage(8,9).

Long ago, at the dawn of civilization, barbers and cruel people circumstantially ignited fire by bumping two pebbles, allowing them to use fire to accomplish a variety of tasks, including cooking food instead of eating uncooked or raw food, and keeping animals safe and secure without the use of any metal equipment. Thus, early civilizations discovered a method of fabricating equipment by melting metals, which they accomplished by melting them with fire.

Then, as time went on, the world's population began to grow from generation to generation. The presence of trash is also growing dramatically as a result of this rapid suburbanization; this significant rise in waste causes severe problems for everyone on the planet. Restaurants, hotels, hospitals, and other such establishments produce the majority of trash. This garbage is often dumped straight into the depot or tossed along the seashore without being separated or treated properly. This technique causes a great deal of issues and difficulties. Water in the earth, in rivers, lakes, and the sea, for example, becomes tainted (impure)(10). The polluted groundwater and landfills then cause a slew of illnesses and health issues, including an increase in rats, mosquitos, reptiles, insects, and a slew of other creatures(11–13).

Waste materials such as plastics, metals, glass, and a variety of other waste products are now playing an increasingly important role in human life. However, as we can see, the amount of metals present in the earth's crust is very restricted. If both of these phenomena occur at the same time, massive quantities of metal will be discarded or thrown away rather being recycled. In order to avoid material drain, we must develop several techniques at many levels, one of which is keeping the material goods utilized in our kitchens, hotels, and restaurants from draining (14). Figure 1 shown the above graph represents the percentage rate of the material present in the earth crust

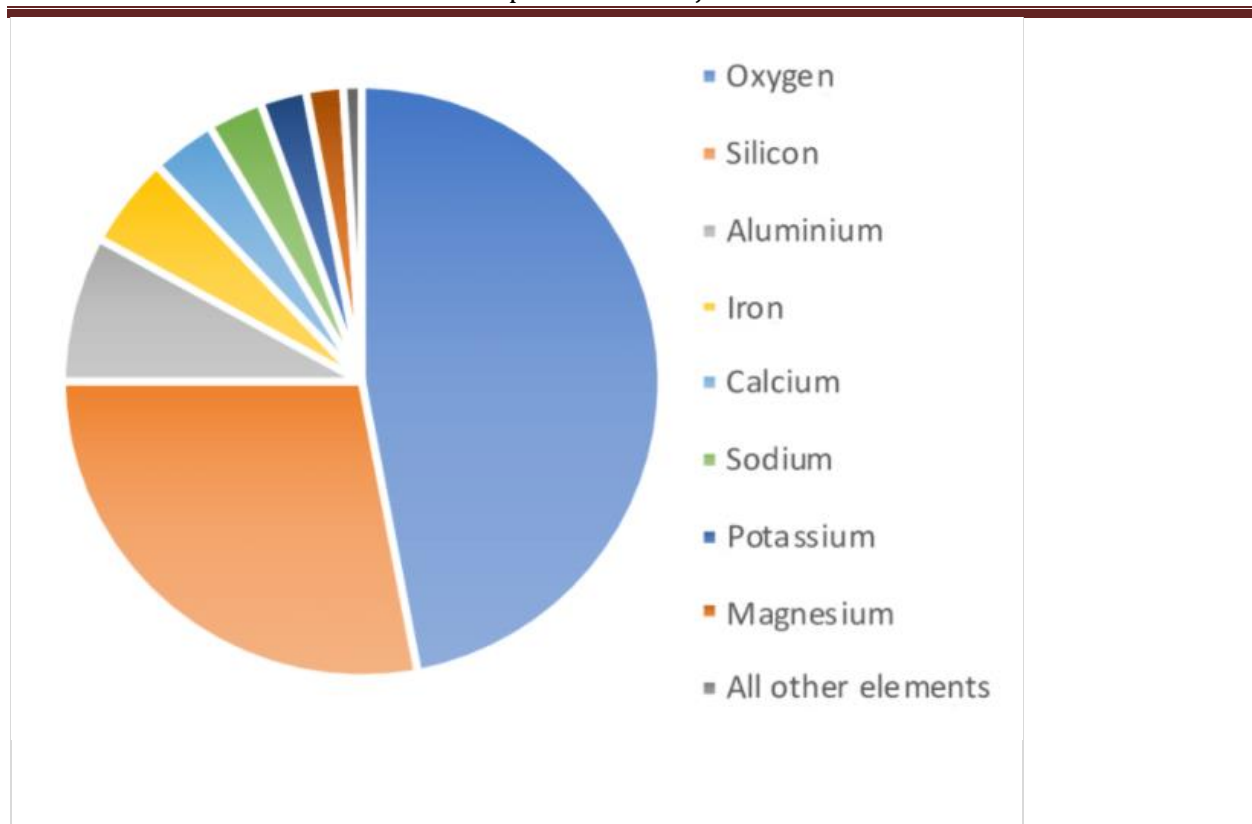


Figure 1: The above graph represents the percentage rate of the material present in the earth crust.

This article collects fundamental techniques such as metal detection, glass detection, and plastic detection in order to avoid material drain and reduce waste in the process. This application additionally incorporates a material counter and an automated washing sector. The program is intended to avoid the aforementioned issue, conserve resources, and minimize the additional labor required to wash tableware in any restaurant, hotel, or kitchen (15–17).

- 16/32-bit ARM7TDMI-S microcontroller in a tiny LQFP64 package.
- 8 to 40 kB of on-chip static RAM and 32 to 512 kB of on-chip flash program memory.
- 128-bit wide interface/accelerator enables high speed of 60 MHz operations.
- In-System/In-Application Programming (ISP/IAP) via on-chip boot-loader software shown in Figure 2.

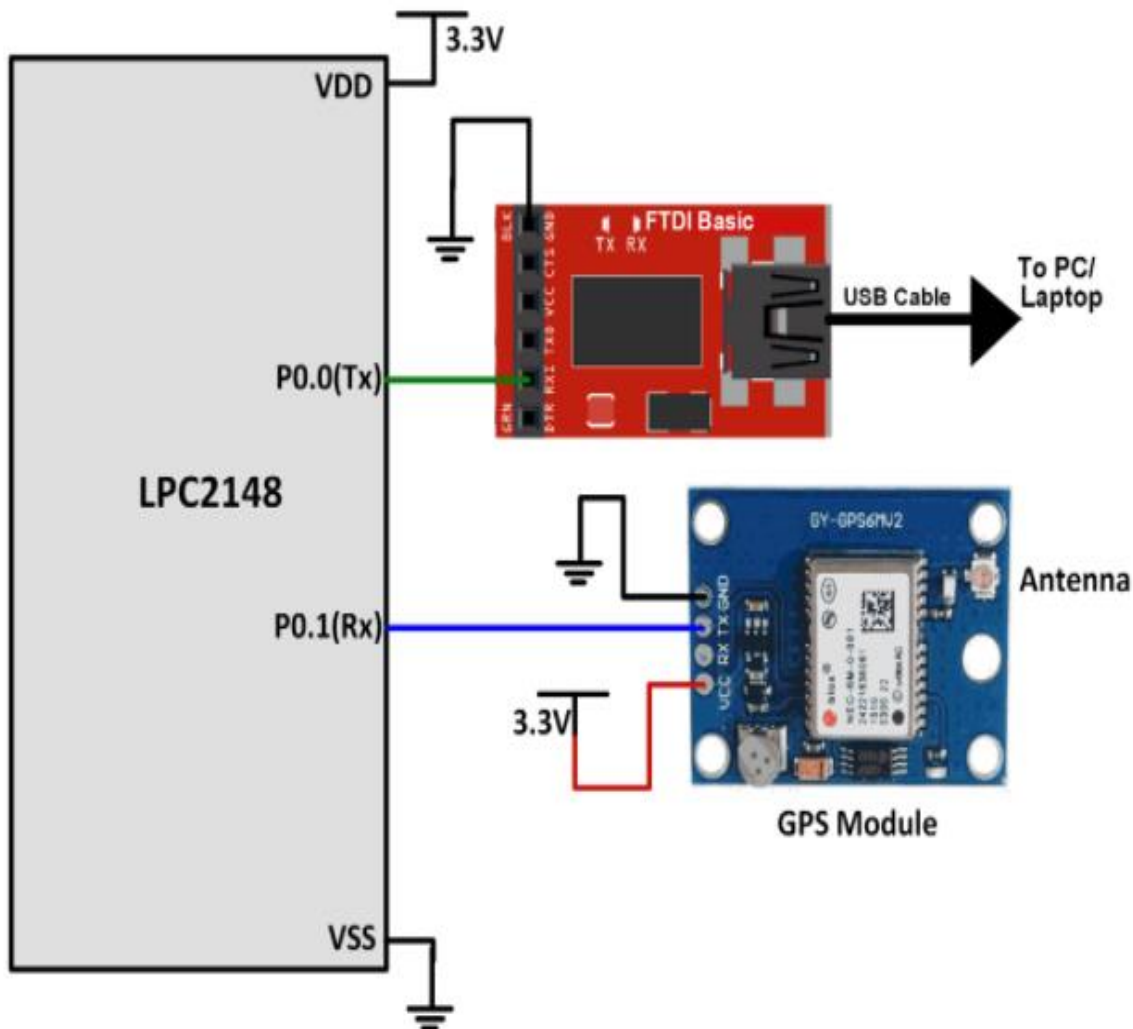


Figure 2: LPC2148 Module Working LPC2148 Module Board for ARM Development

2. REVIEW OF LITERATURE

In this paper, Manisha Jayson et. al. had presented a Smart dustbin, wherein this bin was able to separate waste at fountainhead without any human involvement and can spontaneously alert the waste collection center when the dustbin is completely full. This Smart dustbin will help solve the waste separation problem and help each individual to build an ignoramus society, with no compromise on health and hygiene. This application was made up of a durable plastic also it comprises a plurality of compartments i.e. one for dry waste and one was for wet waste, this compartment inbuilt inside the dustbin can be easily removed for the washing purpose. In this paper the smart dustbin design utilizes a motor and a tray mechanism, however when any waste is dropped in the tray then the waste used to be detected by an infrared (IR) sensor. One the IR sensor detected then the waste moisture sensor gets activated and when the moisture value is more than the set value then it will be considered as a wet waste if low then it will be considered as a dry waste. This dry and wet comparison of waste helps in accurate segregation of the waste

and to be dropped in the respected container. The dropping mechanism involves a servo motor wherein the accurate angle movement required by the servomotor is 100 degrees clockwise or anticlockwise so the waste tray will be tilted till the waste is completely dropped off. Sub-bin is installed with an IR proximity sensor on each side at a moderately full level which act when the waste collected to the fixed level, the fixed sensor reading activates the GSM module to alert the nearest waste collection center or holder of the Smart dustbin to vacant the particular section of the waste bin (4–6,15,18).

This paper Mohammed Rafeeq et. al. had proposed an Automation of Waste Material Segregation in scrap industry. This method is easy and simple solution of segregation of three types of wastes glass, metal and plastic. It is designed to sort the trash into metallic waste, plastic waste and glass waste ready to be processed separately for the next process of operation. The Method uses inductive sensors metallic items, and capacitive sensors to distinguish between and dry waste. Experimental results show that the segregation of waste into metallic, plastic and glass waste has been successfully implemented using the Automation of material segregation (AMS) method (19–23).

3. DISCUSSION

This paper discusses about Barbers and cruel people circumstantially started fire by bumping two pebbles long ago, allowing them to use fire to achieve a range of activities, including preparing meals instead of consuming uncooked or raw food and keeping animals safe and secure without the use of any metal equipment. As a result, early civilizations discovered a technique of creating equipment by melting metals, which they did with fire.

The world's population began to rise from generation to generation as time passed. As a result of this rapid suburbanization, the amount of rubbish is increasing drastically; this considerable increase in waste generates serious difficulties for everyone on the planet. The majority of rubbish is generated by restaurants, hotels, hospitals, and other such establishments. This rubbish is frequently dumped directly into the depot or thrown down the beach without being sorted or properly processed. This method creates a lot of problems and challenges. For example, water in the soil, rivers, lakes, and the sea becomes polluted (impure). The contaminated groundwater and landfills subsequently produce a host of ailments and health problems, including an increase in rats, mosquitos, reptiles, insects, and a variety of other animals.

Plastics, metals, glass, and a number of other waste items have become increasingly significant in human life. However, as can be shown, the amount of metals in the earth's crust is somewhat limited. If both of these events occur simultaneously, large amounts of metal will be wasted or thrown away rather than recycled. To avoid material drain, we must develop a variety of solutions at many levels, one of which is preventing material goods from draining in our kitchens, hotels, and restaurants.

Microorganisms and other living things may break down organic materials in garbage into carbon dioxide, water, methane, or simple organic molecules via composting, aerobic digestion, anaerobic digestion, or other similar processes. It also includes inorganic components that microbes in waste treatment may breakdown. Under anaerobic land-fill conditions, gypsum and its derivatives, such as plasterboard, and other simple organic sulfates, for example, may decompose and generate hydrogen sulfide.

In home garbage collection, biodegradable trash may be defined as just those degradable wastes that may be handled by local waste disposal facilities. When biodegradable waste is not properly handled, it has the potential to contribute significantly to climate change, especially via methane emissions from landfill gas generated by anaerobic fermentation. Another method to mitigate the impact is to reduce the amount of garbage produced, such as via food waste reduction. This kind of garbage is easily decomposable by microbes.

Kitchen waste (spoiled food, fruits, and vegetables), ash, soil, manure, plant fragments, and other materials make up the majority of it. Wet solid waste or "wet garbage" is the term for this kind of trash, which is mainly organic. Many developed nations isolate biodegradable garbage from the rest of the waste stream, either via separate curbside collection or waste sorting after collection. At the time of collection, such trash is often referred to as green waste. By isolating such garbage from the rest of the waste stream, the amount of waste that has to be disposed of is drastically decreased, and biodegradable materials may be composted.

Plastics, metals, glass, and a number of other waste items have become more essential in human existence. However, as can be shown, the quantity of metals found in the earth's crust is very limited. If all of these events occur simultaneously, huge amounts of metal will be wasted or thrown away rather being recycled. To avoid material drain, we must create a variety of methods at many levels, one of which is preventing the draining of the material products used in our kitchens, hotels, and restaurants.

This page compiles basic methods such as metal detection, glass detection, and plastic detection in order to minimize material waste and decrease material drain. A material counter and an automatic washing sector are also included in this application. In any restaurant, hotel, or kitchen, the program is designed to prevent the aforementioned problem, save resources, and reduce the extra work needed to wash tableware. When biodegradable garbage is not adequately managed, it may have a significant effect on climate change, particularly via methane emissions from landfill gas produced by anaerobic fermentation. Reducing the quantity of trash generated, such as via food waste reduction, is another way to lessen the effect. Microbes may readily decompose this kind of trash. It mostly consists of kitchen waste (spoiled food, fruits, and vegetables), ash, dirt, manure, plant pieces, and so on. This trash is mostly organic and is referred to as "wet solid waste" or "wet rubbish."

4. CONCLUSION

The contemplated system is an efficacious solution to the present garbage handling complication which efficaciously separate materials namely metal, glass, plastic as well as other waste materials etc. The method proposed in this paper can be effectually dispensed in restaurant, hotel and kitchen material segregation, this method can be also useful in industrial purpose also. The Automatic Material Separation system can efficaciously include IR imaging sensors to identify the thermal image of an object, inductive proximity sensors to detect the metallic materials, and an electrochemical sensor to detect the formation of gas due to large amounts of waste collection. The main aim of this proposed work is to segregate garbage or waste substances in specific compartments along with the segregation technique this project also involves an automatic washing sector and a digital counter to prevent the loss of material. Automatic washing sector provides a lot more help to the restaurant and hotel so that they do not have to put an extra effort to wash the material. This invention leads the primary approach towards salvage and reuse of the

material. Reprocessing the garbage materials will lead the economic condition of the globe in a large amount as well as recycling of plastic material will reduce the more and more production of plastics which are causing more harm to the earth and also to human beings.

REFERENCES:

1. Fehr M, Melo Vasques De Castro MS, Calçado MDR. Condominium waste management by private initiative: A report of a 10-year project in Brazil. *Waste Manag Res.* 2010;
2. Gabrielle B, Da-Silveira J, Houot S, Michelin J. Field-scale modelling of carbon and nitrogen dynamics in soils amended with urban waste composts. *Agric Ecosyst Environ.* 2005;
3. Jha M, Markandey N, Markandey D. Effective management and disposals of municipal solid wastes strategy for Indian cities. *Indian J Environ Prot.* 2013;
4. Gatoo AH, Singla S. Feasibility of plastic and rubber emulsified road pavements & its contribution to solid waste management in India. *Int J Adv Sci Technol.* 2020;
5. Zargar K, Singla S. Impact of pet plastic waste on mechanical properties of mix concrete design. *Int J Sci Technol Res.* 2020;
6. Mir MA, Verma P. Use of polyethylene waste with stone dust in flexible pavement. *Int J Sci Technol Res.* 2019;
7. Gowramma B. Comparative Study on Biodegradation of Polythene (Pe) and Cellulose Acetate Plastic (Ca) Using Natural Soil Flora. *Peer Rev J Int J Multidiscip Res Rev.* 2016;
8. Van Zomeren A, Comans RNJ, Van Der Sloot HA. A Rapid Procedure for Assessment of Humic Substances and Biodegradable Components of Organic Matter. *Present Sardinia 2007, Elev Int Waste Manag Landfill Symp.* 2007;
9. Chandel SK, Goyal R, Singla S. Utilization of construction waste as partial replacement of aggregates in cement concrete. *Int J Innov Technol Explor Eng.* 2019;
10. Boehncke A, Koennecker G, Mangelsdorf I, Wibbertmann A. Concise international chemical assessment document 6. *IPCS Concise Int Chem Assess Doc.* 1999;
11. Cheema S. Metagenomic approach to study the polyhydroxyalkanoate genes in hydrocarbon contaminated site. *ProQuest Diss Theses.* 2011;
12. Zaheer A, Naveen M, Santosh MK, Imran K. Solubility enhancement of poorly water soluble drugs: A review. *International Journal of Pharmacy and Technology.* 2011.
13. Mathur G, Ghai W, Singh RK. A totalitarian technique for wormhole detection using big data analytics in iot network. *Int J Sci Technol Res.* 2020;
14. Singh S, Mamatha KR, Ragothaman S, Raj KD, Anusha N, SusmiZacharia. Waste Segregation System Using Artificial Neural Networks. *Helix.* 2017;
15. Jayson M, Hiremath S, Lakshmi RH. SmartBin-Automatic waste segregation and collection. In: *Proceedings of 2018 2nd International Conference on Advances in Electronics, Computers and Communications, ICAECC 2018.* 2018.
16. Bilal M, Singh N, Rasool T. A model supported biomedical waste for the enhancement of mechanical properties of concrete. *Model Earth Syst Environ.* 2021;

17. Iyer M, Tiwari S, Renu K, Pasha MY, Pandit S, Singh B, et al. Environmental survival of SARS-CoV-2 – A solid waste perspective. Environ Res. 2021;
18. Wani IA, Sheikh IM, Maqbool T, Kumar V. Experimental investigation on using plastic wastes to enhance several engineering properties of soil through stabilization. In: Materials Today: Proceedings. 2021.
19. Rafeeq M, Ateequrrahman A, Alam S, Mikdad M. Automation of plastic, metal and glass waste materials segregation using arduino in scrap industry. In: Proceedings of the International Conference on Communication and Electronics Systems, ICCES 2016. 2016.
20. Sharma RK, Sharma J, Rai D V., Zafar M. Cod reduction from industrial wastewater using thermal liquid-phase oxidation technique. Int J Chem Sci. 2013;
21. Shaida MN, Singla S. Global biomedical waste management issues and practices. Int J Innov Technol Explor Eng. 2019;
22. Kumar V, Singla S, Garg R. Strength and microstructure correlation of binary cement blends in presence of waste marble powder. In: Materials Today: Proceedings. 2020.
23. Chen Z, Li JS, Poon CS. Combined use of sewage sludge ash and recycled glass cullet for the production of concrete blocks. J Clean Prod. 2018;

SECURITY OF BLOCKCHAIN AT A GLANCE

Dr. Shambhu Bhardwaj*

*Department of Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email id- shambhu.bhardwaj@gmail.com

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ABSTRACT

Blockchain is a technology that is decentralized. It has a lot of power when it comes to solving business issues. Blockchain technology has a lot of potential in a variety of applications, and it may be used for a variety of infrastructure. The technology makes resource management easier and communication more secure and efficient. A blockchain transaction's records are encrypted, and each transaction is linked to previous transactions or records. Algorithms on the nodes verify blockchain transactions. A transaction cannot be initiated by a single entity. Finally, blockchains provide transparency by allowing any participant to see transactions at any moment. Smart contracts provide safe transactions, reducing the risk of third-party interruption. Ethereum is a smart contract-based decentralized platform. This allows developers to build markets that transfer money according to instructions provided years ago. Decentralization and immutability are two key characteristics of block chain. Faster transactions, transaction and validation in seconds, and so forth.

KEYWORDS:*Block Chain, Glance, Risk, Security, And Transaction.*

7. INTRODUCTION

Blockchain technology offers a lot of promise for a lot of different applications, and it can be used for a lot of different infrastructure. The technology facilitates resource management and ensures secure and efficient communication (1). When parties perform financial transactions using Blockchain, trust is enhanced since it lowers the risk of fraud and automatically creates a record of operations. Making an automatic background check for any system member. Blockchain increases trust and lowers risk when entering into a commercial deal with an unknown person because of its decentralized characteristics (2–5).

Today, everyone uses sophisticated technology to communicate through the internet. Voice calls, video calls, texts, and images are all sent via the internet straight from sender to recipient. Between the sender and the recipient, a trusted third party must be maintained for this transaction. In the conventional system, when it comes to money transactions, individuals must trust a third party to execute the transaction. However, in the case of blockchain, it will provide complete transaction security. Every transaction should be recorded in a block, which will serve as a record book. A block is added to the blockchain as a permanent database whenever a transaction is completed. When a block is finished, it is either added to another block or a new block is created. Every block contains a hash of the block before it.

7.1. Key Attributes of Blockchain Technology:**7.1.1. Decentralization**

Decentralization is not to be confused with centralization. It gives you greater security and flexibility than a centralized app. Because quick decision-making is needed, many companies have chosen decentralization. Everything is done in the same place in a centralized atmosphere. When a decentralized environment is used in many locations, it is referred to as a distributed environment (6). It is capable of delivering both efficiency and innovation. Efficiency is concerned with cost and time savings, and it should result in a superior outcome. New ideas are generated through innovation. Fig. 1 illustrates different types of networks.

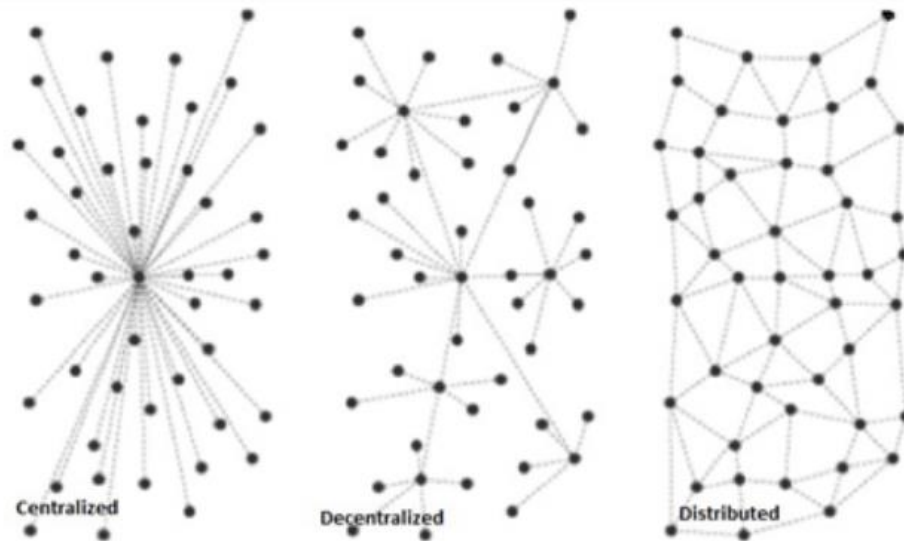


Fig. 1: Network Comparison(7)

7.1.2. Trust:

Each block in Blockchain technology contains information about the block before it. During the transaction, it will offer an authentication method. There is no contact with a third party. Instead of this, a public ledger will be used. This ledger should automatically record all transactions.

7.1.3. Transparent:

The data recorded on the blockchain is both visible and unchangeable. That is why blockchains are regarded as trustworthy and transparent.

7.2. Public And Private Blockchain:

Public, private, and consortium blockchains are the three major kinds of blockchain as listed in Table 1 (8). The emphasis of this paper is on a comparison of public and private blockchains based on certain recent properties. In terms of functionality, public and private blockchains should have many parallels as well as differences.

8. DISCUSSION**8.1. Challenges in Blockchain:**

Blockchain has encountered several difficulties in the business, particularly during bitcoin transactions (9). The issues with the Bitcoin blockchain's functionality are listed below. Below is a list of some common difficulties.

8.1.1. Scalability

The number of transactions is growing every day. For their transaction procedure, the majority of businesses recommended blockchain. All transactions must be saved, and they will all be verified. The block's capacity will be very limited. Some transactions must be postponed because the miner prefers large transaction fees. As a result of the high block size, the propagation speed will be slowed. As a result, the scalability issue is very complex.

There are a few ways to get around the scalability issue with blockchain:

- Storage Optimization of blockchain
- Redesigning blockchain

8.1.2. Privacy Leakage:

When it comes to sensitive data, users think that blockchain provides greater privacy. Instead of their identity, individuals on the blockchain might only create an address. Meiklejohn demonstrated in 2013 and Kosba in 2016 shown that blockchain cannot ensure international privacy (10,11). According to a recent research, bitcoin transactions are connected to an account address, revealing the users identity. The issue was that the user's identity was leaked.

This issue can be solved using the Elliptic Curve Diffie- Hellman- Merkle (ECDHM) algorithm. The public and private keys will be discussed. This will allow two individuals to communicate shared secrets. It will aid in the secure transmission of messages over the internet. To make transactions safe, a secure platform like as smart contracts and ethereum is being created(12–15).

8.1.3. MITM Attack:

The acronym MITM stands for Man in the Middle Attack (16). Third-party contact is the term for this. In this case, a user intervened, perhaps with a counterfeit public key. He can simply decode the sensitive data with this key. The public key is distributed among all participating nodes in a blockchain. Each block should have a connection to the one before it and the one after it. As a result, the public key is immutable and cannot be attacked by counterfeit keys.

8.1.4. DDoS Attack:

DDoS (Distributed Denial of Service) is a kind of assault that targets a single system, such as a computer, website, server, or other network resource (17). As a result, inbound communications or the target system's connection may slow down, or possibly crash or shut down. DDoS attacks, particularly in the blockchain space, pose a major economic risk. This kind of assault is almost difficult to avoid.

One of the most popular solutions for DDoS attacks is a flow analytic device. This gadget will keep an eye on the attackers and respond accordingly. This will indicate the next course of action. This gadget would assist with traffic congestion clearing. Because the harmful traffic will be redirected.

8.2. Security Features of Blockchain:

In a blockchain, a ledger should record each and every transaction. This ledger can't be changed. Data that has already been saved cannot be changed or removed. This ledger is a decentralized application in blockchain technology. As a result, no one can see the transaction or any sensitive data stored in this ledger. A ledger is the sole way for people to read information.

The block chain is another kind of security feature. Each block in a blockchain should have a hash value. The preceding hash links these blocks together. If an attacker intervenes to fix the data, the hash will be altered. It will have an impact on the whole chain. As a result, sensitive data or information will be better protected.

A decentralized application is blockchain technology. It will primarily facilitate peer-to-peer communication. As a result, a network node is regarded as a computer. The distributed ledger should be replicated over these thousands of nodes. This is where the transaction should be authenticated. A transaction cannot be carried out if any of the nodes do not agree to it. As a result, it will be canceled. This will guard against a fraudulent transaction(14,15,18).

8.3. Applications of Blockchain Technology:

8.3.1. Blockchain for Health Care Industry:

In today's world, patients are wary about disclosing medical information to strangers. In this instance, the patient may utilize this technology to keep all of his or her information safe from prying eyes. This blockchain may be accessed via a website or a mobile application. In a blockchain, each and every user has two keys. There are two types of keys: public and private. Only those who use this may make a transaction. There are two people named Alice and Bob, for example. Alice wants to send Bob some confidential information. As a result, Alice uses her private key to sign a digital signature. That is to say, the private key is always used as a password. Then, using her public key, she will hash the data and create an address. The digital signature is then validated by Bob. They will make a transaction if it is validated. Potions information may be secured from prying eyes by using these types of security measures.

8.3.2. Electronic Medical Records:

Patients may use blockchain technology to manage their electronic medical records. The majority of health-care facilities should not give patients access to their medical records. Patients are growing more dissatisfied with the confidentiality of their medical data. All of this can be prevented thanks to blockchain technology.

Blockchain should deal with various frameworks for managing authentication, secrecy, and responsibility while dealing with electronic medical records. It is mostly utilized while dealing with sensitive information. Blockchain will function as a decentralized application for online electronic records. All applications should be completed in a centralized environment. However, in a decentralized system, the application needs be carried out in many locations.

Some difficulties and constraints should be mitigated by using electronic medical records. During the deployment of the individually controlled system, this system will encounter several significant difficulties. That is, personal records would take the role of provider or hospital records. To complement the current data, a portion of the individually controlled records would be downloaded into the institutional record.

Blockchain can help you avoid these problems. Because blockchain facilitates a two-party transaction based on a key exchange. Their personal identity is kept hidden from the rest of the world. They're just revealing their primary identify. In a blockchain, each user should have one public key and one private key.

8.3.3. Blockchain to Protect Personal Data:

There has been a significant rise in the number of reported security incidents involving user personal data. As a result, the data is in the control of a third party, who will gather all personal information. Blockchain eliminates the need for a third party and allows transactions to be made directly between two parties.

In our environment, the quantity of data has lately increased. The biggest online social network, Facebook, has amassed 300 petabytes of personal data. Personal or sensitive information should never be left in the hands of a third party. They are being attacked and abused. Users do not have to trust any third parties because of blockchain. Users are recognized as the proprietors of their personal data on the blockchain. Blockchain should be governed by its own set of regulations. It's referred to as a smart contract. The gateway keeper should establish certain rules before beginning a transaction, which will be expressed as a contract. It'll allow for peer-to-peer communication. Bitcoin has shown in the financial world that it can be trusted and that computation can be done in a decentralized network. Blockchain is primarily intended for use with bitcoin, a digital money(19).

8.3.4. Bitcoin:

Bitcoin is a kind of digital money that is generated and stored digitally. It's a decentralized application. This has direct control over digital money transfers. Bitcoin's value has risen in recent months. One of the major problems that Bitcoin attempts to address is the distributed tracking and confirmation of transactions. It will save the whole transaction history. Blockchain was created primarily for the purpose of transacting this digital money. Who can filter the recent history if the user wants it? Before proceeding with a transaction, the rules and regulations will be established in the form of a smart contract. Only two people may conduct a transaction, and the sender must first provide a digital signature. This digital sign verifies the transaction. If this sign is genuine, the transaction will continue, implying that bitcoin will be exchanged(20).

- **Smart Contract:**

A crypto contract is another name for a smart contract. Nick Szabo suggested smart contracts for the first time in 1994. It is a computer software that regulates the transmission of digital money directly. Blockchain technology is used to store these contracts. A decentralized system is a smart contract. It was split into two groups. It is unnecessary to pay a middleman. It will help you save time and avoid confrontation. In smart contracts, ledger is utilized. It's a decentralized program.

- **Ledger:**

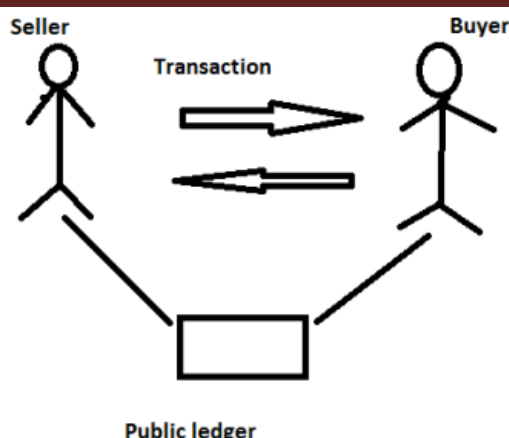


Fig. 2: Ledger

In a blockchain, a ledger as depicted in Fig. 2, is a decentralized program that is allocated to each user. When you finish a transaction, it will be immediately entered in the ledger. There are two people named A and B, for example. Person A is required to pay person B 100 rupees. In this blockchain, there is another individual. They also keep their own ledger. This information will be updated in everyone's ledger automatically. Person A said that B should only get ten rupees. After that, there will be a voting system. This voting method may demonstrate that person A's assertion is untrue. As a result, it will be rejected. All crypto currency transactions should be recorded on this public ledger. There is no centralized data store or administrator(14,18,21,22).

9. CONCLUSION

Blockchain has been a hot subject in the last year, and it will enable a variety of applications. During every transaction of any value, blockchain will provide better security. This technology is primarily intended for bitcoin transactions. Blockchain applications include smart contracts, Ethereum, and distributed ledgers. More security will be provided as a result of this. Bitcoin is the best-suited and most widely utilized blockchain application. Blockchain enables transactions to be completed quicker and at a lower cost than any other application. It will improve security, particularly for sensitive data. Transparency and immutability are frequently seen as additional advantages in blockchain applications. The security of blockchain technology is discussed in this study. We may deduce from this review study that blockchain technology has certain security concerns. These security concerns should have an impact on transactions as well. This technology has the potential for many kinds of assaults, and it also provides some answers to these problems. Blockchain networks may be divided into three categories. There are three types of public, private, and consortium entities. The focus of this review paper is only on public and private blockchain.

REFERENCES

1. Dinh TTA, Liu R, Zhang M, Chen G, Ooi BC, Wang J. Untangling Blockchain: A Data Processing View of Blockchain Systems. IEEE Trans Knowl Data Eng. 2018;
2. Gatteschi V, Lamberti F, Demartini C, Pranteda C, Santamaria V. To Blockchain or Not to Blockchain: That Is the Question. IT Prof. 2018;
3. Agarwal N, Rana A, Pandey JP. Guarded dual authentication based DRM with resurgence

-
- dynamic encryption techniques. *Enterp Inf Syst.* 2019;
4. Hussain I, Pandey N, Singh AV, Negi MC, Rana A. Presenting IoT Security based on Cryptographic Practices in Data Link Layer in Power Generation Sector. In: *ICRITO 2020 - IEEE 8th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions)*. 2020.
 5. Pradhan D, Som S, Rana A. Cryptography Encryption Technique Using Circular Bit Rotation in Binary Field. In: *ICRITO 2020 - IEEE 8th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions)*. 2020.
 6. Liu J, Li B, Chen L, Hou M, Xiang F, Wang P. A data storage method based on blockchain for decentralization DNS. In: *Proceedings - 2018 IEEE 3rd International Conference on Data Science in Cyberspace, DSC 2018*. 2018.
 7. Angrish A, Craver B, Hasan M, Starly B. A Case Study for Blockchain in Manufacturing: “fabRec”: A Prototype for Peer-to-Peer Network of Manufacturing Nodes. In 2018.
 8. Praveen Jayachandran. The difference between public and private blockchain. *Ibm.* 2017;
 9. Yeoh P. Regulatory issues in blockchain technology. *J Financ Regul Compliance.* 2017;
 10. Meiklejohn S, Pomarole M, Jordan G, Levchenko K, McCoy D, Voelker GM, et al. A fistful of bitcoins: Characterizing payments among men with no names. In: *Proceedings of the ACM SIGCOMM Internet Measurement Conference, IMC*. 2013.
 11. Kosba A, Miller A, Shi E, Wen Z, Papamanthou C. Hawk: The Blockchain Model of Cryptography and Privacy-Preserving Smart Contracts. In: *Proceedings - 2016 IEEE Symposium on Security and Privacy, SP 2016*. 2016.
 12. Singh JP, Mamta, Kumar S. Authentication and encryption in Cloud Computing. In: *2015 International Conference on Smart Technologies and Management for Computing, Communication, Controls, Energy and Materials, ICSTM 2015 - Proceedings*. 2015.
 13. Mahajan P, Rana A. Sentiment classification-how to quantify public emotions using twitter. *Int J Sociotechnology Knowl Dev.* 2018;
 14. Singh G, Garg S. Fuzzy Elliptic Curve Cryptography based Cipher Text Policy Attribute based Encryption for Cloud Security. In: *Proceedings of International Conference on Intelligent Engineering and Management, ICIEM 2020*. 2020.
 15. Kalra GS, Talwar R, Sadawarti H. Robust blind digital image watermarking using DWT and dual encryption technique. In: *Proceedings - 3rd International Conference on Computational Intelligence, Communication Systems and Networks, CICSyN 2011*. 2011.
 16. Conti M, Dragoni N, Lesyk V. A Survey of Man in the Middle Attacks. *IEEE Communications Surveys and Tutorials.* 2016.
 17. Javaid U, Siang AK, Aman MN, Sikdar B. Mitigating IoT device based DDoS attacks using blockchain. In: *CRYBLOCK 2018 - Proceedings of the 1st Workshop on Cryptocurrencies and Blockchains for Distributed Systems, Part of MobiSys 2018*. 2018.
 18. Kakkar A, Goel R, Bansal PK. Security system using algorithm for overload rules to reduce error in network services. *WSEAS Trans Inf Sci Appl.* 2006;

19. Al-Bahri B, Noronha H, Pandey J, Singh AV, Rana A. Evaluate the Role of Big Data in Enhancing Strategic Decision Making for E-governance in E-Oman Portal. In: ICRITO 2020 - IEEE 8th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions). 2020.
20. Tripathi S, Nasina J. Adoption of Cloud Computing in Business: A Multi-Case Approach to Evaluate the Fit-Viability Model (FVM) 2017. J Enterp Inf Manag. 2017;
21. Bala L, K. Vatsa A. Quality based Bottom-up-Detection and Prevention Techniques for DDOS in MANET. Int J Comput Appl. 2012;
22. Agarwal N, Rana A, Pandey JP, Agarwal A. Secured sharing of data in cloud via dual authentication, dynamic unidirectional PRE, and CPABE. International Journal of Information Security and Privacy. 2020.

REVIEW ON WATERCHILLER

Dr. S.R.Ali*

*Faculty of Engineering,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email id- drsrali.engineering@tmu.ac.in

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ABSTRACT

The compressor, condenser, evaporator, and expansion device are the major components of a chiller, which cools a fluid by extracting heat from it, either through a vapour compression or absorption refrigeration cycle. This research focuses on examining the design technique used in the industry and evaluating the performance of two distinct configurations of a 5 tonne chilling plant. Scroll compressor and plate heat evaporator and scroll compressor and shell and tube evaporator with R404A refrigerant were the two designs tested. In comparison to the configuration scroll compressor and shell and tube evaporator, the findings of this experiment suggest that the configuration scroll compressor and plate heat evaporator can provide better results. This article includes a critical examination of the evolution of design approaches as well as a summary of the key processes to be followed in plant design. Its goal is to present studies on the subject, as well as to highlight specific results and uncover flaws that hinder these systems from being designed optimally.

KEYWORDS: Cop, Evaporator, Refrigerant, Water, Water Chiller.

INTRODUCTION

A water chiller is a generic phrase that refers to a system that includes a refrigeration plant, a water chiller, and an air or water cooled condenser. The compressor, condenser, and chiller, as well as internal pipes and controls, are all merged into a single unit under this designation. Small capacity reciprocating compressor systems with air or water cooled condensers to large facilities integrating centrifugal or screw compressors are examples of water chiller plants(1). The compressor, evaporator, condenser, and thermostatic expansion valve are the fundamental components necessary for mechanical refrigeration(2), despite the fact that the overall chiller package is more sophisticated. Chillers are mostly used for air conditioning(3). Larger buildings with larger capacities, such as office buildings, shopping malls, hospitals, universities, and schools, are typical comfort air conditioning applications. When temperature and humidity must be tightly controlled, process air conditioning is used. These include laboratories, computer rooms, operation theatres, and key production environments, which may require simultaneous chilling and reheating. Any manufacturing process that generates heat that needs to be rejected qualifies for process cooling(4). Plastics, food, and a variety of other manufacturing processes are common examples. For Chilling Plant applications, we calculate the required capacity of the chilling plant by using the following formula:

$$Q = M \times C_p \times \Delta T / 3024$$

Where

Q=Quantity of heat exchanged (TR/Hr) W = Flow rate of fluid (LPH)

C=Specific heat of fluid (°C)

ΔT = Temperature change of fluid (°C) M=mass of the product per hr.

$$COP = Q/W$$

Q= heat exchanged in condenser (condenser) W=net work done by the system (compressor)

The following factors must be carefully examined while choosing water chillers:

1. Performance characteristics under full load and part load conditions. The water chiller must be able to reduce the refrigeration capacity when the cooling load of the building falls in order to operate efficiently(5).
2. When choosing a water chiller, it's important to consider the minimal load that the chiller may be required to handle. Reciprocal compressors, for example, can unload to 12–15 percent, centrifugal chillers to 20–25 percent, and screw compressors to 10–15 percent(6). If this turn down ratio is insufficient to meet the building's minimal cooling requirements, numerous chillers will be required to achieve energy-efficient operation(7). To limit compressor energy consumption, the chilled water temperature should be kept as high as possible. In most cases, a 1°C increase in chilled water temperature reduces compressor energy input by about 5%.
3. The temperature differentials between the condenser and chiller heat exchangers should be as small as possible. High temperature differentials cause a reduction in water flow rate and, as a result, in pumping energy.

All-Water centralized systems, sometimes known as "chillers," are a form of air conditioning plan that lets buildings to satisfy their interior space thermal conditioning requirement. They are primarily distinguished by the use of water as a heat carrier fluid, which extracts heat from the medium and, as a result, lowers the air temperature through a heat thermo-transfer process(8). When compared to individual acclimatization systems, these systems offer numerous advantages in terms of operation, reliability, and efficiency. An electrical compression cycle or a thermal sorption cycle can be used to run the chiller. Compressors can be divided into four types: reciprocating, centrifugal, screw, and scroll compressors. They might be either absorption or adsorption in the sorption cycle. According to the type of individual compressor and the coefficient of performance, these chillers are available in a variety of chilling capacity ranges. Chiller plant design is concerned with determining the cooling capacity and configuration of the system.

2. ANALYSIS

2.1 Design Procedure:

Customer probing for temperature difference (Temperature necessary) to be maintained in the evaporator(9) or for water and flow rate of water is part of the design approach used in the industry. In most circumstances, the corporation chooses the refrigerants to be utilized, but in rare cases, the consumer is considered. The capacity of the chilling plant is next estimated, followed by the compressor's capacity, condenser's capacity, and evaporator's capacity(10). Following the determination of all equipment capacities, all equipment is either designed in-house or imported from other industries. Equipment for 5 tone chilling plants is imported from other wanders and assembled at medium and small size companies(11). The machine is tested for performance after it has been assembled. The temperature is kept between 5 and 10 degrees Celsius before being delivered to the customer. If a problem is discovered, the machine is sent to the production department for further investigation(6).

2.2 Equipment Selection:

The compressor, condenser, evaporator, and expansion valve are the four basic components of equipment selection. The compressor is chosen based on the calculated compressor capacity(12) and the performance data sheet provided to the industries. Scroll and hermetic compressors are the two types of compressors used for 5 tonne chilling plants(13), according to data provided by the industries. The same selection criteria apply to the condenser and evaporator. The evaporator used in a 5 tonne chilling plant is a heat exchanger that is occasionally selected based on customer information. There are two types of evaporators that are commonly used: Heat exchangers(14) of the shell and tube type as well as plate heat exchangers are available. There is no difference in kinds for 5 tonne based air cooled condensers; the same type condenser is used in all cases of 5 tonne chilling plant(15). The TEX(16) - 2 expansion valve is utilized, and its size is determined by the notional cooling capacity(17) and the pressure differential that must be maintained. Which is chosen based on the performance data sheet provided by the industry.

2.3 TestingSetup:

1. DigitaltempSensorofrange-50 TO99
2. Digitalthermometer ofrange-50°cto99°c
3. pressurerange:ThinkandmicapressuregaugeSuctionrange 0-250psi
4. Dischargerange(-30)-350psi

3. PROCEDURE TESTING:

1. Temperature sensor are attached through tape atliquid line, evaporator outlet, expansionvalveand one sensor is permanently installed in thetank
2. Pressuregaugesareconnectedtosuctionanddischargeline.
3. Temp and pressure readings are note down forevery5mininterval.
4. In the above experiment same water is circulatedfrom the tankwithout the addition of applicationwater, which is added or subtracted continuouslyatconstantrateddependinguponthetypeofapplication.

Twodifferentcombinationarettestedwhichincludes.

3.1 DesignCalculation:

The following aspects must be taken into account for the design a water chiller of a plant:

1. Total plant capacity.
2. Total, of chillers to install.
3. Distribution of cooling capacity.
4. Hydraulic arrangement.

3.2 Hydraulic Arrangement between Chillers.

A plant can be configured in three different ways: series, parallel(18) or mixed chillers. A hybrid or mixed configuration is when a series of chillers are configured in series, while operating in parallel with another arrangement of chillers also configured in series(7). Although there is no general criterion about which provision is the best to use (since there are different design, exploitation and external factors that determine the advantages and disadvantages of each interconnection form), most plants are interconnected in parallel shown in Figure 1.

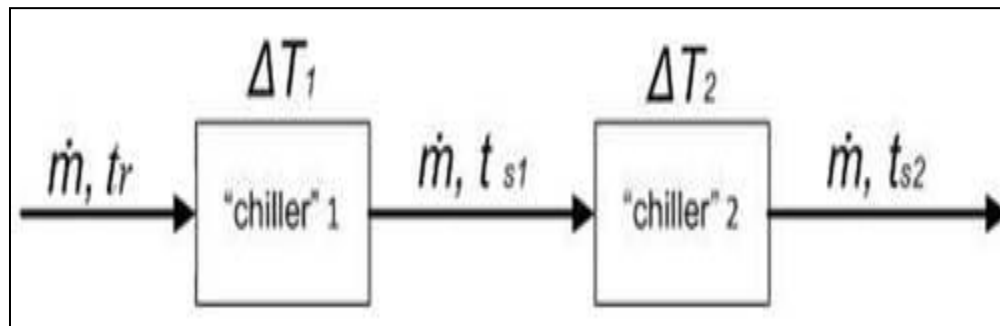


Figure 1: Series connection

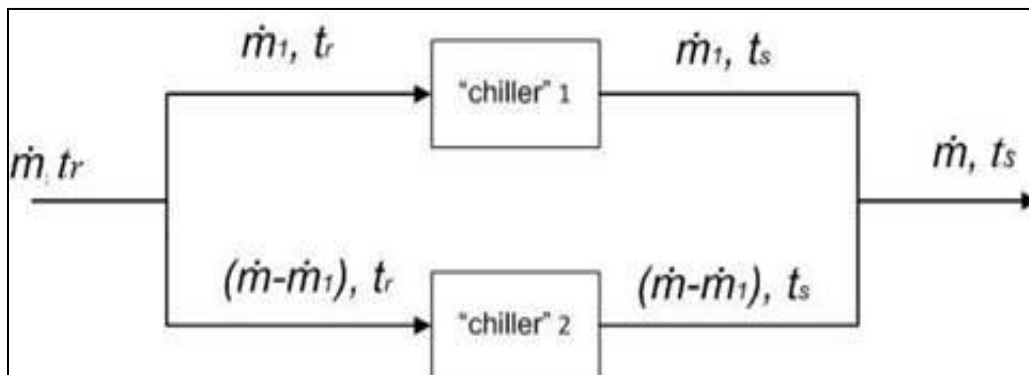


Figure 1: Parallel connection

DISCUSSION

This paper gives an overview of different simulation methodologies that can be used to forecast the in-situ (dynamic) performance of vapors-compression liquid chillers under various operating situations. Stable and transient physical models, as well as steady-state and transient neural network models, were investigated(19). During quasi-static operation, it was discovered that steady-state models can provide outstanding results (to within 5%). Under more dynamic conditions, however, differences of up to 20% can occur. They also have clear shortcomings

throughout the shutdown process, where they will either significantly overestimate or underestimate the work input(20).

Proposes a steady-state model for estimating the performance of vapour-compression liquid chillers under a variety of operating situations. It uses an elemental NTU-e technique to model the shell-and-tube condenser and evaporator in particular. The method accounts for changes in heat transfer coefficients throughout the heat exchangers, boosting both the physical realism and the accuracy of the simulation model. For the majority of operating conditions for both chillers, the model predicts the electrical work input to the compressor, the coefficient of performance (COP), and the condenser capacity to within 10%.

An oil-injected screw chiller system simulation model is presented in this paper. The impact of operational parameters on the fractional area allotted to each phase within the refrigerant (shell and tube) heat exchangers is investigated using a three-zone approach. With a PLR greater than 0.5, the condenser's sub cooled region accounts for less than 2% of the total area, the two-phase region accounts for up to 73 percent, and the superheated region accounts for roughly 25% of the total area.

The energy usage of chillers was evaluated in this paper using data from a walkthrough energy audit of Malaysian office buildings. For 50 percent and 100 percent loadings in academic buildings, chillers require approximately 42,285MWh and 84,569MWh of electric energy, respectively. As a result of this research, it was discovered that employing energy efficient chillers for different percentages of loadings can save 90MWh-896MWh of energy. For high-efficiency chillers with a 50% chiller load, a bill reduction of US\$57,314 can be reached in addition to energy savings. This study also suggests that for 60 percent of speed red, 35,975 MWh of energy and US\$2,302,431 in bill can be avoided.

5. CONCLUSION

Chillers are housed at a central location. When compared to separate air conditioning systems, all-water systems are defined by the use of water as a heat transport fluid, which provides various advantages in terms of operation, dependability, and efficiency. In chiller plant design, total plant capacity, chiller number to be installed, cooling load distribution, and hydraulic chiller configuration should all be addressed. Each example is followed by a set of recommendations. The usual process for designing chiller plants only entails identifying the maximum plant cold capacity and then selecting chiller load distribution using rules or recommendations such as: apply an SF; set an unmet hour; set extra chillers (redundancy). At least two chillers must be present in the plant; it must also be configured in a symmetrical manner, with a parallel layout between them. The resilient chiller plant design is a superior concept that uses thermo-economics analysis to select the plant's components, resulting in better results. Despite this, the distribution of chiller loads is not determined by the behaviour of cooling loads. And, while optimal load analysis and optimal sequence analysis are described as ideal solutions, no optimization software is used, and artificial intelligence methods are used to ensure that the solution provided is unquestionably resilient.

REFERENCE:

1. Al Quabeh H, Saab R, Ali MIH. Chilled water storage feasibility with district cooling chiller in tropical environment. J Sustain Dev Energy, Water Environ Syst. 2020;

2. Alrwashdeh SS, Ammari H. Life cycle cost analysis of two different refrigeration systems powered by solar energy. *Case Stud Therm Eng.* 2019;
3. Davis LW, Gertler PJ. Contribution of air conditioning adoption to future energy use under global warming. *Proc Natl Acad Sci U S A.* 2015;
4. Sharma S, Bajaj H, Bhardwaj P, Sharma AD, Singh R. Development and characterization of self emulsifying drug delivery system of a poorly water soluble drug using natural oil. *Acta Pol Pharm - Drug Res.* 2012;
5. Kalra GS, Talwar R, Sadawarti H. Blind digital image watermarking robust against histogram equalization. *J Comput Sci.* 2012;
6. Kaushal G, Singh H, Prakash S. High temperature corrosion behaviour of HVOF-sprayed Ni-20Cr coating on boiler steel in molten salt environment at 900°C. *Int J Surf Sci Eng.* 2011;
7. Sharma BK, Agarwal RP, Singh R. An efficient software watermark by equation reordering and FDOS. In: *Advances in Intelligent and Soft Computing.* 2012.
8. Bhargava A, Anand M, Sharma A, Saji J, Sihag J, Prakash D. Uses of bio-adsorbents for the purification of water: A step towards the welfare of human society. *Res J Pharm Technol.* 2019;
9. Diallo TMO, Yu M, Zhou J, Zhao X, Ji J, Hardy D. Analytical investigation of the heat-transfer limits of a novel solar loop-heat pipe employing a mini-channel evaporator. *Energies.* 2018;
10. Kaushal G, Singh H, Prakash S. High-temperature erosion-corrosion performance of high-velocity oxy-fuel sprayed Ni-20 Cr coating in actual boiler environment. *Metall Mater Trans A Phys Metall Mater Sci.* 2011;
11. Cha SH, Son JH, Jamal Y, Zafar M, Park HS. Characterization of polyhydroxyalkanoates extracted from wastewater sludge under different environmental conditions. *Biochem Eng J.* 2016;
12. Aprea C, de Rossi F, Greco A, Renno C. Refrigeration plant exergetic analysis varying the compressor capacity. *Int J Energy Res.* 2003;
13. Jouyban Z, Hasanzade R. Chilling stress in plants. *Int J Agric Crop Sci.* 2013;
14. Zohuri B. Heat Exchanger Types and Classifications. In: *Compact Heat Exchangers.* 2017.
15. Sharma RK, Sharma J, Rai D V., Zafar M. Cod reduction from industrial wastewater using thermal liquid-phase oxidation technique. *Int J Chem Sci.* 2013;
16. Man K. TEX for the impatient. *Adv Eng Softw.* 1992;
17. Mota-Babiloni A, Navarro-Esbrí J, Mendoza-Miranda JM, Peris B. Experimental evaluation of system modifications to increase R1234ze(E) cooling capacity. *Appl Therm Eng.* 2017;

18. U.S. DOE. Combined Heat and Power Technology Fact Sheet Series. Reciprocating Engines. Comb Heat Power Technol Fact Sheets Ser. 2016;
19. Zaheer A, Naveen M, Santosh MK, Imran K. Solubility enhancement of poorly water soluble drugs: A review. International Journal of Pharmacy and Technology. 2011.
20. Ahuja R, Purnima, Haque MJ, Tanwar S, Gautam N, Rana A. Secure and Robust Watermarking Scheme based on Motion Features for Video Object. In: ICRITO 2020 - IEEE 8th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions). 2020.

GENERALIZED REVIEW OF CRYPTOGRAPHY

Dr. Priyank Singhal*

*Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- priyanksinghal1@gmail.com

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ABSTRACT

Organizations all over the globe produce a significant quantity of data on a daily basis, thanks to the introduction of the World Wide Web and the development of ecommerce apps and social networks. The most fundamental problem in ensuring secure data transfer over the internet is information security. As society moves toward a digital information era, network security concerns are also becoming more essential. As more people connect to the internet, cyber-attacks becoming increasingly common. It is necessary to safeguard computer and network security, which are both important concerns. The system is hampered by the harmful hubs. It may make use of the assets of other hubs while still protecting its own. Data security has become a top worry for everyone linked to the internet, as it has merged with our lives and grown at a breakneck pace over the past few decades. Data security guarantees that only the intended recipients have access to our information and prohibits any data modification or change. Various techniques and approaches have been developed to attain this degree of security. In this article, we provide an introduction of network security and the different methods that may be used to improve network security, such as cryptography.

KEYWORDS: Cryptography, Decryption, Encryption, Security, Threats.

10. INTRODUCTION

Because of the rapid development of modern Internet technology and information technology, more individuals, businesses, schools, and government departments are joining the Internet, causing more illegal users to attack and destroy the network at the same time by using fake websites, fake mail, Trojan horses, and backdoor viruses (1–3). Computers are the target of network assaults and intrusions, so if the hackers succeed, thousands of network computers will be rendered inoperable. Furthermore, certain intruders with ulterior intentions target the military and government departments, posing significant risks to social and national security.

Cryptography is a method of ensuring message secrecy. In Greek, the word has a particular meaning: “hidden writing” (4–6). Nowadays, however, people and organizations' privacy is protected by high-level encryption, which ensures that information transmitted is safe and only the authorized recipient has access to it. Cryptography is an ancient technology that is continuously being explored, with historical origins. Examples date back to 2000 B.C., when the ancient Egyptians employed “secret” hieroglyphics, as well as other evidence from ancient Greece and Rome, such as hidden inscriptions and the renowned Caesar cipher (7–9).

Hundreds of millions of individuals use cryptography on a regular basis to secure data and information, but the majority are unaware of it. Cryptographic systems, in addition to being very valuable, are also exceedingly fragile, since a single programming or specification mistake may undermine them.

11. LITERATURE REVIEW

Rani et al. provide an overview of different cryptographic methods used to protect networks, as well as some relevant work previously completed by various authors, issues with current work, and some recommendations for future work (10). Cryptography, according to her, is a technique for secretly storing and transmitting data so that only those who need it can access and interpret it. There are two kinds of cryptography: symmetric key cryptography and asymmetric key cryptography.

Anu et al. examined cryptography's objectives, types, and methods in their study (11–14). They also looked at the different kinds of intrusion attacks and cyber security technologies. They discovered that as communication technology advances, a demand for secure communication develops, which is met by various encryption methods such as cryptography, digital signatures, watermarking, steganography, and so on.

12. DISCUSSION

12.1. Cryptography Concept:

The fundamental idea of a cryptographic system as depicted in Fig. 1 is to encrypt information or data in such a manner that an unauthorized person cannot deduce its meaning. Cryptography is often used to transfer data across an unsecured channel, such as the internet, or to ensure that unauthorized individuals do not comprehend what they are looking at in a situation where they have obtained the information.

In cryptography, the obfuscated data is known as “plaintext,” and the process of concealing it is known as “encryption”. The encrypted plaintext is known as “ciphertext”. This is accomplished via a set of principles known as “encryption algorithms”. Typically, the encryption process uses a “encryption key”, which is given to the encryption algorithm together with the data as input. The receiving side may recover the information using a “decryption algorithm” and the proper “decryption key”.

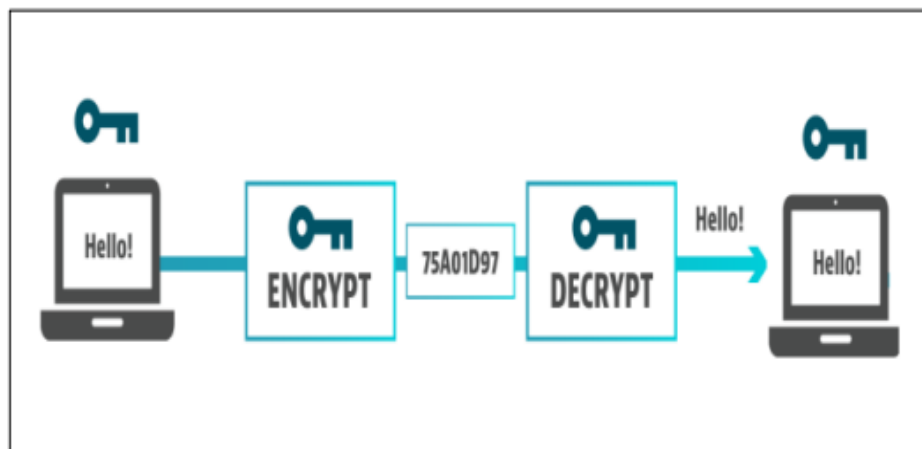


Fig. 1: Cryptography concept (15).

12.2. Historical Algorithms:

This part will present a few historical algorithms, as well as pencil and paper examples for the nonmathematical reader. Long before public key cryptography was introduced, these methods were developed and deployed.

12.2.1. Caesar Cipher

During the Gallic Wars, Julius Caesar, the Emperor of Rome, developed one of the oldest and earliest instances of cryptography. The letters A through Z are encoded using the letters three positions ahead of each letter in the alphabet, like the letters A, B, and C are represented by X, Y, and Z in this kind of method. This implies that a “shift” of 3 is employed, but we could have a similar effect on the encrypted text by using any value between 1 and 25. As a result, a shift is now often referred to as a Caesar Cipher.

The Caesar cipher as shown in Fig. 2 is easy to crack since it is one of the most basic forms of encryption. The letters that were shifted must be moved three letters back to their original places in order to decode the ciphertext. Despite this flaw, it may have been powerful enough for Julius Caesar to employ throughout his battles in the past. However, since the shifted letter in the Caesar Cipher is always three, anybody attempting to decode it just has to move the letters.

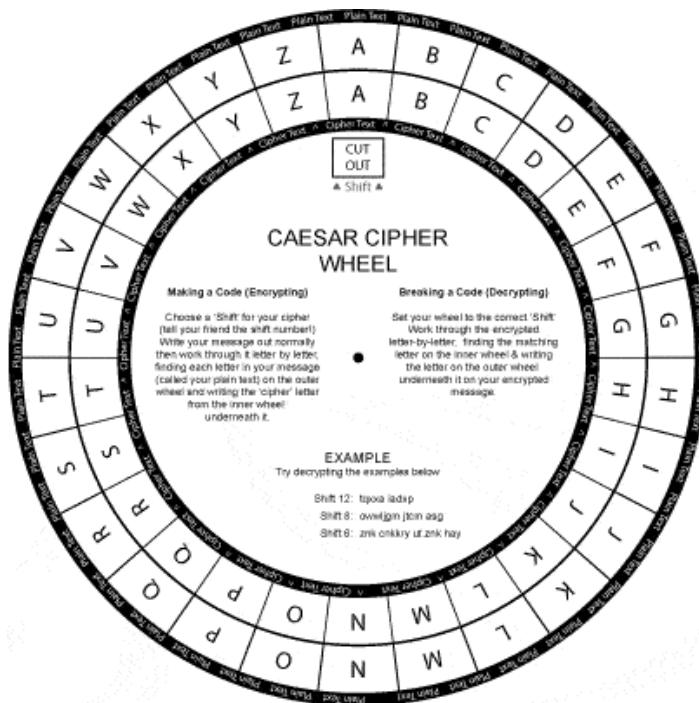


Fig. 2: Caesar Cipher encryption wheel (15)

12.2.2. Simple Substitution Cipher:

The most widely used encryption is the simple substitution cipher, which uses an algorithm to replace every plain text character with a cipher text character. In contrast to the Caesar cipher

method, alphabets are jumbled in this procedure. In a Simple Substitution Cipher, the alphabet letters are placed in random sequence underneath the properly spelled alphabet, as seen here:

A	B	C	D	E	F	G	H	I	J	K	L	M
D	I	Q	M	T	B	Z	S	Y	K	V	O	F
N	O	P	Q	R	S	T	U	V	W	X	Y	Z
E	R	J	A	U	W	P	X	H	L	C	N	G

The same key is used for encryption and decryption. The rule of encryption is “each letter is replaced by the letter below it,” while the rule of decryption is “each letter is replaced by the letter beneath it.” For example, the plaintext CAN's equivalent ciphertext is QDN.

12.2.3. Transposition Ciphers:

Other cipher families use a key and a specific rule to arrange the letters in plaintext to convert them to cipher text. Transposition is the process of changing the letters in plaintext using rules and a particular key. A columnar transposition cipher is one of the most basic kinds of transposition ciphers, and it comes in two flavors: full columnar transposition and partial columnar transposition. A rectangular shape is used to represent the written plaintext horizontally, regardless of whatever form is employed, and its width should match to the length of the key being used. The message may be written in as many rows as needed. When using full columnar transposition, the plaintext is transcribed and any empty columns are filled with null to ensure that each column has the same length. Consider the following scenario:

```

s e c o n d
d i v i s o
n a d v a n
c i n g t o
n i g h t x

```

Depending on the key, the cipher text is then generated from the columns. If we use the key “321654” in this example, the cipher text will be:

cvdng eiaii sdn cn donox nsatt oivgh

When it comes to an incomplete columnar transposition cipher, however, the columns do not have to be filled up, thus the null characters are left out. This results in columns of varying lengths, making deciphering the ciphertext more difficult without the key.

12.3. Modern Algorithms:

12.3.1. Stream Ciphers:

Stream ciphers as illustrated in Fig. 3 uses the key to create pseudorandom bits, and the plaintext is encrypted by XORing the plaintext with the pseudorandom bits. In the past, stream ciphers were often avoided because they were more easily cracked than block ciphers. However, after years of development, the stream cipher has improved in security and can now be used in connections, Bluetooth, communications, mobile 4G, TLS connections, and other applications.

Each bit in a stream cipher is encrypted separately. The first is the synchronous stream cipher, in which the key stream is dependent on the key; the second is the asynchronous stream cipher, in which the ciphertext is reliant on the key stream. A dotted line may be seen in Fig. 3. The stream cipher would be asynchronous if it was present; otherwise, it would be synchronous. An example of an asynchronous cipher is the cipher feedback (CFB).

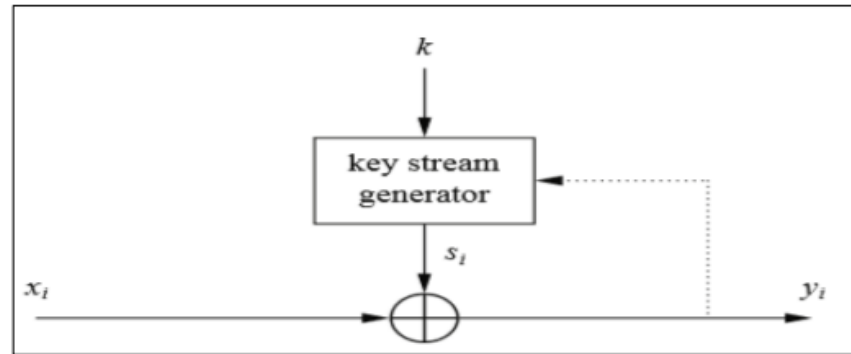


Fig. 3. Illustrates the stream cipher (16)

12.3.2. Block Ciphers:

Fig. 4 depicts the block cipher diagram. This kind of cipher has two algorithms: one for encryption and the other for decryption:

- The encryption method (E) and a plaintext block (P) are given a key (K), and C is the result, which consists of a ciphertext block. $C = E(K, P)$ can be used to express the encryption operation.
- The decryption method (D) is the opposite of the preceding process, which involves decrypting the ciphertext for the plaintext, P. $P = D(K, C)$ is a formula that can be written.

To make the block cipher more secure, a pseudorandom permutation (PRP) is employed. An attacker will not be able to decode the block cipher and calculate the output from any input if the key is kept secret. This is true as long as K's secrecy and randomness are guaranteed from the attacker's perspective. In a broad sense, this implies that the attacker won't be able to spot any patterns in the data that's either input to or output from the block cipher shown in Fig. 4.

The size of the block and the size of the key are usually referred to in a block cipher. The value of both is crucial to the security. A 64-bit or 128-bit block is used in several block ciphers. Because it's critical that the blocks don't become too big, the memory footprint and ciphertext length are both modest. A block cipher processes blocks rather than bits when it comes to ciphertext length. To put it another way, if we wish to encrypt a 16-bit message and replace the blocks with 128-bit blocks, we must first transform the message to 128-bit blocks; only then can the block cipher begin processing and produce a 128-bit ciphertext. When it comes to memory footprint, we require at least 128-bit RAM to work with and process a 128-bit block. Most CPU registers are tiny enough to fit. Alternatively, specialized hardware circuits may be utilized to accomplish this. In most instances, 68 bits, 128 bits, and even 512-bit blocks are still small enough for efficient implementation. However, if the blocks grow in size (i.e., in kilobytes), the cost and performance of the system may suffer.

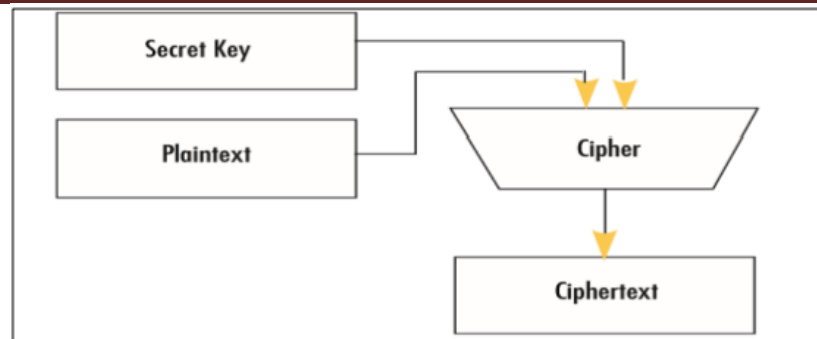


Fig. 4. Block cipher diagram (17)

12.3.3. Hash Functions:

They operate by translating an arbitrarily-sized input to a fixed-size output via a process termed compression, which was formerly known as pseudo random functions (PRF). However, this is not the same as the compression found in .zip and .rar files. It is, instead, a non-invertible mapping. In order to be helpful, a hash function must satisfy two requirements:

- The first requirement is that it be one-way.
- The second characteristic is that it must be resistant to collisions.

The one-way output of a hash function may be regarded a significant feature of it, as can the fact that it is collision resistant, meaning that finding another input that produces the identical result (known as collision) is difficult. There are two types of collision resistance that may be used: preimage collision resistance and second preimage collision resistance.

12.4. Digital Signatures:

Digital signatures, unlike cryptography, did not exist prior to the advent of computers. With the introduction of computer communications, the need for digital signatures to be addressed emerged, particularly in commercial settings where many parties are involved and each must agree to keep their declarations and/or offers confidential (18–20). Unforgeable signatures were originally proposed hundreds of years ago, but they were handwritten signatures. Diffie and Hellman originally proposed the concept of digital signatures in their article “New Directions in Cryptography.”

As a result, in a scenario where the sender and receiver do not have full confidence in one another, authentication alone will not be enough to bridge the gap. Something more is needed, namely a digital signature that functions similarly to a handwritten signature.

13. CONCLUSION

Authentication, integrity, secrecy, and no-repudiation are only a few of the main security objectives that cryptography helps to achieve. To accomplish these objectives, cryptographic algorithms are created. The aim of cryptography is to provide dependable, strong, and resilient network and data security. We presented an overview of some of the research that has been done in the area of cryptography, as well as an explanation of how the various algorithms used in cryptography for various security reasons function in this article. In order to secure personal, financial, medical, and ecommerce data while maintaining a reasonable degree of privacy, cryptography will continue to be used in IT and business strategies.

REFERENCES:

1. Singh R, Kumar H, Singla RK, Ketti RR. Internet attacks and intrusion detection system: A review of the literature. Online Information Review. 2017.
2. Pradhan D, Som S, Rana A. Cryptography Encryption Technique Using Circular Bit Rotation in Binary Field. In: ICRITO 2020 - IEEE 8th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions). 2020.
3. Singh G, Garg S. Fuzzy Elliptic Curve Cryptography based Cipher Text Policy Attribute based Encryption for Cloud Security. In: Proceedings of International Conference on Intelligent Engineering and Management, ICIEM 2020. 2020.
4. Buchanan WJ. Cryptography. Cryptography. 2017.
5. Agarwal D, Tripathi SP, Singh JB. TrFRA: A trust based fuzzy regression analysis. Int Rev Comput Softw. 2010;
6. Abhishekh, Nishad AK. A Novel Ranking Approach to Solving Fully LR-Intuitionistic Fuzzy Transportation Problems. New Math Nat Comput. 2019;
7. Taterka F. Ancient Egyptian Royal Cryptography in the Ramesside Period. Antropol Komun. 2015;
8. Pandya D, Ram K, Thakkar S, Madhekar T, Thakare BS. Brief History of Encryption. Int J Comput Appl. 2015;
9. Nishad AK, Abhishekh. A New Ranking Approach for Solving Fully Fuzzy Transportation Problem in Intuitionistic Fuzzy Environment. J Control Autom Electr Syst. 2020;
10. Rani S, Kaur H. Technical Review on Symmetric and Asymmetric Cryptography Algorithms. Int J Adv Res Comput. 2017;
11. anu seema. A Review on Cryptography, Attacks and Cyber Security. Int J Adv Res Comput Sci. 2017;
12. Gaurav A, Gautam V, Singh R. Exploring the Structure Activity Relationships of Imidazole Containing Tetrahydrobenzodiazepines as Farnesyltransferase Inhibitors: A QSAR Study. Lett Drug Des Discov. 2011;
13. Isha, Rana P, Saini R. Performance of different bit loading algorithms for OFDM at PLC channel. In: Proceedings - 2012 2nd International Conference on Advanced Computing and Communication Technologies, ACCT 2012. 2012.
14. Ali MD, Gupta AK, Naseer A, Mirza MA, Afzal S. Evaluation of aqueous fruit extract of Tamarindus indica (L) for inhibition of tumor necrosis factor- α and cyclo oxygenase enzymes in experimental animal. Asian J Pharm Clin Res. 2018;
15. Caesar Cipher Wheel. Pintrest.
16. Canteaut A, Carpov S, Fontaine C, Lepoint T, Naya-Plasencia M, Paillier P, et al. Stream Ciphers: A Practical Solution for Efficient Homomorphic-Ciphertext Compression. J Cryptol. 2018;
17. Hatzivasilis G, Fysarakis K, Papaefstathiou I, Manifavas C. A review of lightweight block

ciphers. Journal of Cryptographic Engineering. 2018.

18. Hernandez-Ardieta JL, Gonzalez-Tablas AI, De Fuentes JM, Ramos B. A taxonomy and survey of attacks on digital signatures. Comput Secur. 2013;
19. Gaurav A, Gautam V, Singh R. Quantitative structure-activity relationship and design of polysubstituted quinoline derivatives as inhibitors of phosphodiesterase 4. Med Chem Res. 2012;
20. Gaurav A, Gautam V. Identifying the Structural Features of Pyrazolo[4,3-c]Quinoline-3-ones as Inhibitors of Phosphodiesterase 4: An Exploratory CoMFA and CoMSIA Study. Curr Enzym Inhib. 2013;

COMMITMENT TO SAFETY IN THE MANUFACTURING INDUSTRY

Navneet Kumar Vishnoi*

*Faculty of Engineering,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email id- navneet.computers@tmu.ac.in

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ABSTRACT

This article describes one element of a large-scale research of safety culture at 13 industrial firms in the United Kingdom. The research is based on data from three areas of measurement that are important to describing safety culture: workplace evaluations, a survey of employee attitudes toward safety (including questionnaire and interview data), and business accident records. Employee attitudes toward safety as indicated in a self-administered questionnaire were used to predict perceived commitment to safety in this study. The strength of the organization's safety culture was measured by commitment to safety. Employee attitudes toward safety may be predicted based on three factors: management activities for safety, the quality of safety training, and their own personal actions for safety, according to the research. Their views toward safety management activities had the greatest correlation with their commitment to safety. These views were also predictive of the quality of safety instruction and personal safety actions. Surprisingly, the latter were unrelated to assessments of safety commitment.

KEYWORDS: Employee Attitude, Commitment Safety, Industrial Safety, Manufacturing, Safety Action.

1. INTRODUCTION

The main elements and correlates of safety culture in the manufacturing sector of the UK industry are examined in this study(1). It takes into account, in particular, how workers' attitudes may predict their perceived commitment to safety. It is based on the idea that in order to make sense of an organization's safety systems and associated performance outputs, one must first understand the organizational culture for safety. In the early 1980s, cultural theory was one of the most prevalent topics in management literature, and it had a significant impact on public perceptions of organizational performance(2). However, until the early 1990s, especially initially in the nuclear sector, the notion that an organizational safety culture might be an essential organizational characteristic did not receive widespread recognition(3). Despite its late adoption, this concept has since acquired credibility in all areas of business and commerce, and has been recognized as a contributing factor in a number of noteworthy catastrophes, for example(4).

Many proponents of this emerging cultural approach to safety think that safety management systems may be seen as "social" constructs or even "culture artefacts" that incorporate or reflect the cultural products of the business. Culture may be viewed as an emergent feature of

organizational safety processes, as a subsystem of the entire organization, according to an alternative systems theory perspective. Of course, in well-established institutions, both points of view are likely to be correct(5). The design and administration of safety systems reflects the general organizational culture to some degree, while a specific safety culture develops as a reflection of the structure and functioning of such systems. As a result, the safety culture can only be a reflection of the entire corporate culture in this manner(6). Even this method must be seen as limited, given the seeming complexity of organizational culture(7). It is presented here as an argument for utilizing employee attitudes to safety as one of a number of metrics in the description of corporate safety culture, whether it is fully sufficient or not. It has also been said that a good safety culture requires a strong commitment to safety.

As a result, workers' assessments of their commitment to safety may be utilized as a significant indicator of the organization's safety culture's robustness. Process manufacturing is a method of producing completed products by mixing different components according to a predefined formula(8). Food and beverage, oil byproducts, gasoline, medicines, chemicals, plastics, paper, and roll goods are all examples of sectors that utilize it regularly.

Individual projects, small batch production, bulk production, and continuous production are the most common kinds of production methods used in these sectors. Identifying the risks is the first step in addressing manufacturing process safety. This is best accomplished during the equipment's design. The next time you can look for dangers is when you're installing new equipment. Finally, the period after the machine has started producing is the least ideal(9). Exposed moving components, pinch points, uneven surfaces, trip hazards, electrical exposures, hot surfaces, sharp edges or corners, environmental, fall risks, and other dangers may all be hazards. Hazards may now be handled after they have been recognized(10). The Countermeasure Ladder when dealing with recognized safety risks in the production process. The idea of the Countermeasure Ladder "forces" us to think critically about hazard mitigation. When in-depth thought might lead to a better resolution of the danger, too many problems are addressed at the training or audit level(11). Every danger should be addressed as far up the ladder as feasible to ensure that the most effective preventive measures have been identified and can be implemented(12).

The goal of this research was to explain the subjective architecture of safety culture in the UK manufacturing sector by connecting employee attitudes toward safety to their assessments of the organization's commitment to safety. Employee views toward important elements of safety, it was believed, could influence their overall assessment of commitment, either directly or indirectly(13). The first reflected a direct link- age with good attitudes toward personal safety and associated behaviors, all of which influenced the employee's views of commitment in a positive way(14). The second, more indirect, process reflected favorable attitudes about larger system-level problems, indicating actual achievement at that level and a connection between such issues and commitment. As a consequence, it was predicted that the more favorable their views about safety were, the higher their assessment of safety commitment would be(15). The research was based on a questionnaire survey of the whole workforce of 13 manufacturing companies in the United Kingdom. Each of these businesses specialized in the same industry and employed between 200 and 400 people. The poll yielded a total of 3329 properly completed answers, for a response rate of 73 percent. There was no reason to assume that the sample obtained was not representative of the whole population based on the available demographic

data(16). There were four types of employees in that sample: managers (5.9%), supervisors (4.8%), permanent workers (84.0%), and temporary workers (84.0%). (5.3 percent).

2. DISCUSSION

The poll was part of a broader benchmarking project that included semi-structured interviews with a stratified sample of workers from each business, a series of workplace assessments by safety experts, and an examination of the companies' accident records. The data from the questionnaire is the focus of this article; the rest of the data will be presented elsewhere(17). The scales for assessing employee attitudes toward safety were based on those established by the original author for European industrial gas employees, but they were adapted to the requirements and context of the manufacturing firms examined, as stated above. This part of the survey included 16 statements regarding workplace safety procedures and practices at both the individual and organizational levels. On a five-point scale, respondents were asked to endorse these statements. This section included a combination of favorably and negatively worded remarks. Confirmatory factor analysis (CFA) and structural equation modeling were performed on this data using version(18). In CFA, the researcher proposes a model (a specific set of relationships between observable variables/items and their underlying causes) and then statistically evaluates it to see how well it matches the given data. Several comparative confirmatory factor models were evaluated in this instance, each based on distinct empirical and theoretical interpretations of attitudes toward safety. The null model, a five-factor model based on a single (or general) factor model, and two 'intermediary' models of three and four components were proposed(19). Three factors were chosen to define the model with the greatest statistical fit across all four sub-samples (managers, supervisors, permanent employees, and temporary workers), and they were then utilized in this research to evaluate employee attitudes toward safety. The approach supported three scales: management safety actions, quality of safety instruction, and personal safety actions. This factor structure is significantly different from that of the European industrial gas industry. Five variables were identified in that previous study: the efficacy of safety systems, individual accountability, individual skepticism, the safeness of the work environment, and personal immunity(20). Because of the modifications made to tailor this instrument to the requirements and circumstances of the specific industrial sector, the prior five-factor model no longer offered the greatest statistical fit.

As a result, models and measures measuring employee attitudes toward safety may be context-dependent. The scale measuring 'Management actions for safety' consisted of nine items that assessed the quality of near-miss reporting, the quality of preventive and corrective actions for safety, the focus on preventing accidents rather than blaming workers, management setting a good example on safety, encouragement of safety suggestions, the effectiveness of safety committees, and the priority accorded safety. The entire sample has a Cronbach's alpha of 0.71, which is a measure of internal scale consistency. Manufacturing safety refers to everything your company does to protect the health and safety of the people who work in your manufacturing facility or facilities. It's a basic concept that, in reality, may be very complicated, including many people, procedures, and technology. Workers in the manufacturing industry are exposed to a variety of risks and uncertainties.

There are many dangers associated with equipment and environmental hazards, but there are also numerous risks associated with people's decisions and actions. An unprotected table saw blade, for example, and a worker who fails to wear protective eyewear are both significant industrial

safety hazards. Industrial machinery is hazardous. Power saws, shears, guillotine cutters, presses, milling machines, fans, conveyor belts, palletizers, and rotating drums are just some of the equipment that may slice, crush, and shred employees' bodies. Nip points (also known as pinch points)—spots where one or more components (such as gears) rotate—can create dangers. Machines may also produce sparks or flying chips, which can cause injury to employees. As a result, OSHA mandates that some pieces of equipment be equipped with particular safeguards. Machine guarding is the term for this. Barriers, light curtains, and two-hand trips are examples of machine guarding.

The three questions on the 'Quality of safety training' scale measured satisfaction with the quantity, updating, and adequacy of safety training and information. Cronbach's alpha was 0.76 for the whole sample. The four elements on the scale assessing 'personal actions for safety' were: individual responsibility for safety; the significance of being reminded about safety; encouraging others to work safely; and the importance of ensuring competence. Cronbach's alpha was 0.64 for the whole sample. The variations for 'commitment to safety', on the other hand, were significantly different across the sub-samples, with the magnitude of the variance being proportional to the sub-sample size. When interpreting the findings, it's important to keep this variation in variance in mind. For pairwise comparisons between the scale means for the four sub-samples, Tukey's Honest Significant Differences test was employed. The capacity of the scales employed in the research to distinguish between the groups examined is tested in these analyses. Given the homogeneity in size, structure, and operational environment, differences between individual firms were not explored in this research. The patterns of linkages within the entire data set were investigated using structural equation modeling with latent variables. Structural equation modeling (SEM) is a multivariate statistical technique for analyzing structural theories that uses a confirmatory approach. This method aims to pinpoint 'causal' processes. These processes are described by a set of structural equations that may be graphically depicted. A hypothesized model may be statistically evaluated by doing a simultaneous analysis of all variables to see how well it matches the observed data. For each of the four sub-samples, the suggested model for the data from this research, was evaluated (managers, supervisors, permanent and temporary workers).

It was proposed that 'management activities for safety' and 'quality of safety training' were organizational factors that should influence 'personal actions for safety' and, in part, mediate their effects on 'appraisal of commitment to safety.' This model accommodates both the direct and indirect processes that link the attitude scales to the previously mentioned "appraisal of commitment." SEM was used to test this model. The disparities between the groups generated unexpected outcomes. Among the four sub-samples, permanent employees had the most favorable views about safety and, at the same time, the most favorably assessed commitment to safety. Between the other three sub-samples, there were minimal differences. Managers and supervisors, according to experience with the businesses involved, had greater expectations and were more skeptical than permanent employees.

This is in line with the first author's previous work in the industrial gas industry. As a result, their stated views about safety were less favorable. Because they were brought in to alleviate production difficulties on an uncertain basis, temporary employees looked less engaged and suspicious than permanent workers. The strength of workers' attitudes about management actions,' which also influenced attitudes toward 'personal safety actions,' and was linked to the

'quality of safety training,' was the most important predictor of commitment to safety. These results are in line with previous research on managerial commitment. As organizational factors, it was predicted that 'management actions for safety' and 'quality of safety training' would predict 'personal actions for safety.' The results substantially supported this prediction when it came to the impacts of "management activities," but not so much when it came to the effects of "quality of safety training." It was also anticipated that employees' "personal activities for safety" would moderate the impact of these organizational factors on their "commitment to safety" assessments. Personal activities for safety were given a central position in the proposed model, both as a direct impact on 'appraisal of commitment to safety' and as a mediator of other factors.

This prediction was based on the premise of egocentricity in safety cognitions, which means that individual thoughts and actions have a significant impact on organizational safety attitudes and perspectives. This forecast tapped into the above-mentioned direct method of impact. However, there was no evidence to support this theory, and it was shown that the two organizational variables, "management actions" and "quality of safety training," had a significant impact on "appraisals of commitment to safety." Personal safety activities were neither a direct predictor nor a mediator of other predictions; they may be regarded as a separate result rather than as part of the influence mechanism. The paradigm presented is less egocentric and more systems-oriented, with a validation of the significance of "safety management activities." It makes use of the indirect influence method. Furthermore, it clearly shows that attention must be given to management activities as described in terms of the present scale items in order to positively shape 'appraisal of commitment to safety.' This, in turn, seems to imply that the more personal and social elements of this subjective architecture are more linked to management systems and procedures than the more commitment aspects of safety culture. Management-related problems are once again mentioned as potential objectives for future actions.

3. CONCLUSION

The subjective architecture of safety culture was investigated in terms of the relationship between attitudes toward safety and perceived organizational commitment to safety in this study. It has used structural equation modeling to achieve this goal. The resulting models have shown the significance of employee attitudes about "management actions" and "training quality" in influencing organizational commitment assessments. Individual attitudes toward personal safety actions do not appear to influence their assessment of the organization's commitment, implying that the locus of existing safety practices is perceived to be beyond individual control, or indeed a separate outcome influenced by 'management actions for safety.' The design is different from what has been seen in other industries, but it does emphasize 'management actions for safety' as a key area for intervention in order to enhance overall perceived 'commitment to safety'.

The applicability of this approach may be shown in the context of certain industrial sectors where hierarchical management structures are common and where, despite management expectations, safety training at all levels is still in its infancy. Personal actions for safety did not seem to be related to perceived organizational commitment, according to complementary findings from the overall benchmarking research. Within the studied organizations, there is presently no 'responsibility and recognition' or 'empowered' safety culture. The reality is more complex: 'Safety culture cannot be separated from its cultural roots in beliefs, attitudes, and behaviors...' In essence, attitudes are critical to understanding safety culture and, as a result, are a key emphasis for creating such cultures.

REFERENCES:

1. Laub JA. Assessing the servant organization; Development of the Organizational Leadership Assessment (OLA) model. Diss Abstr Int. 1999;
2. Sujana MA, Habli I, Kelly TP, Pozzi S, Johnson CW. Should healthcare providers do safety cases? Lessons from a cross-industry review of safety case practices. Saf Sci. 2016;
3. Bhatnagar V, Ranjan J, Singh R. Analytical customer relationship management in insurance industry using data mining: A case study of Indian insurance company. Int J Netw Virtual Organ. 2011;
4. Johnson CW. Reprint of: Economic recession and a crisis of regulation in safety-critical industries. Saf Sci. 2015;
5. Lee J, Cameron I, Hassall M. Improving process safety: What roles for digitalization and industry 4.0? Process Saf Environ Prot. 2019;
6. Siddiqi MA, Tandon MS, Ahmed O. Leader member exchange leading service employee desired job outcomes and performance: An Indian evidence. Int J Serv Oper Manag. 2019;
7. Skeepers NC, Mbohwa C. A Study on the Leadership Behaviour, Safety Leadership and Safety Performance in the Construction Industry in South Africa. Procedia Manuf. 2015;
8. Abdul Zubar H, Visagavel K, Deepak Raja V, Mohan A. Occupational health and safety management in manufacturing industries. J Sci Ind Res (India). 2014;
9. Laub JA. Assessing the servant organization; Development of the Organizational Leadership Assessment (OLA) model. Dissertation Abstracts International,. Procedia - Soc Behav Sci. 1999;
10. Zhang M, Fang D. A continuous Behavior-Based Safety strategy for persistent safety improvement in construction industry. Autom Constr. 2013;
11. Kumar M, Sharma A, Garg S. A study of aspect oriented testing techniques. In: 2009 IEEE Symposium on Industrial Electronics and Applications, ISIEA 2009 - Proceedings. 2009.
12. Ahmad I, Sattar A, Nawaz A. OCCUPATIONAL HEALTH AND SAFETY IN INDUSTRIES IN DEVELOPING WORLD. Gomal J Med Sci. 2016;
13. Misiurek K, Misiurek B. Methodology of improving occupational safety in the construction industry on the basis of the TWI program. Saf Sci. 2017;
14. Aulakh SS, Gill JS. Lean manufacturing-A practitioner's perspective. In: 2008 IEEE International Conference on Industrial Engineering and Engineering Management, IEEM 2008. 2008.
15. Jain M, Preeti. Availability analysis of software rejuvenation in active/standby cluster system. Int J Ind Syst Eng. 2015;
16. Vinodkumar MN, Bhasi M. Safety climate factors and its relationship with accidents and personal attributes in the chemical industry. Saf Sci. 2009;
17. Sharma RK, Sharma J, Rai D V., Zafar M. Cod reduction from industrial wastewater using thermal liquid-phase oxidation technique. Int J Chem Sci. 2013;

18. Jain M, Naresh P. A multi-state degraded system with inspection and maintainability. Int J Ind Syst Eng. 2012;
19. Boparai KS, Singh R, Singh H. Modeling and optimization of extrusion process parameters for the development of Nylon6–Al–Al₂O₃ alternative FDM filament. Prog Addit Manuf. 2016;
20. Sofat Y. Strategy of advertising agencies in india for evaluating advertising effectiveness across experience. Indian Journal of Marketing. 2011.

AN OVERVIEW ON CORRUPTION

Sourabh Batar*

*Department of Law,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- battarsourabh@gmail.com

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ABSTRACT

This article provides some remarks on a plethora of global corruption indicators in order to choose a set of definitions and describe the quantitative measurements of corruption. According to academic study, corruption variables may be classified into three levels: macro, mesa, and micro. In the past, most studies of the connection between corruption, development, culture, and politics focused on macro issues. Internal system structure is the most significant influence on corruption at the mesa level. To examine the corruption of a nation or area, more and more academics are turning to actual raw data rather than perceptions of data. In the future, micro-factors study on corruption will become more common. Corruption is a unique criminal that must be eliminated not only as quickly as possible, but also as efficiently and effectively as possible, since it obstructs the path to a healthy economy. In today's contemporary culture.

KEYWORDS: Corruption, Factors, Macro, Meson, Micro.

1. INTRODUCTION

The Chinese Communist Party's and governments growing anti-corruption measures have prompted Chinese academics to devote close attention to the issue. In 2015, more than 49 thousand individuals were fined for violating an eight-point rule; these offenders were determined to be engaged in 37 thousand instances throughout the campaign. Corruption has always been an issue in China, dating back to the establishment of the People's Republic(1). More broadly, the issue may be traced back to anciently leaving the nation. Scholars have achieved many accomplishments in the field of corruption study in the past, particularly in the definition and clinical variables linked to corruption. In the area of theory, there are many different definitions of corruption(2). The most common definition is "corruption is defined as the use of public position for private gain," which highlights the nuclear meaning of corruption. The exact definition and measurement may differentiate between various problems depending on the varied studying objectives and aims(3). This article examines the macro, mesa, and micro variables that influence the likelihood of corruption. Each element has an impact on the likelihood of corruption, and the effect does not always flow in one direction, thus the interplay of all variables was complicated. I believe that the literature review will serve as a valuable resource for future academicians(4).

1.1 Corruption:

The corruption index given by a worldwide database, such as Transparency International's CPI, the World Bank Institute's WBES, and the Intelligence Unit's Corruption Index, is typically used in transnational research on corruption. The majority of the data in the index originates from a poll of individuals, companies, or experts(5). Most of these composite indexes, which represent different elements of corruption, depict the entire state of corruption and are very useful for corruption assessment and empirical study. However, perception data reflects the data source's views on corruption and cannot ensure that subjective indicators and real levels of corruption are linked. At the same time, since the same index exists in various years of composition and weight adjustment, part of the index's time longitudinal comparability is weak, resulting in certain time series analysis being deceptive(6).

For the reasons stated above, some quantitative researchers prefer to use practice examples rather than international databases. The connection between economic and political corruption has been studied extensively. Ruska. CREW released individual corruption statistics on US Congress members(7). Many academics have used objective data to examine the issue of corruption across areas, with remarkable success in China. According to the findings of a study on government size and corruption in market and local areas, Tao and Zhou. To assess the degree of corruption of state organs, use the number of corruption cases involving officials of the state organs as an indicator. The percentage of the number of municipal authorities is used by Li and Zhang(8). The number of instances of corruption was tallied. Gong, Wu, and Qipao are three Chinese characters. To perform empirical study, use the technique of direct collecting of corruption instances. These academics' efforts serve as a valuable resource for a more thorough and impartial investigation of corruption in China.

There is currently no consensus on how to determine whether or not corruption has occurred. In recent literature, researchers have tended to utilize a variety of corrupt data bases given by authorities to better precisely assess corruption levels. At the same time, an increasing number of academics are beginning their research with an objective index, a genuine case, a particular country, or a case study of a region, since the horizontal comparison of variables of each country in international corruption research is suspect(9).

1.2 Determination of Corruption:

The corruption index given by a worldwide database, such as Transparency International's CPI, the World Bank Institute's WBES, and the Intelligence Unit's Corruption Index, is typically used in transnational research on corruption. The majority of the data in the index originates from a poll of individuals, companies, or experts(10). Most of these composite indexes, which represent different elements of corruption, depict the entire state of corruption and are very useful for corruption assessment and empirical study. However, perception data reflects the data source's views on corruption and cannot ensure that subjective indicators and real levels of corruption are linked. At the same time, since the same index exists in various years of composition and weight adjustment, part of the index's time longitudinal comparability is weak, resulting in certain time series analysis being deceptive(11). For the reasons stated above, some quantitative researchers prefer to use practice examples rather than international databases. Ruska investigated the link between economic and political corruption. CREW released individual corruption statistics on

US Congress members. Many academics have used objective data to examine the issue of corruption across areas, with remarkable success in China(12). There is yet to be a clear viewpoint on the definition of corruption. In recent literature, researchers have tended to utilize a variety of corrupt data bases given by authorities to better precisely assess corruption levels. At the same time, an increasing number of academics are beginning their research with an objective index, a genuine case, a particular country, or a case study of a region, since the horizontal comparison of variables of each country in international corruption research is suspect(13).

1.3 Macro Factors Affecting the Risk of Corruption:

The increasing significance of corruption stems from a common understanding that effective governance is required for the country's growth. As a result, the connection between corruption and development is the first to enter the field of view in the research of corruption-related variables. Mauro analyzed corrupt data from over. Countries across the globe and came to the conclusion that corruption caused poor investment and hampered economic development(14). Through the analysis of per capita GDP, the causal connection between economic progress and reciprocal causation of corruption was discovered. The impoverished nations are more prevalent than the developed countries. Bradman. While it cannot be disputed that corruption has a good connotation in certain sectors, it has had a catastrophic impact on the economy(15).

By using a time series model, Farooq and Shabazz ET al. demonstrate that corruption is a barrier to economic development. The connection between inequality and corruption is also debatable. By looking at country cross-section statistics. According to Gupta and Dawood et al., corruption has exacerbated economic disparity and poverty. The increasing significance of corruption stems from a shared belief that good governance is essential for a country's growth. As a result, the connection between corruption and development is the first to enter the field of view in the research of corruption-related variables. Mauro analyzed corrupt data from over. Countries across the globe and came to the conclusion that corruption caused poor investment and hampered economic development. Through the analysis of per capita GDP, Riesman discovered the causative connection between economic growth and reciprocal causation of corruption. The impoverished nations are more prevalent than the developed countries. While it cannot be disputed that corruption has a good connotation in certain sectors, Bradman pointed out that it has a catastrophic impact on the economy. By using a time series model, Farooq and Shabazz.ET al. demonstrate that corruption is a barrier to economic development. The connection between inequality and corruption is also debatable. Gupta and Dawood et al. found that corruption has exacerbated income disparity and poverty by looking at cross-section data from different countries(16).

1.4 Meson Factors Affecting the Risk of Corruption:

The impact of internal system architecture on corruption is emphasized by the numerous variables that affect the danger of corruption. Decentralization is favorable to reducing corruption, according to a significant number of academic study findings. Pan, He, and Yuan are three characters. Using China's province panel data, the different effects of fiscal decentralization on regional corruption mechanisms. And. They said that fiscal decentralization may help to reduce the degree of corruption in the area. Johnston and the Sun the institutional disparities between China and India were examined. They believed China had transferred control to local governments, while decision-making power remains in the hands of all levels of government and

state-owned businesses. As a result, the local government emerged. While the majority of India's private businesses are controlled by a small group of nobles and their families. Political contributors who want to stay in power will utilize sponsorship to achieve so. Different academics have differing opinions on whether the competition will help reduce corruption. Tell and Ades. Believes that if corporate earnings are reduced through competition, there will be no extra profits to bribe. As a result, introducing competition is beneficial to reducing corruption. Stenson. Tell, Bliss, Shleifer, Vishnu, Soto De, and other academics' research was summarized. He believed that the link between profit and corruption is complex and difficult to understand. Despite the fact that there is a strong link between corruption and deregulation, simplifying regulations, and the adoption of new laws, it is possible that they will open the door to corruption. Finding a balance between the two is very tough. Tell me about Ades and Tell me about Tell me about Tell me about Tell me about Tell Riesman. Improvements in the degree of openness to the outside world are beneficial to decreasing corruption, according to the author. The impact of the remuneration system on the possibility of corruption has also been extensively debated. Despite the fact that the high-paying system is often touted, Sosa. The anticipated utility model of economics was used to explain the development of corruption, and it was concluded that measures to raise net revenue from possibly corrupt institutions are not only ineffective. However, it is possible that this will promote corruption. Ranges and Ivanna. A new point of view was proposed. To assess the effect of corruption and tax evasion on fiscal policy and economic development, they utilized a dynamic general equilibrium model. They said at the time that if public sector compensation is sufficiently high, corruption and tax evasion would be eradicated. The overall level of social assistance will rise. The findings of Gong and Woo's empirical research of China's current situation revealed that the salary level of public servants and corruption had no clear linear connection. Salary is debatable in its efficacy(17).

1.5 Micro Factors Influencing the Risk of Corruption:

Scholars are also attempting to deduce the origins and processes of corruption from the overall pattern of corrupt conduct. Dollar and his colleagues are dedicated to researching the effect of gender on corruption sooner rather than later. They investigated the connection between gender and corruption using the International Country Risk Guide's corruption index. The findings indicate that the higher the proportion of women among government officials, the lower the level of corruption. It was thought that there could be a reverse causality. Lower levels of corruption in a region will restrict male-dominated social networks and increase employment opportunities for women. Other variables may have an impact on both of them. Based on information from the European Commission, Qu, Sensate, Wängnerud, and Stenson(18). In institutional logic, the connection between various genders and corruption was investigated. They discovered that the difference between men and women stems from their asymmetrical experiences, rather than their fundamental characteristics. Women in the electoral system, in comparison to the bureaucracy, have a larger role in preventing corruption. Gong and Wu investigate the case of multiples. Reports. Bribery occurs in divisional and bureau-level cadres, which are the leaders of government offices, according to him. Rosenblatt(19). According to the idea of social control, individuals in the dominant social status believe they are in a superior position. It is more difficult for them to recognize the corruption. This is due to their great knowledge of their rights and desire to maintain their dominant position. Even if this necessitates the assistance of others. Chen, a native Chinese academic, is also a proponent of the social interaction theory. He

discovered that the rate of corruption among Chinese officials had a substantial impact on the expansion of provinces, using data from China's provinces as a sample. This kind of infection is mostly caused by the demonstrative impact of governmental corruption. The monitoring and control of high-level officials may be the focus of an anti-corruption effort(20).

2. DISCUSSION

Bribery, lobbying, extortion, cronyism, nepotism, parochialism, patronage, influence peddling, graft, and embezzlement are all examples of corruption. Wages and pay scales are low(21). There aren't enough stick and fast punishments. In public, there is a lack of unity. India's citizens are unaware of their fundamental rights. Deals and affairs are not transparent(22). There is a dearth of independent detective agencies. In India, the judicial system does not have sufficient authority. Corrupt individuals do immoral or unlawful actions without remorse for personal benefit. Something corrupt is rotting, ruined, or inoperable, such as a file that crashes your computer. Someone who is dishonest. A thief of cookies, a crook, or a criminal. Immoral and dishonest conduct brings society down. Due to continuous social and economic problems, South Sudan is also regarded as one of the most corrupt nations in the world, with an average score of Kleptocracy. Let's, "thief," kept, "I steal," refers to a corrupt administration(23). Use political authority to seize control of their country's riches, usually through embezzling or misappropriating government money. Italy is without a doubt the most gorgeous nation on the planet. It has the most inspirational cultural riches and breathtaking landscapes found nowhere else on the planet. With their varied architecture, Venice, Florence, and Rome will enchant you, while Tuscany will enchant you with its rolling hills, vineyards, and snow-capped mountains(24).

3. CONCLUSION

It is clear from a review of the available literature that foreign academics conduct a more thorough investigation into the concept of corruption and associated variables from the perspectives of economics and sociology. The early findings of corruption study primarily concentrate on the national and institutional levels, analyzing the particular effect of different elements of the economic, political, and cultural systems on corruption. The research findings are diverse in scope. However, whether or not these variables have a practical effect on corruption remains a point of contention. Serrate (2006) conducted an overall sensitivity analysis based on Extreme-Bounds Analysis using 16 variables, including national inherent endowment, colonialism, religion, open level, and other aspects. Only five variables were determined to be very resistant to corruption. Scholars have continued to reflect on the earlier findings. The accuracy of the early corruption index assessment, as well as the worldwide comparability of macro data, are being researched and improved. When using the empirical analysis technique, researchers have begun to utilize actual raw data rather than perceptions of data to analyze the corruption of a certain nation or area, according to recent research. The current findings are presented in the empirical research section of this article for an overview of domestic research accomplishments. Prior to 2011, there were fewer Chinese intellectuals involved in the study of corruption, as shown by empirical research findings. The logical analysis and qualitative research techniques are the research methods used. The concept of corruption, the reasons for it, the current state of affairs, the effectiveness of anti-corruption measures, and institutional anti-corruption measures are all thoroughly examined. A significant number of quantitative studies on the causes of corruption have appeared in recent years(25).

REFERENCES:

1. Acharya S, Bali S, Bhatia BS. Exploring consumer behavior towards sustainability of green cosmetics. In: Proceedings of the 2021 1st International Conference on Advances in Electrical, Computing, Communications and Sustainable Technologies, ICAECT 2021. 2021.
2. Kaur N, Ghai W. Performance Analysis of Deep CNN Assisted Optimized HIV-I Protease Cleavage Site Prediction with Hybridized Technique. In: Lecture Notes in Electrical Engineering. 2021.
3. Kansal CM, Singla S, Garg R. Effect of Silica Fume & Steel Slag on Nano-silica based High-Performance Concrete. In: IOP Conference Series: Materials Science and Engineering. 2020.
4. Thompson DF. Theories of Institutional Corruption. Annual Review of Political Science. 2018.
5. Fani GM, Singla S, Garg R, Garg R. Investigation on Mechanical Strength of Cellular Concrete in Presence of Silica Fume. In: IOP Conference Series: Materials Science and Engineering. 2020.
6. Dhiman S, Garg R, Garg R, Singla S. Experimental investigation on the strength of chipped rubber-based concrete. In: IOP Conference Series: Materials Science and Engineering. 2020.
7. Khan MN, Singla S, Garg R, Garg R. Effect of Microsilica on Strength and Microstructure of the GGBS-based Cement composites. In: IOP Conference Series: Materials Science and Engineering. 2020.
8. Nanda AK, Bansal PP, Kumar M. Reliability based partial safety factor of concrete containing nano silica and silica fume. Comput Concr. 2020;
9. Locatelli G, Mariani G, Sainati T, Greco M. Corruption in public projects and megaprojects: There is an elephant in the room! Int J Proj Manag. 2017;
10. Farooq U, Singla S. Impact of aggregate and fly ash filler types on asphalt and control mix designs. Int J Sci Technol Res. 2020;
11. Zargar K, Singla S. Impact of pet plastic waste on mechanical properties of mix concrete design. Int J Sci Technol Res. 2020;
12. Sheikh RQ, Yadav V, Kumar A. Stabilization of red soil used as a sub-base material. Int J Sci Technol Res. 2020;
13. Isaksson AS, Kotsadam A. Chinese aid and local corruption. J Public Econ. 2018;
14. Muzaffar A, Yadav EV, Kumar EA. Evaluation and strengthening of existing Hma pavements and newly introduced wma pavements. (In cold regions of India). Int J Sci Technol Res. 2020;
15. Sharma SK, Ghai W. A neural based allocation architecture of mobile computing. Int J Sci Technol Res. 2020;
16. Gorsira M, Denkers A, Huisman W. Both Sides of the Coin: Motives for Corruption Among Public Officials and Business Employees. J Bus Ethics. 2018;

17. De Vries CE, Solaz H. The Electoral Consequences of Corruption. *Annual Review of Political Science*. 2017.
18. Wani AB, Singla S, Sachar A. A case study of integrated land use planning for sustainable infrastructure. *Int J Sci Technol Res*. 2020;
19. Mathur G, Ghai W, Singh RK. A totalitarian technique for wormhole detection using big data analytics in iot network. *Int J Sci Technol Res*. 2020;
20. Sihombing SO. Youth perceptions toward corruption and integrity: Indonesian context. *Kasetsart J Soc Sci*. 2018;
21. Xiao Y, Lenzen M, Benoît-Norris C, Norris GA, Murray J, Malik A. The Corruption Footprints of Nations. *J Ind Ecol*. 2018;
22. Ferwerda J, Deleanu I, Unger B. Corruption in Public Procurement: Finding the Right Indicators. *Eur J Crim Policy Res*. 2017;
23. Kaur V, Oberoi A. Novel Approach for Plant Disease Detection Based on Textural Feature Analysis. In: *Advances in Intelligent Systems and Computing*. 2020.
24. Page O. Institutional corruption. *Veritas*. 2018;
25. Escresa L, Picci L. A new cross-national measure of corruption. *World Bank Econ Rev*. 2017;

EFFECTS OF PUBLIC POLICY ON CHILD LABOUR

Sumit Kumar*

*TeerthankerMahaveer Institute of Management and Technology,
TeerthankerMahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email id-sumit.mamagement@tmu.ac.in

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ABSTRACT

Income, uncertainty, and relative rewards to employment and education all affect household choices regarding child labor. Because of the phenomenon's complexity, a wide range of policy tools may be employed to address or influence child labor. This analysis of 33 impact assessments takes a broad look at how social protection (credit and microfinance, cash transfers, vouchers, and food programs) and labor programs influence child labor. Despite the difficulty of combining results from various definitions, implementation settings, and policy instruments, certain similarities emerge. Programs that address child labor by decreasing family vulnerability, for example, achieve the intended result. In most instances, transfers decreased child labor. Similarly, programs that assist families in coping with risk, such as health insurance, decrease the use of child labor in the home. Policies geared at boosting adult family members' participation in the labor market or entrepreneurial activity, on the other hand, may lead to an increase in demand for adolescent and child labor.

KEYWORDS:*Child Labour, Domestic, Employed, Ilo (International Labour Organization), Poverty.*

1. INTRODUCTION

According to the International Labour Organization (ILO), at least 218 million children aged 5 to 17 worked in some capacity in 2016, mainly in poor countries, with over 151 million working as youngsters(1). Many writers believe that child work merits study because its interaction with education and productivity later in life has long-term implications for a country's economic growth(2).

Most juvenile workers, according to popular belief, work for money in market activities. However, rather than manufacturing, the majority of youngsters are involved in agricultural pursuits(3). Furthermore, their parents on the family farm or business work the majority of youngsters. As a result, consumer boycotts and trade sanctions against goods made using child labor may have only a limited effect on child labor reduction in developing nations(4).

Even if a prohibition on child labor is effectively enacted and enforced, some children may suffer if they are compelled to work due to poverty. As a result, new policy tools are needed to directly address the underlying causes of child labor(5).

The goal of social protection and labor market policies is to reduce poverty, improve poor people's well-being, and safeguard families from economic shocks. Previous meta-analyses of social protection programs have gathered data on the effect of these programs on children's human capital investment; particularly schooling results(6). However, few studies looked at the impact of these initiatives on outcomes other than their immediate goals, such as child labor. This study examines how social protection (cash transfers, vouchers, food programs, insurance) and labor market programs (including microcredit) may influence child labor and presents evidence of their effect across program types(7). Our aim is to get a comprehensive knowledge of how policies and programs are likely to affect child labor, as well as to identify gaps and study subjects that may provide valuable lessons for policymakers and evaluators. Child labor is a complicated issue that stems from family choices affected by a variety of variables such as money, uncertainty, and relative returns to employment and education, to name a few(8–11).

Because of the phenomenon's intricacy, a wide range of policy instruments may be employed to address or influence child labor, even if they are intended to accomplish different goals. It also means that forecasting the effect of various initiatives on child labor is a difficult task. Changing circumstances within the family may lead to complicated patterns of replacement in the time allocation of its members(12)(13). As a result, policy actions may have unforeseeable consequences. Public works projects, microcredit programs, and business training programs, for example, may have an impact on a household's income-generating approach. While the economic impact may reduce child work, the return on children's involvement in productive family activities may rise(14).

Thus, the total impact of these measures on child labor is not specified theoretically. Even educational initiatives may have unintended consequences and, in the worst-case scenario, promote child labor(15). Finding out what kinds of treatments are likely to decrease child labor given context-specific limitations is a challenging job(16).

An extensive search of the literature was conducted for this article on impact assessment studies with a social protection and labor market emphasis, and rigorous techniques were used to evaluate the program's effect on child labor. We chose articles that build the counterfactual using experimental or quasi-experimental methods (propensity score matching, difference in difference, IV, and regression discontinuity design). In all, we identified 33 impact evaluations that include child labor as one of the intervention's outcomes. This little figure highlights the necessity for the development assessment agenda to place a greater emphasis on child labor outcomes.

Despite the difficulty of combining the results of impact assessments across various child labor definitions, implementation contexts, and policy instruments, certain similarities appear. According to our findings, interventions focused on resource transfers (whether unconditional or conditional, in cash or in kind) likely to decrease child labor(17). However, data from the cash transfer literature suggests that the effect of a program on child labor is dependent on the integration of several treatments(18).

Combining (conditional) cash transfers with supply-side interventions like health and education facilities and/or after-school programs may have a greater effect on child labor. Interventions that increase dependence on children's activities inside the family may decrease the effect of conditional cash transfers on child labor by increasing the reliance on income-generating

activities(19). Furthermore, public works schemes and programs aimed at encouraging micro entrepreneurial activity, such as microcredit schemes and business, training courses (possibly in combination with the provision of capital), may increase children's work, either directly in the household business or in activities carried out by adults(20).

Previous literature studies on the connection between public policy and child labor have been updated and extended in this study. Edmonds (2008) focuses on the empirical child labor literature in his chapter in the Handbook of Development Economics. His wide-ranging talk includes the measurement and frequency of child labor, as well as the consequences of child labor for the economy(21).

The well-being of children, the factors of child work, and the impact of governmental interventions on child labor review, the empirical and theoretical literature on child work and offer a comprehensive assessment of the causes of child labor as well as policy implications. The author expand on these evaluations by presenting a heuristic model for describing choices involving children's participation in economic activities. The empirical literature investigating the impact of social programs and labor market programs on child labor outcomes a literature that has grown significantly since the publication of these prior reviews is our major addition to these past reviews. Addresses program design implications and numerous gaps in the research, such as gender aspects of child work that are frequently overlooked, little data on improvements in the worst kinds of child labor, and a lack of evidence for several key intervention categories. We go through these issues and flaws in more depth in order to offer direction for future study(22).

1.1 Definition And Theoretical Foundation Of Child Labor:

Three important conceptual problems are discussed in this section. First, we address the difficulty of defining child labor in empirical research. Second, we offer a basic theoretical framework to aid our understanding of the pathways through which various programs may influence children's time allocation within the family.

Finally, we address the difficulties in determining the effects of policies on child labor and the research included in this article.

1.1.1 What Is Child Labor, And How Is It Defined And Quantified:

The ILO Convention No. 138 on the legal minimum age, the ILO Convention No. 182 on the worst forms of child labor, and the UN Convention on the Rights of the Child are just a few of the widely adopted international conventions that define child labor. Flexibility provisions of the conventions, on the other hand, are left to the discretion of the appropriate national authorities. As a result, there is no universally accepted legal definition of child work, and there is no universally accepted statistical measure of child labor.

The International Conference of Labour Statisticians (ICLS) is the organization in charge of setting worldwide labor statistics standards. The 18th ICLS approved a Resolution addressing child labor statistics in 2008 that organizes child labor measurement around two elements: the child's age (which covers all children aged 5–17) and the kind of activities done by the kid. The following is how the resolution differentiates between "children in productive activities" and "child labor":

- Children in productive activities” is made up of
 - “Children in employment” covers all kinds of paid and unpaid productive activities that the kid engages in.
 - Children who perform unpaid household services, such as the production of domestic and personal services by a household member for consumption within their own household or household chores, are classified as “children in other productive activities.”
- Child labor is a more restricted term that encompasses all minors who are lawfully employed in line with ILO conventions. A child worker is defined as:
 - Any economically active kid under the age of 12.
 - Children aged 12–14 engaging in productive activities that do not come within the definition of authorized light employment.
 - Children aged 17 and under who are involved in activities that are classified as "hazardous" (affecting the child's safety, physical, and mental development) or "worst forms of child labor" (e.g., children in bondage or forced labor, commercial sexual exploitation, illicit activities, and armed conflict, among others).

Academic researchers, on the other hand, seldom assess child labor in accordance with the ICLS decision. The phrases "child labor" and "children engaged in productive activities" are often used interchangeably in the literature on child labor. Furthermore, the kinds of productive activities examined vary significantly: some studies describe children in wage employment as child workers, while others include youngsters involved in any market activity (paid or unpaid) or even home chores. The use of wage employment as a measure of child labor is complicated by the fact that many children who work outside the home are not paid. Furthermore, not all unpaid activities are deemed harmful to children's development. As a result, some studies impose an hour limit to the number of domestic hours a kid works in order to include activities in which children engage on a regular basis.

In addition, the reference era used in this research varies. Some studies look at work done in the seven days leading up to the household survey, while others look at labor done in the previous one or twelve months. The comparison of program effects across studies is complicated by this variability. In our evaluation, we provide the definition and reference period used in each article (where available); we also use the terms "child labor" and "children engaged in an economic activity" interchangeably.

It is essential to highlight that even when a consistent definition of child work is adopted, there may be inexplicable inconsistency in child labor data. Even after accounting for variations in sample design find significant disparities in child labor statistics across independent national surveys within the same country, ranging from 20 to 30 percentage points. In Cameroon, for example, a comparison of the Multiple Indicator Cluster Survey (MICS 2000) and a Priority Survey (2001) indicates that child labor has decreased from 64% in the MICS survey to 16% in the Priority Survey one year later. In Senegal, the Demographic Health Study (DHS 2005) shows 35.2 percent of children working, but the Statistical Information and Monitoring Programme on Child Labour (SIMPOC 2005) survey finds 22.3 percent of children working in the same year.

Despite the fact that there have been an increase in the number of sources of information on child labor in the last decade, there is no evidence to support the veracity of data collecting techniques. Measurement inaccuracy may affect child labor owing to a variety of reasons. For example,

survey data is mainly gathered using conventional household surveys that focus on adult employment. Similarly, owing to financial limitations, the head of family typically provide the information on child labor. In the context of child labor, the benefits of utilizing proxy-based reporting rather than child-based reports are unclear. On the one hand, given that a kid knows best, child-reported information may be more accurate than proxy answers.

1.2 Incidence:

ILO (2017) estimates that almost one in ten children aged 5–17 were engaged in child labor in 2016 (152 million children in absolute terms, 64 million girls, and 88 million boys) based on a variety of nationally representative datasets for 105 countries and applying the criteria provided above. Approximately half of all juvenile workers (73 million) worked in dangerous conditions. Child labor is becoming less prevalent. Since the International Labor Organization (ILO) began tracking worldwide prevalence in 2000, the number of children engaged in child labor has dropped by 94 million.

ILO (2017) also shows how child labor is distributed throughout regions, industries, and sectors. Child labor is most prevalent in Africa, where almost one out of every five children is a child worker. Child labor rates are much lower in Asia and the Pacific (7.4%), the Americas (5.3%), Europe and Central Asia (4.1%), and the Arab States (4.1%). The agricultural industry employs the majority of child workers (70 percent). However, work in services (17%) and industry (12%) is quite prevalent. In a similar vein, approximately two-thirds of child labourers work for their family's business, usually without compensation. The remaining child workers are usually employed outside the home for compensation. Only 4% of child workers work only for their own benefit.

Boys are more likely than girls to participate in child labor, especially at later ages. According to ILO (2017), the gender gap among children, aged 15–17 is approximately 5 percentage points. However, as the International Labour Organization (ILO) (2017) points out, some of the productive tasks that girls engage in are less apparent and may be under-reported. In addition, girls spend much longer hours on domestic tasks, which is not taken into account in child labor statistics.

1.3 Theoretical Foundation:

We provide a heuristic framework in this section to highlight the many ways via which policy may affect child labor. While we use references to the empirical literature to explain the theoretical processes we are thinking about, a comprehensive review is beyond the scope of this article. The theory of child work and the empirical data that supports it in more depth. We use a conventional inter-temporal utility maximization paradigm that does not take into account behavioural economics' most recent findings. We provide some recommendations for further theoretical work in the closing discussion.

We will start with the availability of kid labor. Consider a unitary family in which the parents prioritize current spending, their children's schooling, and their leisure. The labor supply of the parents is inelastic and generates exogenous income, fertility is exogenous and fixed at one child, and school attendance is dichotomous (the child either attends school or not). Thus, the family's income limitation is made up of household income (adult income and kid labor income) minus direct education expenses. Parents will spend in their children's education until the marginal

expenses of their time in school (including lost earnings from employment) equal the marginal benefits.

Several variables affect children's time allocation under this reduced framework. First, in poor credit-constrained families, optimum investment in child education may not be possible since these households cannot borrow against future wages to replace lost earnings or school-related costs. Even if parents prefer education, poor, credit-strapped families are more likely to turn to child work to satisfy subsistence requirements. In the midst of uncertainty, these families are more prone to depend on children for income production. There is ample evidence that poor households use child labor as a buffer against negative shocks such as parental unemployment and agricultural income loss due to droughts or other natural.

This straightforward theoretical framework aids in comprehending how social protection and labor market policies may influence child labor.

While the goals of social protection and labor market programs are to decrease poverty and enhance the well-being of the poor, these programs may have a range of effects on child labor. If income is increased beyond the subsistence level, positive income impacts (e.g., from direct transfers, short-term work, and revenue from productive activities) may enhance school attendance and decrease child labor. Simultaneously, some programs include requirements, such as explicit education conditions, that may reduce the opportunity cost of schooling, resulting in increased school attendance and reduced child labor involvement.

2. DISCUSSION

The author has discussed about the child labour, the aim of social security and labor market reforms is to alleviate poverty, enhance the well-being of impoverished individuals, and protect families from external downturns. Previous meta-analyses of social safety programs collected information on the impact of these measures on children's human capital investment, especially in terms of schooling outcomes. Few studies, however, have examined the effect of these efforts on outcome other than their main objectives, such as child labor. This research looks at how welfare state (cash transfers, voucher, and food programs, insurance) and labor market programs (including microcredit) affect child labor and provides evidence of their impact across program categories. Our goal is to get a complete understanding of how policies and programs are likely to affect child labor, as well as to identify issues and research topics that may teach policymakers and evaluators important lessons. Child labor is a complex problem that arises from family decisions influenced by a number of factors, including money, uncertainty, and the relative rewards to work and education, to mention a few.

3. CONCLUSION

The author has concluded about the child labour, Household decisions on child labor are influenced by income, uncertainty, and the relative benefits of work and schooling. Because of the complexities of the issue, a variety of policy measures may be used to address or affect child labor. This review of 33 impact evaluations examines how child labor is influenced by social assistance (credit and microfinance, cash transfers, certificates, and food programs). Despite the challenges of integrating findings from different definitions, implementing settings, and governance structures, there are certain commonalities. Child work programs that reduce family susceptibility, for example, accomplish the desired outcome. Transfers reduced child labor in the

majority of cases. In the same way, programs that help families cope with risk, such as health care, reduce the use of forced labor in the home.

REFERENCES:

1. Rosha P, Ibrahim H, Nanda AK, Mohapatra SK, Mahla SK, Dhir A. Effect of hydrogen-enriched biogas induction on combustion, performance, and emission characteristics of dual-fuel compression ignition engine. *Asia-Pacific J Chem Eng.* 2020;
2. Thöni A, Taudes A, Tjoa AM. An information system for assessing the likelihood of child labor in supplier locations leveraging Bayesian networks and text mining. *Inf Syst E-bus Manag.* 2018;
3. Sharma R, Chander R. Test Of Weak Form Efficiency In The Indian Stock Market. *Indian J Financ.* 2010;
4. Mehta K, Chander R. Examination of january, december and november effects on the indian stock market. *Indian J Financ.* 2010;
5. Yadav CS, Yadav M, Yadav PSS, Kumar R, Yadav S, Yadav KS. Effect of Normalisation for Gender Identification. In: *Lecture Notes in Electrical Engineering.* 2021.
6. Ghai W, Kumar S, Athavale VA. Using gaussian mixtures on triphone acoustic modelling-based punjabi continuous speech recognition. In: *Advances in Intelligent Systems and Computing.* 2021.
7. Anand V. Photovoltaic actuated induction motor for driving electric vehicle. *Int J Eng Adv Technol.* 2019;
8. Tang C, Zhao L, Zhao Z. Child labor in China. *China Econ Rev.* 2018;
9. Batomen Kuimi BL, Oppong-Nkrumah O, Kaufman J, Nazif-Munoz JI, Nandi A. Child labour and health: a systematic review. *International Journal of Public Health.* 2018.
10. D'Alessandro S, Fioroni T. Child labour and inequality. *J Econ Inequal.* 2016;
11. Hamenoo ES, Dwomoh EA, Dako-Gyeke M. Child labour in Ghana: Implications for children's education and health. *Child Youth Serv Rev.* 2018;
12. Singh D. Robust controlling of thermal mixing procedure by means of sliding type controlling. *Int J Eng Adv Technol.* 2019;
13. Stojkovikj S, Oklevski S, Prakash Jasuja O, Najdoski M. Corrigendum to "Visualization of latent fingerprints on thermal paper: A new method based on nitrogen dioxide treatment" (*Forensic Chemistry* (2020) 17, (S2468170919300931), (10.1016/j.forc.2019.100196))>. *Forensic Chemistry.* 2020.
14. Dammert AC, de Hoop J, Mvukiyehe E, Rosati FC. Effects of public policy on child labor: Current knowledge, gaps, and implications for program design. *World Development.* 2018.
15. Goswami L, Kaushik MK, Sikka R, Anand V, Prasad Sharma K, Singh Solanki M. IOT Based Fault Detection of Underground Cables through Node MCU Module. In: *2020 International Conference on Computer Science, Engineering and Applications, ICCSEA 2020.* 2020.

16. Ali MA, Ali MV, Abbas F. Hidden hazardous child labor as a complex human rights phenomenon: A case study of child labor in Pakistan's brick-making industry. *Cogent Soc Sci.* 2017;
17. Solanki MS, Sharma DKP, Goswami L, Sikka R, Anand V. Automatic Identification of Temples in Digital Images through Scale Invariant Feature Transform. In: 2020 International Conference on Computer Science, Engineering and Applications, ICCSEA 2020. 2020.
18. Anderson E. Policy Entrepreneurs and the Origins of the Regulatory Welfare State: Child Labor Reform in Nineteenth-Century Europe. *Am Sociol Rev.* 2018;
19. 19. Tabash MI, Albugami MA, Salim M, Akhtar A. Service quality dimensions of E-retailing of Islamic banks and its impact on customer satisfaction: An empirical investigation of Kingdom of Saudi Arabia. *J Asian Financ Econ Bus.* 2019;
20. Coon M. Remittances and child labor in Bolivia. *IZA J Migr.* 2016;
21. Kumar S, Shamim M, Bansal M, Gangwar B, Aggarwal RP. Computational modeling and emerging trend in agriculture. In: 2015 International Conference on Computing for Sustainable Global Development, INDIACom 2015. 2015.
22. Yuningsih Y, Salamah U, Nurwati N. Social protection for child labors. *Int J Eng Technol.* 2018;

A REVIEW ON PHOTO CATALYSIS FOR AIR TREATMENT FROM CATALYST DEVELOPMENT TO REACTOR DESIGN

Arun Gupta*

*Faculty of Engineering,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email id- arun.engineering@tmu.ac.in

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ABSTRACT

The intriguing possibilities in environmental cleanup, chemical synthesis, and energy innovation have prompted significant research into photocatalysis for decades. However, photocatalysis' practical/commercial/industrial uses in the area of construction materials have been limited. The problem of poor quantum efficiency in solar energy conversion and low pollutant levels in photodegradation is very difficult to address. Photocatalytic oxidation (PCO) of different pollutants, such as volatile organic chemicals (VOCs) or inorganic gases (NO_x, SO_x, CO, H₂S, and ozone, among others) at relatively low concentrations, seems to be more commercially viable. This study begins with an introduction to PCO's contaminant removal process, followed by a thorough examination and discussion of photo - catalysts and reactor architecture. This article intends to provide basic and comprehensive information for paving the way for commercial gas-phase photo degradation.

KEYWORDS: Air Purification, Inorganic Gases, Pollution, Photo Degradation, Volatile Organic.

1. INTRODUCTION

Attributed to the aforementioned two energy crises, the 1973 oil crisis and the 1979 energy crisis, the discovery of photo catalysis in 1972 on hydrogen generation by water splitting drew urgent study attention. A semiconductor of TiO₂ electrode was employed in the research by Fujishima and Honda to promote hydrogen evolution under irradiation. When semiconductor particles are used, and the various locations of a single particle may act as anodes and cathodes, a variety of photo electrochemical cells can be created (1)(2)(3)(4).

Photo catalysis, based on the semiconductor mechanism, was then greatly expanded, with a variety of practical implications, including photo oxidation/photo degradation, photo catalytic CO₂ reduction,, photo catalytic synthesis, photo catalytic gas-phase oxidation, photo catalytic heavy metal removal, and photo induced self-cleaning. The many practical and theoretical advances in photo catalysis have allowed a number of good reviews, which have established the basics of photo catalysis ranging from activated surfaces, charge generation, surface reactions, and applications. Most photo catalytic processes were previously carried out on wide-band semiconductors like TiO₂ and ZnO. (5)

The limits of photo catalysis were thought to be a combination of thermodynamic and kinetic constraints. The absorption of photons and the subsequent charge generation, recombination, and migration are all determined by the nature of a photo catalyst material. The first phase, light absorption, also affects solar energy usage efficiency, with ultraviolet (UV) light captured by TiO_2 or ZnO accounting for less than 4% of solar spectrum energy. Even if photo induced charges successfully move to the surface, where photo catalytic processes occur, they may be trapped by undesired reactants or undergo surface recombination(6)(7)(8)(9).

As a result, photo catalysis efficiency has remained very low. Photo degradation of aqueous or gaseous contaminants, as well as the generation of solar fuels through photo catalytic water splitting or CO_2 conversion, has been the hottest subjects in photo catalysis for more than four decades. When "photodegradable*" is entered in the "Topic" field and "2013-2015" is entered in the "Year published" field, the ISI database returns 5,840 hits. When the "Topic" is changed to "photocata*" and "hydrogen or (CO_2 reduction)", the results increase to 6,788. The margins of the research gap have been pursued by research activities, such as material adventures or theoretical investigations, but the gap between 3 research and practical application has yet to be bridged(10)(11)(12)(13).

Commercial photo catalysis must be technically and economically competitive with alternatives such as hydrogen production from hydrocarbon reforming, CO_2 conversion by dry reforming and chemical synthesis, water treatment by adsorption, biological treatment, or advanced oxidation processes (AOPs). Air purification, particularly indoor air purification, seems to be a promising area in which photo catalysis may possibly function as a commercialized technology, integrating with particle matter removal technologies, as compared to the aforementioned industrial processes. For a long time, the harmful health effects of air pollution have been recognized all over the globe. Particulate matter (PM) and gaseous pollutants have been recognized as the two major types of air pollutants to be concerned about. Source management and air cleansing have both been shown to be successful methods for reducing air pollution(14)(15)(16).

Increased ventilation may also help with interior air pollution. Source management and physical treatments, such as electrostatic precipitation, wet scrubbing, and filtration, may be used to address particulate matters ($\text{PM}_{2.5}$ and PM_{10}). Because particle pollutants are unlikely to be successfully removed by photo catalysis, we will concentrate on the photo catalytic removal of gaseous pollutants such as NO_x (primarily NO_2), SO_x (mostly SO_2), ozone (O_3), CO, smells, and volatile organic compounds in this study (VOCs).

VOCs and odorous chemicals (H_2S and S-containing organics) are also not explicitly controlled in the standards, as can be observed. However, the presence of such chemicals in indoor air, as well as the health problems connected with them, such as sick building syndrome (SBS), have been well established. Traditional air cleaning technologies for eliminating these gaseous pollutants are confined to physical techniques such as ventilation, adsorption, or filtration, and there has yet to be established an efficient approach for destroying such toxins(17)(18)(19)(20).

Low-level pollutants and fewer competitors (efficient and low-cost technology) for air purification, particularly indoor air purification, have made photo catalytic oxidation (PCO) a great fit, with limited commercialization using UV. There have been many good review articles published in this area, with a focus on NO_x , SO_x , VOCs, and smells. The foundations of PCO, material characteristics, reaction conditions in PCO for air purification, and comparisons were

also discussed. However, there has yet to be published a thorough study that covers the mechanism, photo catalyst design, reactor design, and simulations. We want to overcome this gap with our literature review, which will pave the way for commercialized PCO air purifiers.(21)

2. DISCUSSION

1. Photo Catalytic Oxidation (Pco) For Air Purification:

Due to the energy/oil crises of the 1970s, photo catalytic split was widely studied, but in the 1980s, photo catalysis was redirected to the degradation of organic contaminants. PCO removal of gaseous pollutants was established in a similar way to the comprehensive research on aqueous pollutants.

1.1 Photo Degradation of VOCs:

In early 1970s, Teichner et al. firstly reported gas-phase heterogeneous photocatalysis for partial oxidation of paraffins. Stone et al. systematically investigated the photo adsorption of oxygen and PCO of isopropanol at rutile surfaces. It was shown that water and oxygen can be chemically adsorbed onto the TiO₂ surface, and then produce reactive species on the surface.

It is seen that surface adsorption of oxygen and water can produce reactive radicals that present in photo degradation in water, indicating the capability of PCO for removal of organic pollutants in air. The investigations on chemisorptions and photochemistry of H₂O, O₂, and CO₂ further realized the ideas of PCO removal of VOCs for air purification. The increasing concern of health issue from indoor air pollution has significantly attracted worldwide attention in PCO for VOCs removal.

A wide variety of VOCs, including main contributions from aromatics, aldehydes and halocarbons, have been detected in either outdoor or indoor air. For better evaluation of the performances of photo catalysts or reactors, formaldehyde, trichloroethene (TCE), toluene and benzene have been frequently applied as typical VOCs in PCO studies.(22)

1.2 Formaldehyde (HCHO):

HCHO is a typical carbonyl compound that has been recognized as one of the main indoor air quality, and it has been linked to cancer and other severe illnesses. In polluted air, HCHO concentrations are often in the ppbv to ppmv range, which is still much higher than the WHO recommended limit. Peral and Ollis published their findings on the heterogeneous photocatalytic oxidation of formaldehyde, acetone, 1-butanol, butyraldehyde, and m-xylene. The degradation processes of anatase TiO₂ particles were well characterized by the Langmuir-Hinshelwood rate forms after UV exposure. Due to the competing adsorption of water and organic molecules, Obee et al. discovered that humidity has a substantial impact on formaldehyde PCO efficiency.(23)

2. Nox And Sox Elimination Through Photocatalysis:

2.1. Nox Reduction Through Photocatalysis:

Natural processes and human actions may both produce nitric oxide. Volcanic activity, movement from the upper to lower atmosphere, and certain breakdown processes of organic material caused by the function of microorganisms in an eco-system and solar energy, for example, may all produce NO_x. Human activities, such as combustion processes in fixed and

mobile units such as cars, often increase NO_x emissions in urban regions. NO and NO₂ are the most prevalent NO_x. The creation of troposphere ozone, acid rains, global warming, and human illnesses affecting the respiratory and immunological systems have all been linked to NO_x emissions. Primary techniques for NO_x removal concentrate on emission control, whereas adopted different methods convert NO_x to N₂ (reduction route) or HNO₃ (reduction route) (oxidation route). Heterogeneous photo catalysis, a common secondary technique, may remove NO_x via three distinct processes, including photo-decomposition, photo-oxidation, and photo-SCR (selective catalytic reduction).(24)

2.2 Sox Elimination through Photocatalysis:

The US EPA has designated gaseous SO_x in the ambient air as a significant pollutant because it may cause acid rain, vegetation damage, and building corrosion. It's also one of the main precursors that may lead to the formation of airborne particles, which can reduce visibility and alter climatic patterns. Long-term exposure to SO_x-polluted air may cause respiratory issues including bronchitis and asthma exacerbation. Topalian et al. investigated photofixation of SO₂ on anatase TiO₂ thin films and discovered that adsorbed SO₂ may be photo-oxidized to sulfide and sulfate surface species, which is aided by the production of reactive oxygen species.

2.3. Photocatalytic CO and Ozone Elimination:

In safe living conditions, carbon monoxide (CO) is a hazardous air pollutant. It is usually caused by partial oxidation (combustion) of VOCs (hydrocarbons) and may be deadly owing to oxygen depletion in the blood. In most VOC degradation/oxidation processes, CO oxidation to CO₂ is the last step. Linsebigler et al. investigated CO photo oxidation on TiO₂ and found that active adsorbed molecular oxygen is essential for oxidation, while TiO₂ lattice oxygen is not involved in the processes. The following equations may be used to explain CO photo oxidation with oxygen. Carbonate groups may develop when surface water or hydroxyl radicals are present.

Ozone, a blue gas with a strong stench, occurs naturally in a layer between 30,000 and 150,000 feet above the earth's surface and performs a useful function in the atmosphere by absorbing UV and shielding the Earth from its severe UV exposure. In the ambient environment, however, it may become a dangerous pollutant. It has a strong oxidizing power that varies depending on the area, season, and weather conditions. It may be poisonous and dangerous to human health if the concentration reaches 0.214 mg m⁻³, producing headaches, 13 chest discomfort, and annoyances of the eyes, nose, and throat.

2.4 Photo Catalytic Deodorization:

One of the most essential aspects of air filtration is odor elimination. The presence of H₂S, S-containing chemicals, and certain microorganisms may produce odor. PCO removal of odorous S-containing organic compounds works in a similar way to VOC removal, although the mechanism of photo catalytic deactivation of odorous bacteria is yet unknown. The photo catalytic removal of H₂S via two pathways, e.g. breakdown to generate hydrogen and PCO, is discussed in this section. Bhirud et al. reported hydrogen evolution mechanisms of photo catalytic breakdown of hydrogen sulfide using a visible light photo catalyst of N-TiO₂/grapheme.(25)

3. CONCLUSION

The enormous amount of effort put into the design of photo catalysts and photo catalytic reactors in recent years demonstrates the conviction that this technique will one day be used to clean dirty air. Understanding the mechanisms of pollutant degradation, light absorption, and interfacial charge has advanced to the point where catalysts may now be tuned to produce even better results. Despite these advancements, photo catalysis will not be commercially feasible unless persistent problems such as poor quantum efficiency, visible light absorption capabilities, selectivity for CO₂ and H₂O generation, and stability are solved. A range of specialized groups, such as band gap engineers, material scientists, chemical engineers, and chemists, will be required to contribute. As a result, doping well-known semiconductors like TiO₂ and ZnO with metals, metal oxides, or non-metals like carbon or carbon nitrides, as well as the usage of composites and perovskite-based materials, would be a good start.

New ideas in reactor design will be needed to increase the surface area of the photo catalyst in contact with light while maintaining a minimal pressure drop of the flowing gas. Intrinsic kinetic models must be based on feasible degrading processes, depending on the pollutant, in order to be applicable to a variety of circumstances and reactor types. Computational models built from basic transport equations have shown to be effective tools for the experimental validation of different reactor designs. Nonetheless, understanding fluid fluxes is critical for the correct design of photo catalytic reactors, and CFD-based models are critical, especially when the reactor is large. More investigations at more realistic ppb levels are also needed, owing to the difficulty of producing and regulating such low concentrations, and the impact of gas mixtures, which will imply more complex degradation processes and reaction kinetics, must be studied. Finally, a set of international standards for photo catalytic goods is needed so that simple tests may be used to compare products from various manufacturers.

However, each test requires distinct, costly, and complex analytical equipment, and the preconditioning procedure varies per standard. In terms of experimental methods and data analysis, it has been recommended that comparable protocols be established for all contaminants, whereas published standards for other common pollutants such as formaldehyde and methyl mercaptan are needed and awaiting. As a result, several difficulties and issues in the promising area of photo catalysis must to be solved before this method can be commercialized.

REFERENCES

1. Bangotra P, Sharma M, Mehra R, Jakhu R, Singh A, Gautam AS, et al. A systematic study of uranium retention in human organs and quantification of radiological and chemical doses from uranium ingestion. *Environ Technol Innov*. 2021;
2. Wang S, Yi L, Halpert JE, Lai X, Liu Y, Cao H, et al. A novel and highly efficient photocatalyst based on P 25- graphdiyne nanocomposite. *Small*. 2012;
3. Kaur R, Shikha D, Kaushal A, Gupta R, Singh SP, Chauhan RP, et al. Measurement of indoor ²²²Rn, ²²⁰Rn and decay products along with naturally occurring radionuclides in some monuments and museums of Punjab, India. *J Radioanal Nucl Chem*. 2021;
4. Shikha D, Kaur R, Gupta R, Kaur J, Chandan, Sapra BK, et al. Estimation of indoor radon and thoron levels along with their progeny in dwellings of Roopnagar District of Punjab, India. *J Radioanal Nucl Chem*. 2021;

5. Shen S, Burton M, Jobson B, Haselbach L. Pervious concrete with titanium dioxide as a photocatalyst compound for a greener urban road environment. *Constr Build Mater.* 2012;
6. Rosha P, Ibrahim H, Nanda AK, Mohapatra SK, Mahla SK, Dhir A. Effect of hydrogen-enriched biogas induction on combustion, performance, and emission characteristics of dual-fuel compression ignition engine. *Asia-Pacific J Chem Eng.* 2020;
7. Bilal M, Singh N, Rasool T. A model supported biomedical waste for the enhancement of mechanical properties of concrete. *Model Earth Syst Environ.* 2021;
8. Chen YL, Chen YS, Chan H, Tseng YH, Yang SR, Tsai HY, et al. The use of nanoscale visible light-responsive photocatalyst TiO₂-Pt for the elimination of soil-borne pathogens. *PLoS One.* 2012;
9. Shankaracharya, Odedra D, Mallick M, Shukla P, Samanta S, Vidyarthi AS. Java-based diabetes type 2 prediction tool for better diagnosis. *Diabetes Technol Ther.* 2012;
10. Tesfahun AA, Chawla AS. Risk perceptions and adaptation strategies of smallholder farmers to climate change and variability in North Shoa Zone, Ethiopia. *Manag Environ Qual An Int J.* 2020;
11. Thappa S, Chauhan A, Anand Y, Anand S. Thermal and geometrical assessment of parabolic trough collector-mounted double-evacuated receiver tube system. *Clean Technol Environ Policy.* 2021;
12. Iyer M, Tiwari S, Renu K, Pasha MY, Pandit S, Singh B, et al. Environmental survival of SARS-CoV-2 – A solid waste perspective. *Environ Res.* 2021;
13. Sánchez B, Sánchez-Muñoz M, Muñoz-Vicente M, Cobas G, Portela R, Suárez S, et al. Photocatalytic elimination of indoor air biological and chemical pollution in realistic conditions. *Chemosphere.* 2012;
14. Ochiai T, Masuko K, Tago S, Nakano R, Niitsu Y, Kobayashi G, et al. Development of a hybrid environmental purification unit by using of excimer VUV lamps with TiO₂ coated titanium mesh filter. *Chem Eng J.* 2013;
15. Singh D. Robust controlling of thermal mixing procedure by means of sliding type controlling. *Int J Eng Adv Technol.* 2019;
16. Solanki MS, Sharma DKP, Goswami L, Sikka R, Anand V. Automatic Identification of Temples in Digital Images through Scale Invariant Feature Transform. In: 2020 International Conference on Computer Science, Engineering and Applications, ICCSEA 2020. 2020.
17. Boyjoo Y, Ang M, Pareek V. Photocatalytic treatment of shower water using a pilot scale reactor. *Int J Photoenergy.* 2012;
18. Kumar S, Shamim M, Bansal M, Gangwar B, Aggarwal RP. Computational modeling and emerging trend in agriculture. In: 2015 International Conference on Computing for Sustainable Global Development, INDIACom 2015. 2015.
19. Goel S, Mamta. GA based trip attraction model for DUA. In: 2015 International Conference on Computing for Sustainable Global Development, INDIACom 2015. 2015.
20. Jain RK, Kumar A, Singh NL, Tommasino L, Singh BK. Measurement of peak fluence of

neutron beams using Bi-fission detectors. *Pramana - J Phys.* 2012;

21. Portela R, Tessinari RF, Suárez S, Rasmussen SB, Hernández-Alonso MD, Canela MC, et al. Photocatalysis for continuous air purification in wastewater treatment plants: From lab to reality. *Environ Sci Technol.* 2012;
22. Qi S, Zuo R, Liu Y, Wang Y. Synthesis and photocatalytic activity of electrospun niobium oxide nanofibers. *Mater Res Bull.* 2013;
23. Dong F, Sun Y, Fu M, Wu Z, Lee SC. Room temperature synthesis and highly enhanced visible light photocatalytic activity of porous BiOI/BiOCl composites nanoplates microflowers. *J Hazard Mater.* 2012;
24. Zhang R, Zhang Y, Fu X, Zhang X, Chen J, Wang L, et al. Enhancement of active species formation by TiO₂ catalysis in the bipolar pulsed discharge plasma system. *IEEE Trans Plasma Sci.* 2013;
25. Zazueta ALL, Destailats H, Li Puma G. Radiation field modeling and optimization of a compact and modular multi-plate photocatalytic reactor (MPPR) for air/water purification by Monte Carlo method. *Chem Eng J.* 2013;

MANUFACTURING SECTOR, FATAL WORKER ACCIDENTS IN OUTSOURCED OPERATIONS

Navneet Kumar Vishnoi*

*Faculty of Engineering,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email id- navneet.computers@tmu.ac.in

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ABSTRACT

Several studies have shown that outsourcing increases the likelihood of accidents, and have offered some reasons for why this is true. External workers, for example, have been shown to be more accident prone, although the most frequent reasons of accidents have not been thoroughly examined. This article describes the types of fatal occupational accidents that occur in outsourced manufacturing jobs, as well as the variables that contribute to them and the steps that may be taken to avoid them. This study also examines if these variables vary from incidents that happened in the manufacturing sector when activities were done in-house. The emphasis is on activities carried out in the factory for or by a company in the manufacturing industry. The data for the accident study was collected from accident reports for fatal industrial incidents that occurred in Finland between 1999 and 2008. Accidents are most frequent in outsourced manufacturing operations while installations or work preparations are being done. According to the studies, the most common causes of accidents were unsafe work practices and a lack of hazard identification. Occupational educational and guidance, danger detection, work practices, supervision, and job planning should all be addressed in order to avoid typical accidents. There were additional statistical disparities between outsourced and in-house operations, mostly in the contributing variables. As a result, the safety of outsourced manufacturing activities should be carefully addressed in order to avoid accidents and guarantee worker safety even while working with other people.

KEYWORDS:*Accident Statistics, Fatal Accidents, Manufacturing Industry, Outsourcing, Shared Workplace.*

1. INTRODUCTION

Because of the high frequency of workplace accidents, the manufacturing sector is one of the most hazardous industries. In 2007, there were about 942,000 accidents resulting in more than three days of absence at manufacturing firms in the EU-15 nations and Norway. In the same year, there were 667 fatal incidents in the industrial sector(1). In a 12-month period, around 4.5 percent of manufacturing employees were involved in an accident at work. These data place manufacturing second behind construction in terms of accident statistics. Approximately 30,000 accidents occurred in manufacturing sites in Finland in 2007, with slightly more than 14,000

resulting in at least four days of absence(2). Six of the collisions resulted in death. Employees conducting manufacturing activities were involved in approximately every fourth workplace accident(3). During the same year, the accident frequency of accidents involving at least 4 days of absence from work (per million work hours) at Finnish industrial workplaces was about 20, and around 43 if all reported incidents were included together.

The manufacturing sector, behind construction and private homes with hired people, was the third most dangerous branch in terms of accident frequency(4). The number of manufacturing-related accidents remained unchanged from the previous year, although the frequency dropped somewhat as the number of work hours rose. Production, manufacturing, and processing were the most frequent working processes in Finnish manufacturing workplaces in 2007(5). (56 percent of the accidents). Contact with sharp, pointed, rough, coarse material agents was the most frequent form of injury (23 percent of the incidents), and cuts and superficial injuries were the most common injuries arising from the accidents (47 percent of the accidents)(6). Outsourcing has become a common component of business operations and management as a result of increased rivalry, globalization, and a constantly changing operational environment. Manufacturing firms, in particular, are increasingly favoring outsourcing.

During the period 2000–2006, almost two-thirds of manufacturing firms in Finland with more than ten workers outsourced part of their activities. Outsourcing has been most prevalent in Finnish business among firms involved in metals manufacturing, chemical manufacturing, and forest management(7). More than 80% of the businesses in these industries have outsourced part of their activities. Companies in the food sector, on the other hand, have utilized external suppliers the least fewer than every second one of the companies(8). Almost every examined Finnish manufacturing business that has subcontracted work to other performers has done so with local firms, but every sixth firm has also done so with foreign firms.

The percentage of outsourced operations is expected to rise by the end of the first decade of the twenty-first century. Outsourcing services supporting main company is widespread in Finland, but the execution of core services is also outsourced to service providers. According to a research, service activities (such as financial administration, property maintenance, machine repair, and guarding) are most frequently outsourced by Finnish manufacturing firms with more than 10 workers(9). Since the early 2000s, almost every second firm in the manufacturing sector has outsourced existing activities. Every third manufacturing firm outsources manufacturing and a smaller percentage outsources R&D(10).

Almost all service activities are obtained from Finnish suppliers, while approximately a tenth of R&D and production is outsourced outside of Finland. In terms of operation kinds and frequency of externalization, Finnish big businesses' foreign outsourcing statistics are rather average when compared to other European nations(11). The most frequent motivations for outsourcing among Nordic businesses, according to Nordic outsourcing research, are concentrating on core operations and acquiring specific knowhow. Variations in human need, cost reductions, and a way to convert fixed expenses to variable costs were all cited as frequent causes(12). Aside from cost savings and specialized skills, the major reasons for outsourcing to other countries include increased competitiveness and access to new markets, as well as strategic decisions made by companies and competitors/clients.

All of these reasons are consistent with findings from a number of international studies that explain why businesses outsource their operations. Despite the fact that the impact of outsourcing on accident rates has been observed, thorough and extensive accident study has been very limited(13). The types of injuries and accidents that happened in Sweden's mining sector between 1986 and 1990. Contractor workers, according to the research, seem to be injured more often and severely than mining company employees. who examined incidents involving major contractors and subcontractors working in Finnish construction in 1988 and 1989, found similar findings(14). The most current research on the topic looked at how the fact that workplaces are shared impacted occupational accidents in general and in construction between 1999 and 2004 in Finland. In order to improve occupational safety and health at shared industrial workplaces, more study is required on the topic, particularly on what variables lead to accidents(15). The information for this research was collected from investigation reports of fatal industrial accidents in Finland. After fatal accidents occur in Finnish workplaces or in similar circumstances involving workers or businesses covered under the Employment Accidents Insurance Act, the Federation of Accident Insurance Institutions (FAII) and labor groups coordinate the preparation of reports(16). When an accident occurs in external or commuter traffic, or when a fatality is caused by an occupational illness, no reports are filed(17).

2. DISCUSSION

The workplaces where the deaths happened are notified via reports. The reports are also accessible in Finnish on the FAII's website. The accident reports were prepared after a panel of specialists performed investigations. Representatives from the FAII, as well as labor, official, and employer groups in the industry in issue, make up the group. In addition, participants from research institutions and insurance companies may be utilized(18). The investigations' goal is to figure out what happened, why an accident happened, and how such incidents may be avoided in the future. The individuals who caused the accident are not being investigated. The accident reports are five pages long and contain a chain-of-events graph based on the Finnish accident investigation model, as well as photographs and drawings that explain the accident. The reports also include background information about the wounded person, the employer, and the accident site. The accident categorization information based on the ESAW-classification is also included in the reports(19).

The victim's age, workstation, profession, working procedure, physical activity, deviation, method of injury, branch of the injured party's employer, and business size are all included in the categories. During the ten-year period 1999–2008, the study's emphasis was on fatal workplace incidents involving workers. The data was gathered using accident reports received from the FAII's accident database(20). The accident reports were chosen as a data source because, unlike other accident statistics, they contain accurate information on whether the victim worked for the customer or the service provider business, as well as whether the accident happened at the customer's location or elsewhere. Furthermore, the accident reports contain recommendations from the accident investigation committee for remedial measures targeted at avoiding future incidents(21). The information in this article was collected as part of a research effort at Tampere University of Technology, which included an examination of all accident reports during the time period under consideration. Accidents that happened at the industrial site when workers conducted industrial activities for the manufacturing sector were chosen. The following data was collected from the chosen reports. The accident descriptions included information on the kind of

operation, variables that contributed to the incidents, suggested remedial measures, and the victim's experience. ESAW-codes were provided for the other variables. Some accident reports, however, did not include information on all of these variables(22).

During the time period under consideration, 274 fatal industrial accidents involving workers happened in Finland. For all of them, summaries (containing information about the operation type, operation-related variables, accident factors, and some background information) and full-length reports (for 262 accidents) were provided(23). Employees who died while conducting manufacturing industry activities at an industrial location were the target group in 83 (30%) of the incidents. Industrial sites include manufacturing areas, factories, and workshops; maintenance areas, repair workshops; and areas used primarily for storage, loading, and unloading, as well as other comparable kinds of work settings(24).

In the Finnish manufacturing sector, 34 fatal workplace accidents occurred at outsourced operations and 49 at in-house operations between 1999 and 2008. Outsourced activities had an annual number of accidents ranging from 1 to 6, whereas in-house operations had an annual number of accidents ranging from 3 to 10. Three people were killed in one mishap at an outsourced business, while there was just one casualty in other instances. When compared to all fatal workplace accidents in Finnish manufacturing, the percentage of fatal workplace accidents that happened in outsourced operations. Truck driver (21 percent of casualties), machine driver (15 percent), electrician (12 percent), and machine repairer were the most frequent professions of outsourced operations victims (9 percent). Cleaner, plate maker, machine operator, mechanic, forklift driver, welder, insulation worker, carpenter, engineering worker, and engineer were among the other professions. The victims had a lot of experience in the jobs they were doing at the time of the tragedy. In the accident reports, 73 percent of the external workers had at least 5 years of experience or were characterized as experienced(25). Only around one-tenth of all external victims had more than a year of experience. Victims who were conducting in-house procedures were also skilled, as almost 90% were deemed experienced, with just 3% having no experience. There were no statistically significant differences between outsourced and in-house operations. At least 50 people were employed by half of the providers for whom the victims worked. However, the percentage of small businesses with little more than nine workers was also noteworthy (40 percent). Because three out of every four businesses were big (with at least 50 workers), and just one tenth had less than nine employees, in-house operations were prevalent.

There were statistically significant variations in the size of the victim's employer business between outsourced and in-house activities ($p = 0.003$). Accidents involving workers conducting outsourced activities mostly claimed the lives of service providers (81 percent of the cases). Both kinds of people were killed in the same accident. The majority of the mishaps were the result of the victim's own conduct. Only 6% of incidents involving outsourced work and 2% of accidents involving in-house operations involved another individual. There was no statistically significant difference. Installations and preparations (27 percent of incidents), maintenance and repairs (18 percent), and cleaning activities were the most frequent operational procedures at outsourced manufacturing operations when accidents occurred (15 percent). Even though statistical significance was established only in the instances of production ($p = 0.044$) and monitoring ($p = 0.019$), which were more frequent in-house activities, the working procedures conducted varied significantly between outsourced and in-house operations. The percentages and instances of the working procedures done are given in detail. The bulk of the casualties in outsourced operations

were on the move at the time of the disaster (41 percent of the time). Working with hand-held tools (16 percent) and manipulating items were other popular hobbies (16 percent). There were some minor percentage variations between outsourced and in-house operations, but they were not statistically significant. The percentages linked to the victims' activities are shown. Trapping or crushing injuries were noted in almost every second accident report that addressed incidents that happened at outsourced manufacturing operations. In addition, many outsourced operations incidents included horizontal or vertical impact with or against a fixed item, being hit by or colliding with an object in motion, and coming into touch with electrical voltage, temperature, or hazardous chemicals. Because the various types of injuries were almost equally frequent in both in-house and outsourced operations, statistical significance was not observed.

In-depth analysis of the percentages of different types of injuries in outsourced and in-house operations. Dangerous work practices (e.g., working in a danger zone or using work methods with a high risk of errors), insufficient hazard identification (e.g., defaulting on risk assessment or underrating the significance of identified hazards), and human error (e.g., stumbling across a hazard) are the most common factors contributing to fatal workplace accidents in outsourced manufacturing operations. More than every second accident report addressing incidents that happened while workers conducted outsourced activities cited the first two variables as contributing. Every third shared workplace accident was caused by the latter two. Inadequate supervision (e.g., supervision at the worksite was ignored or supervision of compliance with instructions was inadequate), defective communication (e.g., risks of work tasks, changes in work performance, simultaneous work tasks, or employees on site were not known to all parties involved), and insufficient safety devices (e.g., safety devices) were all common factors contributing to the accidents. When the contributing variables for outsourced operations accidents were compared to those that happened in-house, numerous statistically significant differences were discovered. Inadequate flow of information ($p = 0.012$) and inappropriate warning signals ($p = 0.003$) were noted more often in accident reports involving outsourced activities than in reports involving in-house operations. Machine malfunction, on the other hand, was thought to be a contributing factor in accidents in outsourced instances more often than in-house cases ($p = 0.018$). In addition, there were variations that might be regarded suggestive in the areas of danger detection, teaching, guidance, and safety equipment. Inadequate safety devices were more prevalent among the incidents that happened in-house activities.

In studies that looked at outsourced activities, two additional variables were cited more often. The following is a list of contributing variables that appear in at least every tenth study addressing outsourced activities, their frequency, and the contrasts between them and in-house operations. Several measures were suggested in the reports addressing incidents that happened during the execution of outsourced activities in the manufacturing sector in order to avoid such mishaps. Occupational instruction and guidance (e.g., introduction to safe work methods, performance in abnormal situations, and proper use of tools and safety devices given to all employees regardless of the employer) as well as adequate hazard identification (e.g., systematic identification of hazards and execution of corrective actions re in more than 80% of the reports on outsourced work, occupational training and advice were cited as a suggested remedial measure. The percentage was just 10% lower in the case of danger identification. The use of safe work procedures (e.g., completing work stages in the right sequence, checking that the

installation is dead, and avoiding risk zones) was the second most often suggested preventative factor.

3. CONCLUSION

The fatal workplace incidents that happened in the Finnish manufacturing sector from 1999 to 2008 were examined in this article. The goal of this investigation was to determine what types of accidents occur when workers conduct outsourced manufacturing activities and to investigate the variables that contribute to these mishaps. The goal was also to compare accidents that happened in outsourced operations to those that occurred at in-house operations. The research was conducted by examining accident records based on accident investigations conducted by a team of specialists. Every year, numerous incidents take the lives of workers working for service providers or major corporations, according to a study of accident data from Finnish industrial workplaces. Employees doing outsourced activities account for around 40% of these accidents. Middle-aged workers who are experienced in the jobs they are doing at the time of the accident account for the majority of fatal workplace accidents. Installations and preparations, as well as maintenance and repairs, were the most frequent working activities in fatal incidents at outsourced operations. Movement, breaking, and collision against a stationary object were the most frequent particular physical activity, deviation, and method of injury, respectively. When comparing outsourced activities to in-house duties, some variations in the shares of the investigated variables were discovered. These differences, however, were statistically significant only in a few working activities. Dangerous work practices, inadequate hazard identification, human error, and inadequacies in training and supervision were the most frequent causes and flaws cited in accident reports as contributing to accidents that occurred at outsourced operations. In many instances, these contributing variables varied between outsourced and in-house operations. The suggested remedial measures in the reports, on the other hand, were quite comparable.

REFERENCES:

1. Blank VLG, Andersson R, Lindén A, Nilsson BC. Hidden accident rates and patterns in the Swedish mining industry due to involvement of contractor workers. *Saf Sci*. 1995;
2. Choi GH, Loh BG. Control of Industrial Safety Based on Dynamic Characteristics of a Safety Budget-Industrial Accident Rate Model in Republic of Korea. *Saf Health Work*. 2017;
3. Jain M, Preeti. Transient analysis of a machine repair system with standby, two modes of failure, discouragement and switching failure. *Int J Oper Res*. 2014;
4. Bhatnagar V, Ranjan J, Singh R. Real-time analysis on finding significance of data mining on CRM of service sector organisations: An Indian perspective. *Int J Electron Cust Relatsh Manag*. 2011;
5. Yi KH, Lee SS. A Policy Intervention Study to Identify High-Risk Groups to Prevent Industrial Accidents in Republic of Korea. *Saf Health Work*. 2016;
6. Rai D V., Ranu HS. Ovariectomy and its antioxidative effect on bone. In: ASME International Mechanical Engineering Congress and Exposition, Proceedings (IMECE). 2010.
7. Villar-Martinez A, Rodriguez-Gil L, Angulo I, Orduna P, Garcia-Zubia J, Lopez-De-Ipina D.

-
- Improving the Scalability and Replicability of Embedded Systems Remote Laboratories through a Cost-Effective Architecture. IEEE Access. 2019;
8. Choi WS, Kim BK, Kim K Do, Moon OK, Yeum DM. Impact of the number of painful stimuli on life satisfaction among Korean industrial accident workers completing convalescence: Dual mediating effects of self-esteem and sleeping time. Ind Health. 2016;
 9. Kang YS, Yang SH, Kim TG, Kim DS. Systematic strategies for the third industrial accident prevention plan in Korea. Ind Health. 2012;
 10. Singh A, Rana A, Ranjan J. Data mining techniques and its effect in customer relationship management. Int J Data Anal Tech Strateg. 2015;
 11. Yusuf TA, Ismaila SO, Kuye SI, Samuel OD. Evaluation of the cost and effect of industrial accidents. Eur J Sci Res. 2015;
 12. Renni E, Krausmann E, Cozzani V. Industrial accidents triggered by lightning. J Hazard Mater. 2010;
 13. Dwyer T, Raftery AE. Industrial accidents are produced by social relations of work: A sociological theory of industrial accidents. Appl Ergon. 1991;
 14. Tyagi N, Rana A. Fuel your growth with integration: Hybrid cloud computing. Int J Appl Eng Res. 2015;
 15. Blanton RG, Peksen D. Dying for Globalization? The Impact of Economic Globalization on Industrial Accidents. Soc Sci Q. 2017;
 16. Dubey G, Rana A, Ranjan J. Fine-grained opinion mining of product review using sentiment and semantic orientation. Int J Bus Inf Syst. 2017;
 17. Ince H, Kandemir E, Ince N, Güloğlu R, Safran N. Burn and vital risk criteria in industrial accidents (as forensic medicine approach). Ulus Travma ve Acil Cerrahi Derg. 2008;
 18. Navaney P, Dubey G, Rana A. SMS Spam Filtering Using Supervised Machine Learning Algorithms. In: Proceedings of the 8th International Conference Confluence 2018 on Cloud Computing, Data Science and Engineering, Confluence 2018. 2018.
 19. Ghosh S, Rana A, Kansal V. A statistical comparison for evaluating the effectiveness of linear and nonlinear manifold detection techniques for software defect prediction. Int J Adv Intell Paradig. 2019;
 20. Irshad U, Singla S. Impact of road conditions on traffic management-a case study of chenab valley. Int J Sci Technol Res. 2019;
 21. Khan M, Singla S, Ahmad S. Accident mitigation and management measures for NH-44(India) from Khannabal to Qazigung in Jammu-Kashmir. Int J Innov Technol Explor Eng. 2019;
 22. Hosaini SB, Singla S. Significant factors of delay in construction projects in Afghanistan. Int J Innov Technol Explor Eng. 2019;
 23. Chandel SK, Goyal R, Singla S. Utilization of construction waste as partial replacement of aggregates in cement concrete. Int J Innov Technol Explor Eng. 2019;
-

24. Sachar A, Kaushal M, Kumar A, Singla S. Analysis of chandigarh periphery for the urban containment. Int J Innov Technol Explor Eng. 2019;
25. Farooq A, Verma P, Singla S. Stabilisation of dredged soil for road pavement. Int J Innov Technol Explor Eng. 2019;

SEARCH ENGINE OPTIMIZATION (SEO) AS A DYNAMIC ONLINE PROMOTION TECHNIQUE

Chanchal Chawla*

*Teerthanker Mahaveer Institute of Management and Technology,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email id- chanchal.management@tmu.ac.in

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ABSTRACT

The research looked at whether an extensions viewpoint of 'activity' theory may be used as a basis for developing new internet promotion outlets like search engines. This conception was treated as a paradigm for contextual issues in Search Engine Optimization (SEO), which may be used to facilitate the modeling and development of SEO promotion strategy investigations. For this work, a critical interpretive method was used. Our structured literature review resulted to an initial judging sample of 55 research papers works (chosen at the first stage of the existing literature), which were read and attained at one to thirty (30) released relevant research, which were processed to provide some valuable findings. We expanded the selection of research papers depending on the operational create perceptions on web mediated communications systems due to the lack of research function of theory in the e-marketing literary works and the fact that the Search Engine Marketing Journal, which was recently set up, was the only refereed journal that focused on search engine marketing themes. The goal of our study was to classify the constructs of the following basic concept: "behavioristic framework for the development of SEO promotion techniques." The investigation of Increase Visibility Inc.'s important case provided us with vital information on the great potential of activity theory, its applicability to modern online advertising methods such as SEO, and thus the phenomena researched became more evident. In our extension perspective of activity theory on the development of the SEO promotion technique, the literature review and case study analysis findings showed extremely new constructs and produced an original assumption of the constructs and their link to other constructs. The extension perspective of activity theory has practical ramifications for promotional managers.

KEYWORDS:*Promotion Technique, Search Engine, SEM, SEO, Web-Mediated Marketing.*

1. INTRODUCTION

Profit and non-profit organizations of all sizes and from various industries appear to be particularly interested in and focused on the internet market with their initiatives and ideas, realizing that the web offers very substantial and appealing marketing potential. European online consumers are major Internet users, with 1.3 billion purchases made in a six-month period in 2007, spending an average of € 747, 00 per person. Consumers use search engines to convey

their immediate purchasing needs, which often leads to the purchase of items and services. Companies are quickly understanding that search results are a major source for these new leads and clients, which is why search engines are regarded as the most dynamic marketing and newest online communication channels (among other internet technologies, such as RSS)(1)(2)(3)(4).

SEO may be defined as a natural or organic method of ensuring that a website ranks first when a user searches for a specific product or phrase. The goal of SEO is to increase the number of visitors to a website by ranking it very top of the search results using the most relevant keywords that describe the blog content. SEO can do a variety of searches, including image searches, local searches, and industry-specific vertical searches, in addition to keywords, which are the most prominent online promotion approach for conducting SEO procedures. As the most essential tactic in the Search Engine Marketing (SEM) process and as part of an online marketing plan, SEO can be used to boost a website's ranking and eventually to web dominance(5). In terms of consumer design, online consumer value, and price, SEO can take into account how search algorithms and techniques and what precisely online consumers seek for. Because online searches use search engines to find information, marketers have been interested in engaging these potential clients because of their existing involvement(6)(7)(8).

The criteria for a web application based on an examination of the major concepts of activity theory. Activity theory, according to the authors, is a useful tool for analyzing web applications because it offers web application developers with a model that allows them to accurately express navigational and organizational needs. a comprehensive paradigm based on activity theory that focuses on interactive information retrieval behavior According to the author, this framework not only provided a comprehensive and integrated explanation of the mechanisms governing the interaction between users' cognitive states and their manifested behavior when using an information retrieval system, but it also provided an explanation of the mechanisms governing the interaction between users' cognitive states and their manifested behavior when using an information retrieval system. The authors used activity theory to look into the elements and structure of web-based communication(9)(10)(11).

They have proposed several implications for future WMC research. Finally, this research presented a conceptual framework for developing and evaluating a corporate web site. A corporate web site, according to the writers, is distinct from traditional mass media. WMC was also unlike standard mass media advertising in terms of marketing. This necessitated the creation of a new paradigm for analyzing WMC. The phrase "web-mediated marketing communications" was defined in this study as a company's usage of a website for marketing purposes. Through the fundamental aspects of activity theory (subject, tools, object, purpose, and results), SEO promotion strategy is a relatively new research field. The ontological approach that we shall take in this research is structural because of the conceptual character of Bedny's activity theory in online promotion. In this study framework, the critical-hermeneutic method will allow for the discovery of concepts and broader linkages.

Search engines appear to be one of the most dynamic and fresh internet marketing channels, since they are a key source for attracting more and more online customers. In information research, there is a substantial literature on topics such as activity theory and methods for activity systems. Activity system constructs such as "subject," "object," and "goal statement," on the other hand, remain mostly unexplored. The literature, encouragingly, underlines the importance of SEO and SEM as part of an online marketing plan, which may be used primarily to improve a

web site's ranking and lead to web dominance. In the e marketing literature, notably in SEM, there is no research activity of activity theory. It seems reasonable because the Search Engine Marketing Journal, which was just created, is the only refereed journal devoted to search engine marketing topics (2007). Existing search engine marketing research studies (not based on the activity theory) are mostly concerned with specific activity theory concepts such as "subject," "tool," and "outcome" (mainly after 2007).

No study has yet presented a new perspective for online promotion managers based on Bedny's theoretical perspective of activity theory, particularly considering the vital role of the elements of subject, tool, object, objective, and result through an SEO activity diagram. We feel that extending Bedny's theoretical base on "activity" theory to SEO contextual issues is a behavioristic framework. In terms of design, analysis, and effectiveness assessment of the SEO promotion approach, such a framework for promotion managers can be proven useful, and it will attract major attention in the marketing literature in the near future(12)(13). The method online customers engage is shaped by SEM and SEO tools. SEM and SEO tools are influenced by online customers' attempts to address information-seeking difficulties, with the goal of making SEM and SEO solutions more useful or efficient. As individuals' creative interactions and increasing sophistication technology tools and approaches influence it, the use of SEM and SEO tools is an evolutionary capture and use of knowledge that impacts not only online clients' behavior, but also individual mental fully operational and future tool design.

An SEM goal-directed system should be implemented, in which online consumers' cognition, behavior, and motivation are integrated and structured by a self-regulation system toward the achievement of a deliberate goal via value communication(14)(15)(16). The marketing outcome of SEM and SEO efforts may be the one that achieves the goal. The goal of search engine marketing (SEM) and search engine optimization (SEO) is to turn a physical product into a marketing outcome. The ability to collect semantic information from objects detected in an image and associate it with search engines determines SEM and SEO activities, while the transformation of the item stimulates the presence of SEM and SEO activities. There isn't a single SEM or SEO activity that isn't driven by a marketing goal. Individuals of SEM project teams play varied responsibilities in terms of encompasses many different and information use, but they are all part of the team approach, which implies they must be in sync with the company's overall marketing strategy(17)(18)(19).

1.1 Conceptual Mapping:

The following conceptual mapping figure, based on Bedny's behaviorism and the study thematic, will assist us in: a) deepening our knowledge of the research themes; b) identifying important ideas; and c) recognizing and identifying the basic research for each abstract category of SEO as an innovative online promotional strategy(20)(21).

1.2 Categorizing the Concepts:

In terms of classifying the elements related to the main concept of the "behaviorism foundation for the construction of Search Engine Optimization (SEO) promotional strategy" in order to investigate the research topic(22).

1.3 Research Activity for Each Conceptual Category:

According to the classification in the previous paragraph, we will give the corresponding research activity for each conceptual category of the examined idea of "behaviorism framework for the creation of SEO promotion strategy" in this part(23).

2. REVIEW OF LITERATURE

Katumba et al. studied about the requirement to identify and access appropriate geospatial data is becoming increasingly important as geographical information and technology are increasingly used in a range of knowledge areas and disciplines. Most spatial data infrastructures (SDI) provide geoportals as entry points for disseminating and sharing geospatial data. Geoportals are frequently only recognized inside the geoformation community, and thus pose technological problems for online search engines to index. To address these issues, we collected and classified common search phrases used by people while browsing for geographical materials on the Internet. We released metadata about geospatial sources "directly" on the Web, guided by these phrases, and conducted empirical tests using search engine optimization (SEO) approaches. Two different sets of HTML pages were created and registered with Google and Bing. The metadata in one set was formatted using Dublin Core, whereas the metadata in the other was formatted using Schema.org. According to the findings, Google was more successful than Bing in retrieving the pages. Pages that were marked up with Schema.org were more easily found than those that were marked up with Dublin Core. In the majority of the tests, the statistical results were significant. This study indicates that Schema.org and Dublin Core-marked sites offer an innovative approach for increasing the visibility and discovery of geographical content on the Web(24).

According to Oliveira et al. With the rising use of geographical information and technology in a number of knowledge domains and disciplines, the requirement to identify and access adequate geospatial data is crucial. Most spatial data infrastructures (SDI) provide geoportals as entry points to the SDI through which geospatial data are distributed and exchanged. Geoportals are generally known in geoformation communities exclusively and thus create technological problems for indexing by web search engines. To solve these issues, we selected and categorized search phrases often employed by users while browsing for geographical materials on the Web. Guided by these terms, we released metadata about geographical sources "directly" on the Web and ran empirical experiments utilizing search engine optimization (SEO) approaches. Two sets of HTML pages were generated and registered with Google and Bing accordingly. The metadata in one set was marked up with Dublin Core, the other with Schema.org. Analysis of the results suggests that Google was more effective than Bing in retrieving the pages. Pages marked up using Schema.org were more effectively retrieved than those marked up with Dublin Core. The statistical results were significant in most of the tests undertaken. This research demonstrates that pages marked up with Schema.org and Dublin Core offer an innovative alternative for boosting the visibility and enabling the finding of geospatial content on the Web(25).

Yalçın et al. discussed about Internet sites, which scan and class various internet sites as according their terms, justifications and contents and making it easier and quicker to get acquired location results, are known as search engines. SEO "Search Engine Optimization" is the one of the generally utilized approach that makes web pages fast accessible. In this work we explained

essential facts to create a web site more crawled by search engines and using their keywords create them first listed(26).

Prawira et al studied about the number of internet news media in the country is expanding rapidly however media study, it is focused on its function as an instrument of democracy. Like other companies on the Web, internet news media have to be open to ideas in the workplace and understand how to market their product via search engine optimization (SEO) (SEO). This essay uses a feminist innovation method in the newsroom to examine the online news media production that uses Search Engine Optimization (SEO) (SEO). The research was done using ethnography approach in three major online news media in the country namely liputan6. Com, detik.com and metrotvnews.com during January-March 2017. The study data was acquired from conversations with more than 30 journalists and observations in the workplace. Results reveal that structure of an organization, work practice, and mindset influences the adoption of SEO in the newsroom(27).

3. DISCUSSION

The study purpose of the paper was to evaluate the feasibility of an expansion of Bedny's conceptual on 'activity' concept as an efficient for SEO contextual issues, which could be utilized to improve the modeling and development of SEO promotion technique studies.

Search engine optimization (SEM) and search engine optimization (SEO) are inspired translating an item into a marketing outcome. SEM and SEO activities seem to be by how meaning of words can be collected from objects detected in an image and can be related to search engines, while modification of the object stimulates the presence of the SEM and SEO activities. There are no SEM and SEO efforts without a marketing goal. SEM project teams' members have different duties related the conversion of components usage of information but they are part of a collaborative effort, which implies that they must be linked with the broader marketing strategy of the firm. The use of SEM and SEO techniques is indeed a collect and use of understanding that influences not only online clients' behavior, but as well the cognitive health of the personal future tool design, as creative and the increasing sophistication tools and nears impact it. An SEM goal oriented system should be implemented where online customers' consciousness and desire are combined and structured by a mechanism of self-regulation towards attaining a conscious goal via the transmission of values. The marketing outcome of SEM and SEO actions is the one that achieves the goal.

4. CONCLUSION

The study goal of the article was to investigate the potential of an extension of Bedny's theoretical viewpoint on 'activity' theory as an efficient for SEO situational problems, which could be utilized to assist the modeling and development of SEO promotion method studies. This conception was addressed as a framework for the development of Search Engine Optimization (SEO) promotion method. The foregoing discussion enabled us to check the: a) degree of answering the study question and the support of the initial assumptions, b) connection of the results to earlier work, c) theoretical implications, d) practical consequences, and e) future research. Based on the response to the research question, we may accept the following basic assumptions: a) approaching Bedny's theoretical basis of 'activity theory from such an online promotion management aspect, the donation of the conceptualization in rise to a range can be approached as a framework for SEO online promotion technique, b) SEO's objective would be to

web tourist counts by ranking an \organization's web site very high as a result of searches using more correct terminology the promotion offer through a web site. Therefore, efficient SEO marketing method can \result in increased sales and larger profits. Search engines appear to be one of the most active marketing newest internet promotions \channels, as they are a primary source for getting more and more online consumers. There was a large literature in information research on conceptions, such as activity theory and tools for activity systems. In contrast, activity system constructs, such as "subject", "object" and "goal statement", were largely underdeveloped. No study, till now, has offered a new point of view for promotion managers of an online advertising, such as the SEO, based on Bedny's theoretical point of view of activity theory and especially regarding the key role of the elements of subject, tool, object, goal and outcome an SEO activity system.

REFERENCES:

1. Abolhasan M, Wysocki T, Dutkiewicz E. A review of routing protocols for mobile ad hoc networks. Ad Hoc Networks. 2004;
2. Virk JPS. Use of genetic Algorithm in capacitor placement and sizing for optimal power system operation. In: Proceedings of the IASTED International Conference on Modelling and Simulation. 2011.
3. Kalra GS, Talwar R, Sadawarti H. Robust blind digital image watermarking using DWT and dual encryption technique. In: Proceedings - 3rd International Conference on Computational Intelligence, Communication Systems and Networks, CICSyN 2011. 2011.
4. Bhandari A, Singh M. On the ontology-based description of temporal services interfaces in asynchronously communicating services. In: Proceedings - 2011 International Conference on Communication Systems and Network Technologies, CSNT 2011. 2011.
5. Cui M, Hu S. Search engine optimization research for website promotion. In: Proceedings - 2011 International Conference of Information Technology, Computer Engineering and Management Sciences, ICM 2011. 2011.
6. Kaur P, Rattan D, Bhardwaj AK. Enhancement of fault tolerance of intrusion detection system using AES and DES based heart beat events. In: International Conference and Workshop on Emerging Trends in Technology 2011, ICWET 2011 - Conference Proceedings. 2011.
7. Pandey B, Sharma KP. Radar Transmogrification Technology: Support for Unmanned System. In: Proceedings - 2019 Amity International Conference on Artificial Intelligence, AICAI 2019. 2019.
8. Singh D. Robust controlling of thermal mixing procedure by means of sliding type controlling. Int J Eng Adv Technol. 2019;
9. Goswami L, Kaushik MK, Sikka R, Anand V, Prasad Sharma K, Singh Solanki M. IOT Based Fault Detection of Underground Cables through Node MCU Module. In: 2020 International Conference on Computer Science, Engineering and Applications, ICCSEA 2020. 2020.
10. Sharma K, Goswami L. RFID based Smart Railway Pantograph Control in a Different Phase

-
- of Power Line. In: Proceedings of the 2nd International Conference on Inventive Research in Computing Applications, ICIRCA 2020. 2020.
11. Ghai W, Kumar S, Athavale VA. Using gaussian mixtures on triphone acoustic modelling-based punjabi continuous speech recognition. In: Advances in Intelligent Systems and Computing. 2021.
 12. Kishore N, Singh S. Torque ripples control and speed regulation of Permanent magnet Brushless dc Motor Drive using Artificial Neural Network. In: 2014 Recent Advances in Engineering and Computational Sciences, RA ECS 2014. 2014.
 13. Verma S, Biswas R, Singh JB. Extension of superblock technique to hyperblock using predicate hierarchy graph. In: Communications in Computer and Information Science. 2010.
 14. Srivastava SN, Kshatriya S, Rathore RS. Search Engine Optimization in E-Commerce Sites. Int Res J Eng Technol. 2017;
 15. Goel AR, Ranjan A, Wajid M. VLSI architecture and implementation of statistical multiplexer. In: Proceedings of the International Conference on Innovative Applications of Computational Intelligence on Power, Energy and Controls with Their Impact on Humanity, CIPECH 2014. 2014.
 16. Bakker EM. Image and video retrieval: Second International Conference, CIVR 2003, Urbana-Champaign, IL, USA, July 24-25 2003: proceedings. Lecture notes in computer science. 2003.
 17. Berman R, Katona Z. The Role of Search Engine Optimization in Search Rankings. Mark Sci. 2013;
 18. Khanna R, Verma S, Biswas R, Singh JB. Implementation of branch delay in Superscalar processors by reducing branch penalties. In: 2010 IEEE 2nd International Advance Computing Conference, IACC 2010. 2010.
 19. Gupta H, Kumar S, Yadav D, Verma OP, Sharma TK, Ahn CW, et al. Data analytics and mathematical modeling for simulating the dynamics of COVID-19 epidemic—a case study of India. Electron. 2021;
 20. Xie X, Fang Y, Wu J. The basic principle and applications of the search engine optimization. In: Advances in Intelligent Systems and Computing. 2013.
 21. Gupta H, Varshney H, Sharma TK, Pachauri N, Verma OP. Comparative performance analysis of quantum machine learning with deep learning for diabetes prediction. Complex Intell Syst. 2021;
 22. Swati PP, Pawar B, Ajay SP. Search Engine Optimization: A Study. Isca.in. 2013;
 23. Gudivada VN, Rao D, Paris J. Understanding Search-Engine Optimization. Computer (Long Beach Calif). 2015;
 24. Katumba S, Coetzee S. Employing search engine optimization (SEO) techniques for improving the discovery of geospatial resources on the web. ISPRS Int J Geo-Information. 2017;
 25. Oliveira A, Terra Ferreira H, Casimiro V, Araújo Camargo Marques dos Santos C. Search

engine optimization - seo: a contribuição do bibliotecário na otimização de websites para os mecanismos de busca. Perspect em Gestão Conhecimento. 2011;

26. Yalçın N, Köse U. What is search engine optimization: SEO? In: Procedia - Social and Behavioral Sciences. 2010.
27. Prawira I, Rizkiansyah M. Search engine optimization in news production online marketing practice in Indonesia online news media. Pertanika J Soc Sci Humanit. 2018;

A META-ANALYTICAL REVIEW OF WORKPLACE WASTE RECYCLING BEHAVIOR

Amit Kumar*

*Faculty of Engineering,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- amit.engineering@tmu.ac.in

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ABSTRACT

Many research has been performed in order to identify variables that may affect trash recycling behavior in order to improve waste recycling. However, many research has concentrated on domestic trash production rather than other types of waste creation. As a consequence, the purpose of this article is to offer a comprehensive review of past research on workplace trash recycling behavior. A meta-analysis of 51 relevant research on workplace trash recycling attitudes and behavior was conducted using data from several sources. The majority of previous research were performed in the United States, focused on a particular waste stream, were frequently conducted inside academic settings, adopted (or modified) an existing theoretical framework, and were based on self-reported behavior surveys, according to the findings. Demographics, environmental circumstances, previous behavior, incentives, prompts and/or information, attitudes, and identity are some of the elements discovered. Due to the complexity and variety of human behavior, the results emphasized the magnitude of difficulties facing waste management practitioners in identifying the variables that may influence trash recycling behavior. However, the findings of the studies examined in this study indicate that influencing workplace trash recycling behavior may need a mix of variables. This may offer effective incentives for stakeholders in waste management to create a framework that can help them handle workplace waste management.

KEYWORDS: *Meta-Analysis, Recycling, Waste Management, Workplace Waste, Waste Recycling.*

1. INTRODUCTION

Waste recycling has been receiving a lot of attention from policymakers and other environmental stakeholders for a long time now in order to solve waste production problems(1). As a consequence, many policies and initiatives have been developed at the local, national, and international levels. The functional legal structure among EU member states is a good example. This framework may be traced back to the 1975 Waste Framework Directive as modified in 1991, which paved the way for the EU's current updated Waste Framework Directive(2).

Changes in behavior and lifestyle are generally seen as a key answer to the present waste generation issues. Trash management practitioners and researchers have recognized understanding people's waste recycling attitudes and behavior as a useful approach for solving waste production problems(3). This may be due to the importance of environmental preservation in human decision-making, as well as the inadequacy of technology to solve all waste-related problems(4). The concern may be due to a growing awareness of environmental effects and the realization that human activities, such as trash generation, are harmful to the natural environment's long-term viability(5). Because of the growing concern and knowledge about trash generation and its consequences, a variety of research have been performed to better understand variables that may improve waste recycling behavior(6). Despite recent efforts focusing on trash recycling behavior and its causes, it is clear that household garbage is receiving more attention than waste generated in other settings(7). This discrepancy, however, is not just seen in connection to trash recycling literature and practices, but also in respect to other environmental problems(8). For example, sustainable behaviors are emphasized more in home settings than in professional contexts, and concluded that workplaces have been neglected (9). As a consequence, many variables affecting household trash recycling behavior have been discovered and recorded in the literature on the subject. Demographics, incentives, and feedback are some of them. Scheme design, scheme knowledge, environmental concern, antecedent behavior, and personal standards are some of the other variables mentioned in the research (10). However, studies have shown that individuals do not behave in the same manner when they are away from home in terms of the environment, sustainability, or trash recycling(11). While there is enough data regarding the variables that may impact home trash recycling behavior, there is less evidence about the factors that may influence workplace waste recycling behavior. This may explain the disparities in environmental (or trash recycling) behavior seen in various settings (12). As a result, the primary goal of this article is to quantify the amount of research done on workplace waste recycling behavior in order to guide the development of a framework that would help to improve workplace trash recycling(13). The goal is to offer a quantitative and cumulative evaluation of recent research and results on trash recycling behavior in the workplace(14). As a consequence, this article aims to address the following research questions(15). This article aims to offer a thorough and cumulative review of previous research on workplace trash recycling behavior in order to measure its scope and understand its affecting variables. In other words, it provides an analysis of past research on workplace trash recycling behavior(16). The goal is to identify different variables that have been identified in prior research as having an impact on trash recycling behavior in the workplace(17). As a consequence, while researching and collecting the available studies on workplace waste recycling behaviors, no particular industry or sector was examined. To put it another way, this study made every effort to analyze previous studies on workplace trash recycling behaviors independent of employment environment(18).

In addition, the purpose of this article is to evaluate the current methods and techniques used by past researchers in their studies(19). Meta-analysis was utilized to accomplish the goal of this research, which allows for reasonable conclusions to be drawn from a variety of empirical investigations (20). While the method has traditionally been used to analyze quantitative empirical research, determining the number of papers to include in a meta-analysis is currently a major issue. Instead of organizations or individuals, the impact size from each individual research retrieved for meta-analysis is used as the primary unit of analysis(21). Meta-analysis is a statistical analytic method that combines results from many independent research to evaluate statistical significance or efficacy of constructs, variables, and intervention options(22).

In other words, meta-analysis is a statistical method for combining the results of many research on the same subject or end measure(23). Although meta-analytic review has been criticized, it produces a statistical summary of aggregated studies that are included in meta-analysis using a systematic procedure, as opposed to traditional narrative reviews, which do not use a specific sampling procedure and are thus marked by inherent subjectivity. Meta-analysis, is thought to improve construct validity by integrating results from several empirical research that looked into comparable constructs(24). This is predicated on the premise that research published in peer-reviewed journals were rigorously performed. As a consequence, meta-analysis is used to discover and determine the statistical significance of the constructs under study using effect size estimates(25).

2. DISCUSSION

The emphasis on impact size rather than sample size in meta-analytical reviews indicates that all studies significant, small significant, and no significant effects may contribute to overall results. This enables for the disclosure of accumulated information from previous investigations, as well as the avoidance of wasteful research resources. As a result, meta-analysis is capable of resolving both Type 1 reporting a relationship when there isn't one) and Type II (reporting no connection when there is one) errors. Meta-analysis may also be used to evaluate the consistency and generalizability of results across studies. While meta-analysis and narrative reviews have similar basic processes (such as literature searches), meta-analysis, unlike narrative reviews, uses systematic methods to reduce subjective judgments. While meta-analysis has numerous advantages, it is not without its detractors. The most common critique of meta-analysis is that it has inherent bias due to the subjective inclusion/exclusion criteria used by meta-analytic writers. Because the most significant publications are published in English, research performed in languages other than English are unlikely to be included, and the results of such studies would not be accounted for in meta-analytic reviews. As a result, the removal of research performed in other languages from meta-analytic reviews indicates that meta-analyses are prone to language bias. Furthermore, since research with significant results are more likely to be published, examining just published studies may lead to an overestimation of particular factors/constructs.

This is known as the file-drawer issue in meta-analysis, and it may lead to publication bias in meta-analyses. The file-drawer issue arises as a consequence of authors' or reviewers' intentional choices to obtain and evaluate those papers with publishable findings. To put it another way, file drawer issues occur when only articles with statistically significant findings are published and retrieved for meta-analysis, whereas papers with insignificant results unpublished are not consulted. In meta-analyses, these biases language and publishing may obscure key variables that might influence policy or other intervention efforts, particularly when dealing with human behavior. Meta-analysis, on the other hand, has been chastised for combining "apples and oranges" by integrating research with disparate theoretical and methodological methods.

Furthermore, since meta-analysis examines individual effects such as variations between means, the estimate of effect size may be skewed owing to the impact of sample size, making statistical analysis of retrieved studies more difficult and less accurate. After weighing the benefits and drawbacks of meta-analysis, it was determined that it was the best method for providing an accurate assessment of this body of work. However, owing to a lack of study in this area, no cut-off point or particular time period was considered as part of the qualifying criterion. Furthermore, the choice to exclude any time period decreased or eliminated the impacts of stochastic variation, such as the removal of research that fell beyond the cut-off point.

As a result, the study's methodology included an internet search and content analysis of several research databases. As a result, Google scholar was utilized as the starting point for a broad search to find relevant works and their repository sources. Google Scholar serves as a central repository, pulling together all relevant research from a variety of sources and disciplines that meet the analyses' inclusion requirements. As a consequence, a search syntax was created and entered into the Google Scholar search engine as a method of locating diverse research, including databases of relevant journals and papers. However, when these variables were analyzed, it was shown that attitude toward workplace waste recycling behavior was the most studied construct, with (or 12.83 percent) studies. This construct is determined by an individual's assessment of the target behavior and describes a social actor's emotions (both positive and negative) toward that behavior. With (or 11.23 percent) research, it was also shown that the importance of attitudes was followed by that of prompts (including information and communication).

Identity (group or self) and descriptive norms, on the other hand, were the least studied notions, with just one (or 0.53 percent) research each. The methodology and settings utilized in those research may explain this. It may also be due to the fact that the majority of these research was conducted with the goal of increasing trash recycling rather than determining the variables that affect workplace waste recycling behavior. In other words, rather than correlational research, many of the evaluated studies were intervention-based studies conducted in academic settings. As a consequence, several interventions, such as incentives and reminders, were employed to encourage or inspire individuals to recycle, with little or no effect on their recycling behavior.

This may explain the drop in recycling rates seen in those trials when the incentives were removed. For example, when the contingencies/interventions (raffle–personal contingency and contest–group contingency) were removed, the quantities of paper placed reverted to baseline. This adds to the growing body of information and argument (particularly in family settings) that financial incentives cannot maintain recycling behavior beyond the intervention time. Furthermore, descriptive and subjective norms may be mapped separately as a construct or combined as a single construct or factor and classified under the umbrella term "social norm."

This is supported by the fact that both categories are capable of explaining the impacts of an individual's subjective perception and interpretation of social constraints, such as those imposed by important people. Although there is no agreement on the impact of these variables on workplace waste recycling behavior, the results indicate that a mix of factors may be needed to improve trash recycling behavior in the workplace. This information may help waste management planners and policymakers create a policy instrument, strategy, or framework to promote workplace trash recycling. To do so, a meta-analytical evaluation of these variables may be necessary to identify the most important factor(s) that may improve workplace trash recycling behavior. Factors affecting workplace waste recycling behaviors are generally categorized and addressed under the following categories based on the evaluated studies: Predictors, Motivators, and Barriers.

Direct connections between each of the identified variables (predictors, motivators, and obstacles) and workplace waste recycling behaviors are hypothesized using the model, with no moderating or intervening factors. In other words, each component is thought to influence workplace waste recycling behavior separately; this relationship is shown by a single headed arrow connecting each element to workplace waste recycling behavior. The model also implies that the discovered variables (or constructs) have correlations (or covariance), which may be positive or negative, significant or non-significant. In this theoretical model, the correlational connections between predictors and motivators, predictors and barriers, and motivators and obstacles are represented by two headed arrows. This is a significant assumption or research issue that will be addressed in future study (and validate).

The whole model not only hypothesizes direct connections between each component and office waste recycling behaviors, but also tries to show how these variables combine to influence workplace recycling behaviors. For a better grasp of the theoretical model, these variables are further described below. This indicates that recycling programs that require a substantial amount of human work and increase Behavioural costs are likely to be unpopular and may deter participation. As a consequence, in order to be successful, any intervention aimed at increasing recycling should be intended to eliminate or decrease recycling obstacles. Regardless, conflicts between personal and situational factors should be handled via scheme design to realistically decrease or remove recycling obstacles.

These variables, however, seem to interact or overlap with one another, resulting in correlations or causal connections. As a consequence, the next step in the study is to identify and estimate the nature of any potential connections or interactions between these variables. This will not only allow for the identification of key variables (constructs) that may have a major impact on trash recycling behavior, but it will also aid in the identification of connections between these factors. The next step is to expand the meta-analytic evaluation of these papers in order to accomplish this. Although meta-analysis was created and is most often used to encode and analyze quantitative data, it has also been used to meta-analyze qualitative studies. For example, qualitative meta-analysis was used to summarize and make conclusions about the variables that contribute to the success of marketing websites. Also, based on client views, a qualitative meta-analysis method to determine the categories of effect of beneficial occurrences in psychotherapy. Unlike quantitative meta-analysis, the goal of qualitative meta-analysis is to develop a grand theory, a mid-range theory, or a theoretical framework from various qualitative studies investigating similar constructs, rather than to establish causal relationships or identify significant factors from multiple studies.

However, since the studies examined in this article utilized various research techniques, one of the difficulties is encoding results from these studies in a way that allows statistical combination and comparison. As a result, one option is to use a novel technique known as the "meta-analytical triangulation process." The goal is to get beyond the issue of comparing and analyzing "apples and oranges," which is linked with meta-analysis of research with different methodological approaches.

3. CONCLUSION

It may be inferred from this study that policymakers, academics, and other stakeholders pay little attention to workplace trash recycling. As a consequence, this study backs up previous research that found a scarcity of studies on office trash recycling habits. Furthermore, many of these research was performed in the United States, focused on a particular waste stream, and were conducted in an academic setting. In addition, various variables discovered in previous research that were thought to have an impact on workplace trash recycling behavior were investigated further in this study. Although little is known or understood about the variables that influence workplace trash recycling, this study shows that a mix of factors may be needed to successfully improve office waste recycling. As a result, the current study showed that variables affecting workplace behavior may be classified as demographics, psychological, situational, and personal. This may help waste planners and policymakers develop a workplace waste recycling strategy or framework. Based on current information, this article further argues that in order to decrease the quantity of trash transported to landfill, comprehensive solutions that can address problems of waste generation from many perspectives are needed. Finally, in order for any nation, such as the United Kingdom, to divert a significant quantity of trash from landfill, waste generation from many settings must be handled.

REFERENCES:

1. Sector H, Plan T, Welle K, Rimi NA, Sultana R, Luby SP, et al. Preventing environmental health-related disease in health care and other settings Environmental health in health care and other settings. *J Hosp Infect.* 2015;
2. Mwanza BG, Mbohwa C. Drivers to Sustainable Plastic Solid Waste Recycling: A Review. *Procedia Manuf.* 2017;
3. Wongsawat S. Predicting factors for quality of life of elderly in the rural area. *Int J Arts Sci.* 2017;
4. Jungmeier G. The Biorefinery Fact Sheet. *Int J Life Cycle Assess.* 2017;
5. Ragaert K, Delva L, Van Geem K. Mechanical and chemical recycling of solid plastic waste. *Waste Management.* 2017.
6. Omran A, Mahmood A, Abdul Aziz H, Robinson GM. Investigating households attitude toward recycling of solid waste in Malaysia: A case study. *Int J Environ Res.* 2009;
7. Mollon N, Eash BA, Onye K, Finks J, Scott L. The Michigan Special Pathogen Response Network (SPRN)—Be Prepared for What’s Next. *Am J Infect Control.* 2016;
8. Nugraha S, Ohara-Hirano Y. Mental Health Predictor of the Sixth Batch Indonesian Nurse and Certified Care Worker Candidates Migrate to Japan under the Japan–Indonesia Economic Partnership Agreement in Pre-migration Stage. *J Heal Sci.* 2014;
9. Moh YC, Abd Manaf L. Overview of household solid waste recycling policy status and challenges in Malaysia. *Resources, Conservation and Recycling.* 2014.
10. McCarty JA, Shrum LJ. The recycling of solid wastes: Personal values, value orientations, and attitudes about recycling as antecedents of recycling behavior. *J Bus Res.* 1994;
11. Kumar V, Singla S, Garg R. Strength and microstructure correlation of binary cement blends in presence of waste marble powder. In: *Materials Today: Proceedings.* 2020.
12. Omran A, Schiopu A-M. REASONS FOR NON-PARTICIPATION IN RECYCLING OF SOLID WASTE IN NORTHERN MALAYSIA: A CASE STUDY. *Environ Eng Manag J.* 2018;
13. WHO WHO. Migration of health workers - WHO Code of Practice and The Global economic Crisis-. *Cahiers de sociologie et de démographie médicales.* 2014.
14. Singh G, Siddique R. Abrasion resistance and strength properties of concrete containing waste foundry sand (WFS). *Constr Build Mater.* 2012;
15. Chandel SK, Goyal R, Singla S. Utilization of construction waste as partial replacement of aggregates in cement concrete. *Int J Innov Technol Explor Eng.* 2019;

16. Hardianto, Trihadiningrum Y, Ciptomulyono U. Municipal solid waste recycling facilities in Malang Raya, Indonesia. ARPN J Eng Appl Sci. 2016;
17. BiPRO. Screening of waste management performance of EU Member States. Rep Submitt under EC Proj “Support to Memb States Improv waste Manag based Assess Memb States’ performance” Rep Prep Eur Comm DG ENV, July 2012. 2012;
18. Shaida MN, Singla S. Global biomedical waste management issues and practices. Int J Innov Technol Explor Eng. 2019;
19. Zargar K, Singla S. Impact of pet plastic waste on mechanical properties of mix concrete design. Int J Sci Technol Res. 2020;
20. McCarty JA, Shrum LJ. The Recycling of Solid Wastes : Personal Values , as Antecedents of Recycling Behavior. J Bus Res. 2016;
21. CAS UI et.al. Satu Langkah Menuju Impian Lanjut Usia Kota Ramah Lanjut Usia 2030. In: Perpustakaan Nasional: Katalog Dalam Terbitan KDT. 2013.
22. Mir MA, Verma P. Use of polyethylene waste with stone dust in flexible pavement. Int J Sci Technol Res. 2019;
23. Hamidul Bari Q, Mahbub Hassan K, Ehsanul Haque M. Solid waste recycling in Rajshahi city of Bangladesh. Waste Manag. 2012;
24. Dinas Kesehatan Provinsi Jawa Barat. Rencana Strategis Dinas Kesehatan Provinsi Jawa Barat Tahun 2013-2018. Dinas Kesehatan Jawa Barat. 2014.
25. Omran A, Read AD. “Waste not, want not” a study of household attitude toward recycling of solid wastes. Environ Eng Manag J. 2008;

A REVIEW ON ADVANCEMENT OF AGRICULTURE USING IOT

Teshu Kumar*

*Department of Agricultural Sciences,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email id- teshukumar@gmail.com

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ABSTRACT

In the face of a rising population, agriculture plays a critical role in solving food shortages and ensuring global food security. Mechanization has boosted crop production in the agricultural sector, ushering in a new era of agricultural precision. Modernizing agricultural equipment has lately altered the way farm machinery is used. The area of precision farming has transformed this breakthrough. Diverse kinds of high-quality effective sensors have been employed in the fields of active irrigation, fungicides, fertilizers, and disease control in various plants. As a result of this approach, agricultural output has increased, reducing production costs. Farmers have been able to relieve themselves using smartphone applications and high-speed internet thanks to the usage of Internet of Things (IoT) technology in agriculture. These applications correlate data received from a field with standard charts already stored in the database to give information required for a farmer to manage a crop accurately. This innovation in the automation of agricultural equipment not only ensures precision in agriculture, but it also aids farmers in increasing production and solving the world's food crisis. This study examines agricultural advancements by integrating Internet of Things (IoT) technologies for precision farming.

KEYWORDS:*Agriculture, Equipment, Farming, Irrigation, Machinery.*

1. INTRODUCTION

Agricultural machinery has been developed for almost every stage of the agricultural process. The same equipment is used in both organic and non-organic farming. Agricultural engineers are trained to develop agricultural machinery, buildings, and improved facilities in order to increase agricultural output. A broad variety of equipment is required for tilling the soil, sowing seeds, growing crops, irrigating the land, protecting it from pests and weeds, harvesting, animal feeding, threshing grains, and processing and packing the products. Over the past two to three decades, India has mostly concentrated on the structured organization of field pathologies, trials, demonstrations, pilot projects, and other practical research. The major elements of crop development strategy in the post-green revolution period have been increasing agricultural strategies consisting of high yielding plant varieties, intensively cultivated crops and increased use of fertilizers, increased irrigation, and best techniques of planting, harvesting, and plant defense. High yield varieties have been developed for a number of crops, but their impact on development, efficiency, and prices varies between cultures and locations. In India, the most

fundamental farming methods are utilized, as well as sophisticated agricultural equipment like as tractors and harvest combinations. Bullock carts and buckets are used by many farmers. The Green Movement has aided the states of Uttar Pradesh, Punjab, and Haryana with irrigation and infrastructure(1,2)(3,4).

To encourage the second Green Revolution, India is required to make a significant effort in farmer training. Providing farmers with knowledge alone is inadequate. In order to optimize agricultural output and improve their economic position, farmers must be able to make the best choices about themselves and have a clear knowledge of how and what to do. Farmers in India must have access to the finest agricultural information available, and they must be encouraged to utilize agricultural tools to their advantage. Agriculture and farmer economic development are dependent on the improvement of agricultural tools. In order to survive and flourish in the knowledge intensive agricultural age, farmers need put in more effort to master new technologies and become more information literate. Anyone from a farming family must have access to the Internet, understanding of electronic information resources, and the ability to successfully utilize Information Technology (IT) in agriculture in order to have permanent access to new knowledge about agriculture(5,6)(7)(8).

The world's population is expected to reach 9.3 billion people by the end of 2050, according to the most recent census. This growing population needs more food to meet demand. According to experts, the food market would increase to 60% in 2050. Most living organisms, including people and animals, get their nourishment through agricultural processes. A growth in agricultural output follows an increase in food demand. When there are food shortages, the importance of agriculture in the globe increases. Agriculture productivity determines a country's economy if it is reliant on agriculture. To preserve the agricultural sector's image and fulfill the need for increased food production, farmers must shift from conventional farming methods to modern farming systems. In today's agricultural system, a farmer utilizes sophisticated technology to manage all factors, including biotic and abiotic stressors, in order to boost output and therefore farm profitability. The farmer adjusts to new technologies on a regular basis and continues to decrease return gains. The new manufacturing method focuses on the quality and volume of the commodity via effective delivery control, with the goal of lowering production costs while increasing the return on a small piece of land(9,10)(11).

The goal of this article is to examine current advancements in the area of agricultural mechanical automation. The study also discusses advancements in IoT technology and its use in agriculture, with the goal of increasing productivity and reducing output losses by giving vital precision agricultural information.

1.1 Agriculture and Information Technology Services:

Various efforts are being undertaken in India to incorporate and use information technology in the agricultural industry. The National Agriculture Policy emphasizes the use of information technology. The Department of Agriculture and Cooperation is developing an e-government strategy that will focus on agriculture-related e-government activities. Plan has prioritized the services provided to farmers, as well as the procedures that need to be re-engineered for this goal. Phase 1 of the National e-Governance Plan for Agriculture is nearing completion. Phase 2 will explain the role of civic society and the business sector. The department has already established a Central Sectors Scheme with a budget of ₹100.00 crores to develop e-governance

in agriculture at the national level and to offer support in the centers for states and UTs(12)(12)(13).

Various attempts have been undertaken in India to create a framework for information exchange at various levels. Mobile telephony in India continues to grow as new technologies are introduced to the market. With price competition, mobile telephony is becoming one of the cheapest forms of communication in the world, enabling India's countryside to connect with rural regions and encouraging those who live in rural areas. Mobile phone has a significant impact on rural India and helps small and marginal farmers communicate more effectively. The government's National Farmers Committee has suggested that rural knowledge centers be established across the nation utilizing contemporary information and communication technology (ICT). Mission 2007 was a worldwide initiative spearheaded by a coalition of almost 80 civil society organizations(14,15).

The National Informatics Centre manages the National Informatics Centre Network (NICNET), a government-owned network for sharing government information (NIC). It contains the vast bulk of official data from various authorities. It also oversees the District Rural Development Agency's webpages (DRDA). It started the smart village initiative in the tenth five-year plan. Implementing and encouraging cost-effective and appropriate information and communication technologies (ICTs) for usage in rural regions is one of the project's objectives. AGMARKNET (Agricultural Marketing Information Network) is a program that utilizes NICNET to keep track of regular agricultural commodity prices and arrivals for over 300 crops and 2000 variations. Thirteen hundred and forty-seven Agriculture Produce Wholesale Markets (APWMs) have been connected. This initiative has the potential to grow to over 7000 wholesale marketplaces worldwide, as well as 35,000 rural markets in India. The Punjab government is using the AGRISNET software to enhance and promote agricultural informatics and communications(16)(17)(18).

1.2 Agriculture Sector Computerization:

Agriculture production has increased in recent years as a consequence of improvements in farm machinery. This section discusses the most recent automation of agricultural mechanical equipment:

1.2.1 Soil Parameter Evaluation:

Soil fertility is responsible for 60% of agricultural output, therefore regular soil testing is critical. The importance of soil testing cannot be overstated. In precision agriculture, soil productivity is also a significant factor. Soil fertility influences fertilizer application and crop fertilization patterns. Farmers working in soil research laboratories must adopt a time-consuming and difficult approach to working with busy farmers. Soil fertility research labs utilize pH as well as biological, physical, and chemical properties. To solve the issue of soil testing for farmers, a sensor-based system has been developed that accomplishes all criteria utilizing the ESP 8266. There is an online technique that compares the sensor data to the database's current settings. This online platform assists farmers in gaining insight into soil fertility and provides a variety of crops based on soil fertility conditions for diverse soils. Better soil irrigation allows farmers to achieve optimum yields in precision agriculture(19)(20)(21).

1.2.2 Precision Agriculture Moisture Monitoring:

In a developed society, agriculture is a key technique for increasing agricultural output and alleviating food shortages. To optimize the number and quality of agricultural goods, this method combines coordinating and knowledge tools. To improve production, this system employs automated equipment and sensors to monitor various agricultural gear. The YL69 sensor was utilized by Kamelia to automate a sprinkle irrigation system. When the soil humidity level goes below 15%, this sensor detects it and immediately activates the sprinkling device's pump. Until the soil moisture level reaches 45 percent, the sprinkler pump is turned off. This machine saves time, lowers water usage, and improves energy efficiency. All of the device's readings are shown on a liquid crystal display (LCD) screen for the farmer, and they are connected to values on a website system(22)(23)(22).

1.2.3 Physical Monitoring System Implementation in Precision Agriculture:

A cyber-physical system is a new innovation that is being utilized in the real world to improve the efficiency and quantity of agricultural products. With the current population survey (CPS) technique, the mechatronic approach has been updated during the past 20 years. CPS is critical to the development of farmers' knowledge and communication systems in order to enhance crop management in precision farming. CPS employs trans-disciplinary methods, as well as appropriate prototype ideas and test beds, in its procedures, tools, sensors, and applications. It assists farmers in increasing crop quantity and quality by using better information and communication mechanisms in the implementation of excellent agricultural practices(24)(25).

1.3 Agricultural Development in the Modern Era:

Agriculture, along with its related businesses, is undeniably India's main source of revenue. In terms of rural employment, food security, and environmentally sustainable technology such as sustainable natural resource management, soil conservation, and biodiversity preservation, sustainable agriculture is critical. The Ministry of Agriculture is now concentrating its efforts on commercializing agriculture, with the aim of achieving a 4% annual growth rate. Only a handful of them have a focus on regionally varied approaches, commodities diversification, future regions, and scientific resource management(26).

1.4. IoT Advancements for Precision Agriculture:

The Internet of Things (IoT) for precision farming is a real-world digital technology. This section covers recent advances in utilizing IoT technology to enhance the performance of agricultural and mechanical equipment and systems.

1.4.1 Iot-Based Irrigation System Automation:

IoT methods were used by Rajalakshmi and Mahalakshmi to propose an irrigation system automation paradigm. The Internet of Things (IoT) is basically an Internet network that is used to evaluate operations. It is used to enhance farm productivity in the agricultural business in order to increase the return on food production for the 9.6 billion people that depend on the agriculture sector until 2050. Agricultural activities such as irrigation have been standardized thanks to the use of humidity detecting sensors, temperature sensors, wetness sensors, and light intensity sensors. The measurement data was transmitted to the web server, which already had the usual charts. The web system's programmer will process the data automatically, and the results will be

sent to the farmers' Smartphone app. This allows the farmer to easily assess the condition of his crop while also keeping an eye on the irrigation pump from afar.

The Internet of Things approach allows for the creation of a Raspberry Pi irrigation model that can be automatically mounted. This system boosts agricultural production by efficiently utilizing irrigation water in water-scarce areas. The circuit model measures daylight time, temperature, and moisture with two types of sensors and sends the data to a database. The database calculates the irrigation water requirements of the crops and automatically activates the irrigation system when the crop requires it. This method avoids water scarcity and provides a sufficient amount of water for a region, making it an ideal solution for water-scarce areas.

1.4.2 IoT System Applications in Crop Disease Prevention:

Biological stresses such as rodents, mosquitoes, and diseases were the primary cause of agricultural losses. A farmer's disease prevention is a critical process. The Decision Support System (DSS), a new disease prevention program, has been adopted and has proven to be effective in controlling potato diseases. This method has been successfully utilized with sensors to prevent ambient conditions in addition to detecting fungal problems in potatoes. High-quality sensors are used to gather climatic data, which is then sent through IoT technology to a database via an internet connection, where the data is analyzed and performance evaluated before being uploaded to the cloud IoT system. Following that, the farmer's mobile receives all weather and application criteria for a particular disease prevention fungicide. Fungicide application costs are decreased, and disease control is achieved in a timely manner.

2. DISCUSSION

Agricultural output has increased in terms of yield, but efficiency and diversity have decreased, causing farmers in many areas of the state to suffer. The growth drivers were therefore essential in the worldwide improvement of agriculture, but they were confined to a few crops that, despite agricultural success, were not regarded a good indicator of the state's overall development. Agricultural development leads to increased production as well as an increase in unemployment. It is helpful for large farms, but small farmers cannot afford such equipment owing to high prices. Farm equipment advancements are not favorable to balanced development. On the worldwide market, the rising cost of agricultural inputs and the comparatively low price of agro-food products have created a problem for Indian agriculture. Milk and milk products are simpler to get by on international marketplaces than they are in India. Small farmers and their families bear the brunt of ever-increasing agricultural input expenses. Debt and stress are on the road for the farmers. Many Indian farmers are getting exposed to the most up-to-date technology, and skilled farmers are being hired by foreign agricultural firms to help spread improved farming methods in their areas. Increased agricultural exports, increased economic productivity by ensuring the integration of potential and achieved outputs, and value added activities utilizing agricultural produce, and finally improved access to domestic and foreign markets that are either tightly controlled or secured, are the three components of agricultural globalization.

3. CONCLUSION

It has been concluded that agricultural machines and automation of machinery have increased agricultural production in comparison to the normal use in the agricultural sector of agricultural machinery. Many forms of high quality sensors, IoT technology and high-speed Internet have

revolutionized the agricultural manufacturing process. This technique of automation also lowered the cost of production and improved crop return. Latest methods of robotics and high-quality sensors have opened a new door in the field of precise farming. Agriculture globalization is a part of the real science and economic flow of technological transition. Advance agricultural equipment depends on the nature of farmers because farmers welcome innovation and other farmers use old farming methods, particularly if they want to reduce physical labor. The continuous use of the new ideas and better technology in agriculture is used to increase production for the sake of farmers' economic wellbeing and the safeguarding of food safety. In India, agricultural information is primarily transmitted to farmers by extension programmes, which include magazines, radio, one-to-one communication, television discussions, and exhibits of goods, fertilizers, and seeds at farmers' fairs. Agriculture's sophisticated machinery boosts the economy while still affecting farm workers and increasing causal labor. As a result, technological advancements in agriculture benefit big farms while harming agricultural labor and small farmers. Agriculture should be developed in such a manner that it promotes a sustainable growth of the industry.

REFERENCES

1. Malavade VN, Akulwar PK. Role of IoT in Agriculture. Natl Conf "Changing Technol Rural Dev. 2016;
2. Dagar R, Som S, Khatri SK. Smart Farming - IoT in Agriculture. In: Proceedings of the International Conference on Inventive Research in Computing Applications, ICIRCA 2018. 2018.
3. Sharma P, Berwal YPS, Ghai W. Enhancement of plant disease detection framework Using Cloud Computing And Gpu Computing. Int J Eng Adv Technol. 2019;
4. Kumar A, Ishwar B. Linear Stability Of Triangular Equilibrium Points In The Photogravitational Restricted Three Body Problem With Triaxial Rigid Bodies, With The Bigger One An Oblate Spheroid And Source Of Radiation. Publ Korean Astron Soc. 2015;
5. Koch A. Iot In Agriculture : How Is It Evolving ? Farm Inst Insights. 2017;
6. Bing F. The Research Of Iot Of Agriculture Based On Three Layers Architecture. In: Proceedings Of 2016 2nd International Conference on Cloud Computing and Internet of Things, CCIOT 2016. 2017.
7. Mehta A, Gupta A. Retrospection and comparison of Dsdv and Aomdv routing protocols in Manet using Ns-2. In: Proceedings of the 2014 International Conference on Issues and Challenges in Intelligent Computing Techniques, ICICT 2014. 2014.
8. Singh P, Verma M, Kumar A. A novel method for ranking of vague sets for handling the risk analysis of compressor system. Appl Soft Comput J. 2015;
9. Sushanth G, Sujatha S. IOT Based Smart Agriculture System. In: 2018 International Conference on Wireless Communications, Signal Processing and Networking, WiSPNET 2018. 2018.
10. Takekar SP, Takekar SP. Plant and taste to reap with Internet of Things implementation of IoT in agriculture to make it a parallel industry. In: Proceedings of the International Conference on IoT in Social, Mobile, Analytics and Cloud, I-SMAC 2017. 2017.
11. Singh S, Kaler RS. Performance optimization of EDFA-Raman hybrid optical amplifier using genetic algorithm. Opt Laser Technol. 2015;
12. Kaur S, Girdhar A, Gill J. Computer Vision-Based Tomato Grading and Sorting. In: Lecture Notes in Networks and Systems. 2018.

13. Singh S, Kaur R. A study to understand the relationship between emotional intelligence and psychological well-being among adolescents of Chandigarh and Punjab college students. *Int J Innov Technol Explor Eng*. 2019;
14. Shim KS, Ko HS, Kim JR, Choi JI. The method of Agriculture Technology Information Service in Web2.0. *Agribus Inf Manag*. 2009;
15. Cui Y, Liu S. Key technology study of agriculture information cloud-services. In: *IFIP Advances in Information and Communication Technology*. 2012.
16. Latif M, Singla S, Vadav V. Modeling off-street parking based on user's behavior using spss software. *Int J Innov Technol Explor Eng*. 2019;
17. Bhatta DP, Singla S, Kaushal M, Sachar A. Effect of retrofitting on beam-column joints. *Int J Innov Technol Explor Eng*. 2019;
18. Shaida MN, Singla S. Global biomedical waste management issues and practices. *Int J Innov Technol Explor Eng*. 2019;
19. Bravo C, Torres B, Alemán R, Marín H, Durazno G, Navarrete H, et al. Indicadores morfológicos y estructurales de calidad y potencial de erosión del suelo bajo diferentes usos de la tierra en la Amazonía ecuatoriana. *An Geogr la Univ Complut*. 2017;
20. Walia A, Singhal N, Sharma AK. A novel e-learning approach to add more cognition to semantic web. In: *Proceedings - 2015 IEEE International Conference on Computational Intelligence and Communication Technology, CICT 2015*. 2015.
21. Kumar S, Kumar K, Pandey AK. Dynamic Channel Allocation in Mobile Multimedia Networks Using Error Back Propagation and Hopfield Neural Network (EBP-HOP). In: *Procedia Computer Science*. 2016.
22. Verma KG, Kaushik BK, Singh R. Propagation Delay Variation due to Process Induced Threshold Voltage Variation. In: *Communications in Computer and Information Science*. 2010.
23. Bhardwaj S, Singhal N, Gupta N. Adaptive neurofuzzy system for brain tumor. In: *Proceedings of the International Conference on Innovative Applications of Computational Intelligence on Power, Energy and Controls with Their Impact on Humanity, CIPECH 2014*. 2014.
24. Rai MK, Khanna R, Sarkar S. Control of tube parameters on SWCNT bundle interconnect delay and power dissipation. *Microelectron Int*. 2014;
25. Rai MK, Spandana G, Nivedita, Sarkar S. Control of SWCNT-interconnect performance by tube-diameter. In: *IEEE Region 10 Annual International Conference, Proceedings/TENCON*. 2009.
26. Stone ML, Benneweis RK, Van Bergeijk J. Evolution of electronics for mobile agricultural equipment. *Transactions of the ASABE*. 2008.

AN OVERVIEW OF MEASURES FOR SECURING WATER RESOURCES FOR IRRIGATED CROP PRODUCTION

Sunil Kumar*

*Department of Agricultural Sciences,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email id- sunil.agriculture@tmu.ac.in

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ABSTRACT

Agriculture consumes the majority of the world's scarce fresh water supplies. Agronomical and political incentives may be used to optimize agricultural water resources and their usage. Reduce irrigation water loss in conveyance before it reaches the farm; choose water-efficient irrigation methods such as drip and segments and sub, which save 30–40% water as opposed to furrow irrigation; improve irrigation using plant and soil sensors and remote sensing-based models; and use deficit irrigation (DI) to increase water productive capacity. Other options include using 'virtual water' principles to ensure food supply to dry regions; reducing food, feed, and biofuel waste from post-harvest to the end consumer; changing food composition to less water-consuming products; and regulating irrigation water use through rationing, subsidies, or water pricing to support water-saving measures such as the use of dredge irrigation. The water-saving potential of various methods is examined and evaluated. When compared to other methods, reducing food waste and losing irrigation water from the conveyance source to the farm both have a large potential for water savings. How the measures are chosen will be determined by the local circumstances, which is ultimately a political decision.

KEYWORDS:*Cropping Systems, Deficit Irrigation, Low-Quality Water, Virtual Water, Waste Food.*

1. INTRODUCTION

According to the findings of this study, the majority of papers published in the previously examined periods focused on the nature and dynamics of bullying and cyberbullying. Later, the majority of research focused on the associated factors(1)(2). Only a few of the widely referenced publications focused on minorities' participation in the phenomenon, and even fewer papers reported on bullying prevention and intervention, with none reporting on cyberbullying. Both phenomena are very difficult to describe, as stated in the introduction. Simultaneously, it is critical to define their nature and dynamics prior to investigating potential causes or consequences, as well as developing and executing intervention initiatives(3)(4)(5).

As a result, it's natural that studies focusing on its definition, nature, and dynamics are among the most often referenced research in the field. In terms of bullying, the findings of this study indicate that it has previously been defined. It was crucial to clarify if this was just a new term

for what had long been known as peer aggression or whether it was a distinct phenomenon. During the early decades, the definition provided by Olweus (1995) was often used, which defined bullying as a series of negative acts directed against a student who is unable to defend himself owing to a strength imbalance. Bullying was characterized from a crossnational viewpoint(6)(7). Important features of bullying were its intentionality, and it was generally regarded as unjustified or unprovoked. Aggressive behavior declines with age and may be categorized as direct or indirect, with more males than girls participating in the former and more girls participating in the latter, however there are significant differences across studies. Bullying participation varies with country and study(8)(9). Bullying was also characterized as a collective process created inside the peer network, not simply dyadic conduct, including students who behave as victims, bullies, or spectators. It was also characterized from an ecological viewpoint in the early stages of study on the subject, with significant roles for contextual factors like as the classroom, instructors, or the whole society(10)(11)(12).

1.1 Agronomical Measures:

- **Pressurized Irrigation Methods That Save Water:** Drip irrigation, when properly maintained, provides water near to the root systems, reducing evaporation and runoff. Most commercial systems use calibrated emitters fed by a computerized set of valves to regulate the system. Subsurface drip irrigation (SDI) minimizes evaporative losses to the atmosphere by decreasing soil evaporation. It is also environmentally beneficial since it causes less soil erosion than gun irrigation(13). SDI has been the subject of much research over the last 30 years. Drip irrigation, on the other hand, may not be feasible for crops with tight spacing, such as rice or wheat. In the United States, Brazil, Argentina, and other nations, center pivot irrigation systems are widely utilized for irrigating field crops, accounting for more than half of sprinkler-irrigated areas. By 2003, there had been a massive growth in irrigation in the United States, with a total irrigated area of 21.6, with 51 percent watered by pivots, 43 percent by gravity, and 6% by other methods (micro-irrigation). According to the land satellites system, there were 170 000 pivot machines in the United States in 2002, irrigating at least 8 Mha(14)(15).

Outside of the United States, the system calculated that there were 88 000 pivots. This industry grew at a rate of between 7% and 11% each year on average (New Ag International 2008). This significant change was sparked by the enormous labor savings that pivots enable, as well as water and energy reductions. The greatest issue now preventing the spread of this technique is that many nations' farm sizes are either too small or unsuitable for pivots. Raine and Foley (2002) calculated that the capital costs of surface, pivot, and drip irrigation for a 50-ha cotton crop produced under Australian conditions are 1150, 2100, and 4000 \$ ha¹, respectively, showing that pivot irrigation costs per ha are approximately half of drip irrigation costs. Low Energy Precision Application (LEPA) pivot systems were created in the United States to save both water and energy. This technique has mainly been utilized for row crop irrigation, with application efficiency reaching 95%. Another method, the Low Elevation Spray Application (LESA) system, uses sprinklers positioned approximately 15 cm above the ground to provide water straight to the furrow at extremely low pressure. When compared to sprinklers, both LEPA and LESA are 20–40% more efficient, with energy savings of 35–50%(16)(17).

- Irrigation Scheduling:** To maximize crop development and output, irrigation scheduling involves determining the frequency, amount, and timing of watering. When deciding when to irrigate, soil moisture and weather monitoring are utilized, and soil water capacity and crop type are used to decide how much water should be supplied during irrigation. Irrigation is often dependent on meteorological data, which is generally calculated by calculating the cumulative deficit (D) of daily water balance data from evapotranspiration (ET) and rainfall (R) (i.e. $D = (R - ET)$). A specific D level will trigger an irrigation event during a drying cycle (Hillel 1998). Because meteorological data is readily available, sophisticated techniques for calculating ET forecasts may be used, according to Allen et al (1999). A threshold is used to assess irrigation requirement, and a method is used to prescribe how much water to apply in each scenario (16)(18)(19)(20). Many models are able to forecast when to irrigate a crop based on knowing the current crop stage, soil water content, and ET. Irrigation scheduling is also based on crop water status and soil water status, as reviewed by Jones (2004), respectively. To keep soil moisture at a predetermined level, soil moisture sensors were buried approximately 20 cm deep inside the crop root zone.
- Irrigation Deficit:** Deficit irrigation (DI) is a technique of irrigation in which the quantity of water utilized is maintained below the maximum evapotranspiration level ET_m (or ET_c), which is estimated as $k_c \cdot 9 \cdot ET$, and the resulting slight water stress has negligible impact on yield. DI may be utilized in places where water is a scarce resource, since the water saved by DI may be used to irrigate additional land. The principles of DI based on the relative yield response to relative ET response in a variety of crops were recently reviewed by Geerts and Raes (2009), who emphasized the reasons for increased water productivity by using DI. DI is more frequent in fruit trees and vines than in field crops because their economic rewards are usually greater and less directly linked to biomass production than to fruit quality and yield. Extensive field studies in drought-sensitive species such as potatoes and tomatoes showed that DI could save 20–25 percent of total irrigation water or about 77 mm of water under Mediterranean conditions in early potatoes without yield depression when compared to fully irrigated plants (21).
- Irrigation Using Salty Water:** Irrigated land has a 200 percent greater productivity than rainfed land, and it provides one-third of the world's food; nevertheless, approximately half of the irrigated land suffers from salinity (Hillel 1998). Drainage systems have a long history of dealing with salty soils in dry environments. Salinity reduces crop development, and sodium (Na^+) and chloride (Cl^-) are the two main ions that cause osmotic and ion-specific damage (Munns and Tester 2008). When irrigating with saline water, however, water usage efficiency (WUE) may be improved (22). For modeling the salinity of soil moisture, crop response to salinity, drainage, and groundwater availability for crops, mathematical, numerical models such as SaltMod (Oosterbann 2012) and SALTMed have recently been created. Other crop growth models have also been modified to irrigation with salty water (23).
- Wastewater Is Used For Irrigation:** Up to 90% of the water used for residential purposes is discarded as wastewater. Typically, industries utilize approximately 5% of the water they extract. The irrigated fields are situated near metropolitan areas where wastewater is produced when wastewater is utilized for irrigation. Only 10% of the world's irrigated farmland is watered with treated wastewater, while waste and contaminated water is utilized on 20 Mha, or approximately 7% of the world's irrigated farmland (WHO 2006); these figures

are best estimates with considerable uncertainty (Scott et al. 2010). Implementation of action plans for achieving high safety standards with appropriate pathogen-reduction goals in accordance with WHO (2006) recommendations for wastewater usage typically entails multiple stages. In low-income countries like Ghana, a strategic plan for improving wastewater treatment is being developed, whereas in high-income countries like Israel, half of the irrigation water comes from the use of 72 percent of the country's sewage, which is treated in large-scale treatment plants and stored in storage tanks, as well as a variety of small-scale plants producing effluents of various qualities. Recent studies indicate that using treated wastewater to irrigate high-value crops yields excellent agronomical results. Nutrients and fertigation are included in fewer decision support systems (24). However, when using low-quality waters in irrigation, incorporated dustigation and cleaning methods and processes in a management model for decision support. The deterministic 'Plant-Soil-Atmosphere' model DAISY (Abrahamsen and Hansen 2000) is the model's cornerstone, simulating water and nitrogen dynamics, crop development, and, if needed, heavy metals and pathogen fate in the soil.

- **Systems for Cropping and Farming:** Scalars recently examined how various agronomic strategies may be utilized to promote plant development in semiarid environments. Supplemental irrigation, such as DI, may be used to combat dry periods caused by high temperatures. Crop productivity is improved by early planting aided by minimal tillage, the use of organic manure, and weed control. Crop rotations, which promote enhanced nitrogen availability, reduced disease risk, and better weed management, will help to support this. Agricultural species that are salt- and drought-tolerant, such as quinoa and amaranth, may help to sustain crop rotations and provide high-value cash crop products. Crop modeling may be helpful for deciding which crops to grow and develop for this goal, as well as for determining which crops to grow and develop further.

1.2 Management Measures:

- **Managing Water Supplies That Are Restricted in The Area:** Precipitation held in the soil and utilized for ET amounts to approximately 3000–6000 km³ per year¹ globally, and is referred to as 'green' water. Rainfed agriculture uses green water, while irrigated agriculture uses some of it. Blue water is water that comes from rivers, lakes, reservoirs, and aquifers. According to recent estimates, the worldwide quantity of blue water for irrigation is 927–1660 km³ per year¹. Because most water evaporates and infiltrates deeply, 40–80 percent of water taken from aquifers, lakes, and rivers contributes to agricultural production, considerable work is put into reducing losses in the conveyance phase. Crops, commodities, and services have all had their water footprint and virtual water estimated. The WFP of a product is the total volume of fresh water utilized to manufacture the product when the different stages in the manufacturing chain are added together. In terms of virtual water, soybeans use 3.1 m³ per kilogram of bean, cereals 1.2–1.4 m³ per kilogram of grain, and maize 0.7 m³ per kilogram of grain. Tomatoes and potatoes need 0.1 m³ water per kilogram of fruit. According to Aldaya et al. (2010), blue water economic productivity varies from 0.1–0.2 euros per m³ for low-cost grains to 2–3 euros per m³ for vegetables. The most lucrative crops seem to be vegetables, followed by grapes and olives. created a worldwide map of water productivity or the inverse virtual water for rainfed and irrigated wheat by combining crop water consumption from AQUASTAT with wheat yields from FAOSTAT.

This may be helpful for learning how river basins and/or irrigation systems can be used to facilitate virtual water commerce in order to save water globally.

- **Composition of Food and Feed, As Well As Waste:** Grain is in high demand throughout the world to meet the needs for food, feed, and fuel. It avoids greenhouse gas generation by boosting output on current farms rather than bringing new land and ecosystems into production. The average maize production in the United States has risen from 1.6 tons per hectare in the first part of the twentieth century to 9.5 tons per hectare now. New agricultural technology such as hybrid maize, fertilizer usage, and equipment are all contributing to this rise (Edgerton 2009). People consume more meat and dairy items each year as their income rises. Global meat output is expected to more than double by 2050, from 229 Mt in 2000 to 465 Mt (OECD/FAO 2011). Milk production is expected to grow by the same amount, from 580 to 1043 Mt. As the middle class grows, consumer demand moves away from stable foods and toward processed meals with more animal protein(25).

2. DISCUSSION

Shifting irrigation systems may do more than just minimizing the 40–60 percent loss of water during conveyance due to evaporation and deep penetration. Sprinkler and micro-irrigated areas are now covered in 33 and 6 Mha, respectively, throughout the world (Sener 2010). If a portion of the surface irrigated land (estimated surface irrigated land 315–39 = 276 Mha) is decreased and converted to sprinkler and micro-irrigated land, the water-saving potential is enormous. Shifting to DI offers a lot of water-saving potential since the principles can be applied to both surface and pressurized irrigation, with subsurface drip having the most promise. More accurate irrigation scheduling backed by models, remote sensing-based evaluations of real ET, and plant and soil water status sensors may all help save water. When water-saving DI is employed in the form of DI and partial root zone drying, certain instruments are also required (PRD). Table 4 shows a basic assessment of the benefits and drawbacks of utilizing irrigation systems in the form of furrow, pivot, and drip irrigation based on the preceding descriptions. Because of variations in prices, system features, the requirement for area size and form, climate/agronomy practices, and the necessity for environmental protection, a shift away from water-saving technologies need political incentives. The latter may take the shape of water price, rationing, regulation, consulting services implementation, infrastructure dam building, and so on. Up to 90% of the water taken for household consumption is returned to rivers and aquifers as wastewater, whereas businesses usually utilize just 5% of the water withdrawn.

3. CONCLUSION

On 20 Mha, or approximately 7% of the world's irrigated agriculture, wastewater is utilized (WHO 2006). The amount of untreated wastewater used is an order of magnitude more than the amount of treated wastewater used (Scott et al. 2010). Implementing action plans to achieve high safety standards with appropriate pathogen-reduction goals in accordance with WHO (2006) recommendations for wastewater usage frequently requires multiple stages. Many parts of the globe prohibit the use of wastewater for safety concerns, and the majority of wastewater is disposed of straight into the sea. The use of salty and waste water for irrigation is complicated; however, new decision support systems and model improvements may make it easier to utilize low-quality water for cleaning processes, and supplementary fertigation may be used to correct nutritional imbalances. To prevent salt buildup, a leaching percentage of the total irrigation water

of 10–20 percent is required to control salinity via drainage. More precise irrigation scheduling for utilization of this poor water quality reserve may be achieved by using the above-mentioned modeling techniques for soil solute concentration management. Supplemental/DI, as well as changing the cropping system to favor more salt- and drought-tolerant crops (Jacobsen et al. 2012, Matthews et al. 2013), should be considered in the context of maximizing virtual water import. This is a policy that has been prompted by water shortage. As a result, desert countries such as those in the Middle East and North Africa (MENA) continue to import significant amounts of food to meet local need, while farmers attempt to supplement their income by producing fruits and vegetables for export markets. Such strategy is clearly being implemented in Lebanon, but it is less so in many other parts of the globe. This should be seen in the context of minimizing food waste and changing the diet composition to include more vegetarian foods. The water footprint and the notion of "virtual" water are now widely accepted as aids for both product development and water redistribution from rainy to dry regions. The dangers of water exporting from rain-scarce low-income regions have recently been addressed.

REFERENCES

1. Jensen CR, Ørum JE, Pedersen SM, Andersen MN, Plauborg F, Liu F, et al. A short overview of measures for securing water resources for irrigated crop production. *Journal of Agronomy and Crop Science*. 2014.
2. Manjit K, Abhishek M. Plant growth promoting rhizobacteria (PGPR) for enhancing sustainable agriculture and revolutionized tools for farmers. *Res J Biotechnol*. 2021;
3. Brozynska M, Furtado A, Henry RJ. Genomics of crop wild relatives: Expanding the gene pool for crop improvement. *Plant Biotechnology Journal*. 2016.
4. Sharma P, Berwal YS, Ghai W. Krishimitr: A cloud computing and platform for disease detection in agriculture. *Int J Innov Technol Explor Eng*. 2019;
5. Jain N, Awasthi Y. WSN-AI based Cloud computing architectures for energy efficient climate smart agriculture with big data analysis. *Int J Adv Trends Comput Sci Eng*. 2019;
6. Zhao C, Liu B, Piao S, Wang X, Lobell DB, Huang Y, et al. Temperature increase reduces global yields of major crops in four independent estimates. *Proc Natl Acad Sci U S A*. 2017;
7. Kumar S, Shamim M, Bansal M, Gangwar B, Aggarwal RP. Computational modeling and emerging trend in agriculture. In: 2015 International Conference on Computing for Sustainable Global Development, INDIACom 2015. 2015.
8. Kashyap K, Sharma TK, Rajpurohit J. Logistic map and wavelet transform based differential evolution. *Int J Syst Assur Eng Manag*. 2020;
9. Jaimala, Singh R, Tyagi VK. Stability of a double diffusive convection in a Darcy porous layer saturated with Maxwell nanofluid under macroscopic filtration law: A realistic approach. *Int J Heat Mass Transf*. 2018;
10. Ranganathan T, Ananthakumar U. Hedging in Presence of Crop Yield, Crop Revenue and Rainfall Insurance. *J Quant Econ*. 2017;
11. Kaushik BK, Agarwal RP, Sarkar S, Joshi RC, Chauhan DS. Repeater insertion in crosstalk-aware inductively and capacitively coupled interconnects. *Int J Circuit Theory Appl*. 2011;

12. Jain M, Agarwal RP. Capacity & coverage enhancement of wireless communication using smart antenna system. In: Proceeding of IEEE - 2nd International Conference on Advances in Electrical, Electronics, Information, Communication and Bio-Informatics, IEEE - AEEICB 2016. 2016.
13. Schwember AR. An update on genetically modified crops. *Cienc e Investig Agrar*. 2008;
14. Lehtomäki A, Viinikainen TA, Rintala JA. Screening boreal energy crops and crop residues for methane biofuel production. *Biomass and Bioenergy*. 2008;
15. Singh G, Siddique R. Abrasion resistance and strength properties of concrete containing waste foundry sand (WFS). *Constr Build Mater*. 2012;
16. Bala Ismail I, Mustapha Y. Micropropagation as a tool for experimental breeding, crop production and crop improvement. *Global Advanced Research Journal of Agricultural Science*. 2013.
17. Kaushal G, Singh H, Prakash S. High temperature corrosion behaviour of HVOF-sprayed Ni-20Cr coating on boiler steel in molten salt environment at 900°C. *Int J Surf Sci Eng*. 2011;
18. Kumar M, Sharma P, Sadawarti H. Measuring testability of aspect oriented programs. In: ICCAIE 2010 - 2010 International Conference on Computer Applications and Industrial Electronics. 2010.
19. Singh B, Singh J, Ailawalia P. Thermoelastic waves at an interface between two solid half-spaces under hydrostatic initial stress. *Arch Mech*. 2010;
20. Kaushal G, Singh H, Prakash S. Cyclic oxidation behavior of detonation gun sprayed Ni-20Cr coating on a boiler steel at 900°C. In: TMS Annual Meeting. 2010.
21. Kierończyk B, Rawski M, Długosz J, Świątkiewicz S, Józefiak D. Avian crop function - A review. *Annals of Animal Science*. 2016.
22. Hummer KE, Pomper KW, Postman J, Graham CJ, Stover E, Mercure EW, et al. Emerging fruit crops. In: *Fruit Breeding*. 2012.
23. Bhardwaj P, Rai D V., Garg ML, Mohanty BP. Potential of electrical impedance spectroscopy to differentiate between healthy and osteopenic bone. *Clin Biomech*. 2018;
24. Alvarez R, Steinbach HS, De Paepe JL. Cover crop effects on soils and subsequent crops in the pampas: A meta-analysis. *Soil Tillage Res*. 2017;
25. Kumar V, Singla S, Garg R. Strength and microstructure correlation of binary cement blends in presence of waste marble powder. In: *Materials Today: Proceedings*. 2020.

ACCIDENTAL IDENTIFICATION WITH TRACKING TECHNOLOGY

Dr. Pavan Kumar Singh*

*Faculty of Engineering,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- pavan.engineering@tmu.ac.in

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ABSTRACT

Economic casualties due to traffic accidents are rising in most countries. Although the number of road deaths has decreased since 2001, much change is needed. The facilities to provide emergency care following an accident is also not up to the mark due to lack of knowledge. This is why we are implementing robotics in the ambulance that can help the rescue squad hit time to save lives. The automobile industry is more concerned with human welfare. This document is a car automation in which the network can be used to monitor the vehicle after the crash and to report relevant details about the vehicle in order to include emergency assistance. Emergency facilities or an SOS system shall be used to illustrate the operation of this system was considered. When the car has a crash, the device sends spatial coordinates and uses these coordinates. Tracking the location of the vehicle on the Google map through the internet is provided to the hospitality services. The message shall contain the Information of the car and even the precise location of the vehicle. Where an ambulance or emergency medical services can be needed be hurried to the scene of the crash.

KEYWORDS:Global Positioning System (GPS), Global System For Mobile Communication (GSM), Road Deaths, Tracking, Traffic Accidents.

1. INTRODUCTION

The high demand for cars has also raised the chances of road traffic and road accidents. People's lives are at high risk. This is due to the lack of the finest emergency services available in our world(1). This concept is a device that can detect injuries in considerably less time and delivers simple information to the first aid centre within a few seconds, covering the spatial coordinates, timing and angle of the crash in the car. This distress message will be sent to the emergency team in a short time to help save precious lives(2)(3)(4). A switch is often given to avoid transmitting a response in exceptional situations where there is no injury, which will save the valuable time of the emergency rescue team. When an accident happens, the warning code is transmitted immediately to the ambulance squad and the police department. It's a postsended via the Global System for Mobile communication (GSM) module and the location of the accident is identified with the aid of the Global Positioning System (GPS) module. With the aid of both the Micro Electro Mechanical System (MEMS) sensor and the vibration sensor, the accident can be identified exactly. The Angle of the rolls over the car can also be detected by a message via the

MEMS sensor. This application offers the optimal remedy for bad emergency conditions(5)(6)(7).

1.1.Global Positioning System (GPS)

The Global Positioning System (GPS), formerly known as Navstar GPS, is a satellite-based radionavigation system owned and administered by the United States Space Force. It is a global navigation satellite system (GNSS) that gives geolocation and time information to a GPS receiver anywhere on or near the Earth when four or more GPS satellites can be seen without obstruction. Mountains and buildings may obstruct the GPS signals, which are quite weak.

The GPS does not need the user to send any data, and it works independently of telephonic or Internet reception, however both technologies may improve the accuracy of GPS location data. Military, civic, and commercial users all across the globe rely on the GPS for crucial location. The US government designed, maintains, and administers the system, which is publicly available to anybody with a GPS device(8)(9)(10).

The GPS project was initiated in 1973 by the United States Department of Defense. In 1978, the first prototype spacecraft was launched, and in 1993, the whole constellation of 24 satellites became operational. After the Korean Air Lines Flight 007 disaster, President Ronald Reagan issued an executive order allowing civilian usage beginning in the 1980s. Due to technological advancements and increasing demands on the present system, efforts to update the GPS and integrate the next generation of GPS Block IIIA satellites and the Next Generation Operational Control System are already underway (OCX). These revisions were sparked by announcements from Vice President Al Gore and the Clinton administration in 1998(11)(12).

The GPS service is controlled by the US government, which may block access to the system on a case-by-case basis, as it did to the Indian military during the Kargil War in 1999, or degrade it at any moment. As a consequence, a number of nations have established or are developing new global or regional satellite navigation systems. The Russian Global Navigation Satellite System (GLONASS) was created at the same time as GPS, but until the mid-2000s, it had insufficient coverage of the world. GLONASS may be added to GPS systems, increasing the number of accessible satellites and allowing locations to be set more rapidly and precisely to within two meters (6.6 ft). In 2018, China's BeiDou Navigation Satellite System commenced worldwide operations, with complete deployment expected in 2020. There's also the Galileo navigation satellite system of the European Union, as well as India's NavIC. The Quasi-Zenith Satellite System (QZSS) is a GPS satellite-based augmentation system developed by Japan to improve GPS accuracy in Asia-Oceania, with satellite navigation independent of GPS expected to be operational by 2023(13).

1.2.Global System for Mobile communication (GSM)

The Global System for Mobile Communication (GSM) is an acronym for Global System for Mobile Communication. It is a protocol for second-generation (2G) digital cellular networks created by the European Telecommunication Standards Institute (ETSI). It was designed to take the place of first-generation (1G) cellular networks. GSM was inspired by a cell-based mobile radio system developed at Bell Laboratories in the early 1970s.

GSM is a global, open, digital cellular radio network that serves over 200 nations. It operates on the basis of narrowband time division multiple access (TDMA). It spans practically all of

Western Europe and is expanding in North America and Asia. It may be utilized for more than just phone conversations; it can also be used for data processing and text messaging. To send or receive e-mails, faxes, surf the internet, monitor security, and so on, a user may link his GSM-enabled phone to his laptop(14).

1.1.1. The GSM Standard Runs On Three Separate Frequencies, As Shown Below:

- 900 MHz: The initial GSM system utilized this frequency.
- 1800 MHz: This frequency was utilized to accommodate the increasing number of customers.
- 1900 MHz: This frequency is mostly utilized in the United States.

1.1.2. Data Applications Supported By GSM

When you link your GSM phone to a computer system, you get the following features.

- Internet: GSM is the most widely available and reliable wireless data connection for accessing the internet.
- Mobile Fax: GSM allows you to send and receive faxes from anywhere that has GSM connectivity.
- Secured LAN access: GSM offers secure LAN connection to business networks. It encrypts air communications and adds an extra layer of protection to sensitive e-mails and faxes.

1.1.3. Advantages of GSM

Various advantages associated with the GSM are illustrated in the Figure 1.

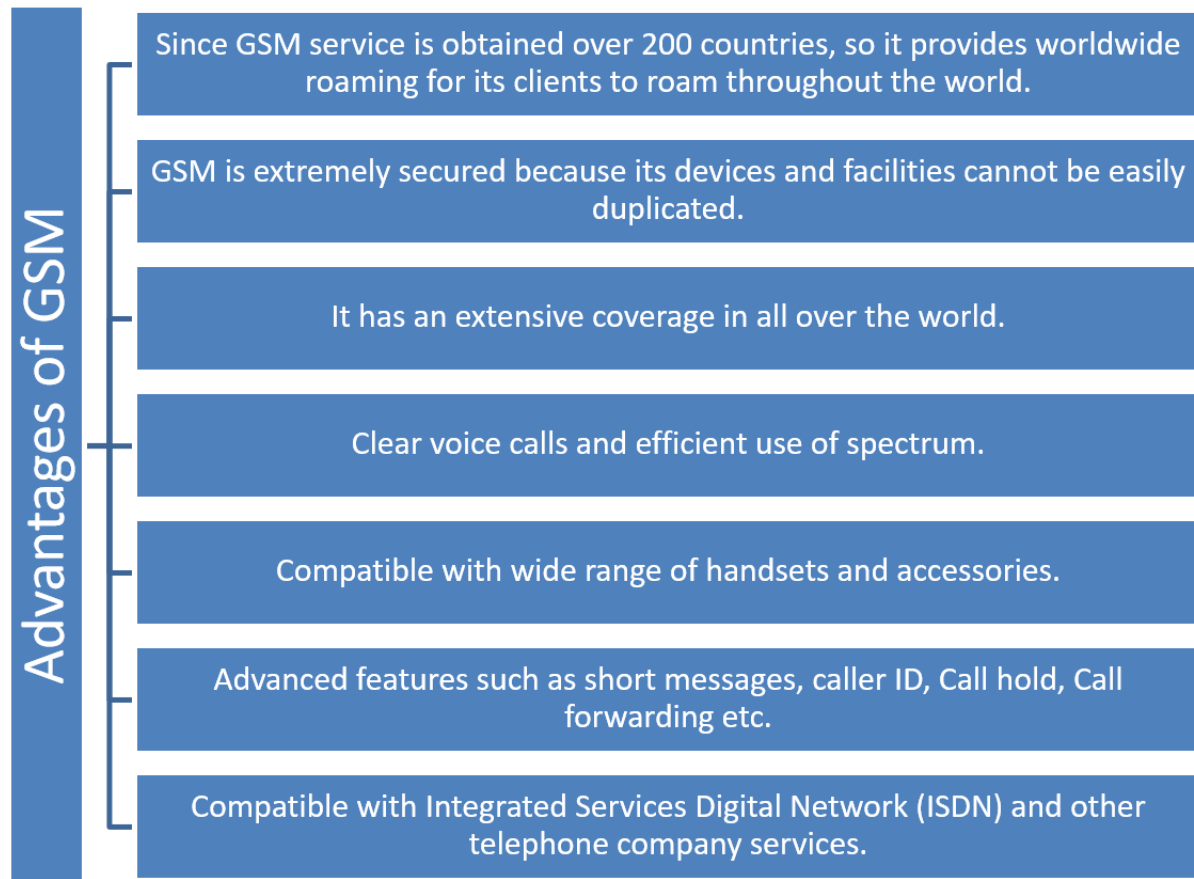


Figure 1: Illustrating the Advantages of Global System for Mobile Communication

1.1.4. Disadvantages of GSM

Various disadvantages associated with the GSM are illustrated in the Figure 2.

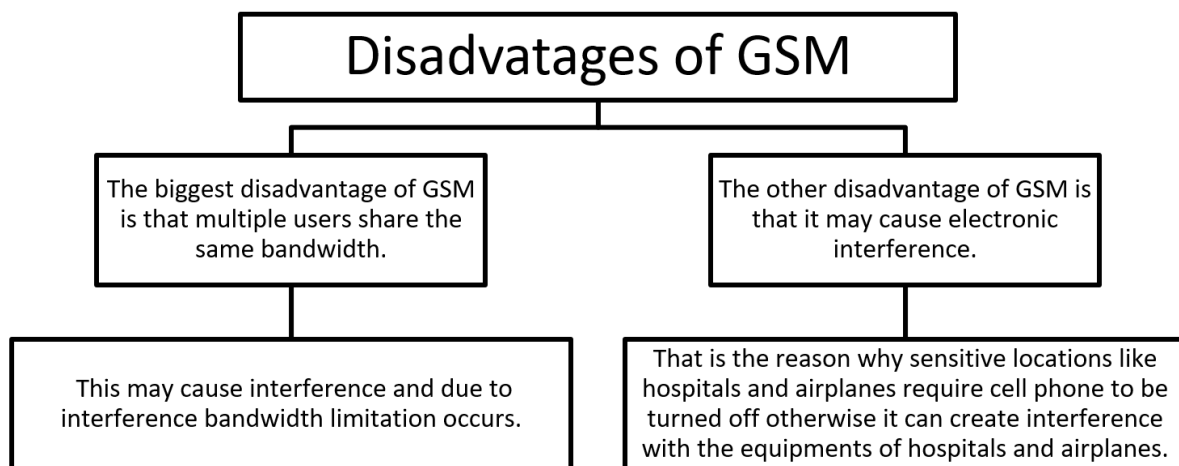


Figure 2: Illustrating the Disadvantages of Global System for Mobile Communication

As per the National Highway Safety Administration (NHTSA) established by the Highway Safety Act, it represents the execution of safety programmers. According to the standards of NHTSA Vehicle makers seeking to incorporate safer cars or protective technologies, vehicles have various services, such as airbags and specialized devices to protect passengers during collisions, and thus, due to advanced construction procedures, these structures have more strict safety standards to avoid disasters. However, this type of accidents continues to occur, with damage to buildings, severe injury and a lack of emergency systems. Linear advances in automotive safety technologies would also aim to minimize serious accidents and human fatalities. NHTSA claims that this is the best(15)(16)(17).

Improving vehicle protection can benefit from the extensive use of crash prevention, accident warning and immediate emergency assistance systems. Car protection is the research and practice of planning, building, machinery and legislation to mitigate the occurrence and effects of accidents and incidents. The proposed solutions seek to incorporate a low-cost safety accident warning system. Detection of an injury of the Messaging System is the simplest version of a technically feasible model using GSM and GPS technologies. To do this, all controls are rendered using a microcontroller that can talk faster. The causes for the crash may be the driver's fault or some other result, so it is important to provide proper emergency care following an accident. The purpose of this framework is to mitigate the various drawbacks of the automotive industry in the event of an unknown catastrophe by supplying appropriate operation within a shorter span of time. Our scheme has been placed in order to resolve economic losses due to shortage of awareness and emergency care(18)(19).

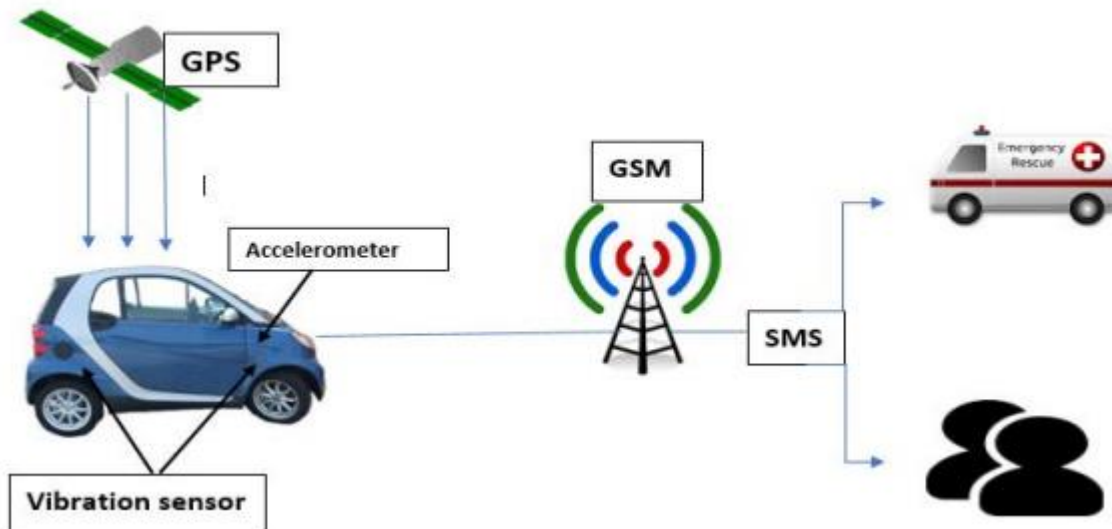


Figure 1: Illustrating The planning of the system(20)

The key goal of the AVCSS is to monitor an accident that turns into a tragedy. The paper suggested a method to offer immediate help to individuals who have suffered an injury. The design consists of a microcontroller chip, an accelerometer, a vibration sensor, a GPS system and a GSM module. Power supply and all other electronics, including GPS, GSM, controller and warning, are installed on the fragile (figure 1).

Box and sensors located at the critical stage of a vehicle where the effect of tilting and acceleration is more conserved. A high-performance (16/32) bit microcontroller unit is used to process and store a real-time signal from the accelerometer and vibration sensor. The accelerometer is the key sensor used to identify a major crash and vibration sensor attached to detect a normal crash and to alert the driver of any major accident. Once the crash has been identified, GPS gathers the current location values, including latitude (N or S), longitude (E or W). This is the Geographical coordinates are obtained by the microcontroller and the information will be transmitted to the cell phone with the aid of GSM.

Thus, the notification on the smartphone screen includes an exact location which will be routed to the Google map and warn the operator to provide hospitality facilities as well as interrupts or signals from the vibration sensor in case of a simple accident, the current driver will also send a message to the family member/vehicle owner that "your car has crashed." The platform of this system is an IDE where people can add separate telephone numbers for accident assistance(21).

1.1 GSM: - It stands for Global System for Mobile Communication. GSM is used as a media used to manage and track the load of the transformer from somewhere by sending a packet. It has a deterministic character of its own. Hereby, GSM is used to track and control the DC motor, Stepper engine, temperature sensor and solid state relay by transmitting a message via the GSM modem(22). There is also no reason to lose time by manual process and transport. It is also known to be highly efficient communication via mobile devices that would be useful in industrial controls, vehicles and equipment that can be operated from anywhere else. It is also extremely economical and less expensive; thus, GSM is favored for this mode of control(23).

1.2 GPS: - It stands for Global Positioning System. GPS is used in both detection and navigation vehicles. Tracking systems allow the base station to keep track of the vehicles without the involvement of the driver, while the navigation device allows the driver to reach the destination. If it's a navigation device or a tracking system, the design is more or less identical. Where an accident has happened at some location, the GPS device monitors the position of the car and sends the details via GSM to the user by alerting the person through SMS or a call(24).

DISCUSSION

The high demand for cars has also raised the chances of road traffic and road accidents. People's lives are at high risk. This is due to the lack of the finest emergency services available in our world. This concept is a device that can detect injuries in considerably less time and delivers simple information to the first aid centre within a few seconds, covering the spatial coordinates, timing and angle of the crash in the car. This distress message will be sent to the emergency team in a short time to help save precious lives(25).

CONCLUSION

This paper describes a proposal with characteristics such as functional viability, cost-effectiveness, movability and compactness. The accelerometer, vibration tracker, GPS and GSM system that reduces the catastrophe to a large degree. This machine can solve the lack of automation in the vehicle. The time to search the crash scene is reduced and the victim will be healed as soon as possible, helping to save more lives. The key purpose of the AVCSS crash

framework is to minimise the risk of injuries in the case of an accident and also to warn the customer of the state of the car. Emergency networks if an event happens. They're alerted, and they can hit the specific location on time. This implementation is much more fitting for abandoned areas where an accident happens easily and injuries occur during the night.

REFERENCES

1. Chhabra JK, Gupta V. Towards spatial complexity measures for comprehension of Java programs. In: Proceedings - 2006 14th International Conference on Advanced Computing and Communications, ADCOM 2006. 2006.
2. Hu W, Xiao X, Xie D, Tan T, Maybank S. Traffic accident prediction using 3-D model-based vehicle tracking. IEEE Trans Veh Technol. 2004;
3. Kumar M, Sharma A, Garg S. A study of aspect oriented testing techniques. In: 2009 IEEE Symposium on Industrial Electronics and Applications, ISIEA 2009 - Proceedings. 2009.
4. Sadawarti H, Bansal PK. An efficient irregular augmented shuffle network. WSEAS Trans Commun. 2007;
5. PRABHA C, SUNITHA R, ANITHA R. Automatic Vehicle Accident Detection and Messaging System Using GSM and GPS Modem. Int J Adv Res Electr Electron Instrum Eng. 2014;
6. Kumar M, Sharma P, Sadawarti H. Measuring testability of aspect oriented programs. In: ICCAIE 2010 - 2010 International Conference on Computer Applications and Industrial Electronics. 2010.
7. Kaur A, Singh P, Rattan D. Automatic marking of Punjabi syllables boundaries in a sound file. In: ICSPS 2010 - Proceedings of the 2010 2nd International Conference on Signal Processing Systems. 2010.
8. Pandey B, Sharma KP. Radar Transmogrification Technology: Support for Unmanned System. In: Proceedings - 2019 Amity International Conference on Artificial Intelligence, AICAI 2019. 2019.
9. Singh D. Robust controlling of thermal mixing procedure by means of sliding type controlling. Int J Eng Adv Technol. 2019;
10. Anand V. Photovoltaic actuated induction motor for driving electric vehicle. Int J Eng Adv Technol. 2019;8(6 Special Issue 3):1612–4.
11. Solanki MS, Goswami L, Sharma KP, Sikka R. Automatic Detection of Temples in consumer Images using histogram of Gradient. In: Proceedings of 2019 International Conference on Computational Intelligence and Knowledge Economy, ICCIKE 2019. 2019.
12. Goswami L, Kaushik MK, Sikka R, Anand V, Prasad Sharma K, Singh Solanki M. IOT Based Fault Detection of Underground Cables through Node MCU Module. In: 2020 International Conference on Computer Science, Engineering and Applications, ICCSEA 2020. 2020.

13. Javaid AY, Jahan F, Sun W. Analysis of Global Positioning System-based attacks and a novel Global Positioning System spoofing detection/mitigation algorithm for unmanned aerial vehicle simulation. Simulation. 2017;
14. Bangali J, Shaligram A. Design and implementation of security systems for smart home based on GSM technology. Int J Smart Home. 2013;
15. Sharma DK, Sharma AK. Search engine: A backbone for information extraction in ICT scenario. In: The Dark Web: Breakthroughs in Research and Practice. 2017.
16. Verifier SD, Drive AH. Simulink ® Verification and Validation TM Reference. ReVision. 2015;
17. Ramos Brandão P. The Importance of Authentication and Encryption in Cloud Computing Framework Security. Int J Data Sci Technol. 2018;
18. Walia A, Singhal N, Sharma AK. A novel e-learning approach to add more cognition to semantic web. In: Proceedings - 2015 IEEE International Conference on Computational Intelligence and Communication Technology, CICT 2015. 2015.
19. Goel AR, Ranjan A, Wajid M. VLSI architecture and implementation of statistical multiplexer. In: Proceedings of the International Conference on Innovative Applications of Computational Intelligence on Power, Energy and Controls with Their Impact on Humanity, CIPECH 2014. 2014.
20. Deshpande S. Realistic Mobility Model of AVCSS (Advanced Vehicle Control and Safety System) for Accident Detection with Tracking Technology. Int J Res Appl Sci Eng Technol. 2018;
21. Khamis Al-Balushia ZM. Tracking and Accident Detection in Automobiles Using GPS and GSM Technology. J Student Res. 2017;
22. More P, Patil U. A Survey on Accident Detection, Tracking and Recovery of Vehicles. Int Res J Eng Technol. 2008;
23. KumarA A, Scholar U, Professor A. Accident Detection and Alerting System Using Gps & Gsm. Int J Pure Appl Math. 2018;
24. Rathinakumar R, Manivannan D. Wireless accident information system using GSM and GPS. Res J Appl Sci Eng Technol. 2012;
25. Shah D. Automatic Vehicle Accident Detection System Based on ARM &GPS. International Journal for Research in Technological Studies ISSN:-Applied (Online). 2013.

ENVIRONMENTAL IMPACT OF ACID RAIN: A REVIEW

Atri Deo Tripathi*

*Faculty of Engineering,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email id- dratri.engineering@tmu.ac.in

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ABSTRACT

Acidification of rain-water is identified as one of the most serious environmental problems of transboundary nature. Acid rain is mainly a mixture of sulphuric and nitric acids depending upon the relative quantities of oxides of Sulphur and nitrogen emissions. Due to the interaction of these acids with other constituents of the atmosphere, protons are released causing increase in the soil acidity. Lowering of soil pH mobilizes and leaches away nutrient cations and increases availability of toxic heavy metals. Acid rain is one of the important environmental threats and occurs due to the presence of certain acids in the atmosphere. Acidification of the rainwater is identified by the presence of sulphuric and nitric acids. Interaction of acid rain with environmental components results in their degradation. Acid rain reduces the soil fertility resulting in an adverse impact on the growth of the forest and crop fields. Acidification of the water bodies (lake/ponds) affects aquatic flora and fauna adversely. Acid rain also has some deleterious effects on human health, building and materials. The acid rain is responsible for the disturbance of several abiotic and biotic components of the ecosystem. Thus, the present review focuses on the causes, impacts and possible solution for the acid rain.

KEYWORDS: *Acid Rain, Deposition, Environmental, Nitrogen, Pollutants Causes, Sulphuric.*

1. INTRODUCTION

Since the beginning of civilization, human beings have used various natural resources for their benefit. To make their life easier, they have produced facilities that use many of the Earth's energy resources. On one side this kind of development makes our lives easier, but on the other hand it results into pollution by release harmful substance into environment(1). Acid rain is the most serious environmental problems emerged due to air pollution. Acid rain is particularly damaging to lakes, streams and forests, and the plants and animals that live in these ecosystems. Rain is one of the most essential ingredients for human and animal life. The water provided by rain allows all life on Earth to survive(2). Although rain is naturally acidic, it is being increasingly acidified by pollution from homes, factories, power stations and cars. The term used to describe this problem is "acid rain". Acid rain hasn't just occurred in the last twenty to thirty years(3). This was over 100 years ago. For years ever since most of the world has been industrialized, the effects of pollution have plagued nations alike. Acid rain is one of the largest contributors to this industrialized form of pollution(4).

New Delhi adds 1,500 poorly regulated new cars to its roads every day, so it's no wonder that the city is choking on auto exhaust. Asian air pollution kills 2 million people every year. Tough emissions laws in the U.S. explain why we're breathing better, despite adding cars, population and miles traveled(5,6). Acid rain is also called acid deposition because this term includes other forms of acidic precipitation such as snow. It is two types of deposition(7):

1. **Wet Deposition** - Wet deposition refers to acidic rain, fog, and snow. If the acid chemicals in the air are blown into areas where the weather is wet, the acids can fall to the ground in the form of rain, snow, fog, or mist. As this acidic water flows over and through the ground, it affects a variety of plants and animals(8).
2. **Dry Deposition**- In areas where the weather is dry, the acid chemicals may become incorporated into dust or smoke and fall to the ground through dry deposition, sticking to the ground, buildings, homes, cars, and trees. Dry deposited gases and particles can be washed from these surfaces by rainstorms, leading to increased runoff(9).

1.1 Causes Of Acidification:

Sulphur dioxide (SO₂) and oxides of nitrogen and ozone to some extent are the primary causes of acid rain. These constituents interact with reactants present in the atmosphere and result into acid deposition(10). The natural sources of Sulphur pollutants are oceans and too much smaller extent from volcanic eruptions. The man-made sources of SO₂ emissions are the burning of coal and petroleum and various industrial processes. Other sources include the smelting of iron and other metallic (Zn and Cu) ores, manufacture of sulphuric acids, and the operation of acid concentrators in the petroleum industry(6). The levels of NO_x are small in comparison to SO₂, but its contribution in the production of acid rain is increasing(6,10).

The degree of acidity is measured by pH value, it is shorthand version of potential hydrogen. The pH of normal rainwater is also acidic; the reason is that water reacts to a slight extent with atmospheric carbon dioxide (CO₂) to produce carbonic acid(5).



Small amount of nitric acid is also responsible for the acidity of normal rainwater, which is produced by the oxidation of nitrogen in presence of water during lightning storms.

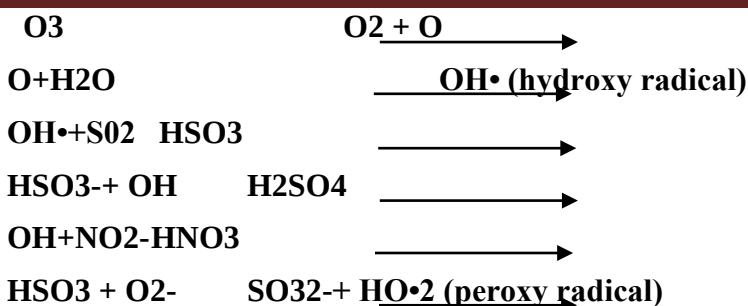


Rain that presents a concentration of H⁺ ion greater than 2.5 µeq-1 and pH value is less than 5.6 is considered acid (Evans,1984). Galloway et al. (1982) proposed a pH of 5.0 as a limit of natural contribution.

1.2 Chemical Reactions During Acid Rain Formation:

The chemical reaction that results in the formation of acid rain involves the interaction of SO₂, NO_x and O₃(1). When the pollutants are vented into the atmosphere by tall smoke stacks, molecules of SO₂ and NO_x are caught up in the prevailing winds, where they interact in the presence of sunlight with vapors to form sulphuric acid and nitric acid mists(11). These acids remain in vapour state under the prevalent high temperature conditions. When the temperature falls, condensation takes the form of aerosol droplets, which owing to the presence of unburnt carbon particles will be black, acidic and carbonaceous in nature(8,9).

1.2.1 Acid Reactions Involving O₃: -



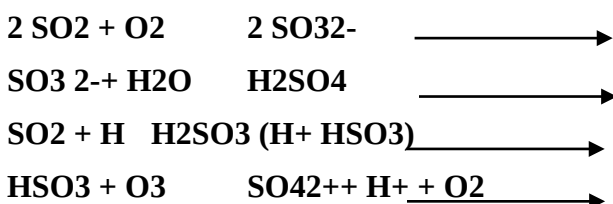
Peroxy radicals react with formaldehyde, acetaldehyde and form formic and acetic acids and some other organic acids, contributing to 5-20% acidity in total acid rain load(12).

1.2.2 Acid Reactions Involving Sulphur:

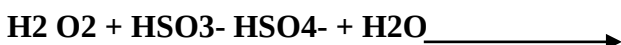
Coal is especially rich in Sulphur. As coal is burned, its component gets oxidized



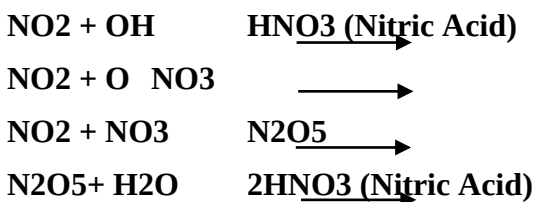
The oxidation of Sulphur to SO₂ occurs directly in the flame; therefore, SO₂ is discharged to the atmosphere from the smoke stacks(13). As SO₂ is swept along by the prevailing wind, it is slowly oxidized at ordinary temperature to SO₃-



Oxidant property of atmosphere plays an important role in conversion of SO₃ to SO₄. Sulphur dioxide oxidation is most common in clouds and especially in heavily polluted air where compounds such as ammonia and O₃ are in abundance(14). These catalysts help to convert more SO₂ into sulphuric acid(7,10).



1.2.3 Acid Reactions Involving Nitrogen:



1.3 Effects of Acid Rain:

After studying the Hubbard Brook Forest and other areas today, there are several important impacts of acid deposition on both natural and man-made environments(15). Aquatic settings are the most clearly impacted by acid deposition though because acidic precipitation falls directly into them. Both dry and wet deposition also runs off of forests, fields, and roads and flows into lakes, rivers, and streams(3,16).

1.4 Effects of Acid Rain on Health:

Acid rain looks, feels, and tastes just like clean rain. The harm to people from acid rain is not direct. Walking in acid rain, or even swimming in an acid lake, is no more dangerous than walking or swimming in clean water(17). However, the pollutants that cause acid rain sulfur dioxide (SO₂) and nitrogen oxides (NO_x) do damage human health. These gases interact in the atmosphere to form fine sulfate and nitrate particles that can be transported long distances by winds and inhaled deep into people's lungs. Fine particles can also penetrate indoors(18). Many scientific studies have identified a relationship between elevated levels of fine particles and increased illness and premature death from heart and lung disorders, such as asthma and bronchitis(15).

2. DISCUSSION

2.1 Acid Rain Harms Other Plants:

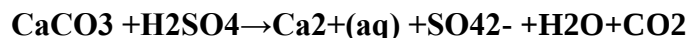
Acid rain can harm other plants in the same way it harms trees. Although damaged by other air pollutants such as ground level ozone, food crops are not usually seriously affected because farmers frequently add fertilizers to the soil(17).

2.2 Effects in the Forest:

Over the years, scientists, foresters, and others have noted a slowed growth of some forests. Leaves and needles turn brown and fall off when they should be green and healthy. In extreme cases, individual trees or entire areas of the forest simply die off without an obvious reason(19).

2.3 Effects on Stone Buildings and Monuments in Acid Rain:

Marble and limestone have long been preferred materials for constructing durable buildings and monuments. Marble and limestone both consist of calcium carbonate (CaCO₃), and differ only in their crystalline structure. Limestone consists of smaller crystals and is more porous than marble; it is used more extensively in buildings(20). Marble, with its larger crystals and smaller pores, can attain a high polish and is thus preferred for monuments and statues(21). Although these are recognized as highly durable materials, buildings and outdoor monuments made of marble and limestone are now being gradually eroded away by acid rain calcium carbonate and sulfuric acid (the primary acid component of acid rain) results in the dissolution of CaCO₃ to give aqueous ions, which in turn are washed away in the water flow.



This process occurs at the surface of the buildings or monuments; thus acid rain can easily destroy the details on relief work (*e.g.*, the faces on a statue), but generally does not affect the structural integrity of the building(22).

Because of these problems and the adverse effects air pollution has on human health, a number of steps are being taken to reduce sulfur and nitrogen emissions(23). Most notably, many governments are now requiring energy producers to clean smoke stacks by using scrubbers which trap pollutants before they are released into the atmosphere and catalytic converters in cars to reduce their emissions(24).

2.4 Control of Acid Rain:

Liming: -The damage to lakes and other water bodies can be eliminated by adding lime(25). Many chemicals such as caustic soda, sodium carbonate, slacked lime and limestone are most popular for raising pH of acidified water(26).

3. CONCLUSION

Acid rain is one of the global issues with several adverse impacts on the environment. Oxides of nitrogen and Sulphur dioxide are major gasses behind the formation of acids in the atmosphere responsible for acid rain. Emissions from industries are major sources for Sulphur dioxide whereas several fossil fuel combustion activities and vehicular emissions are the major cause for emission of oxides of nitrogen in the atmosphere. As a result of these gasses acid rain happens after the formation of nitric acid and sulphuric acid. Acid rain causes several environmental problems such as the impact on the forest, crop, building, material, soil/water acidification including health-related issues (respiratory disorder, irritation in eyes and skin infections). To reduce such type of global problems several strategies have been adopted to reduce the acid rain and its impact on the environment. The effect of acid rain can be lowered by spreading awareness among the people and by the implementation of policies. Using advanced technology that is cost-efficient and reliable may also decrease acid deposition. The government can make some more strict policies regarding the emission of Sulphurdioxide and nitrogen from the transport and industries.

REFERENCES:

1. Xjui BOEDB. Rainwater harvesting: a lifeline for human well-being. Water. 2009;
2. Gould R. The Effects of Acid Rain. In: Going Sour. 1985.
3. Irvine IC, Greaver T, Phelan J, Sabo RD, Houtven G Van. Terrestrial acidification and ecosystem services: effects of acid rain on bunnies, baseball, and Christmas trees. Ecosphere. 2017;
4. Matsushima I. Effect of acid rain on corrosion of carbon steel. Zair to Kankyo/ Corros Eng. 2002;
5. Singh A, Agrawal M. Acid rain and its ecological consequences. Journal of Environmental Biology. 2008.
6. Livingston RA. Acid rain attack on outdoor sculpture in perspective. Atmos Environ. 2016;
7. US EPA O. Effects of Acid Rain. Ambio. 1976;
8. Menz FC, Seip HM. Acid rain in Europe and the United States: An update. Environ Sci Policy. 2004;
9. Li T, Wang X, Zhou Q, Liao C, Zhou L, Wan L, et al. Swift Acid Rain Sensing by Synergistic Rhizospheric Bioelectrochemical Responses. ACS Sensors. 2018;
10. Bakhshipour Z, Asadi A, Huat BBK, Sridharan A, Kawasaki S. Effect of acid rain on geotechnical properties of residual soils. Soils Found. 2016;
11. Gee KD, Hunt WF. Enhancing Stormwater Management Benefits of Rainwater Harvesting via Innovative Technologies. J Environ Eng. 2016;

12. De Carvalho Julio Luz JRS, Santos SM, Gavazza S. A PVC-pipe device as a sanitary barrier for improving rainwater quality for drinking purposes in the Brazilian semiarid region. J Water Health. 2018;
13. Rain Sensor Interfacing with LPC2148.
14. Liu J, Zhang G, Wu F, Zhang H, Yang H. Study of rainwater quality assessment model based on radial basis function artificial neural network. In: 2012 International Symposium on Geomatics for Integrated Water Resources Management, GIWRM 2012. 2012.
15. Smith A. Scaling-up inclusive innovation: asking the right questions? Contribution. Contribution to OECD Symposium on Innovation and Inclusive Growth (scaling-up session). 2014.
16. Hames RS, Rosenberg K V., Lowe JD, Barker SE, Dhondt AA. Adverse effects of acid rain on the distribution of the Wood Thrush *Hylocichla mustelina* in North America. Proc Natl Acad Sci U S A. 2002;
17. Rainwater Harvesting System.
18. Rijsberman FR. 6.11 Rainwater harvesting. Water Policy. 1998;
19. Hillel D. Water Harvesting. In: Encyclopedia of Soils in the Environment. 2004.
20. Patel AD, Shah APPK. Rainwater Harvesting- A Case Study of Amba Township, Gandhinagar. In 2015.
21. Chaudhary P, Sharma A, Chaudhary A, Khati P, Gangola S, Maithani D. Illumina based high throughput analysis of microbial diversity of maize rhizosphere treated with nanocompounds and *Bacillus* sp. Appl Soil Ecol. 2021;
22. Sehwat R, Maithani M, Singh R. Regulatory aspects in development of stability-indicating methods: A review. Chromatographia. 2010.
23. Singh S, Shrivastava AK. In silico and wet-lab study revealed cadmium is the potent inhibitor of HupL in *Anabaena* sp. PC C 7120. Arch Microbiol. 2016;
24. Bajaj J, Dwivedi J, Sahu R, Dave V, Verma K, Joshi S, et al. Antidepressant activity of *Spathodea campanulata* in mice and predictive affinity of spatheosides towards type A monoamine oxidase. Cell Mol Biol. 2021;
25. Virk JK, Kalia AN, Gauttam VK, Mukhija M, Rath G. Development and characterization of spheroidal antidiabetic polyherbal formulation from fresh vegetable juice: A novel approach. J Food Biochem. 2021;
26. Chandra H, Singh C, Kumari P, Yadav S, Mishra AP, Laishevtcev A, et al. Promising roles of alternative medicine and plant-based nanotechnology as remedies for urinary tract infections. Molecules. 2020.

A REVIEW ON BULLYING AND CYBERBULLYING

Sumit Kumar*

*Teerthanker Mahaveer Institute of Management and Technology,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email id-sumit.mamagement@tmu.ac.in

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ABSTRACT

The concept of bullying and the related definition of cyberbullying are discussed in this chapter. We'll start by looking at the definition of bullying and the defining characteristics that are usually connected with it, such as purpose (to hurt), repetition, and power imbalance. We also take into account the word "harassment." We then go on to the terms cyberbullying and cyberaggression, which are related. This includes a discussion of the conventional bullying criteria's applicability in the internet realm. Finally, we provide some suggestions for better understanding and use of the term "cyberbullying." Bullying and cyberbullying are both researched extensively throughout the globe. Despite the fact that prevalence rates in impoverished nations are very high, little attention is given to them. Similarly, various subjects get uneven attention. As a result, this study provides a survey of the research that have had the most effect on the profession, highlighting what is already well known and expressing concerns about problems that need further attention.

KEYWORDS: Aggression Bullying, Cyber Aggression, Cyber Bullying, Repetition, Relation.

1. INTRODUCTION

Aggression is usually understood in the psychological literature to be a deliberate act of harming someone (or any living creature) who does not want to be hurt. Although some individuals commit self-harm, the 'somebody' is typically someone else. Because unintentional damage is not deemed hostile, the act should be deliberate. For decades, the literature on aggressiveness centered on direct, in-person forms of aggression, such as striking, kicking, and punching, as well as direct verbal assaults like threats, taunts, or insults(1)(2)(3). However, in the early 1990s, the emphasis was shifted to include other forms of violence. Coined the term "indirect aggression," which refers to hostility directed towards someone but not committed directly. It is often done via the use of a third party, such as spreading malicious rumors about someone. Indirect aggression may also refer to situations in which an intentional detrimental act was committed but the victim was not there at the time; for example, when the victim is not present, concealing, stealing, or destroying someone's possessions is called indirect physical bullying. Relational aggression was used by Crick and Grotpeter (1995) to describe aggressive conduct that is designed to harm someone's relationships(4)(5).

This involves the propagation of rumors as well as social isolation. Although relational aggression is often indirect (e.g., spreading rumors about someone's relationships and reputation with others; never selecting a partner with whom to work or play, never speaking to him/her), it may also be blatant and face-to-face ("You can't play with us"). Galen and Underwood (1997) used the term "social aggression" to describe hostility aimed at lowering someone's self-esteem or social standing(6). According to some research, relational aggression pain is more important than physical aggression pain. In addition to the more obvious blows and insults examined in previous decades, it is now widely recognized that aggressiveness should include indirect and relational forms. Aggression may occur in the workplace, especially in adulthood, and can take more sophisticated forms such as setting completely unreasonable objectives and under mining another's confidence and job happiness(7).

Cyber aggression in the twenty-first century involves assaults against mobile phones and the Internet. In conclusion, when it comes to 'traditional' (i.e. pre-cyberbullying) forms of violence, the term 'bullying' seems to be a valid category(8). It is characterized by a power imbalance as a core or fundamental criteria; recurrence is a secondary criterion, in that it contributes to the probability identification of bullying. In terms of the effect on victims and intervention techniques, the difference between bullying and aggressiveness seems to be useful. The evidence supporting victims is greatest; for example, the research focused on victim perceptions. More empirical support for the bullying/aggression difference is still needed, particularly from the perpetrator's viewpoint. More empirical basis is required in this area, according to Finkelhor, Turner, and Hamby (in press), who suggest that bullying is just a sub-category of a larger concept of peer victimization(9)(10).

1.1 Different Languages of Bullying:

Bullying is a word that originated in Anglo-Saxon or northern European cultures. Bullying has various names in different languages, and not all of them imply the same thing. The Latin-based languages of Europe lack a word that is comparable to bullying, while having many names for aggressiveness and violence; nevertheless, the English term bullying seems to be well understood(11)(12). The word has been adopted into the Italian language. In Spain, the closest phrase is *aces* (harassment), which is more associated with direct, repetitive violence, while *maltreat* (mistreatment by abuse of authority) is a broader idiom; furthermore, the term bullying is now sometimes used. Bullying is referred to as *ijime* in Japan. This is comparable to the Korean word *wang-ta*, which focuses more on group dynamics and the victim's place in the social network, with a greater emphasis on social exclusion. The forms and procedures of bullying seem to be more important than the criteria of recurrence and power imbalance in explaining these disparities.

As a result, there is a case to be made that bullying is a natural category, at least for adults (children tend to use the term bullying in a similar way to aggression, but the importance of the power imbalance criterion is increasingly recognized as people get older – see Monks and Smith,

2006; Vaillan court)(13). A natural category is one in which, despite the absence of a word that is extremely similar to bullying in a lexicon, the idea is easily grasped along the lines of the conventional definition. The issue seems to be widespread; after all, in interpersonal interactions, some individuals may be inclined to take advantage of those who are in a more vulnerable position for their own gain. Although the meanings of words in various languages do not always match, most of this variance is due to the kind of violence.

However, further study into how key words vary in other languages, as well as how well the common idea of bullying is recognized across cultures, would be beneficial. We also highlight that, following Rosh and Mervin (1975), it is better to speak about probabilistic features or criteria rather than definitional qualities that apply to every case when establishing a category. A category may have better and worse exemplars, meaning that some are more core or archetypal than others (for bullying - hitting vs ignoring someone). A category's boundaries may be blurred, allowing additional exemplars of the idea to be included (for bullying, social exclusion in the past, and cyberbullying more recently)(14)(15).

1.2 The Criterion of Repetition:

Repetition is often used as a criterion for bullying. The criteria of recurrence implies that it occurs more than once or twice; therefore, a one-time conduct is not considered bullying. However, there is some disagreement over whether recurrence could be considered a fundamental criterion. After providing exemplars of behaviors in the initial definition of bullying in the Olweus bullying questionnaire, for example, it is noted that 'these acts are frequently repeated,' implying that this is not necessary. Some critics believe that even a single threat or threatening look may indicate a long-term bullying mentality and can be considered bullying(16)(17). Determining what is a "once in a lifetime" event is also challenging. Even if said just once, a threat such as "I'm going to murder you!" may be seen as a continuous threat until it is retracted or apologized for. Olweus (1999) states that sometimes just having a conversation is enough to start a bullying relationship. Understanding why one episode (interaction) may be bullying helps to understand bullying as a kind of relationship. Interactions are the basis of relationships, but they go beyond that (Hinde, 1987). In bullying, an impactful interaction can link the perpetrator and the victim in a relationship, inducing (especially in the victim) expectations of future aggressions. This is especially true in the school setting, where students share time and space for long periods of time. The problem of recurrence interacts with the desire to hurt to some degree. Repetition of a harmful conduct is a clear sign that the offender intends to do damage. However, we believe that, although significant, recurrence is not a necessary criterion for bullying in the same way that power imbalance is; it is more of a probabilistic indication(18)(19)(20).

1.3 What About Cyberbullying:

Cyberbullying, also known as cyber harassment, is a kind of online bullying or harassment. Online bullying includes cyberbullying and cyber harassment. As the digital world has grown

and technology has progressed, it has become more prevalent, particularly among adolescents. Cyberbullying occurs when a person, usually a teenager, bullies or harasses people online and in other digital places, especially on social networking platforms. Posting rumors, threats, sexual comments, a victim's personal information, or derogatory labels are all examples of harmful bullying conduct (i.e. hate speech)(21)(22). Repeated conduct and an intent to hurt may be used to identify bullying or harassment. Cyberbullying victims may suffer poor self-esteem, increased suicide thoughts, and a range of unpleasant emotions, including fear, frustration, anger, and depression. Because of high-profile instances, awareness in the United States has increased in the 2010s. Several states in the United States, as well as other nations, have enacted legislation to prevent cyberbullying. Some are intended to combat adolescent cyberbullying particularly, while others go beyond physical harassment. These complaints are typically made with local police first in instances of adult cyberharassment. The laws vary depending on the region or state. Cyberbullying victimization has been linked to a variety of severe effects, according to research. The harmful consequences of cyberbullying vary depending on the nation and other factors. Some academics believe that current computer methods might be used to detect and prevent cyberbullying. Internet trolling is a frequent type of bullying that occurs in an online community (such as online gaming or social media) with the hopes of eliciting a response or causing disturbance, or just for personal enjoyment. Cybers talking is a kind of bullying or harassment in which a victim is stalked through electronic communications; this may be a serious danger to the victim. Cyberbullying cannot be blamed for all bad interactions that occur online or on social media. According to research, online interactions may lead to peer pressure, which can have a negative, positive, or neutral effect on individuals engaged(23)(24)(25).

1.4 Repetition in Relation to Cyberbullying:

When it comes to cyberbullying, issues of repetition are more difficult to deal with than when it comes to conventional bullying. Based on the technology employed, a single cyberbullying act may easily snowball beyond the perpetrator's initial control and be disseminated or seen frequently by others. As a result, a single act by a perpetrator may be replicated by others and experienced by the victim many times. This element of recurrence is arguably more frequent in cyber media (e.g., text message circulation, repeated visits to websites), although it may also happen offline. An original rumor created by the offender, for example, may be repeated many times by others, or an offensive remark scrawled on the school wall can be viewed by others many times. As a result, repetitive communications aren't limited to cyberbullying. It is, however, probably more prevalent in cyberbullying since the repetition may be extremely fast and the potential audience is much bigger online. In terms of defining bullying, we regard the criteria of repetition to be secondary rather than fundamental, as stated above. The outsider's point of view, as well as the purpose to hurt, should be the most important factor. A pattern of behavior is a good indication of malice, particularly if the victim or others provide feedback to the offender. However, in certain instances, a perpetrator's solitary act might fairly be anticipated to be repeated by others, and the perpetrator could reasonably be believed to know and even plan

this. If you make an insulting remark on a website, you can expect it to be seen by a large number of people. If this is the case, the argument for labeling this cyberbullying becomes stronger.

2. DISCUSSION

Bullying is ingrained in the American psyche. Our culture exemplifies the peak of competitive capitalism. Many of the bullying issues that we face today are exacerbated by this win-or-die mentality, as well as the competitive college admissions process and much of the business sector. Because of how deeply embedded bullying and cyberbullying have become in our competitive culture, they can only be controlled in the near term and not fully eradicated. The most worrisome problem at hand is the clinical consequences of bullying and cyberbullying on today's children. Both the legislation and preventive initiatives are aiming to eliminate the long-term mental consequences. The fact that these early emotional reactions to bullying in any form have been shown to develop to the point of suicidal ideation and violent responses is the main reason why this problem has become such a hot topic in the media. The idea of youngsters being so engulfed in the psychological assault of bullying that they commit suicide is very disturbing, and it is a problem that must be addressed. Though the legislative and judicial departments of government at both the state and federal levels are having a tough time adjusting legislation to include cyberbullying as technology develops, the fact that the problem is a major concern is reassuring. However, it's disturbing that it takes high-profile instances like United States vs. Lori Drew to force a reform in the law. In an ideal world, laws would evolve in tandem with technological advancements to aid in the definition of the issue and the establishment of suitable legal consequences. Prevention initiatives is becoming more successful as more is known about the causes of bullying and the particular methods used. As previously stated, a successful program must clearly define the problem, create recognition, and develop consistent approaches to dealing with the problem across all platforms. In the future, the most difficult challenge for cyberbullying prevention will be combining the rapid rate of technology innovation with effective preventive methods.

3. CONCLUSION

Finally, we propose that cyberaggression should be defined as a deliberate harmful conduct directed against another person via the use of electronic technology (computers, phones, etc). (text, images). We also believe that cyberbullying should be kept apart from cyberaggression as a concept. Many academics are interested in studying cyberaggression, Internet safety, and other negative issues that arise as a result of electronic technology; nevertheless, cyberbullying is also a valid research topic. We believe that the term "cyberbullying" encompasses three key characteristics. The first criteria, which is frequent in cyberaggression, is the desire to damage. The presence of a particular target at which the deliberately damaging communication is aimed is the second requirement. As a distinguishing feature of this subgroup of cyberaggression, the third criteria is that there is an imbalance of power. The power imbalance may be measured in terms of

the perpetrator's and victim's technical know-how, relative anonymity, social standing, number of acquaintances, or marginalized group position. Imbalance of power should not be inferred from the victim's response, but rather evaluated as much as feasible from the 'outside' viewpoint.

Cyberaggression research, unlike cyberbullying research, should focus on the intent to damage without a particular target or power imbalance. These are the most important characteristics of cyberbullying. Because concepts are hazy, other criteria may be useful. We show that the perpetrator's repeat is not a necessary condition in this case. Cyberbullying may utilize repetition in a wider sense, including dissemination mechanisms, as a secondary criteria. Similarly, the victim's effect is a secondary criteria. In both instances, their existence may strengthen the conclusion that an incident constitutes cyberbullying. Finally, we'd like to point out that additional study is required in many of the topics we've covered. The conclusion that bullying is a natural category should be investigated further. Furthermore, the significance of different criteria for assessing power imbalance in cyberbullying has received little attention till now.

For the time being, we consider cyberbullying to be a valid and defensible notion, but this may alter as study progresses, and as technology advances and new kinds of cyberbullying and cyberaggression arise. We are confident, however, in our recommendation for more caution and clarity in research when using these and similar words. According to the findings of this study, the majority of papers published in the previously examined periods focused on the nature and dynamics of bullying and cyberbullying. Later, the majority of research focused on the associated factors. Only a few of the widely referenced publications focused on minorities' participation in the phenomenon, and even fewer papers reported on bullying prevention and intervention, with none reporting on cyberbullying. Both phenomena are very difficult to describe, as stated in the introduction. Simultaneously, it is critical to define their nature and dynamics prior to investigating potential causes or consequences, as well as developing and executing intervention initiatives. As a result, it's natural that studies focusing on its definition, nature, and dynamics are among the most often referenced research in the field. In terms of bullying, the findings of this study indicate that it has previously been defined. It was crucial to clarify if this was just a new term for what had long been known as peer aggression or whether it was a distinct phenomena. During the early decades, the definition provided by Olweus (1995) was often used, which defined bullying as a series of negative acts directed against a student who is unable to defend himself owing to a strength imbalance. Bullying was characterized from a crossnational viewpoint. Important features of bullying were its intentionality, and it was generally regarded as unjustified or unprovoked.

REFERENCES

1. Samara M, Burbidge V, El Asam A, Foody M, Smith PK, Morsi H. Bullying and cyberbullying: Their legal status and use in psychological assessment. *Int J Environ Res Public Health*. 2017;
2. Herrera-López M, Romera E, Ortega-Ruiz R. Bullying y cyberbullying en Colombia; coocurrencia en adolescentes escolarizados. *Rev Latinoam Psicol*. 2017;

3. Sharma V, Singh AV, Rana A. Cyber Physical Systems-Implications and Challenges. In: ICRITO 2020 - IEEE 8th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions). 2020.
4. Bevilacqua L, Shackleton N, Hale D, Allen E, Bond L, Christie D, et al. The role of family and school-level factors in bullying and cyberbullying: A cross-sectional study. BMC Pediatr. 2017;
5. Bhatta DP, Singla S, Kaushal M, Sachar A. Effect of retrofitting on beam-column joints. Int J Innov Technol Explor Eng. 2019;
6. Ortega R, Elipe P, Mora-Merchán JA, Genta ML, Brighi A, Guarini A, et al. The Emotional Impact of Bullying and Cyberbullying on Victims: A European Cross-National Study. Aggress Behav. 2012;
7. Latif M, Singla S, Vadav V. Modeling off-street parking based on user's behavior using spss software. Int J Innov Technol Explor Eng. 2019;
8. Zych I, Ortega-Ruiz R, Del Rey R. Systematic review of theoretical studies on bullying and cyberbullying: Facts, knowledge, prevention, and intervention. Aggression and Violent Behavior. 2015.
9. Hinduja S, Patchin JW. Cultivating youth resilience to prevent bullying and cyberbullying victimization. Child Abus Negl. 2017;
10. Singh S, Kaur R. A study to understand the relationship between emotional intelligence and psychological well-being among adolescents of Chandigarh and Punjab college students. Int J Innov Technol Explor Eng. 2019;
11. Garaigordobil Landazabal M, Martínez Valderrey V, Machimbarrena J. Intervención en el bullying y cyberbullying: Evaluación del caso Martín. Rev Psicol Clínica Con Niños y Adolesc. 2017;
12. Kaur S, Girdhar A, Gill J. Computer Vision-Based Tomato Grading and Sorting. In: Lecture Notes in Networks and Systems. 2018.
13. Vazsonyi AT, Ksinan Jiskrova G, Özdemir Y, Bell MM. Bullying and Cyberbullying in Turkish Adolescents: Direct and Indirect Effects of Parenting Processes. J Cross Cult Psychol. 2017;
14. Garaigordobil M. Conducta antisocial: conexión con bullying/cyberbullying y estrategias de resolución de conflictos. Psychosoc Interv. 2017;
15. Singh S, Kaler RS. Performance optimization of EDFA-Raman hybrid optical amplifier using genetic algorithm. Opt Laser Technol. 2015;
16. Paul S, Smith PK, Blumberg HH. Comparing student perceptions of coping strategies and school interventions in managing bullying and cyberbullying incidents. Pastor Care Educ.

2012;

17. Jain N, Awasthi Y, Jain RK. Ubiquitous sensor based intelligent system for net houses. In: Proceedings - IEEE 2021 International Conference on Computing, Communication, and Intelligent Systems, ICCIS 2021. 2021.
18. Ghai W, Kumar S, Athavale VA. Using gaussian mixtures on triphone acoustic modelling-based punjabi continuous speech recognition. In: Advances in Intelligent Systems and Computing. 2021.
19. Khatri M, Kumar A. Stability Inspection of Isolated Hydro Power Plant with Cuttlefish Algorithm. In: 2020 International Conference on Decision Aid Sciences and Application, DASA 2020. 2020.
20. Singh D. Robust controlling of thermal mixing procedure by means of sliding type controlling. Int J Eng Adv Technol. 2019;
21. Sharma S, Sharma S. Design of high gain Wang shape microstrip patch antenna for wireless system. In: 2012 3rd International Conference on Computing, Communication and Networking Technologies, ICCCNT 2012. 2012.
22. Sharda V, Agarwal RP. Analysis of Graphene Nanoribbon (GNR) interconnects with multi-gate device technology for VLSI applications. In: 2015 IEEE UP Section Conference on Electrical Computer and Electronics, UPCON 2015. 2016.
23. Solanki MS, Sharma DKP, Goswami L, Sikka R, Anand V. Automatic Identification of Temples in Digital Images through Scale Invariant Feature Transform. In: 2020 International Conference on Computer Science, Engineering and Applications, ICCSEA 2020. 2020.
24. Singh P, Tyagi N. Radial Basis Function For Handwritten Devanagari Numeral Recognition. Int J Adv Comput Sci Appl. 2011;
25. Goel S, Sinha AK. An improved modeling of mode-choice behavior in urban area using adaptive neural fuzzy inference system. In: 2014 International Conference on Computing for Sustainable Global Development, INDIACom 2014. 2014.

VIRUSES AS SYMBIONTS: A REVIEW

Abhinav Saxena*

*Faculty of Engineering,
TeerthankerMahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email id- abhinav.polytechnic@tmu.ac.in

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ABSTRACT

Most Symbiologists Haven't Regarded Viruses As Possible Symbionts Till Now. This Is Due In Great Part To A Reluctance To Regard Viruses As Living Creatures, Which Stems From Misconceptions About Viral Intricacy, Behaviour, And Evolution. The Ramifications Have Been Negative For Evolutionary Biology, With A Broad Range Of Symbiogenetic Evolution Being Overlooked Or Misunderstood. They Offer A Rigorous Description Of The Function Of Viruses In Symbiosis To Address This Issue. They Also Give Suggestions To Colleagues Who Want To Learn More About This Fascinating Area Of Symbiogenesis, Including The Creation Of A Methodological Database To Aid Future Research. The Connection To Persist, Plastid Proteins Must Be Synthesized For Eight To Nine Months After Intake. A Number Of These Enzymes Are Encoded By Xanthophyte Nuclear Genes In Vaucheria, Necessitating The Strategic Process Of The Plastid And Xanthophyte Nuclear Genomes For Ongoing Photosynthesis.

KEYWORDS: Aggressive Symbiosis, Co-Evolution, Human Evolution, Horizontal Gene Transfer, Symbiogenesis.

1. INTRODUCTION

Virus-host associations, including genomic fusions, are more frequent than many scientists know, and they play an essential but underappreciated role in evolution. Elysia chlorotica, a sacoglossan sea slug which lives in coastal salt marshes from Nova Scotia to Florida, is a recent example(1). The chloroplasts of the xanthophyte Vaucheria litorea, that are consumed and sequestered inside the body of the juvenile slug in specially specialized digestive diverticula, give it its brilliant green hue. Because the chloroplasts are no longer autonomous, the slug-chloroplast connection has been dubbed "kleptoplasty(2)." Mary Rumpho defines it as a "unique symbiotic connection" of algae chloroplast and molluscan cells, through which the sea slug gains a new physiological capacity, photosynthesis. The ingested plastids photosynthesize vigorously all through the slug's life, whether borrowed or symbiogenetically integrated(3).

However, for the slug's long-term photosynthesis must be explained by a similar fusion of plastid and nuclear genomes(4). However, continuing photosynthesis would need the transfer of essential genes and/or whole genetic pathways from the xanthophyte nucleus to the nucleus of the slug. There is mounting evidence that viruses, ostensibly retroviruses (which have been difficult to type despite possessing the enzyme reverse transcriptase), that have been discovered

in both the cytoplasmic and nucleus of slug tissues allow this transmission(5). The virus-slug relationship may be much closer.(6)

In the spring, the gametophytes adults deposit egg masses before dying. The presence of viruses inside the tissues of dying slugs is always associated with death. The role of infections in the snail population's decline is presently being investigated (Pierce, personal communication)(7). The Elysia-retroviral connection may be an example of "aggressive symbiosis" if a causal involvement is established.(8)

1. Examples of Virus-Host Symbiogenesis:

In my research on emergent plagues, I looked at a number of cases where the causal disease, whether a virus, bacterium, or protist, culled the population of a virgin host, choosing a type that'd survive the infection's continued presence. The ensuing co-evolution of disease and host was facilitated by this "population gene pool culling(9)." As a result, hostility may be viewed as playing a key role in the formation of certain evolutionary relationships. Furthermore, once the co-evolutionary connection emerges, this ability for aggressiveness, which was originally aimed towards the mate, may be aimed against a competitor or prey of the couple(10). The fluctuations of virus-host in the myxomatosis epidemic are a good illustration of this. *Oryctolagus cuniculus*, a wild Europe rabbit, was originally introduced to Australia in 1859 as a food source for British settlers. Due to the lack of natural predators, the rabbit population exploded, resulting in extensive damage of agricultural grassland. Feral rabbits in the Murray Valley, in southern Australia, were infected with myxoma virus of the genus *Leporipoxvirus* in an intentional act of biocontrol agents in 1950. The inherent aggressiveness of a plague virus was used to manage a "rabbit plague" in this manner. While there was no intention of conducting an ecological experiment, the technique and results had clear adaptive implications(11). The myxoma virus usually co-evolves with the Brazilian cotton-tailed rabbit, *Sylvillagus brasiliensis*, and produces only small skin imperfections in this species.

It is transmitted by a variety of biting mosquito species. Biologists established a scenario similar to virgin encounter between the two rabbit species in nature by putting sick rabbits into the wild. The pandemic erupted when mosquitoes multiplied after a rainy spring. In only three months, 99.8% of the rabbits in southeast Australia, an area about the size of Western Europe, were eradicated. If viral aggressiveness had been the consequence of the two rabbit populations fighting for resources, the Brazilian bunny's competitor would be wiped off, enabling the virus-carrying Brazilian rabbit to take control of the ecosystem(12).

No biological competitor took advantage of the cull in this man-made situation, yet virus and host evolution persisted. The virus had chosen a minority genotype capable of surviving its presence in the *Oryctolagus* population's surviving rudiment(13). Culling was followed by co-evolution between the virus and its new host, *Oryctolagus*, reducing the lethality of what had become a persistent endemic infection to 25% in only seven years(14). Co-evolution between rabbit and virus has persisted to the current day, when the rabbit population has repopulated the ecosystem in huge numbers, nearly fully immune to the previous lethality of its persistent viral companion(15). In other animals, especially humans, plague dynamics indicate that aggressive coexistence involving epidemic and chronic pathogens has played a comparable role in host evolution(16).

Ants that defend plants by attacking browsing animals, or toxin-producing fungus in grasses that deter herbivores, are instances of aggressive symbiosis. The parasitoid wasps, which comprise about 25,000 species in symbiotic relationships with roughly 20,000 species of polydnviruses, are a well-known example(17). In many cases, the viral genome has been incorporated into the genome of the wasp. These 'unique symbiotic viruses,' which have a segmented genome of spherical double-stranded DNA, replicate from integrated proviral DNA in the wasp ovary and thus are infused into the host along with the wasp egg, where they are essential for the wasp larval survival. A polydnvirus's genetic study showed a complicated structure(18).

2. DISCUSSION

2. Viruses as Life Forms:

Constantin Merezhkowsky used the word "syrbogenesis" to describe "the creation of creatures through the mixture or association of two or more individuals who come into symbiosis". Whether we take de Bary's concept of symbiosis or Merezhkowsky's definition of syrbogenesis as our benchmark, the fundamental issue is whether viruses should be classified as "organisms" or "beings." To investigate this vital issue, we must first dispel popular misconceptions regarding the nature of viruses. Arguments against viruses as living organisms Viruses, being genetic parasites of living creatures, could not have developed until the prokaryotes, or cellular forms, had emerged. - Viruses are not living forms since they are obligatory parasites with no autonomous metabolism from outside their hosts. Viruses steal genes from their hosts to develop. - Some of the most well-known virus families began as genetic offshoots of their hosts' genomes. There are no valid evolution phylogenies for viruses based on the information presented above. Viruses are not cellular, therefore they should be excluded from any consideration as living forms based on a cellular definition of life(19).

3. Arguments Against Viruses As Living Organisms:

Viruses, being hereditary parasites of living creatures, could not have developed till the prokaryotes, or cellular forms, had emerged. - Viruses are not living forms since they are obligatory parasites with no autonomous metabolic outside of their hosts. Viruses steal genes from their hosts to develop. - Some of the most well-known virus families began as genetic offshoots of their hosts' genomes. There are no valid evolutionary phylogenies for viruses based on the information presented above. Viruses are not cellular; therefore they should be excluded from any consideration as living forms based on a cellular definition of life.

4. The Arguments For Viruses As Life Forms:

Even in the prebiotic evolutionary stage, modern virology acknowledges that genetic replicators are vulnerable to parasitism by other replicators. "The propensity for replicators to become parasitized, and even for the parasite replicators itself to be parasitized, is a well-established phenomena in virology,' in the Swifteen meaning of fleas on the back sides of other fleas. When Eigen and Winkler tried to replicate primordial evolution using the concepts of "hypercycles" and "quasispecies," or when mathematician John von Neumann utilized computers modeling to build artificial life programs, the same trend was found. Genetic self-replicators eventually parasitized the computer and mathematical models. Viruses attribute their beginnings to the inherent evolutionary tendency of self-replication, not on the previous development of prokaryotic hosts, as Villarreal finds(20).

Most scientists now believe that organelles like mitochondria and plastids were once self-contained living creatures. Rickettsia prowazekii, the cause of epidemic typhus, seems to be one of the direct binding contemporary relatives to the progenitor of mitochondria, according to gene sequences research. Rickettsiae are biologically transitional between tiny bacteria and bigger viruses in terms of size and genomic complexity. However, the Mimiviridae, a new family of nucleocytoplasmic big DNA viruses, are as large as mycoplasma at 400 nanometers and have genomes with much more than 1,200 genes, making them genetically more sophisticated than many Rickettsia. All Rickettsiae are obligatory intracellular parasites, apart from R. quintana..Mimivirus. Didier Raoult provided this image. Soda/is glossinidius, Buchnera, Wolbachia, Wigglesworthia glossinidia On the one hand, claiming that virus are non-living because they lack the genetic imperatives for independent adult, while admitting that similar bacterial taxa, which lack the same imperatives, are alive, seems logically contradictory (21).

5. Symbiogenesis vs. Horizontal Gene Transfer:

Mesorhizobium loti's nodulation and fixation genes are encoded in the bacterial genophore as a 500-kb "symbiosis island" that may be transmitted from symbiotic to non-symbiotic rhizobium strains thanks to an enzyme (P4 phage integrase) that is inherent to the symbiosis island. "Horizontal gene transfer" is generally blamed for the existence of the bacteriophage integrase. But how helpful is such a proposition, both theoretically and mechanically? In general terms, "horizontal gene transfer" is correct, but it reveals nothing about the dynamics of the transfer or the evolutionary consequences. Each method of "horizontal gene transfer" deserves the same level of scrutiny as any other evolutionary process. Indeed, when considering the evolutionary dynamics of virus-host union, it becomes apparent that simple gene transfer is completely insufficient to describe what really occurs (22).

6. Symbiogenesis of Retroviruses:

Retrovirus genomes are made up entirely of RNA. To insert itself into their hosts' DNA-coded genomes, they use reverse transcriptase, a crucial enzyme that converts viral RNA to complementary DNA, which is subsequently integrated into the host chromosomes. Because viruses are tiny and their genomes are so little in comparison to their hosts', it's easy to overlook the virus's contribution to such a marriage.

Each of these genes codes for a variety of genetic possibilities. For example, gag codes for matrix and core shell proteins, pol codes for enzymes including reverse transcriptase, protease, ribonuclease, and integrase, and env codes for glycoproteins on the surface and transmembrane. Env also codes for proteins that induce immunosuppression and host cell fusion. Long terminal repeats, or L TRs, are flanking regulatory areas that are necessary for genomic integration and are brought to the union by the retrovirus. The L TRs, once integrated into the holobiontic genome, include promoter and enhancer elements, as well as polyadenylation signals, which may regulate the expression of viral genes as well as genes originating from the previous host. LTRs have the potential to proliferate across the genome, increasing their impact. Splice donor and acceptor sites, as well as primers that bind particular tRNA molecules needed to start reverse transcription, may be found in viral regulatory sequences. The holobiont's "genomic inventiveness" is enhanced by these virus-derived genes and regulatory sequences(23).

7. Retroviruses and the Human Genome's Holobiontic Nature:

Considering how common and important retroviruses are, it's remarkable that their significance in human illness and evolution has just recently been recognized. Takatsuki and colleagues in Japan initially reported human T-cell leukemia in 1977, and Gallo and coworkers identified the causal retrovirus, human T-cell leukemia virus type I, or HTLV-I, in 1980. This led to the identification of HTLV-II and, more importantly, the human immunodeficiency viruses HIV-1 and HIV-2, which caused the current AIDS epidemic. Exogenous retroviruses, such as HIV-1, reproduce in infected people's somatic tissues and spread horizontally throughout the human population via sexual contact and contaminated blood products. They may also be transmitted vertically from mother to kid via viral transmission transplacentally or during parturition, or through breast milk. Endogenous retroviruses are inherited via the germ line as an essential component of the genome, according to Mendelian principles. Human endogenous retroviruses, or HERVs, make up around 8% of the human genome, and if we add HERV fragments and derivatives, the retroviral heritage accounts for approximately half of our DNA. Germ cell endogenization of nominally exogenous retroviruses produces endogenous retroviruses. A recent endogenization of the koala genome through retroviral invasion has been described and there is growing evidence of a recent endogenization in sheep (Palmarini, personal communication) and humans, where HERV-K13, found on chromosome 19 in only 29% of people of primarily African, Asian, and Polynesian descent, appears to have enslaved (less than 150,000 years ago). The virus HERV-H/RGH-2, which has been linked to multiple sclerosis, is still horizontally transmissible. The fact that almost all modern humans carry the same endogenous retroviruses suggests that the exogenous forefathers of HERVs were highly contagious global epidemic infections with transmission pathways similar to HIV and HTLV, and that one's spread through initial African-based inhabitants of primates and later hominids may have been linked to plague culls. The comparison of mitochondrial and tissue compatibility genes in humans and chimps provides some support for such gene pool culling in primates.(24)

3. CONCLUSION

Although I've concentrated on retroviruses in human evolution, persistent virus-host interaction, sometimes including genome fusion, may be extrapolated to all mammals, as well as insects and many other animals, even angiosperms when pararetroviruses are employed. Clearly, a significant aspect of evolution has been overlooked. Inspired by new virus thinking, Marilyn Roossinck reexamined the evolution of plant viruses, concluding that, while both contest and symbiotic interplay applied to various situations, evolution by symbiosis was the most likely model for so many human evolution events resulting in rapid changes or the formation of new species. She and her colleagues have been pioneering this symbiogenetic viewpoint into new pathways of viral-plant interactions, which has led to the identification of a unique symbiotic plant virus species. It is anticipated that additional scientists will contribute to the growth of this new and fascinating branch of evolutionary biology. I've included a few methods and means for colleagues to explore fresh ideas below:

The detection of viral symbiosis in this last part, I've tried to provide some fundamental guidelines for peers interested in studying viral symbiogenesis in nature. With time and possibly with the help of the ISS, a valuable methodological database that will aid and stimulate future research should be feasible. Occasionally, a fortuitous inspection may reveal a previously undetected viral presence. This was the situation with the viruses in *Elysia chlorotica*, when an electron microscopist discovered virus in tissue slices that were being investigated for another

reason. The exact nature of the viruses implicated is currently being researched. However, evidence of xanthophyte-to-slug gene transfer is emerging.

REFERENCES:

1. Virk JK, Kalia AN, Gauttam VK, Mukhija M, Rath G. Development and characterization of spheroidal antidiabetic polyherbal formulation from fresh vegetable juice: A novel approach. J Food Biochem. 2021;
2. Chandra H, Singh C, Kumari P, Yadav S, Mishra AP, Laishevtcev A, et al. Promising roles of alternative medicine and plant-based nanotechnology as remedies for urinary tract infections. Molecules. 2020.
3. Rosenberg E, Zilber-Rosenberg I. Microbes drive evolution of animals and plants: The hologenome concept. mBio. 2016.
4. Bajaj J, Dwivedi J, Sahu R, Dave V, Verma K, Joshi S, et al. Antidepressant activity of *Spathodea campanulata* in mice and predictive affinity of spatheosides towards type A monoamine oxidase. Cell Mol Biol. 2021;
5. Sandhu M, Sureshkumar V, Prakash C, Dixit R, Solanke AU, Sharma TR, et al. RiceMetaSys for salt and drought stress responsive genes in rice: A web interface for crop improvement. BMC Bioinformatics. 2017;
6. Martinez J, Tolosana I, Ok S, Smith S, Snoeck K, Day JP, et al. Symbiont strain is the main determinant of variation in Wolbachia-mediated protection against viruses across *Drosophila* species. Mol Ecol. 2017;
7. Sehrawat R, Maithani M, Singh R. Regulatory aspects in development of stability-indicating methods: A review. Chromatographia. 2010.
8. Ryan FP. Viruses as symbionts. Symbiosis. 2007;
9. Maithani M, Sahu S, Chaudhary AK, Singh R. Development and validation of a novel RP-HPLC method for simultaneous determination of salbutamol sulfate, guaifenesin, and ambroxol hydrochloride in tablet formulation. J Liq Chromatogr Relat Technol. 2012;
10. Nainwal N, Jawla S, Singh R, Saharan VA. Transdermal applications of ethosomes—a detailed review. Journal of Liposome Research. 2019.
11. Jyothi MN, Rai D V., Nagesh babu R. Identification and Characterization of High Temperature Stress Responsive Novel miRNAs in French Bean (*Phaseolus vulgaris*). Appl Biochem Biotechnol. 2015;
12. Guo H, Qu Y, Liu X, Zhong W, Fang J. Female-biased symbionts and tomato yellow leaf curl virus infections in *Bemisia tabaci*. PLoS One. 2014;
13. Chaudhary P, Khati P, Chaudhary A, Gangola S, Kumar R, Sharma A. Bioinoculation using indigenous *Bacillus* spp. improves growth and yield of *Zea mays* under the influence of nanozeolite. 3 Biotech. 2021;
14. Ghosh NS, Pandey E, Giilhotra RM, Singh R. Biosynthesis of gold nanoparticles using leaf extract of *desmodium gangeticum* and their antioxidant activity. Res J Pharm Technol. 2020;

15. Bhargava A, Anand M, Sharma A, Saji J, Sihag J, Prakash D. Uses of bio-adsorbents for the purification of water: A step towards the welfare of human society. *Res J Pharm Technol.* 2019;
16. Khan R, Kaushik M, Hussain Z. Hepatoprotective and antioxidant efficacy of ethanolic extract of curcuma amada rhizome against paracetamol induced hepatic toxicity in experimental animals. *Int J Res Pharm Sci.* 2020;
17. Chopra KL, Rai D V., Sethi A, Avadhani JS, Kehwar TS. Impact of dose calculation algorithms on the dosimetric and radiobiological indices for lung stereotactic body radiotherapy (SBRT) plans calculated using LQ-L model. *J Radiother Pract.* 2018;
18. Roossinck MJ. Move Over, Bacteria! Viruses Make Their Mark as Mutualistic Microbial Symbionts. *J Virol.* 2015;
19. Wei T, Li Y. Rice Reoviruses in Insect Vectors. *Annual Review of Phytopathology.* 2016.
20. Ansari PG, Singh RK, Kaushik S, Krishna A, Wada T, Noda H. Detection of symbionts and virus in the whitefly Bemisia tabaci (Hemiptera: Aleyrodidae), vector of the Mungbean yellow mosaic India virus in Central India. *Appl Entomol Zool.* 2017;
21. Xu P, Chen F, Mannas JP, Feldman T, Sumner LW, Roossinck MJ. Virus infection improves drought tolerance. *New Phytol.* 2008;
22. Lima-Mendez G, Faust K, Henry N, Decelle J, Colin S, Carcillo F, et al. Determinants of community structure in the global plankton interactome. *Science* (80-). 2015;
23. Martinez J, Longdon B, Bauer S, Chan YS, Miller WJ, Bourtzis K, et al. Symbionts Commonly Provide Broad Spectrum Resistance to Viruses in Insects: A Comparative Analysis of Wolbachia Strains. *PLoS Pathog.* 2014;
24. Li S, Zhou C, Chen G, Zhou Y. Bacterial microbiota in small brown planthopper populations with different rice viruses. *J Basic Microbiol.* 2017;

TYPE D PERSONALITY AS A RISK FACTOR IN CORONARY HEART DISEASE: A REVIEW OF CURRENT EVIDENCE

Dr Hetandar Kumar Bhartiya*

*Department of Medical,
TeerthankerMahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email id- bhartiya.14@gmail.com

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ABSTRACT

The Review's Objectives This review article summarizes current study results on the psychological context of Type D personality and the mechanisms through which Type D influences disease progression and prognosis in coronary heart disease patients (CHD). One out of every four CHD patients has a Distressed (Type D) personality, which is defined by two persistent characteristics: social inhibition and negative affectivity. Increased mortality and morbidity, as well as a worse health-related quality of life, are associated with Type D personalities. Type D is one of a group of psychological risk factors that influence the prognosis of coronary artery disease. Risk prediction accuracy may be influenced by the pattern of co-occurrence of various psychosocial variables as well as intra-individual variations in psychosocial profiles. Type D personality has been linked to a variety of biological and behavioral processes. It is critical to identify pathways that explain the observed correlations between Type D personality and CHD in order to enhance etiological and pathophysiological understanding, as well as to develop customized treatments that target particular risk related pathways.

KEYWORDS: Atherosclerosis, Coronary Heart Disease, Heterogeneity, Cardiac Mortality, Type D.

1. INTRODUCTION

Type D personality, also known as distressed personality, is a known risk factor for the development and prognosis of coronary heart disease (CHD), and has been listed in the European Cardiovascular Prevention guideline as a risk factor to test for since 2012. Type D personality is defined by a mix of social inhibition and negative affectivity, and it affects around one out of every four CHD patients. CHD has evolved into a long-term chronic disease as a result of better treatment choices, placing a significant strain on patients' quality of life, carers, and the health-care system as a whole(1)(2). Psychosocial risk factors, such as Type D personality, are common in individuals with heart disease and have been proven to exacerbate their suffering(3)(2). As with other psychosocial risk variables, risk prediction studies assessing the increased risk associated with Type D personality have revealed significant variability. Furthermore,

psychological risk variables often do not exist in isolation among patients, but rather cluster together, making risk assessment more difficult.

Type D personality has been linked to depressive symptoms, anxiety, and chronic stress in previous studies. However, research has tended to concentrate on separate impacts, disregarding the natural order and grouping of psychological categories, such as from stable predispositions to more episodic variables such as sadness and chronic stress, as well as states such as mood and acute stress(4). This review will suggest that Type D personality should be understood in this psychological framework, and that further research is required to uncover the psychological mechanical processes as well as the independent impacts of chosen sub-elements of that process(5)(6).

The link between Type D personality and CHD development is mediated by biological mechanisms and health-related behaviors. During long-term follow-up of patients with CHD, medication adherence, lifestyle changes, and post-event cardiac rehabilitation are at the forefront of therapy to avoid disease progression. A patient's predisposition, such as Type D personality, may alter these behavioural circuits, influencing cardiac prognosis(7). Direct biological pathways, in addition to indirect behavioural pathways, may be found, with strain processes impacting pathophysiology processes, thus influencing illness development and prognosis. Understanding these processes will allow innovative and customized treatments to be created, taking into account individual risk factor profiles(8)(9).

We will discuss causes of variability in outcome prediction as well as new research results on the psychological context of Type D personality in the present review. Then, we'll review new research on the molecular and behavioral processes through which Type D influences disease progression and prognosis in CHD patients. CHD is the leading cause of death in contemporary civilization, and numerous risk factors have been identified. Smoking has risen to the top of the list, despite the fact that the data is mixed(10)(11). Consider the findings of the renowned Framingham research, which included a random sample of adult Framingham residents. The final cohort included 2282 men and 2845 women between the ages of 29 and 62 who were free of CHD at the time of the first assessment(12)

Every two years, members were tested for heart disease after a comprehensive medical check-up(13). The risk ratios for males and females aged 35 to 84 were 1.0 for males and 1.0 for females in the most recent study; in other words, there were no differences between smokers and non-smokers! Criteria for assessment for women were as low as 0.8 at various intermediate stages, implying that cigarettes had less CHD than non-smokers; risk ratios for men were as high as 1.4 at times, but multivariate analysis including personality variables (Type A) reduced the statistical significance of this finding to less than 0.05. Thus, there is very little evidence of relevance for smoking as a risk factor for CHD in otherwise healthy individuals in this mammoth research(6)(14)(15).

1.1 Type D Personality and the Psychosocial Risk Spectrum:

Unpleasant affectivity, or the propensity to feel negative emotions, and distressed personality are two stable characteristics. Across time and circumstances, along with the characteristic of social inhibition, which refers to the fear of rejection or disapproval while sharing these feelings in social encounters. Type D personality is consistent across time, has a significant hereditary component, and has proven cross-cultural assessment equivalence(16)(17). Future bouts of

emotional stress, such as depressive episodes and anxiety, are more likely if you have a Type D personality. Individual personality characteristics that are generally stable may contribute to clinical outcome heterogeneity. Personality traits influence the likelihood of experiencing post-event emotional stress and may have a role in the choice of evaluation and coping strategies. Indeed, Type D personality has been linked to higher levels of emotional stress, such as anxiety and depression, as well as a propensity for maladaptive coping techniques(18)(19).

A recent research of our group in CHD patients found that poor resilience, high neuroticism, and introversion, and intermediate levels of a variety of coping mechanisms were associated with within-person clustering of social inhibition and negative affectivity(20). This indicates that despite attempting to cope with their stress in a variety of ways, this high-distress group still had significant levels of anxiety and sadness, as well as a decrease in positive mood six months later. The people in this high-distressed group were more likely to be unmarried and employed. Individuals in the high distress cluster (based on the European Society of Cardiology psychosocial screening instrument; which included depression, tension, and Type D) were younger, had a worse lifestyle, and had more early adverse life experiences, according to a previous research(21)(22).The intra-individual cluster method used in the two studies above does a better job of addressing the complex nature of psychological functioning and its environment, and as a result, intra-individual clusters may enhance risk prediction accuracy and open up new pathways for customized treatments(23)(24).

2. DISCUSSION

Depression is linked to the development of CHD in otherwise healthy individuals, according to the review and meta-analyses. Despite the fact that both clinical depression and depressed mood had statistically significant overall effect sizes, sensitivity studies indicated that clinical depression is the more powerful and consistent predictor. The potential that both depression and future coronary events are caused by undetected subclinical symptoms of CHD is perhaps the most difficult issue in determining the causal connection between depression and CHD incidence. However, studies that used extensive medical exams at baseline to account for this possible bias and/or omitted occurrences during the first years of follow-up found only a somewhat lower RR (from 1.77 to 1.51) that was nonetheless statistically significant.

3. CONCLUSION

Although there is considerable variability across studies, Type D personality is an established independent risk factor in patients with CHD, prospectively linked with poorer clinical and patient-reported outcomes. Large portions of the variability have been linked to illness stage, specificity of the outcome measure, and sample age, according to research results. When selecting endpoints, it is critical to examine the molecular pathways via which a risk factor is likely to exert its impact. Otherwise, it may inadvertently downplay the significance of the risk factor. Furthermore, Type D personality should be assessed in the context of its physical and social environment. Intraindividual characteristics must thus be used in risk assessment via the use of a smart, multifunctional psychological screener. Type D personality has been linked to a variety of biological and behavioural processes that influence the onset and development of heart disease. Type D is expected to exert its impact via a cluster of interacting processes, each contributing a tiny portion, since CHD is multifactorial by nature. Individuals with Type D personalities have a cluster of poor health behaviours, placing them at risk for future heart

disease and disease development. Biomedical pathways are more like a network than a series of events, and they should be treated as such. Future study should examine the network of possible biological and behavioral connections connecting Type D personality to cardiac episodes and cardiac mortality, as well as the variety of pathophysiology "routes" that may be taken.

REFERENCES

1. Kupper N, Denollet J. Type D Personality as a Risk Factor in Coronary Heart Disease: a Review of Current Evidence. *Current Cardiology Reports*. 2018.
2. Khan UJ, Oberoi A, Gill J. Hybrid Classification for Heart Disease Prediction using Artificial Intelligence. In: *Proceedings - 5th International Conference on Computing Methodologies and Communication, ICCMC 2021*. 2021.
3. Pushkarev GS, Kuznetsov VA, Yaroslavskaya EI, Krinochkin D V., Bessonov IS. Clinical characteristics of ischemic heart disease patients with type D personality, underwent percutaneous coronary interventions. *Cardiovasc Ther Prev (Russian Fed)*. 2015;
4. Fang J, Yao S, Xing X, Zhang X. Correlations Between Type D Personality and Biological Risk Factors. *Chinese J Clin Psychol*. 2008;
5. Narasimhan S, Panwar RAS. Assessment of cardiac autonomic functions in medical students with type d personality. *J Clin Diagnostic Res*. 2016;
6. Gupta H, Kumar S, Yadav D, Verma OP, Sharma TK, Ahn CW, et al. Data analytics and mathematical modeling for simulating the dynamics of COVID-19 epidemic—a case study of India. *Electron*. 2021;
7. Moryś JM, Bellwon J, Jezewska M, Adamczyk K, Gruchała M. The evaluation of stress coping styles and type D personality in patients with coronary artery disease. *Kardiol Pol*. 2015;
8. Pedersen SS, Denollet J. Type D personality, cardiac events, and impaired quality of life: A review. *European Journal of Cardiovascular Prevention and Rehabilitation*. 2003.
9. Khatri M, Kumar A. Stability Inspection of Isolated Hydro Power Plant with Cuttlefish Algorithm. In: *2020 International Conference on Decision Aid Sciences and Application, DASA 2020*. 2020.
10. Christodoulou C, Douzenis A, Mommersteeg PMC, Rallidis L, Poullos A, Efstathiou V, et al. A case-control validation of Type D personality in Greek patients with stable coronary heart disease. *Ann Gen Psychiatry*. 2013;
11. Ghai W, Kumar S, Athavale VA. Using gaussian mixtures on triphone acoustic modelling-based punjabi continuous speech recognition. In: *Advances in Intelligent Systems and Computing*. 2021.
12. Pinki, Rani D, Bajaj H, Singh R. Sars-cov-2 (Covid-19) and role of real time reverse transcription polymerase chain reaction (rt-pcr) in its diagnosis. *Research Journal of Pharmacy and Technology*. 2021.
13. Sher L. Type D personality: The heart, stress and cortisol. *QJM - Monthly Journal of the Association of Physicians*. 2005.

14. Ghosh NS, Pandey E, Giilhotra RM, Singh R. Biosynthesis of gold nanoparticles using leaf extract of desmodium gangeticum and their antioxidant activity. *Res J Pharm Technol.* 2020;
15. Ghosh NS, Giilhotra RM, Singh R, Banerjee A. Biosynthesis of silver nanoparticles using desmodium gangeticum leaf extract. *Int J Res Pharm Sci.* 2019;
16. Yu XN, Chen Z, Zhang J, Liu X. Coping mediates the association between type D personality and perceived health in Chinese patients with coronary heart disease. *Int J Behav Med.* 2011;
17. Pathak D, Singh RP, Gaur S, Balu V. Experimental investigation of effects of welding current and electrode angle on tensile strength of shielded metal arc welded low carbon steel plates. In: *Materials Today: Proceedings.* 2019.
18. Shukla U, Singhal N, Srivastava R. A Large-Capacity Optical Switch Design for High-Speed Optical Data Centers. *J Opt Commun.* 2019;
19. Kumar S, Shekhar J, Singh JP. Data security and encryption technique for cloud storage. In: *Advances in Intelligent Systems and Computing.* 2018.
20. Pedersen SS, Denollet J, Ong AT I., Sonnenschein K, Erdman RAM, Serruys PW, et al. Adverse clinical events in patients treated with sirolimus-eluting stents: The impact of Type D personality. *Eur J Prev Cardiol.* 2007;
21. Sandhu M, Jayanand, Rawat B, Dixit R. Biologically important databases available in public domain with focus on rice. *Biomedicine (India).* 2017.
22. Kour S, Mishra A, Sinha A, Kaur P, Singh H. The Development of Mesoporous Ni-Based Catalysts and Evaluation of Their Catalytic and Photocatalytic Applications. *ChemistrySelect.* 2020.
23. Jayanand, Sinha A, Gupta R, Rai D V. Effect of alcohol on biochemical properties and thermal stability of weight bearing bones in male Wistar rats. *Indian J Exp Biol.* 2017;
24. Kaushal G, Singh H, Prakash S. Comparative high temperature analysis of HVOF-sprayed and detonation gun sprayed Ni-20Cr coating in laboratory and actual boiler environments. *Oxid Met.* 2011;

A STUDY ON PAY-PER-CLICK ADVERTISING

Manoj Agarwal*

*Teerthanker Mahaveer Institute of Management and Technology,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email id- manoj.management@tmu.ac.in

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ABSTRACT

Digital marketing is being widely employed to efficiently and effectively market products/services to achieve increased sales and generate higher revenues. It allows businesses to effectively communicate desired content to their consumers. Pay-per-click (PPC) is one such form of digital marketing. PPC is often acknowledged for the different advantages it offers, and at the same time, it is notably criticized for fraud and other issues associated with its use. The literature on this subject, although limited, has invested considerable efforts in unveiling the pros and cons of employing PPC as a marketing/advertising strategy. This paper reviews 50 publications on PPC advertising to synthesize their findings and arrive at a common ground for understanding the digital presence and impact of this form of marketing. Alongside discussing the findings, observed limitations and opportunities for future research have been identified and reported. Then, with extra features, we release a new model with the goal of achieving more profitability. The innovative PPC Free-Donation program is still in its early stages, but it has the potential to grow. The paper demonstrates a system that uses the suggested concept. The system works as both an E-Commerce and an E-Business system, allowing PPC search results to handle the day-to-day tasks of pay-per-click free contribution.

KEYWORDS: Advertising, Digital Marketing, Internet Marketing, Pay-Per-Click, Search Engine Marketing.

1. INTRODUCTION

Organizational marketing has a long history of being praised for its effectiveness. Marketing, particularly in progressive organizations, is focused not just on costing, distributing, and communications, but also on recognizing continuously reorienting consumer demands and modifying or even inventing newer organizational products/services to fulfill those needs. Since the millennium, marketing has shifted to digital; with digital marketing, often known as internet marketing, companies use digital technology to communicate with their customers. It is vital for all businesses, regardless of size or scope, to establish and actively maintain an internet presence. The most popular digital marketing channels nowadays are display ads, affiliate marketing, search engine optimization, email marketing, and social marketing(1)(2)(3). Websites that enable graphical advertisements to be displayed with their exclusive web page content are known as display advertising. Affiliate marketing is when affiliates display ads on their own websites to

promote the products/services of another company/organization, and the company/organization splits contractual earnings with the affiliates for sales/profits generated via affiliates' websites. Search engine marketing include factors such as optimizing search engines, comprehending key performance indicators, and utilizing web analytics with the goal of directing relevant visitors to the relevant organizational/business webpages. Email marketing is when a company uses electronic mail to advertise products and services to existing customers while also attracting new ones(4)(5)(6).

The innovative use of social media platforms to publicize and market products in order to catch new customers is known as social media marketing, or social marketing. While each of these digital marketing channels has a significant presence and impact, the focus of this research is on one sort of search engine marketing: pay-per-click advertising (PPC). PPC advertising is based on commercial marketers bidding against each other. Cost-per-click advertising is another name for this type of digital marketing technique (CPC). The online publisher, often known as the proprietor of a webpage, allows businesses to advertise items and services on the owner's page. This can be anything from a search results (for example, someone looking for "pizza just next to me" on their phone) to a local service search (for example, someone having to look for a dentist or a plumber throughout their area), to anyone looking for a gift ("Mother's Day flowers") or a high-end item such as enterprise applications(7). All of these queries result in pay-per-click advertisements. Companies who run ads in pay-per-click advertisement are now only charged when a particular user clicks on their ad, hence the name "pay-per-click. "Display advertising (usually, displaying banner ads) and remarketing are two more types of PPC advertising. The firm will pay the publisher a specified amount each time an user on the author's website clicks on that advertisement, hence the name pay-per-click/cost-per-click ads. One of the most notable internet advancements is the process of offering/selling advertising space on websites. Through the pay-per-click (PPC) approach of internet advertising(8)(9).

Apart from the benefits that this marketing method offers, there are some drawbacks, the most serious of which is click fraud, for which it has been chastised. A large number of research have been conducted on issues relating to pay-per-click advertising. Whether its information systems (IS), marketing, computer science, or economics, PPC and its mechanics have piqued the curiosity of academics from a wide range of disciplines.PPC (Pay-Per-Click) is a sponsored search engine that was first created by Overture and was previously known as Goto.com. In 1998, the proof of concept was first presented at a conference in California. Leading internet giants such as Google, Yahoo!, and others have turned PPC into a multibillion-dollar advertising business. Google is well-known for generating a 39-fold rise in total revenue over a five-year period (2002-2007), primarily from keyword advertising. In 2003, Google launched AdSense, which now leads the company's keyword advertising business. Given Overture's complete control of the PPC business, Yahoo! is alleged to have chosen to purchase the company in 2003(1)(2).

PPC has grown in prominence as a powerful digital marketing technique. The retailer who advertises on a third-party site owes the owner of the third-party site a pre-determined fee determined through a competitive bidding process.Marketers cannot simply spend more to assure that their advertising appear more conspicuously than their competitors' ads beside the results on a search engine (often known to as a Search Engine Results Page, or SERP). Instead, Google and other major search engines employ a fully automated method known as the Ad Auctions to

decide the relevancy and legitimacy of adverts that show on their SERPs. This figure is based on the number of clicks on an advertisement on a third-party website that sends buyers to retailers' own websites to complete their purchases. Advertisers put bids for the amount they are ready to pay for each click their ad receives during PPC auctions. This means that each keyword is auctioned, and the amount bid determines which adverts receive a position on a publisher's website, as well as the order in which they appear(10)(11).

1.1 Advantages And Limitations Of PPC:

PPC is widely recognized as not just a successful form of advertising, but also as one of the most well publicized forms of performance-based advertising. When a web user types in keywords, the search results that show across multiple pages are referred to as "organic results," and PPC ads connected to those keywords appear in various corners of the results pages. PPC advertising's success can be attributed to its ability to track information like the number of clicks and the proportion of sales generated by those clicks. Such useful data can help advertisers and marketers enhance the design of their advertising campaigns and have better control over keyword auctions. PPC advertising's growing popularity can be attributed to its ability to help advertisers better allocate their resources(12)(13)(14). Because he or she chose one of the campaign's keywords, the web visitor who sees a PPC advertisement on their search results page is already interested in it. This past interest enhances the likelihood that the online user will be interested in purchasing the product or service advertised in the PPC ad. There is the option of localizing PPC advertising. Instead of advertising globally, a company might choose to advertise in the region where they most expect its customers to be(15)(16). A business is clearly in a better way to promote more clicks when advertised globally, but if a firm is localized and cannot cater for consumers worldwide, they can choose to localize their marketing exclusively for the most probable consumer group. Advertising to smaller geographical areas reduces the advertisement's visibility and gets fewer clicks, resulting in a lower payment to the online publisher/search engine that is displaying the ad(17)(18)(19).

Five advantages of PPC are typically identified in an online article: its ability to quickly launch advertisements to targeted traffic; its ability to help expand as well as increasingly enhance visibility online; its scheduling capability, which allows advertisements to be showcased at specific times and in specific locations; its ability to allow reduced keyword and simple website testing; and efficient management(20)(21).

2. REVIEW OF LITERATURE

King et al. discussed about Paid search advertising has proven to be a profitable revenue strategy for the top commercial search engines as well as a successful channel for marketers. There's a lot of study going on in sponsored search about how to classify and forecast performance measures including inbound links rate, engagement rate, median results page position, and conversion rate. However, there is little study on the application of advanced data mining approaches to pay per click campaign classification, such as ensemble learning. This study compares the classification results from four base classification models (Nave Bayes, logistic regression, decision trees, and Support Vector Machines) with four prominent ensemble learning approaches to examine sponsored search ad campaigns in depth (Voting, Boot Strap Aggregation, Stacked Generalization, and MetaCost). When compared to typical classifiers, the purpose of our research is to see if ensembles learning approaches can predict effective pay-per-click ads and

hence raise the overall revenue of the campaign portfolio. Based on a profit per campaign evaluation criterion, we discovered that ensemble learning methods were superior classifiers. This study adds to the body of knowledge on applied evolutionary algorithms in the context of sponsored search advertising(22).

O'Connor et al. studied about laying out the legal landscape for trademark use in pay-per-click advertising; this study looks into trademark usage in hotel searches. Searches were conducted on two main search results using a randomly chosen sample of 90 hotel properties throughout the world to see if third parties were utilizing hotel trademarks in their paid placement. Abuse appears to be widespread, according to the findings. While hotels rank well in organic search, they are frequently preceded or surrounded by paid listings that use their trade names inappropriately. Customers may be diverted to competitor websites, and resort trademarks must be reclaimed immediately in the online search arena(23).

According to COLBURN et al. The study focused on Google Ad words, a Google-created Internet advertising system that allows businesses to get in front of consumers who are seeking for them straight away. The system allows anyone to display an advertisement (ad) based purely on what the user typed into it as a search term, and the advertiser does not have to pay Google until the ad is clicked. The steps and prerequisites for implementing pay-per-click best ways to advertise are also highlighted(24).

Midha et al. studied about Pay-per-click (PPC) advertising platforms are increasingly concerned about click fraud. Assessment, repercussions for others, normative beliefs, and perceived behavior control are all part of an ethical behavior model presented. The model, which incorporates aspects from the theory of reasoned action, the theory of planned, and deterrent theory, was put to the test using data from 155 people who had experience with PPC programs. PPC service providers and legislators might utilize the findings to establish initiatives to address the problem(25).

3. DISCUSSION

Web search is a notion that underpins Internet usage. The search engines that make these online searches possible are crucial. Google and Yahoo! use the pay-per-click (PPC) model to offer advertising space to businesses. According to research, the number of clicks is an insufficient metric for determining the impact of display advertising such as PPC and CPA. The essential requirement of PPC advertising is that the content promised in an advertisement and the actual content of the website to which a visitor is redirected should be a solid match. When deciding on keywords/phrases for a PPC ad, it's critical to consider cost. Formerly known as the "push" style of marketing approach, banner adverts, pop-up advertisements, and promotional email marketing disturb a web user's usual course of web browsing, giving them unnecessary discomfort. The search listing advertising form is a non-intrusive and discreet method of marketing that merely runs in the background. Fraud by competitors is criminal, while fraud by publishers is a breach of contract.

The first ten years of search advertising brought nearly \$7 billion in revenue. If used by some businesses in the high-risk category, search advertising may cause more harm than good. Google's comment on click fraud detection, implying that the company is unable to detect fraudulent clicks that do not follow a specific pattern. It's difficult to track down invalid clicks that come from commonly used IP addresses. Google and Yahoo click!'s fraud detection

mechanisms have been questioned, with some criticizing them as merely symbolic and without the power to stop this form of fraud. Different PPC providers employ different click fraud detection strategies to detect click fraud. Their article supports advertisers that accuse PPC suppliers of not disclosing the true percentage of invalid clicks, which is thought to be higher than the disclosed rate. Piggybacking could have significant consequences for all parties involved (web users, web publishers, and advertisers). Consumers may become unhappy with PPC adverts as a result of the much-publicized uncertainty created by this piggybacking problem, which may demotivate them, resulting in reduced click-through rates and thus impacting income for participating web producers. Given the importance of paid searches in internet advertising and their powerful influence, it is critical to keep a constant understanding of their direct impact on customer behavior.

4. CONCLUSION

PPC has been widely hailed as the dominant pricing model in the internet advertising business, with its simplicity, measurability, and accountability serving as significant factors in its widespread acceptance. Setting defined goals is essential for a successful internet marketing plan, and these goals should be tracked across all digital channels used. The element of click fraud is inextricably linked to PPC advertising, and this link grows stronger as the number of publications on the subject grows. 15 of the 50 studies examined in this study were specifically interested in click fraud and its negative effects on the internet advertising sector. Click fraud is inherently harmful, but it also results in a loss of trust between advertisers and online publishers. This is a critical success factor for all parties involved in a business partnership. With fighting click fraud becoming more difficult, literature has reported that advertisers that use PPC and similar types of advertising are compelled to put their faith in their site publishers, who ensure that click fraud schemes are managed and monitored.

Businesses can also hire third-party organizations that guarantee to detect click fraud, which can be utilized by businesses to collect refunds from their individual publishers once proven, hence reducing and regulating trust concerns between advertisers and publishers. In the interests of advertisers who are unhappy with their PPC advertising suppliers' click fraud management tactics. Advertisers should take part in organized activities and movements; such participation is likely to put a lot of pressure on the online publishers and search engines that run PPC auctions and adverts. There are various Google and Yahoo! references that point to more accurate reporting of the types of clicks that an advertisement receives. Businesses must aim for more than just collecting data from various metrics that provide information on click fraud; they must also use that data in the proper light and implement effective countermeasures to prevent future invalid click attacks. Some of the 50 studies revealed their limits and future study directions, which are summarized in the next section. From the standpoint of a web publisher, the best balancing decision between PPV and PPC advertising is to advertise a single PPC and a single PPV contract in a single term. Future research should look at several contracts for both types of advertising throughout multiple advertising seasons to get a complete picture of the tradeoffs that online publishers can make in such situations. As this literature analysis shows, there are few publications on PPC advertising, and of those that do exist, the majority of them are concerned with click fraud.

REFERENCES

1. Kashyap K, Sharma TK, Rajpurohit J. Logistic map and wavelet transform based differential evolution. *Int J Syst Assur Eng Manag.* 2020;
2. Sharma TK, Prakash D. Air pollution emissions control using shuffled frog leaping algorithm. *Int J Syst Assur Eng Manag.* 2020;
3. Sidana A, Kaushal S, Farooq U. Evaluation of antileishmanial potential of *Gentiana kurroo* royle by in vitro and in silico methods. *J Appl Pharm Sci.* 2018;
4. Kritzinger WT, Weideman M. Search Engine Optimization and Pay-per-Click Marketing Strategies. *J Organ Comput Electron Commer.* 2013;
5. Bhatnagar V, Ranjan J, Singh R. Analytical customer relationship management in insurance industry using data mining: A case study of Indian insurance company. *Int J Netw Virtual Organ.* 2011;
6. Wilson K, Saharan A, Mittal P, Gautam RK, Saini V. Formulation, development and evaluation of topical intradermal drug delivery system for anti-acne product. *Indian Drugs.* 2021;
7. Kaushik BK, Agarwal RP, Sarkar S, Joshi RC, Chauhan DS. Repeater insertion in crosstalk-aware inductively and capacitively coupled interconnects. *Int J Circuit Theory Appl.* 2011;
8. Devanur NR, Kakade SM. The price of truthfulness for pay-per-click auctions. In: *Proceedings of the ACM Conference on Electronic Commerce.* 2009.
9. Sharma V, Sharma S, Verma OP, Bhardwaj B, Sharma TK, Pachauri N. Prediction and optimization of abrasive wear loss of ultrahigh strength martensitic steel using response surface methodology, Harris Hawk and artificial neural network. *Int J Syst Assur Eng Manag.* 2021;
10. Kritzinger WT, Weideman M. Comparative case study on website traffic generated by search engine optimisation and a pay-per-click campaign, versus marketing expenditure. *SA J Inf Manag.* 2015;
11. Sharma S, Bansal M. Real-time sentiment analysis towards machine learning. *Int J Sci Technol Res.* 2020;
12. Kritzinger WT, Weideman M. Parallel search engine optimisation and pay-per-click campaigns: A comparison of cost per acquisition. *SA J Inf Manag.* 2017;
13. Virk JK, Gupta V, Maithani M, Rawal RK, Kumar S, Singh R, et al. Isolation of Sinapic Acid from *Habenaria intermedia* D. Don: A New Chemical Marker for the Identification of Adulteration and Substitution. *Curr Tradit Med.* 2018;
14. Lata S, Mittal SK. Identification of flavonoid glycosides of methanol extract from *cucumis dipsaceus ehrenb.* (fruit) by using HPLC-UV-ESI-MS methods. *Int J Pharm Qual Assur.* 2017;
15. Manjit K, Abhishek M. Plant growth promoting rhizobacteria (PGPR) for enhancing sustainable agriculture and revolutionized tools for farmers. *Res J Biotechnol.* 2021;

16. Bilal M, Singh N, Rasool T. A model supported biomedical waste for the enhancement of mechanical properties of concrete. *Model Earth Syst Environ*. 2021;
17. Kwon C. Single-period balancing of pay-per-click and pay-per-view online display advertisements. *J Revenue Pricing Manag*. 2011;
18. Nainwal N, Jawala S, Singh R, Saharan VA. Solubility-Permeability Interplay of Hydrotropic Solubilization Using Response Surface Methodology. *Drug Deliv Lett*. 2020;
19. Ghosh NS, Pandey E, Giilhotra RM, Singh R. Biosynthesis of gold nanoparticles using leaf extract of *desmodium gangeticum* and their antioxidant activity. *Res J Pharm Technol*. 2020;
20. Anupam V, Mayer A, Nissim K, Pinkas B, Reiter MK. On the security of pay-per-click and other Web advertising schemes. *Comput Networks*. 1999;
21. Srivastava AK, Naseer A, Gupta A. Evaluation of Neurobehavioral and Biochemical Parameters of Poly- Herbal Formulation on MPTP-Intoxicated Mice for the Treatment of PD. *Curr Bioact Compd*. 2019;
22. King MA, Abrahams AS, Ragsdale CT. Ensemble learning methods for pay-per-click campaign management. *Expert Syst Appl*. 2015;
23. O'Connor P. Pay-per-Click Search Engine Advertising. *Cornell Hosp Q*. 2009;
24. Colburn Ken. Implementing Effective Pay-Per-Click Advertising. *Franch World*. 2011;
25. Midha V. The glitch in on-line advertising: A study of click fraud in pay-per-click advertisingPrograms. *Int J Electron Commer*. 2008;

A REVIEW OF ONCOLYTIC VIRUSES IN CANCER TREATMENT

Dr. Sanjeev Kumar Jain*

*Department of Medical,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email id- drskjain2005@rediffmail.com

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ABSTRACT

Oncolytic viruses (OVs) are becoming more significant in the treatment of cancer. Oncolytic viruses provide an appealing therapeutic combination of tumor-specific cell destruction and immune activation, making them potential in situ cancer vaccines. OVs may also be modified to improve tumor selectivity and immune stimulation, and they can be easily coupled with other medicines. The efficacy of OVs has been shown in many preclinical trials and, most recently, in people, with the approval of the oncolytic herpes virus talimogene laherparepvec in metastatic melanoma by the US United States Food and drug, a significant milestone for the field. As a result, scientists, doctors, and the general public are growing increasingly interested in the OV approach to cancer treatment. The primary goal of this study is to offer a general overview of OVs in clinical development as well as a description of where clinical trials are now.

KEYWORDS: Cancer, Drugs, Gene, Oncology, Virus.

1. INTRODUCTION

Oncolytic viruses (OVs) are a category of biologic medicines that have the potential to treat cancer. This method has been used in a number of clinical studies that are now underway or have just concluded. In 2015, talimogene laherparepvec becomes first OV to get FDA clearance in the United States, marking a watershed moment for the industry. Viruses, on the other hand, have long been used to treat cancer. Case reports and short trials of different viruses in cancer treatment were documented during the twentieth century(1). These studies, which included a limited number of patients, relied on wild-type and sometimes poorly produced viral isolates, and it wasn't until the 1990s that viruses were genetically engineered to improve their oncolytic ability. The first genetically engineered OV was based on the type 1 herpes simplex virus (HSV1). This was quickly followed by a slew of studies2 demonstrating the efficacy of this strategy employing a variety of viruses as well as tumor models. During the early stages of OV development, the field's primary goal was to find viruses or modified versions with tumor-selective replication. However, it has long been recognized that an immunological component is essential, if not vital, for this approach's therapeutic effectiveness. Indeed, OVs are now widely regarded as immunotherapy drugs, whose efficacy in patients is dependent on the activation of anticancer immune responses in the host(2)(3).

Early OV clinical studies revealed excellent safety profiles, even at large dosages, with some hopeful responses, intratumoral viral multiplication, and immune cell infiltrates. After the

publication of substantial advantages in a major randomized phase 3 clinical study using the engineered immunostimulatory OV talimo gene laherparepvec in patients with locally advanced melanoma and also its conditions in the United States and European Countries Union, the area is gaining momentum. Many OV's are currently being studied in advanced studies, with some promising results. OV's are emerging potential chemotherapeutic drugs in oncology after two decades of clinical studies in people with cancer. This review highlights recent advances and discusses current clinical studies in this field(4)(5).

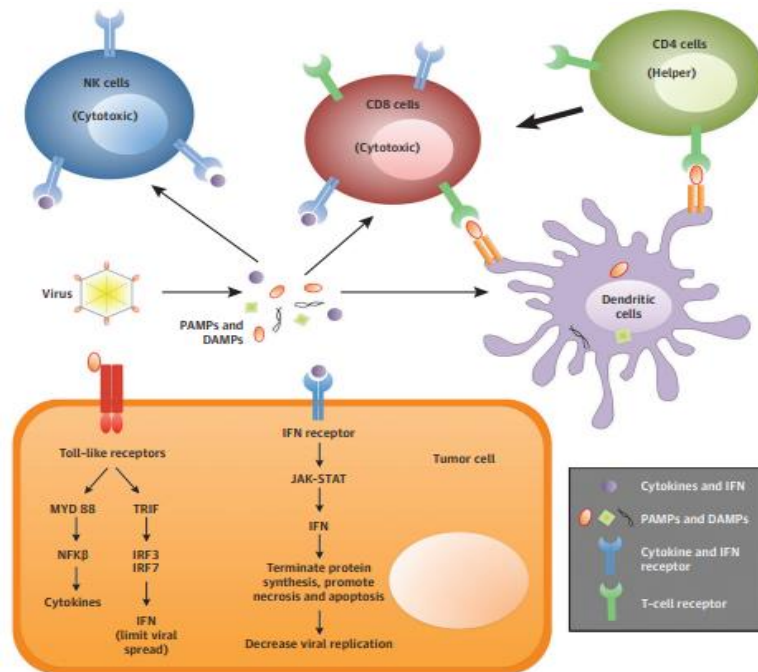


Figure 1: Generalized Overview of Mechanisms of Act of Oncolytic Viruses(6).

1.1.OV Action Mechanisms:

The therapeutic effectiveness of OV is accomplished via a combination of selective tumor cell death and the development of antitumor immunity, according to a broad molecular understanding of OV activity (Figure). The production of cell debris and viral antigens in the tumor microenvironment stimulates the immune system. Several variables influence tumor selectivity in OV treatment. Cellular entrance through virus-specific receptor-mediated pathways is the first of them. On tumor cells, a particular viral entry receptor is often overexpressed(7)(8)(9).

However, other researchers are attempting to enhance tumor selectivity by redirecting OV's to enter cells through tumor-specific receptors. As shown in (Figure 1) Second, relative to normal quiescent cells, fast cell division in tumor cells with high metabolic and replicative activity may promote greater viral replication. Furthermore, tumor-driver mutations boost the selectivity of viral replication in tumor cells. Third, many tumor cells lack antiviral type I interferon signaling, allowing for virus replication to be selective. Viral replication in the tumor microenvironment activates both the innate and adaptive immune systems(10). The presence of virus combined with

cell lysis, resulting in the release of tumor antigens and danger-associated molecular patterns, may overcome immunosuppression in the tumor microenvironment and enhance antitumor immunity. Pre-existing antiviral and antitumor immunity, as well as the inclusion of immune stimulatory transgenes, all affect the effectiveness of this strategy(11)(12).

1.2.Application in the Clinic:

Viruses from all around the world have been studied as possible cancer treatments. Individual features of OV that are presently being studied in clinical studies.

1.2.1. Herpesvirus

Oncolytic viruses produced from modified HSV-1 (oHSVs) have been extensively studied in humans. Talimogene laherparepvec, an immunostimulatory HSV which expresses granulocyte-macrophage colony-stimulating factor, is currently a significant focus of the research (GM-CSF). In patients with melanoma, intratumoral injection of talimogene laherparepvec resulted in a substantial increase in durable response rate (DRR) (16.3%) when compared to controls (2.1 percent). Patients with stage IIIB, IIIC, IVM1a, or treatment-naïve illness had the strongest effects. Tumor regression was seen in non-injected lesions at a distance, indicating the development of systemic antitumor immunity(13)(14).

1.2.2. Adenovirus:

Some of the first oncolytic adenoviruses to enter clinical trials were oncolytic adenoviruses. The use of adenovirus as just an oncolytic agent has a long history. Under the designation H101, an E1A/E1B-deleted virus (ONYX015) has been thoroughly studied and licensed for the treatment of head and neck cancer in China. 24RGD (DNX2401), an integrin-binding retargeted adenovirus, has been studied in clinical studies where the maximum tolerated dosage (MTD) was not achieved although some responses were found. Trials are also underway with enadenotucirev, which is based on the Ad11/3 serotype rather than the usual Ad5 serotype, making it less vulnerable to bloodstream neutralization(15)(16)(17).

1.2.3. Vaccinia Virus is a virus that causes vaccinations:

JX-594 (Pexa-Vec) is now being investigated in a variety of tumor types. Pexa-Vec is a vaccinia vaccine strain developed by Wyeth that has been modified to express human GM-CSF and has been tested in over 300 patients. After intravenous injection, it was well tolerated and improved survival in individuals with liver cancer. Prostate-specific antigen (PSA) is a prime-boost regimen that utilizes modified vaccinia as the main immunotherapy, followed by boosters utilizing fowl pox virus to target prostate-specific antigen in prostate cancer. Prostate-specific antigen and a panel of costimulatory molecules are expressed in both vectors.

This dual virus strategy avoids the fast emergence of vaccinia-neutralizing antibodies. Prostate-specific antigen in combination with ipilimumab demonstrated no extra adverse effects and some encouraging results in a phase 1 dose-escalation study (MTD was not reached)(18).

1.2.4. Virus That Causes Measles:

Measles induces the development of fusogenic syncytia and cell death. A measles virus that expresses the human sodium/iodide symporter SLC5A5 (MV-NIS) is presently being tested in a number of clinical studies. MV-NIS enables for imaging of infected cells, treatment progression

monitoring, and radiovirotherapy using I 131-labeled sodium iodide. Clinical evidence has shown that this technique is safe and that it can image viral infection and tumor regression

1.2.5. Coxsackievirus:

In cancer cell lines, Coxsackievirus possesses oncolytic characteristics and causes a strong immune response. Cavatak, a vaccine against wild-type coxsackievirus A21, is now in clinical testing. Numerous studies are now underway, all of which are based on promising phase 2 results from 2015 in stage IIIC and stage IV melanoma. A preliminary DRR of 21% was observed in one trial, including regression of distant noninjected lesions.

1.3.Virus That Causes Polio:

The polio virus has shown oncolytic characteristics in preclinical studies⁶⁶ and has gotten a lot of interest because of early findings in brain tumors and widespread media exposure. PVS-RIPO, which has been designed to eliminate the native virus's neurovirulence, was used in these investigations. PVS-RIPO is a cytotoxic and immunostimulatory virus that has shown to have long-term radiographic and clinical responses in glioblastoma patients. PVS-RIPO has been recognized as a breakthrough treatment in recurrent glioblastoma based on recent phase 1 results.

1.3.1. Retrovirus:

Retroviruses have the potential to be helpful agents since they may easily infect mitotic cells and propagate quickly without triggering cell lysis.

Toca511 is a murine leukemia virus that has been genetically modified to produce the yeast enzyme cytosine deaminase, which converts 5-fluorocytosine to the deadly metabolite 5-fluorouracil. Toca511 treatment resulted in long-term survival and systemic antitumor immunity mediated by memory T cells in mice with implanted gliomas. Toca511 is presently being tested in a phase 2/3 clinical study for malignant glioma, and first findings are encouraging⁽¹⁹⁾⁽²⁰⁾⁽²¹⁾.

1.4.OV Clinical Trials Considerations:

With the rise of OV and combinatorial studies in clinical trials, it's important thinking about the difficulties that come with clinical trial design and execution. Delivery, viral pharmacokinetics and pharmacodynamics, and biomarkers are all areas that are changing as the research progresses. Safety Despite the rare reports of death, published trial data has not shown any major general safety concerns. However, when more potent OV are created and used in new ways, safety remains a worry. Despite designing for tumor cell selectivity, off-target effects are possible, and genetic modification may lead to unanticipated harmful consequences. Virus mutation, evolution, and recombination, as well as cytotoxic gene products and viral transmissibility, are all issues. The native thymidine kinase gene of oncolytic HSVs has been preserved, which aids virus replication and is also a target of the antiviral medication ganciclovir⁽²²⁾⁽²³⁾.

1.5.Toxic and Negative Consequences:

OVs are usually well accepted when delivered locally. Mild flu-like symptoms, which may become more severe after systemic delivery, and local response at the injection site are the most

frequent side effects recorded. Acetaminophen use before to therapy may help to minimize these effects.

1.6.Dose:

In contrast to the outcomes of traditional medication clinical trials, many OV's do not reach an MTD because to the viral stock concentration that may be achieved or the virus's extremely high tolerance. For studies including new treatment combinations, the maximum tolerated dosage may need to be re-established.

1.7.Other OV's in the Works:

At the preclinical stage, several labs are working on improving OV's. Efforts are being undertaken to enhance viral potency and tumor targeting in addition to immune activation. Seed sequences of variably produced microRNAs, for example, have been integrated into OV's in recent years to improve tumor cell selectivity. This approach can be used to a variety of viruses, and it may be a safer and more effective way to boost viral efficiency by minimizing collateral harm to healthy cells. Currently, one clinical study using the adenovirus Ad5PTD (CgA-E1AmiR122)45 utilizes miR-122 to regulate E1A expression in order to guarantee tumor-specific replication(24)(25)(26).

2. DISCUSSION

Oncolytic viruses (OV's) are a kind of biologic therapy with the ability to cure cancer. This technique has been utilized in a number of ongoing or recently completed clinical trials. The talimo gene laherparepvec becomes the first OV to get FDA approval in the United States in 2015, signaling a turning point in the industry. Viruses, on the other hand, have been utilized to treat cancer for quite some time. During the twentieth century, case reports and brief trials of several viruses in cancer therapy were recorded. Oncolytic viruses (OV's) are becoming more important in cancer therapy. Oncolytic viruses have the therapeutic benefit of destroying tumor-specific cells while also activating the immune system, making them potential in situ tumor vaccines.

OV's can also be tweaked to enhance tumor selectivity and immune activation, and they're simple to combine with other drugs. Because these viruses developed alongside humans, they provide new ways to trigger immunological attack, perhaps overcoming the immune system's difficult interactions with tumor cells. Improved viruses with improved tumor selectivity and potency, as well as better combinations with other immune therapies, may improve patient outcomes even more. The field's challenge will be to successfully identify the OV's and combinations that will be most helpful for patients, particularly those with malignancies resistant to prior therapies, given the increasing number of OV's and other immune stimulatory medicines under development.

3. CONCLUSION

Oncolytic viruses are a kind potentially biologic treatment capable of curing cancer. A number of current or recently completed clinical studies have used this approach. In 2015, the talimo gene laherparepvec will become the first OV to be approved by the FDA in the United States, marking a watershed moment in the sector. Viruses, but at the other hand, have long been used in the treatment of cancer. Advances in prostate diagnostic and therapeutic applications have enhanced

doctors' capacity to stratify patients by risk or suggest therapy based on cancer prediction and patient choice. Chemotherapy may be used as a first line of defense. Compared to androgen deprivation treatment, it improves survival. Abiraterone, enzalutamide, as well as other drugs may help men with metastatic prostate cancer who are resistant to hormone treatment.

REFERENCES:

1. Kumar L, Thakur I, Verma A, Bhatia BS, Mangat CK. Degradation and Decolourization of Methyl Orange Dye Using Fe-TiO₂ Hybrid Technology (Photo-Fenton and Photocatalysis) in Fixed-Mode. In: Lecture Notes in Civil Engineering. 2021.
2. Kuhn I, Harden P, Bauzon M, Chartier C, Nye J, Thorne S, et al. Directed evolution generates a novel oncolytic virus for the treatment of colon cancer. PLoS One. 2008;
3. Kumar N, Singh A, Sharma DK, Kishore K. Novel Target Sites for Drug Screening: A Special Reference to Cancer, Rheumatoid Arthritis and Parkinson's Disease. Curr Signal Transduct Ther. 2018;
4. Bourgeois-Daigneault MC, St-Germain LE, Roy DG, Pelin A, Aitken AS, Arulanandam R, et al. Combination of Paclitaxel and MG1 oncolytic virus as a successful strategy for breast cancer treatment. Breast Cancer Res. 2016;
5. Jain UK, Bhatia RK, Rao AR, Singh R, Saxena AK, Sehar I. Design and development of halogenated chalcone derivatives as potential anticancer agents. Trop J Pharm Res. 2014;
6. Litwin MS, Tan HJ. The diagnosis and treatment of prostate cancer: A review. JAMA - J Am Med Assoc. 2017;317(24):2532–42.
7. Ratra S, Naseer A, Kumar U. Design, Docking, ADMET and PASS Prediction Studies of Novel Chromen-4-one Derivatives for Prospective Anti-Cancer Agent. J Pharm Res Int. 2021;
8. Khan MN, Singla S, Garg R, Garg R. Effect of Microsilica on Strength and Microstructure of the GGBS-based Cement composites. In: IOP Conference Series: Materials Science and Engineering. 2020.
9. Dhiman S, Garg R, Garg R, Singla S. Experimental investigation on the strength of chipped rubber-based concrete. In: IOP Conference Series: Materials Science and Engineering. 2020.
10. Rana AS, Bedi TS, Grover V. A new permanent magnet type magnetorheological finishing tool for external cylindrical surfaces having different outer diameter. In: Lecture Notes in Mechanical Engineering. 2021.
11. Potts KG, Hitt MM, Moore RB. Oncolytic viruses in the treatment of bladder cancer. Advances in Urology. 2012.
12. Srivastava R, Sharma PK, Das KJM, Manjhi J. A hybrid approach for head and neck cancer using online image guidance and offline adaptive radiotherapy planning. J Radiother Pract. 2019;
13. Zeyaulah M, Patro M, Ahmad I, Ibraheem K, Sultan P, Nehal M, et al. Oncolytic viruses in the treatment of cancer: A review of current strategies. Pathology and Oncology Research. 2012.

14. Farooq U, Singla S. Impact of aggregate and fly ash filler types on asphalt and control mix designs. *Int J Sci Technol Res.* 2020;
15. Bommareddy PK, Peters C, Saha D, Rabkin SD, Kaufman HL. Oncolytic Herpes Simplex Viruses as a Paradigm for the Treatment of Cancer. *Annual Review of Cancer Biology.* 2018.
16. Kehwar T, Chopra K, Rai D. A unified dose response relationship to predict high dose fractionation response in the lung cancer stereotactic body radiation therapy. *J Med Phys.* 2017;
17. Khatri M, Kumar A. Stability Inspection of Isolated Hydro Power Plant with Cuttlefish Algorithm. In: 2020 International Conference on Decision Aid Sciences and Application, DASA 2020. 2020.
18. Garber K. China approves world's first oncolytic virus therapy for cancer treatment. *J Natl Cancer Inst.* 2006;
19. Garofalo M, Saari H, Somersalo P, Crescenti D, Kuryk L, Aksela L, et al. Antitumor effect of oncolytic virus and paclitaxel encapsulated in extracellular vesicles for lung cancer treatment. *J Control Release.* 2018;
20. Bourhill T, Mori Y, Rancourt DE, Shmulevitz M, Johnston RN. Going (Reo)viral: Factors promoting successful reoviral oncolytic infection. *Viruses.* 2018.
21. Yadav CS, Yadav M, Yadav PSS, Kumar R, Yadav S, Yadav KS. Effect of Normalisation for Gender Identification. In: *Lecture Notes in Electrical Engineering.* 2021.
22. Stojkovikj S, Oklevski S, Jasuja OP, Najdoski M. Visualization of latent fingerprints on thermal paper: A new method based on nitrogen dioxide treatment. *Forensic Chem.* 2020;
23. Zargar K, Singla S. Impact of pet plastic waste on mechanical properties of mix concrete design. *Int J Sci Technol Res.* 2020;
24. Sugiyama T, Yoneda M, Kuraishi T, Hattori S, Inoue Y, Sato H, et al. Measles virus selectively blind to signaling lymphocyte activation molecule as a novel oncolytic virus for breast cancer treatment. *Gene Ther.* 2013;
25. Wani IA, Sheikh IM, Maqbool T, Kumar V. Experimental investigation on using plastic wastes to enhance several engineering properties of soil through stabilization. In: *Materials Today: Proceedings.* 2021.
26. Sheikh RQ, Yadav V, Kumar A. Stabilization of red soil used as a sub-base material. *Int J Sci Technol Res.* 2020;

A REVIEW OF THE LITERATURE ON DEPRESSION, QUALITY OF LIFE, AND BREAST CANCER

Dr Prerana Gupta*

*Department of Medical,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email id- Preranagupta1978@gmail.com

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ABSTRACT

In the breast cancer group, depression is often misdiagnosed and undertreated. In the five years after a diagnostic, the patient's risk factors for depression are more important than the illness or its therapy. Except for recurrence, the phase of breast cancer (early or advanced) has little statistical significance in terms of rates of psychological distress. Fatigue, a history of depression or a recent bout of sadness following the beginning of cancer, cognitive attitude of feeling of powerlessness, and resignation are all risk factors for depression. Higher prevalence of mental disorders is associated with body image damage caused by mastectomy and sexuality aftereffects. The research on the connection between increased breast cancer risk and depression is mixed. Some studies indicate a protective role, while others establish a link between stress, immunity, and the development of cancer or even death. Breast cancer survivors had a greater incidence of mild to severe depression, as well as a poorer quality of life in all categories except family functioning. Treatment for depression in women with breast cancer enhances their life quality but may extend their lives. Antidepressant medicines are still the gold standard for treating depression. The research does not support the potential connection between its prescription as well as an increased risk of breast cancer.

KEYWORDS: *Breast Cancer, Depression, Mood Disorders, Mental Disorders, Quality Of Life.*

1. INTRODUCTION

In terms of incidence and death rates, breast cancer is among the most common cancers in Western nations. Breast cancer accounts for about 28.9% of all cancer diagnoses in Europe & 7.8% of all deaths in 2006. Nowadays, its therapy provides patients with excellent survival rates. These survivors will be at a significant risk of psychological discomfort and, as a result, possible mood disorders(1). Depression including depressive disorders, anxiety as well as anxiety disorders, anger or poor self-esteem, and inadequate emotional support are all linked to psychological pain in breast cancer patients. Fears and worries about mortality and illness recurrence, as well as damage of body image, changes in femininity, sexuality, and beauty, may cause psychological anguish years after diagnosis and therapy(2)(3)(4)(5).

1.1.Mood Problems Are Common Among Breast Cancer Patients:

For many years and in many investigations, the range of mental problems and psychological discomfort in cancer has been evaluated. Scientists gathered information from 215 patients at three cancer clinics. They examined the incidence of mental problems and found that 50% of patients would have a typical reaction to cancer in terms of daily stress or crisis response. The remaining 50% will have adjustment problems with sad or anxious symptoms, with 20% of these patients experiencing a severe depressive episode. The prevalence of mental problems was estimated to be 56.5 percent over the lifetime periods among 517 patients (75 percent female patients) recruited through two acute inpatient care clinics, two rehabilitation clinics, and nine specialist practices for cancer, using a cross-sectional methodology(6).

Depression is twice as common in early breast cancer patients as it is in the overall female population, particularly in the first year following diagnosis. The first recurrence of breast cancer is a very trying period, and it's frequently accompanied by psychological discomfort, including increased rates of anxiety and depressive disorders (>40 percent). The greatest rates of depression prevalence are traditionally seen in the following areas: head and neck, lung, and pancreas. Despite this, depression is predicted to be present in 52.65% of breast cancer patients(7)(8)(9)(10)(11).

1.2.Breast Cancer Patients Who Have Been Diagnosed With Depression:

In order to establish a diagnosis of depression in this particular demographic, many factors must be considered, including the diagnostic method employed, which determines which criteria are most relevant to the nosography utilized: The DSM, CIM 10, and the period of assessment are all essential factors to consider since psychological disturbances vary over time. Furthermore, the following factors seem to influence the occurrence of depression: illness severity, degree of patient disability or physical disability, performance status, and previous history of depression. Surprisingly, severe sadness and depressive symptoms in women with breast cancer are underappreciated and undertreated. One reason may be that breast cancer survivors are often hesitant to express their emotional distress. Another explanation may be that oncologists are unfamiliar with screening for depressed symptoms. Failure to diagnose mood disorders may be troublesome since depression and its accompanying symptoms decrease quality of life, interfere with medical therapy compliance, and perhaps shorten survival(12–14).

Aside from the typical depression symptoms of sorrow, anhedonia, guilt, helplessness, despair, and suicidal thoughts, the following risk factors for depression in breast cancer patients should be investigated:

- A history of mental disease in the past.
- The environment, as well as more than four cancer-related issues (e.g., pain).
- The absence of a trusting connection.
- A person with a neurotic personality.
- Having a racial / ethnic minority status.

Depression or breast cancer have a link. When considering the possibility of a link between breast cancer and depression, many issues arise:

- Is depression linked to a higher risk of breast cancer?

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- Is depression a risk factor for death from breast cancer?
 - Is there a link between sadness and the severity of the illness (advanced stage breast cancer)?
 - Is depression linked to a lower risk of breast cancer?
 - Is there a link between breast cancer and depression?
 - How does depression affect the quality of life of breast cancer patients?

1.3. Depression As A Breast Cancer Risk Factor:

It's not a far-fetched notion to think that women who are depressed are at a higher risk of getting breast cancer. Galien had previously observed that women with a gloomy mood owing to a rise of black bile were more likely to get breast cancer in Greek Antiquity. Several metaanalyses have been conducted in attempt to determine if there is a connection between mood disorders and breast cancer. The following criteria were used to evaluate 46 papers by these authors(15,16)(17)(18)(19).

Anxiety/depression, children family environment, conflict-avoidant personality, denial/repression coping, anger expression, extraversion-introversion, stressful events, separation/loss,

- Denial/repression coping, separation/loss experiences, and stressful life events all have substantial impact sizes.
- Depression and breast cancer risk factors

Depressive illness has been linked to ethnic minority women (e.g., in Southern California), low-income women, pain, anxiety, and health-related quality of life in breast cancer patients. Depression may be exacerbated by a poor social and cultural environment among these marginalized groups. These individuals are less likely to seek early consultation for screening when a breast lump develops because they are sad. However, there is no link between cancer stage and treatment status and depression. Other variables that may contribute to greater sadness and anxiety following breast cancer disclosure include discussing survival rates and life expectancy. Speaking about the impact of disease and treatment outcomes on quality of life, emphasizing the importance of being involved in the cancer treatment decision-making process, and using the word cancer, which remains a synonym for inescapable death for the vast majority of patients(20,21)(22)(23).

1.4. Breast Cancer Mortality And Depression As Both A Prognostic Factor:

Could depression be a risk factor for the progression of breast cancer? There are several good reasons in the literature that support this claim.

- First, severe depression lowers motivation and makes it more difficult to stick to treatments like chemotherapy.
- Second, severe depression may be a significant predictor of late-stage breast cancer detection because individuals who discover a lump delay seeking medical help.
- Finally, in light of the two preceding considerations, severe depression may have a negative impact on the outcome of breast cancer patients. Is it possible to consider depression as a prognostic factor for breast cancer mortality? The solution to that query is still a mystery. According to some research, there is a link between depression and breast cancer mortality.

1.5. Depression And The Severity Of The Disease:

Is there a link between depression and advanced-stage breast cancer? It's likewise tough to provide a clear response here. Due to numerous bias, there may be a shaky evidence for such a connection. Treatment side effects such as nausea, tiredness, and pain are often linked to depressed symptoms, although they are not always caused by depression, and poor self-esteem and loss of autonomy are prevalent in advanced breast cancer. Depressive symptoms in young breast cancer survivors are not associated with the severity of the illness. In terms of the literature, research that look for a connection between depression and breast cancer recurrence or depression and advanced stage breast cancer have come up with conflicting results

1.6. Breast Cancer, Depression, Or Quality Of Life:

Fatigue, a history of depression or a recent bout of sadness after the diagnosis of breast cancer, and cognitive attitudes of helplessness/hopelessness and resignation are all risk factors for depression. When it comes to the issue of measuring quality of life, the following factors must be considered: beauty, body image effect, sexuality, the significance of menopausal symptoms including such hot flashes load, and the existence of lymphedema. Quality of information provided by physicians and communication about illness worries and emotions are two key criteria to maintain quality of life during breast cancer disclosure. Depression may have a negative effect on a breast cancer patient's quality of life. Many studies have shown that depression and related symptoms, such as dysphoria, have a negative impact on quality of life, medical therapy compliance, including survival. This is because depression has an impact on interpersonal relationships, work performance, stress, and symptoms and fitness symptom perceptions. As a result, it has an effect on the patients' entire quality of life. Depression was linked to a poorer quality of life in long-term stage I-III breast cancer survivors (disease-free for 5 years) compared to 93 low-risk breast screening patients in two investigations. The Beck Depression Inventory Scale was used to evaluate depression. Depression was found in 29 percent of breast cancer survivors and 15 percent of low-risk breast cancer patients, respectively. Except for family functioning, greater depression is linked to poorer quality of life functioning in both categories.

1.7. Antidepressant Medications Or The Risk Of Breast Cancer:

Treatment for depression in women with breast cancer improves their quality of life and may extend their lives. Antidepressant medications are still the gold standard for treating mood disorders. The possibility of a link between antidepressant medication prescription and the later development of breast cancer is still debated. Is there a link between the use of psychotropic medications like antidepressants and the development of breast cancer? This is a significant issue for the medical community, which is accustomed to giving these types of drugs to depressed patients on a regular basis. So far, epidemiological evidence for a link between antidepressant use breast cancer has produced conflicting and inconsistent results. Due to methodological limitations such as case control studies, lack of accounting for potential confounding factors, and multiple statistical comparisons, the hypothesis is controversial(24).

Although more research is needed before the body of scientific evidence can be definitively conclusive, the possibility of a link has not been ruled out. Antidepressants must be combined with psychosocial interventions to care for breast cancer patients with depressive disorders. Psychosocial interventions improve cancer patients' well-being by reducing emotional distress

and depression in women who have been diagnosed with breast cancer, but they do not guarantee survival. The impact of supportive expressive group therapy (SEGT) versus relaxation techniques on survival was studied in a recent randomized controlled trial involving 485 women with advanced breast cancer. These therapies did not result in a significant increase in survival, according to these researchers (median survival 24 months in SEGT and 18.3 in controls). However, SEGT improved quality of life, as well as treatment and prevention of depression(25).

2. DISCUSSION

Depression is frequently misdiagnosed and undertreated in the breast cancer community. The patient's causes of depression are more significant than the disease or its treatment in the five years after a diagnosis. The stage of breast cancer (early or advanced) has minimal statistical relevance in terms of rates of psychological discomfort, with the exception of recurrence. Depression is caused by fatigue, a history of depression or a recent episode of melancholy after the diagnosis of cancer, cognitive attitudes of helplessness/hopelessness, and resignation. Body image impairment induced by mastectomy as well as sexuality aftereffects are linked to a higher incidence of mental illnesses. Breast cancer is one of the most prevalent malignancies in Western countries, both in terms of incidence and mortality rates. Breast cancer accounts for about 28.9% of all cancer diagnoses and 7.8% of all deaths in Europe in 2006. Its treatment now has a high success rate in terms of patient survival. These survivors will be at a high risk of psychological distress and, as a consequence, of developing mood disorders. Undiagnosed and untreated depression has a negative impact on the quality of life of women with breast cancer. To treat these mood difficulties, and also psychological issues such as feminine representation, sexuality, or the risk of sterility, a psycho-oncologist is required. There is no need to advocate for a change in the current use of antidepressant medications in the treatment of depression in breast cancer patients since depression therapy is still necessary for improving their quality of life.

3. CONCLUSION

Patients having breast cancer who have comorbid depression have substantially more suffering and impairment. Clinical psychological distress and depression screening are essential during the diagnosis, surgery, and recurrence of breast cancer in order to treat them properly and avoid recurrence of mental problems. Breast cancer patients' quality of life is severely harmed by undiagnosed and untreated depression. A psycho-oncologist is needed to address these mood problems as well as psychological issues including feminine representation, sexuality, as well as the danger of sterility. And no need to support a change in the present usage of antidepressant medicines in the management of depression among breast cancer patients since treatment of depression remains essential for enhancing their quality of life.

REFERENCES:

1. Sidana A, Kaushal S, Farooq U. Evaluation of antileishmanial potential of *Gentiana kurroo* royle by in vitro and in silico methods. *J Appl Pharm Sci*. 2018;
2. Dai X, Cheng H, Bai Z, Li J. Breast cancer cell line classification and Its relevance with breast tumor subtyping. *Journal of Cancer*. 2017.
3. Kaur R, Shikha D, Kaushal A, Gupta R, Singh SP, Chauhan RP, et al. Measurement of indoor ²²²Rn, ²²⁰Rn and decay products along with naturally occurring radionuclides in some monuments and museums of Punjab, India. *J Radioanal Nucl Chem*. 2021;

4. Shikha D, Kaur R, Gupta R, Kaur J, Chandan, Sapra BK, et al. Estimation of indoor radon and thoron levels along with their progeny in dwellings of Roopnagar District of Punjab, India. *J Radioanal Nucl Chem.* 2021;
5. Tesfahun AA, Chawla AS. Risk perceptions and adaptation strategies of smallholder farmers to climate change and variability in North Shoa Zone, Ethiopia. *Manag Environ Qual An Int J.* 2020;
6. Lebert JM, Lester R, Powell E, Seal M, McCarthy J. Advances in the systemic treatment of triple-negative breast cancer. *Current Oncology.* 2018.
7. Talwar R, Chatterjee AK. A method to calculate the voltage-current characteristics of 4H SiC Schottky barrier diode. *Maejo Int J Sci Technol.* 2009;
8. Kumar N, Singh A, Sharma DK, Kishore K. Novel Target Sites for Drug Screening: A Special Reference to Cancer, Rheumatoid Arthritis and Parkinson's Disease. *Curr Signal Transduct Ther.* 2018;
9. Hussain S, Singh A, Zameer S, Jamali MC, Baxi H, Rahman SO, et al. No association between proton pump inhibitor use and risk of dementia: Evidence from a meta-analysis. *J Gastroenterol Hepatol.* 2020;
10. Stojkovic S, Oklevski S, Jasuja OP, Najdoski M. Visualization of latent fingerprints on thermal paper: A new method based on nitrogen dioxide treatment. *Forensic Chem.* 2020;
11. Sharma S, Hussain MS, Agarwal NB, Bhurani D, Khan MA, Ahmad Ansari MA. Efficacy of sirolimus for treatment of autoimmune lymphoproliferative syndrome: a systematic review of open label clinical studies. *Expert Opinion on Orphan Drugs.* 2021.
12. Wang YA, Jian JW, Hung CF, Peng HP, Yang CF, Cheng HCS, et al. Germline breast cancer susceptibility gene mutations and breast cancer outcomes. *BMC Cancer.* 2018;
13. McDonald ES, Clark AS, Tchou J, Zhang P, Freedman GM. Clinical diagnosis and management of breast cancer. *J Nucl Med.* 2016;
14. Yates LR, Knappskog S, Wedge D, Farmery JHR, Gonzalez S, Martincorena I, et al. Genomic Evolution of Breast Cancer Metastasis and Relapse. *Cancer Cell.* 2017;
15. Wang L. Early diagnosis of breast cancer. *Sensors (Switzerland).* 2017;
16. Dai X, Xiang L, Li T, Bai Z. Cancer hallmarks, biomarkers and breast cancer molecular subtypes. *Journal of Cancer.* 2016.
17. Rani D, Sharma V, Manchanda R, Chaurasia H. Formulation, design and optimization of glycosomes for topical delivery of Minoxidil. *Res J Pharm Technol.* 2021;
18. Chaudhary P, Khatri P, Chaudhary A, Maithani D, Kumar G, Sharma A. Cultivable and metagenomic approach to study the combined impact of nanogypsum and *Pseudomonas taiwanensis* on maize plant health and its rhizospheric microbiome. *PLoS One.* 2021;
19. Vaccari F, Giovanelli N, Lazzer S. High-intensity decreasing interval training (HIDIT) increases time above 90% $\dot{V}O_{2peak}$. *Eur J Appl Physiol.* 2020;
20. Ghoncheh M, Pournamdar Z, Salehiniya H. Incidence and mortality and epidemiology of

breast cancer in the world. Asian Pacific J Cancer Prev. 2016;

21. Feng Y, Spezia M, Huang S, Yuan C, Zeng Z, Zhang L, et al. Breast cancer development and progression: Risk factors, cancer stem cells, signaling pathways, genomics, and molecular pathogenesis. Genes and Diseases. 2018.
22. Sharma V, Sharma S, Verma OP, Bhardwaj B, Sharma TK, Pachauri N. Prediction and optimization of abrasive wear loss of ultrahigh strength martensitic steel using response surface methodology, Harris Hawk and artificial neural network. Int J Syst Assur Eng Manag. 2021;
23. Chandra H, Singh C, Kumari P, Yadav S, Mishra AP, Laishevtcev A, et al. Promising roles of alternative medicine and plant-based nanotechnology as remedies for urinary tract infections. Molecules. 2020.
24. Akram M, Iqbal M, Daniyal M, Khan AU. Awareness and current knowledge of breast cancer. Biological Research. 2017.
25. Sun YS, Zhao Z, Yang ZN, Xu F, Lu HJ, Zhu ZY, et al. Risk factors and preventions of breast cancer. International Journal of Biological Sciences. 2017.

HOME SCHOOLING AND SOCIALIZATION: A REVIEW

Sumit Kumar*

*Teerthanker Mahaveer Institute of Management and Technology,
TeerthankerMahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email id-sumit.mamagement@tmu.ac.in

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ABSTRACT

The contemporary home school movement seems to be having a significant impact on society and education in particular. Home schooling is a method in which children's education is obviously parent-controlled or directed (and sometimes student-directed) during regular school hours on regular school days of the week. Caregiver and home- and family-based education have been practiced by numerous civilizations throughout history, and it has never vanished in some of them, despite the fact that it did not resurface in the United States until the 1970s. Gordon and Gordon pointed out that education focused on and around the home and family has played an important part in Western civilization's history. Home schooling, in some form or another, was common in America until the late nineteenth century, according to a study of education in the United States. "In general, therefore, parents in the seventeenth and eighteenth centuries particularly the father was in charge of educating his children. Christian theology, occupational skills, as well as how to read and, to a lesser degree, composes and figure". "The school was a volunteer and incidental organization throughout the nineteenth century: attendance fluctuated considerably from day to day and season to season."

KEYWORDS:Children, Extracurricular Activities, Teachers, Schooling Civilization, Socialization.

1. INTRODUCTION

"How come your kids aren't in school?" Do you have any teaching experience? How can you tell whether you're giving the correct lessons? Aren't you concerned that your children will be unable to attend college? "How did you come to the decision to keep your children at home?"

If they've been at it long enough, homeschooling parents have been asked these questions numerous times by the inquisitive and the condemning. But, of all the many concerns that home students are asked, "What about socialization?" is probably the most well-known and perplexing(1)(2)(3). What makes this issue so perplexing is that the term "socialization" means various things to different individuals? Some people refer to social activity as providing opportunities for children to interact with their peers and engage in conventional extracurricular activities such as sports, school plays, and senior prom. Others refer to societal influence, such as educating youngsters to follow the majority's rules. Some individuals use the term "social exposure" to refer to exposing youngsters to the culture and values of various groups of people.

All of these activities are a component of socialization, but it's more precisely described as "the process through which individuals learn the norms of conduct and systems of ideas and attitudes that enable them to operate successfully as members of a certain community(4)(5)(6)(7)."

Normally, youngsters participate in "daily routines that immerse them directly in the ideals of their society," which triggers this process. Parents, for example, teach their children to think in terms of minutes and hours, schedules, and deadlines by hurrying them along to avoid being late, organizing their children's activities around specific hours such as "bedtime" or "dinnertime," and consulting their watches and saying "I don't have time" when their children want them to play. Of course, in a society like ours, this way of thinking aids individuals in functioning more effectively. Naturally, parents are often involved in these everyday activities. They also include other family members, classmates, neighbors, family friends, books, television, movies, coaches, music instructors, camp counselors, religious leaders, and any other source of direct or indirect interaction between children and other members of their community (8,9)(10)(11)(12). Furthermore, children actively engage in the process as they develop their own unique understandings of the social environment around them via reciprocal interactions with others. So, how essential is education as one of many socialization agents?

1.1 Educating Future Teachers:

Parents who choose to homeschool their children devote time and attention to an activity that was formerly reserved for experts. Even in areas with the most liberal home schooling legislation, parents must understand what is typically taught to children of a particular age, locate resources and projects that teach specific skills, and learn how to effectively manage their own and their children's time. The overwhelming majority of home school parents who want their children to go to college or university must also learn how to evaluate their children's development against higher education entrance criteria.

Even a cursory examination of home education literature reveals the breadth and depth of home educating parents' quest for ideas, resources, and appropriate performance criteria. New ideas and resources for teaching mathematics, history, social studies, classics, literature, art, theatre, and creative and expository writing were uploaded on home education Web sites in less than a month. Parents may get advice on what type of math software would work best for their children, as well as join discussion groups with other parents dealing with similar problems(13,14).

Without passing judgment on the quality of these materials, it is obvious that many dedicated individuals are putting out considerable effort. The supplies on hand are hardly rudimentary. They're from universities, research institutions, mutual aid networks, school districts, and state education agencies, among other places. Contributors to homeschooling Web sites and association gatherings are also engaged in serious study and development. Home schooling is a massive teacher training program, with tens of thousands of individuals learning how to teach, evaluate outcomes, and improve teaching on a continual basis. It has to be one of the country's largest parent education programs(11)(15)(16)(17).

Large numbers of individuals are dedicated to learning how to serve others successfully in areas other than home education. Nonprofit and faith-based organizations, which have become the primary providers of welfare and job training services in recent years, are working hard to learn how to provide effective services, retain clients, maintain private and public funding, build stable organizations, and select and train staff. Although most of these organizations are headed by

professionals with public administration expertise, many of them depend significantly on individuals who have never had formal training in their fields. Chambers of commerce and retired executive groups are assisting these organizations in getting off the ground. Faithworks, a conservative Christian organization, offers volunteer leadership and training to nonprofit organizations working on issues such as poverty, education, public health, job training, and convicts' passage to freedom(18,19).

Home education, like charter schools, relies on the development of new human capital. People must learn how to educate and inspire pupils in new settings and under new regulations, as well as how to use complementing adult abilities, locate resources, and make efficient use of limited time and money. Critics claim that most of this effort is squandered, and that any new human capital produced at such a high expense can simply replicate what is already available in traditional public and private institutions. Unlikely. Although the newcomers will certainly spin some wheels and go into blind alleys, these efforts will inject fresh blood and new ideas into sectors of human services that were previously controlled by civil service cartels and were therefore rule-bound and risk-averse(20)(21).

1.2 Likely to Develop into Something Similar to Schools:

Home scholars aren't all hermits who live in secluded log huts. A growing percentage of families that home school their children reside in or near cities, are highly educated, and have regular jobs. They are not all scared of the contemporary world; many are avid Internet users, and many home school parents on the West Coast work in the computer and software sectors. Many home academics are members of major faiths, but many are Christian extremists and Mormons. Lutherans, Catholics, and Jews all have active homeschooling groups. Many of the new urban home students in Washington, Oregon, and California are unchurched. Isolationism does not result from the strong independence of home students. Parents are increasingly trading services—for example, a mother who majored in math teaches children from multiple households in exchange for music or history lessons. Families get together to form basketball or soccer teams, host social gatherings, and stage plays and recitals. A growing percentage of home students respect professional educators' knowledge and are willing to accept support, advice, and testing aid from school systems. Some families have formed their whole lives around educating their children, according to state home school association officials, and they are reluctant to change. However, few homeschooling parents desire to keep their children isolated from the rest of the world. Many parents are willing to accept assistance and take advantage of chances to have their children taught by professionals or evaluated in methods that demonstrate progress toward achieving college admissions requirements(22,23).

In such a scenario, parents are more inclined to cooperate, specialize, and take use of comparative advantages. It's too early to tell if many of these partnerships will ever grow complex enough to incorporate

1. Cash payments for services or
2. Non-monetary payments for services.
3. The hiring of coordinators to plan and integrate services, as well as to ensure quality.

Some home education cooperatives, on the other hand, have progressed to the point where groups of parents are operating organizations that seem to the naked eye to be schools.

In the mid-1980s, research on home schooling began, and an early case study suggested that home-schooled children were not as isolated as most people assumed. Since then, many surveys have asked homeschooling parents to report on their children's activities, some of which have been very big. Almost all home-schooled children participated in extracurricular activities on a regular basis, according to these polls.

American education has always had mixed goals, but in the last 50 years or so, "school has been considered accountable for an expanding range of socializing activities that were initially thought the proper roles of other social institutions, such as the family" and are not specifically relevant to academics. Education and indoctrination have become inextricably intertwined in our cultural awareness as a result of this. Many individuals today believe that conventional education provides necessary socializing experiences that homeschooling cannot provide.

In an attempt to bring professional psychology to bear on contemporary problems, the American Psychological Association published the views of educational psychologists on home schooling in the APA Monitor. Home-schooled children, according to these experts, may be unable to get along with others and may have difficulties transitioning into "mainstream life." They said that homeschooled students "only hear their parents' ideas and have limited opportunity to develop their own opinions," while traditional schools teach "what society as a whole values." They said that although home education shields children from society, conventional schools guarantee that children grow up to be "complete individuals" by teaching important social skills like collaboration, respect for others, and self-control(24,25).

The fiercest opponents claim that the primary objectives of home educating parents are to isolate children from society and to stifle their social development. According to a study of public school superintendents, 92 percent of them think home-schooled children lack sufficient socializing opportunities. When pressed to clarify their positions, several of these superintendents said that home schoolers "don't want any other influence on their children's life than their parents," that "community at large are bad," and that "they want to guarantee their children's ignorance." One superintendent said that the parents "had genuine emotional issues themselves" and is unaware of "the tremendous damage they are inflicting to their children in the long term, educationally and socially."

Unsurprisingly, homeschooling parents differ on every issue. They characterize traditional schools as strict and authoritarian environments in which passive compliance is rewarded, peer relationships are all too frequently hostile, scornful, or manipulative, and students must deal with a depressing ideological and moral atmosphere. Parents who home educate their children claim that such an atmosphere may restrict their children's uniqueness and damage their self-esteem. Children may become reliant, insecure, or even antisocial as a result of it, according to experts. They think it will jeopardize their attempts to instill good values and proper conduct in their children. Finally, they assert that cultivating the kind of rewarding and supportive connections that promote good personal and moral growth is improbable. Nonetheless, when parents opt to homeschool, they consider the benefits of homeschooling rather than the drawbacks of traditional education. Home schooling parents are passionate about providing positive interpersonal communication environment for young children but they "believe that socialization is best achieved in a time of life setting under the auspices of the family". They "aim to give their children with safe, secure, and positive settings in which to develop and learn" . They go on to

state that “skills acquired at home are put into effect in the larger world, the success that follows develops self-esteem and prepares the kid for adulthood”.

Parents opt to home educate for a variety of reasons, but one of the most common is that they think it will provide their children with the socializing experiences they want. Of course, homeschooling parents are aware that providing their children with some types of social interactions may need additional work. They claim, for example, that home schooling makes it more difficult to locate buddies for their children who share their interests, and that activities like theatre and band are less available.

The significance of study on the topic of socialization is highlighted by such a divide in opinion between professional educators and home educating parents. Could children who are home-schooled be missing out on the kinds of social experiences that will equip them to function well in society? Or, alternatively, might home education provide children with much superior socializing opportunities than the majority of youngsters receive? In any case, the issue of "What about socialization?" is crucial. However, in order to be correctly answered, this question must be recast into three more particular questions, each of which is compatible with a correct definition of socialization: Do children who are homeschooled take part in their communities' everyday activities? Are they learning the necessary norms of conduct, belief systems, and attitudes? Are they able to operate as productive members of society?

2. DISCUSSION

Organized sports, scouts and 4-H organizations, paid employment, volunteer work, religious activities, music and dance classes, interest groups, playing with friends, and more were among the activities mentioned by parents in these polls. One of the reasons home-schooled kids participate in so many different extracurricular activities is because they don't watch much television. In a large study of home schooling families, Rudner discovered that just 3% of home-schooled fourth graders watch more than 3 hours of television each day. For fourth graders in the United States, the equivalent number is 38%.

Montgomery found that homeschooling parents were deliberately providing chances for their children to develop leadership skills after analyzing the nature of home-schooled children's activities. Personal identity, morality, professional aspirations, independence, social connections, social skills, and sexuality were all found to be actively cultivated by home educating parents, according to Johnson. These parents' methods included giving children regular duties around the home, allowing them to control their own studies, and having high standards for their children's conduct, in addition to arranging for them to participate in extracurricular activities.

Chatham-Carpenter requested home-schooled and public-schooled children to maintain a diary of all their interactions with others for a month in order to have a better understanding of social connections. For every contact lasting more than 2 minutes, the youngsters, aged 12 to 18, recorded who they spoke to and what they talked about. They also assessed how tolerant and understanding each individual on their list was, as well as how close they were with them.

3. CONCLUSION

Despite the fact that there are still far too many unresolved issues regarding homeschooling and socializing, some early conclusions may be drawn. Children that are homeschooled participate in their communities' everyday activities. They are not alone; in fact, they interact with and feel

connected to a wide range of individuals. Much of the credit for this goes to homeschooling parents. Because they actively encourage their children to take advantage of social possibilities outside the home, they are thinking about their children's long-term social development. Children who are homeschooled are learning the norms of conduct, as well as the systems of beliefs and attitudes that they need. They have high self-esteem and are less prone to exhibit behavioral issues than other youngsters. They may also be more socially developed and possess superior leadership abilities than other youngsters. They also seem to be functioning well as adult members of society.

In summary, almost all studies of home-educated students' learning and thinking skills come to the same conclusion: a wide range of families representing various philosophical and religious worldviews, socioeconomic statuses, and races and ethnicities are clearly successful at teaching their children through home education. However, there is no agreement on the source of these children's exceptional academic performance, and the issue has not been fully explored. One may be tempted to conclude that the relevance of this and other studies on academic performance stems from the fact that home education is usually linked with or causes greater accomplishment than public schooling. However, it should be noted that this subject was just one aspect of this study and paper, and that only a small amount of causal-comparative research was conducted. This study, along with others, may indicate that there is something intrinsic in the contemporary practice of home schooling that may (and does) mitigate the impact of background characteristics linked to poorer academic performance when children are put in traditional public schools. As a result, one might argue that the "therapy" known as home schooling is merely a combination, or at least a possible combination, of many variables that contribute to successful education and learning in traditional classrooms. Furthermore, home schooling may contain certain elements that have not been discovered or about which no one has pondered and given to the world of research.

REFERENCES:

1. Farooq U, Singla S. Impact of aggregate and fly ash filler types on asphalt and control mix designs. Int J Sci Technol Res. 2020;
2. Zargar K, Singla S. Impact of pet plastic waste on mechanical properties of mix concrete design. Int J Sci Technol Res. 2020;
3. Sheikh RQ, Yadav V, Kumar A. Stabilization of red soil used as a sub-base material. Int J Sci Technol Res. 2020;
4. Muzaffar A, Yadav EV, Kumar EA. Evaluation and strengthening of existing Hma pavements and newly introduced wma pavements. (In cold regions of India). Int J Sci Technol Res. 2020;
5. Mathur G, Ghai W, Singh RK. A totalitarian technique for wormhole detection using big data analytics in iot network. Int J Sci Technol Res. 2020;
6. Mir MA, Verma P. Use of polyethylene waste with stone dust in flexible pavement. Int J Sci Technol Res. 2019;
7. Sethi V, Tandon MS, Dutta K. A path model of antecedents of green purchase behaviour among Indian consumers. Int J Public Sect Perform Manag. 2018;
8. Kaur G. Home Schooling – Advantages and Disadvantages. Int J Trend Sci Res Dev. 2018;
9. Anthony K V., Burroughs S. Making the transition from traditional to home schooling: Home school family motivations. Curr Issues Educ. 2010;

10. Goswami L, Kaushik MK, Sikka R, Anand V, Prasad Sharma K, Singh Solanki M. IOT Based Fault Detection of Underground Cables through Node MCU Module. In: 2020 International Conference on Computer Science, Engineering and Applications, ICCSEA 2020. 2020.
11. Solanki MS, Sharma DKP, Goswami L, Sikka R, Anand V. Automatic Identification of Temples in Digital Images through Scale Invariant Feature Transform. In: 2020 International Conference on Computer Science, Engineering and Applications, ICCSEA 2020. 2020.
12. Stojkovicj S, Oklevski S, Jasuja OP, Najdoski M. Visualization of latent fingerprints on thermal paper: A new method based on nitrogen dioxide treatment. *Forensic Chem.* 2020;
13. Arai AB. Reasons for home schooling in Canada. *Canadian Journal of Education.* 2000.
14. Basham P. Home Schooling: From the Extreme to the Mainstream. *Fraser Inst.* 2007;
15. Singh R, Bishnoi J, Tyagi VK. Onset of Soret driven instability in a Darcy–Maxwell nanofluid. *SN Appl Sci.* 2019;
16. Dey YN, Wanjari MM, Srivastava B, Kumar D, Sharma D, Sharma J, et al. Beneficial effect of standardized extracts of *Amorphophallus paeoniifolius* tuber and its active constituents on experimental constipation in rats. *Heliyon.* 2020;
17. Mangla SK, Bhattacharya A, Yadav AK, Sharma YK, Ishizaka A, Luthra S, et al. A framework to assess the challenges to food safety initiatives in an emerging economy. *J Clean Prod.* 2021;
18. Medlin RG. Home schooling and the question of socialization. *Peabody J Educ.* 2000;
19. Mincu CM, Sârbu EA. Homeschooling and Socialization in the Romanian Context. *Rev Asistenta Soc.* 2018;
20. Chaudhary P, Khati P, Chaudhary A, Maithani D, Kumar G, Sharma A. Cultivable and metagenomic approach to study the combined impact of nanogypsum and *Pseudomonas taiwanensis* on maize plant health and its rhizospheric microbiome. *PLoS One.* 2021;
21. Mukherjee S, Kundu A, De PS, Mahato JK, Chakraborti PC, Shome M, et al. Insitu investigation of tensile deformation behaviour of cold-rolled interstitial-free high-strength steel in scanning electron microscope. *Mater Sci Eng A.* 2020;
22. Lois J. Family Ties: Relationships, Socialization, and Home Schooling. *Contemp Sociol A J Rev.* 2008;
23. Suyatno S, Wibowo Saputro I. Homeschooling: Indonesia New Trend of Islamic Education in the Global Era. *J Educ Learn.* 2017;
24. Farris MP, Woodruff SA. The future of home schooling. *Peabody J Educ.* 2000;
25. Hill PT. Home schooling and the future of public education. *Peabody J Educ.* 2000;

CARBON NANOTUBES IN BIOMEDICINE

Dr Vipin Jain*

*Teerthanker Mahaveer Institute of Management and Technology,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email id- vipin555@rediffmail.com

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ABSTRACT

Biomaterials have now become an important component in a wide range of biological, preclinical, and clinical applications. The employment of nanoparticles in these areas has a lot of promise, owing to the high ratio of surface atoms, which changes the physicochemical characteristics and enhances chemical reactivity. Carbon nanotubes (CNTs) are one of them, and they've shown to be a strong tool for improving biomedical approaches to the treatment of a variety of illnesses. CNTs have a high capacity to permeate cell membranes, and the sp² hybridization of all carbons allows them to interact with virtually any biomolecule or chemical, enabling them to target cells and deliver medicines under the right conditions. Nanotubes are also being investigated as a load in nanocomposite materials, enhancing their mechanical and electrical characteristics, or even for direct usage as scaffolds in human tissue synthesis, in the emerging promising area of artificial biomaterial creation. Nonetheless, despite their beneficial contributions, some major concerns about CNTs' solubility in water, low biodegradability and dispersity, and toxicity issues associated with CNTs' interaction with biomolecules in body tissues, including potential effects on the proteome and genome, must be addressed in order to accelerate their clinical development. This study examines a large body of literature to highlight the most important and recent developments in the optimum design and characterization of carbon nanotubes with biomedical applications, as well as their capabilities in many preclinical research fields.

KEYWORDS: Carbon Nanotubes, Biomedical Research, Preclinical Applications, Cancer, Neurodegeneration, Imaging, Theranostic Compounds, Tissue Engineering.

INTRODUCTION

Understanding, designing, and developing novel materials with intriguing properties at the nonmetric scale, where quantum theory effects are visible, is known as nanotechnology. These nanomaterials contain at least one dimension of 1 to 100 nm and may take the form of nanoparticles, nanotubes, or Nano surfaces(1)(2). Nano biotechnology, on the other hand, is the confluence of nanotechnology and biology, integrating the efficacy of biological materials with the principles and tools of fundamental sciences such as physics and chemistry. It is also defined as the science that looks into the creation and production of highly organized structured materials that respond to stimuli in a certain way, above and beyond the molecular level. Nanomaterials

have found widespread use in a variety of scientific and technological fields, including water purification, electro catalysis, materials, and medicinal applications ranging from cancer therapy to stem cell therapy(3)(4)(5). In fact, these constructions have become increasingly useful in two areas of biology and medicine:

- Nanomedicine, with applications in imaging, biosensors, drug delivery systems, and photo thermal therapy; and
- Tissue and implant technology, either as scaffold-based nanoparticles or as biomedical devices.

Carbon-based, inorganic-based, organic-based, and composite-based noncom pounds may be divided into four broad categories based on their composition. Carbon nanotubes (CNTs), discovered by Imam in 1991, are a novel allotrope of carbon that merits special attention because of their intrinsic characteristics (surface, form, and physical properties) that make them particularly suited for preclinical applications. CNTs are cylinder-shaped structures composed of a sheet of graphene wrapped up into a tube. Single-walled nanotubes (SWCNTs) are made up of a single graphene sheet with a diameter ranging from 0.4 to 40 nm, while multi-walled carbon nanotubes (MWCNTs) are comprised of various sheets forming evenly spaced cylinders with an interlayer distance of 0.35 nm, similar to the basal plane detachment in graphite, and diameters ranging from 2 to 100 nm(6)(7)(8)(9). The nanotubes are typically closed at the ends with half-fullerene molecules, while the tips are formed by pentagonal defects. CNTs are classified into three kinds based on how the sheets are rolled up: armchair, zig-zag, and chiral nanotubes(10)(9).

Each carbon atom in NTs is coupled with sp² hybridization, which is stronger than the sp³ bonds found in diamond and gives these compounds superior mechanical, electrical, optical, and thermal characteristics. Other distinguishing characteristics, such as their large surface area, needle shape, and residual metal impurities content, have made them one of the most promising nanomaterials for applications ranging from nanomedicine to Nano electronics, such as the production of quantum dots by introducing fullerenes and nanowires by filling CNT with pure elements for molecular electronics. Carbon nanotubes have been used in biomedicine and preclinical research as transporters for various medicines, biomolecules such as enzymes, deoxyribonucleic acid (DNA), and ribonucleic acid (RNA), as well as to create ion transport channels, owing to their capacity to penetrate the cell membrane. CNTs have also been utilized as nonreactors, because to their small inner size and unique electrical properties owing to the curvature of the CNT wall. Despite their broad variety of biological uses, carbon nanotubes have two flaws to overcome: their intrinsic toxicity, which stems from the metal catalyst residue left over from the manufacturing process, and their poor water solubility. On these grounds, we've centered this review on presenting the main functionalization processes, characterization methodologies, and biomedical applications of carbon nanotubes, as well as identifying the most relevant strategies for overcoming the inherent problems that currently impede their preclinical use(11).

2 Carbon Nanotube Functionalization Carbon nanotubes are made in a variety of ways, however the majority of them leave metallic impurities in the sample and result in a mixture of CNTs with varying diameters, lengths, and chirality characteristics. The propensity of nanotubes to agglomerate uncontrolled owing to their high surface energy, as well as the stability of bundles

by van der Waals forces and π -electron interactions among them, provide further challenges. CNTs are insoluble in most biocompatible solvents as a result of this feature, severely restricting their biomedical uses. By altering the surface characteristics of CNTs, functionalization addresses several of these issues. CNTs may be purified by functionalization, resulting in improved homogeneity, reduced toxicity, increased dispensability, and solubility. It also enables customized CNT decorating for a variety of uses and applications. The major functionalization routes are presented in this overview, along with specific examples based on nanotube preparation for preclinical study(12)(13)(14)(15).

CNTs may be functionalized in a variety of ways, having applications in biomedicine. Traditionally, they have been divided into covalent and non-covalent functionalization methods, however a higher hierarchy element may be added: the site of the functionalization. Hexahedral functionalization attempts to introduce new capabilities to the outside face of CNTs, while endohedral functionalization compensates for alterations in the interior face. Endohedral functionalization involves filling the interior portion of the CNT with host material rather than forming bonds between CNT and functional groups. The filling with water via capillary was the first reported endohedral functionalization, although additional solvents quickly followed. Simple incubation can also effectively entrap hydrophobic compounds in the inner space of CNTs. Several additional instances of endohedral functionalization via fullerene encapsulation. Nonetheless, the tiny diameter of the interior chamber of the CNTs limits the size of the enclosed components, limiting this synthetic method. The goal of hexahedral functionalization, on the other hand, is to adorn the CNTs' exterior faces. It has no size restrictions in theory and may possibly attach virtually any kind of functional group. The covalent methods involve the creation of new chemical bonds, which change the original CNT structure, while the non-covalent strategies rely on interactions through π -stacking forces and/or van der Waals, which preserve the CNT skeleton. We've divided the various kinds of functionalization into categories for ease of understanding, but it's worth noting that most synthetic processes nowadays include many of the approaches outlined here(16)(17).

1.1.Functionalization Via Covalent:

The creation of additional chemical bonds during covalent functionalization alters the original CNT structure. The carbon hybridization will shift from sp^2 to sp^3 , resulting in the loss of the π -conjugation system of the graphene layer, which is responsible for much of the optical, electrical, and thermal characteristics of CNTs(18). Despite this flaw, covalent functionalization has a number of advantages that make it a particularly appealing approach: It provides strong and highly solid attachment of functional groups, greater selectivity, is more robust and better regulated than non-covalent functionalization, may be done in organic solvent or even without solvent, and offers a vast array of functional groups. All of these advantages contribute significantly to the prospective application of carbon nanotubes in biomedicine. In a nutshell, covalent functionalization is classified according to whether the modifications are made to the sidewalls or to the defect locations.

Functionalization of the Side Walls because the sidewalls of carbon nanotubes are rather inert, direct functionalization requires the application of a highly reactive chemical. The major sidewall derivatization methods in SWCNTs are covered in detail by Singh et al., including halogenation, acylation, nucleophilic addition, radical addition, cycloadditions, and carboxyl chemistry processes(19). The most frequently utilized methods for preparing CNTs to enhance

their solubility and dispersity, reduce their intrinsic toxicity, and improve their biocompatibility for biomedical applications are presented here. Halogenation using elemental fluorine at temperatures between 25 and 600 °C, fluorination was first utilized to overcome the lack of CNT reactivity. These new C-F bonds are weaker than those found in alkyl fluorides and may be used for further functionalization by employing Grignard or organoleptic chemicals to replace fluorine with amines, alcohols, or alkyl groups(20). Electrolysis may be used to fluorinate, chlorinate, and bromine CNTs in addition to fluorination. Additions with Electrophilic and Nucleophilic Components Alkyl and hydroxyl groups are formed by electrophilic addition of alkyl halides, while amino-functionalized CNTs are formed by nucleophilic addition of amine-based nucleophiles. Friedel–Crafts acylation between MWCNT NH₂ (Scheme 2a) is an electrophilic reaction that may be utilized for further functionalization with poly (l-lactase) polymer or collagen utilizing glutamic acid as a crosslinked(21). SWCNT may be alkylated by treating it with t-butyl lithium and then peroxidizing the intermediates to produce neutral CNTs with tart-butyl moieties as an example of nucleophilic addition(22).

Theranostic chemicals are nanoparticles that combine diagnostic and therapeutic functions onto a single platform. CNTs have been extensively researched for theranostic applications, since they may readily be combined with a variety of molecules/structures to provide synergetic analytic and curative effects [190]. Essentially, this method depends on the functionalization of CNTs with structures that have the ability to detect and cure illness while also accomplishing cell targeting and drug delivery under micro environmental stimuli. Some examples have previously been provided in previous posts. SWCNTs were shown to improve dielectric contrast between humoral and healthy tissue for microwave detection and hyperthermia therapy in breast cancer after researchers created tissue-mimicking materials. More recently, drug-conjugated SWCNTs as Nano carriers for breast cancer treatment have been prepared and characterized in vitro and in vivo. The researchers wanted to use a combination of therapeutic medicines (paclitaxel and salinomycin) supplied through biocompatible CD44 antibody-conjugated SWCNTs with a pH-responsive release to target a stem cell subpopulation. The therapy was monitored non-invasively in tumor-bearing animals using MRI and bioluminescence imaging (BLI), and the findings clearly indicated that the combination therapy had a better therapeutic impact than treatment with individual drug-conjugated Nano carriers or free drug suspensions(23).

1.2.Defect Functionalization:

Defect functionalization makes use of the structural weaknesses of CNTs to create new bonds. Although nanotubes are highly unreactive, all the preparation methods to obtain them leave some defects in their structure, both in the lateral walls and in the tips. Among the lateral walls, these defects include dipoles of heptagon–pentagon pairs in the hexagonal network called Stone–Wales defects, *sp*³-hybridized defects, and vacancies in the *sp*² network(24). The nanotube's ends are usually closed with fullerene, presenting mixed pentagonal–hexagonal structures more reactive than the pristine lateral walls. Defect functionalization employs these intrinsic defects

or generates new ones on the nanotube structure, normally by aggressive oxidative processes either in liquid or gas phase, or by electrochemical oxidation. This approach has the advantage of generating more functional groups, but also implies higher structural damage. Using less aggressive oxidative approaches, the structural damage is minimized preserving CNT's properties. Defect functionalization can be classified according to the nature of the chemical

transformation occurring at the defect sites, like oxidation, amination, etiolation, etc. These attached functional groups are normally used as the starting point for further derivatization.

Oxidation and carboxyl-based coupling constitutes one of the most relevant strategies for CNTs functionalization, including the formation of esters, amides, and ammonium carboxylate salts. This modification is achieved in a two-step process. The first one often involves the treatment of commercially available carbon nanotubes with a mineral acid such as nitric acid or a sulfonitric mixture. This step shortens CNTs, narrowing length distribution, and reduces the metal concentration left from their synthesis, decreasing toxicity and improving the preclinical possibilities. Nanotube defects will suffer the effects of the oxidant creating carboxylic and other oxygen-bearing groups.

2. DISCUSSION

Cell Growth with Carbon Nanotubes By creating appropriate structures for neural prosthetic applications, Nano biotechnology may have a significant effect on the treatment of nervous system diseases. High cell adhesion as well as excellent electrical conductivity is desirable requirements for the design of biocompatible implants for neuron repair/regeneration. Carbon nanotubes meet all of these criteria, including strong binding affinity and good electrical conductivity, making them suitable materials for the creation of neuro-implants targeted at growing neurons and repairing neuronal injury. Some examples have previously been provided. Carbon nanotubes provide an excellent surface for promoting dendritic elongation and cell attachment, according to research. Experiments were conducted on neonatal hippocampus neuron networks grown on MWCNTs that were distributed. Because of the high electrical conductivity of these nanomaterials, the development of neural circuits on a nanotube grid is followed by a significant rise in network activity, according to the findings. In a similar vein, reported growing hippocampus cells on carbon nanotubes to create an integrated SWCNT–neuron system. SWCNTs have been shown to increase the activity of brain circuits in both theoretical and experimental studies. CNT uses in tissue regeneration and engineering, on the other hand, extend well beyond nervous tissue. CNTs were utilized to create artificial cardiac tissue, with the conductivity of orientated CNTs assisting cell development. CNTs were shown to be a highly appropriate bone scaffold both in vitro and in vivo due to their unique nanotube geometry, which aided artificial bone formation. Finally, carbon nanotubes play a significant role in the production of synthetic fiber muscle. Despite the fact that traditional hydrogels are biocompatible and appropriate for culturing or manufacturing a variety of cell types and tissues, their poor mechanical strength and lack of electrical conductivity have restricted their biomedical uses for skeletal muscles, cardiac, and brain cells. Nonetheless, the creation of hybrid nanocomposite systems may circumvent these restrictions, allowing bioscaffolds with adjustable electrical and mechanical properties to be created. In fact, CNT-based hybrid hydrogels have emerged as promising options for regenerative medicine and tissue engineering in recent years. Developed a variety of nanotube–hydrogel hybrid systems with enhanced electrophysiological and mechanical characteristics. The researchers implanted neonatal rat cardiomyocytes onto these hybrid MWCNTs hydrogels, resulting in functioning cardiac patches with superior mechanical integrity and electrophysiological properties. Another research found that adding functionalized MWCNTs to alginate improved the mechanical, physical, and biological properties of composite hydrogels as compared to the starting materials. The porous hybrid MWCNT–alginate gels produced were less degradable, had improved HeLa cell adherence, and

had higher cell proliferation, demonstrating the potential usefulness of these structures as new tissue preparation substrates. SWCNTs were incorporated into collagen hydrogels, which enhanced cell alignment and assembly, resulting in engineered cardiac tissues with increased contraction capability. Hybrid SWCNT/collagen hydrogels were shown to be potential tissue scaffolds for heart regeneration following myocardial infarction in in vitro experiments. In a similar vein, a bio hybrid hydrogel made of hydrazide functionalized CNTs and solubilized pericardial matrix was recently reported. This hydrogel provides an ideal environment for the development of cardiomyocytes generated from human induced pluripotent stem cells, making it a potential material for stem cell-based cardiac tissue engineering.

3. CONCLUSION

Bionanotechnology is a potential new technique for bettering the treatment of a variety of diseases. A broad range of nanomaterials have been produced, described, and assessed for a variety of biomedical applications in order to address issues that cannot be solved using traditional methods. Carbon nanotubes, for example, have unique physical, chemical, and biological characteristics. Coating, surface functionalization, and decorating with different molecules, ligands, or nanostructures may significantly enhance these inherent properties. All of this makes carbon nanotubes excellent platforms for diagnostic, therapeutic, and theranostic uses that other nanoparticles lack, as well as potential preclinical and clinical applications. The biomedical uses of carbon nanotubes (CNTs) have been discussed in this article in the fields of medication and/or gene delivery, bio imaging, and tissue engineering. Nanotubes' unique electrical and mechanical properties make them ideal for theranostic applications, since they provide a unique platform for integrating disease detection and treatment capabilities. These structures may be employed in diagnostics as efficient biosensors or contrast agents for non-invasive imaging, while also increasing medication lifetime and facilitating direct administration inside cells of a target-specific tissue. Nanotubes have also become more important in biotechnology, where they serve as good scaffolds on their own or as part of hybrid materials for regenerative medicine. They've shown to be helpful in cell growth and proliferation, allowing for tissue engineering. The research covered in this review have shown CNTs' promise and justified all of the effort put into maximizing their usage as an alternative therapy for complex medical diseases for whom there are no currently available therapies. Despite the many and extensive research, several significant drawbacks that limit possible therapeutic uses must be addressed, with toxicity being the most significant obstacle. The trinity of CNTs functionalization, type, size, and purity has been identified as one of the most important factors in determining the usefulness of nanotube-based complexes in vivo. Collecting accurate cellular and animal data in relation to molecularly well-defined structures lays the groundwork for future discoveries.

REFERENCES

1. Lata S, Mittal SK. Identification of flavonoid glycosides of methanol extract from cucumis dipsaceus ehrenb. (fruit) by using HPLC-UV-ESI-MS methods. Int J Pharm Qual Assur. 2017;
2. Sidana A, Kaushal S, Farooq U. Evaluation of antileishmanial potential of Gentiana kurroo royle by in vitro and in silico methods. J Appl Pharm Sci. 2018;
3. Manjit K, Abhishek M. Plant growth promoting rhizobacteria (PGPR) for enhancing sustainable agriculture and revolutionized tools for farmers. Res J Biotechnol. 2021;

4. Wani PA, Wahid S, Rafi N, Wani U. Role of NADH-dependent chromium reductases, exopolysaccharides and antioxidants by *Paenibacillus thiaminolyticus* PS 5 against damage induced by reactive oxygen species. *Chem Ecol.* 2020;
5. Bilal M, Singh N, Rasool T. A model supported biomedical waste for the enhancement of mechanical properties of concrete. *Model Earth Syst Environ.* 2021;
6. Zhu Y, Wang L, Xu C. Carbon Nanotubes in Biomedicine and Biosensing. In: *Carbon Nanotubes - Growth and Applications.* 2011.
7. Sharma S, Hussain MS, Agarwal NB, Bhurani D, Khan MA, Ahmad Ansari MA. Efficacy of sirolimus for treatment of autoimmune lymphoproliferative syndrome: a systematic review of open label clinical studies. *Expert Opinion on Orphan Drugs.* 2021.
8. Stojkovikj S, Oklevski S, Jasuja OP, Najdoski M. Visualization of latent fingerprints on thermal paper: A new method based on nitrogen dioxide treatment. *Forensic Chem.* 2020;
9. Hussain S, Singh A, Zameer S, Jamali MC, Baxi H, Rahman SO, et al. No association between proton pump inhibitor use and risk of dementia: Evidence from a meta-analysis. *J Gastroenterol Hepatol.* 2020;
10. Hussain S, Singh A, Habib A, Hussain MS, Najmi AK. Comment on: "Cost Effectiveness of Dialysis Modalities: A Systematic Review of Economic Evaluations." *Applied Health Economics and Health Policy.* 2019.
11. Samadishadlou M, Farshbaf M, Annabi N, Kavetsky T, Khalilov R, Saghi S, et al. Magnetic carbon nanotubes: preparation, physical properties, and applications in biomedicine. *Artificial Cells, Nanomedicine and Biotechnology.* 2018.
12. Hirani KJ. Biochemical Characterization and Probiotic Potential of Lactic Acid Bacteria Isolated from Camel Milk. *Biosci Biotechnol Res Commun.* 2021;
13. Niladry G, Ranjit S. Biogenic synthesis of bimetallic nanoparticles using cassia tora leaf extract. *Res J Biotechnol.* 2020;
14. Harinder V, Jyoti S, Amolkumar S, Singh GP, Jasdeep P. Isolation and characterization of stress inducible protein (TaSti/Hop) from heat-tolerant wheat cultivar C306. *Res J Biotechnol.* 2019;
15. Chaudhary P, Khatri P, Chaudhary A, Gangola S, Kumar R, Sharma A. Bioinoculation using indigenous *Bacillus* spp. improves growth and yield of *Zea mays* under the influence of nanozeolite. *3 Biotech.* 2021;
16. Fisher C, Rider AE, Jun Han Z, Kumar S, Levchenko I, Ostrikov K. Applications and nanotoxicity of carbon nanotubes and graphene in biomedicine. *Journal of Nanomaterials.* 2012.
17. Goyal AK, Singh R, Chauhan G, Rath G. Non-invasive systemic drug delivery through mucosal routes. *Artificial Cells, Nanomedicine and Biotechnology.* 2018.
18. Tavakolifard S, Biazar E. Modification of carbon nanotubes as an effective solution for cancer therapy. *Nano Biomedicine and Engineering.* 2016.
19. Jain A, Homayoun A, Bannister CW, Yum K. Single-walled carbon nanotubes as near-

- infrared optical biosensors for life sciences and biomedicine. *Biotechnology Journal*. 2015.
- 20.** Teradal NL, Jelinek R. Carbon Nanomaterials in Biological Studies and Biomedicine. *Advanced Healthcare Materials*. 2017.
- 21.** Bekyarova E, Ni Y, Malarkey EB, Montana V, McWilliams JL, Haddon RC, et al. Applications of Carbon Nanotubes in Biotechnology and Biomedicine. *J Biomed Nanotechnol*. 2006;
- 22.** Tian LG, Chen DM. Function and application of carbon nanotubes in biomedicine. *Gongneng Cailiao/Journal Funct Mater*. 2009;
- 23.** Bottini M, Rosato N, Bottini N. PEG-modified carbon nanotubes in biomedicine: Current status and challenges ahead. *Biomacromolecules*. 2011.
- 24.** Bandaru NM, Voelcker NH. Glycoconjugate-functionalized carbon nanotubes in biomedicine. *J Mater Chem*. 2012;

A REVIEW OF VERTICAL AXIS WIND TURBINE

Dr. Varun*

*Faculty of Engineering,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- drvarun.engineering@tmu.ac.in

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ABSTRACT

The utilization of wind turbines for power production and renewable energy is one of the oldest methods of tapering. Economic sustainability is a critical component of social-economic development and renewable energy usage. Tidal energy, wind, and other renewable energies, as well as a reduction in fossil fuel dependence, will all assist. Greater environmental awareness has resulted in more research into environmentally friendly energy sources, allowing wind power to be regarded as a viable alternative. Horizontal and vertical wind turbines are two kinds of wind turbines that are often utilized for energy generation. The horizontally positioned axis is mainly utilized for large-scale installations, therefore the use of this horizontal axis is often of interest since it comes with a significant installation and initial cost. The geometry of the bath it uses, as well as its location in the turbine, will have a significant impact on the amount of electricity generated by wind turbines. For effective and operational use of the turbine, both parameters must be properly set and computed. The study focuses on a number of factors that can be used to improve the design and construction of vertical-axis wind turbines. The wind turbines are intended to assess a variety of factors, including the wind energy status and different open energy production methods. It necessitates the optimization of vertical axis turbine bladder design parameters in relation to a variety of factors, including assembly geometry orientation.

KEYWORDS:*Energy Generation, Renewable Energy, Vawt, Wind Energy, Wind Turbine.*

1. INTRODUCTION

Wind is a secondary source of solar energy in an area where the sun shines constantly. The kinetic energy of the moving wind is linked to wind power. It is created by a place where the sun's energy is caused by uneven heating of the earth's surface, as well as other effects such as tilting and the earth's movement in space(1). Wind energy provides a decent and ecological alternative, as well as national energy stability, at a time when global supplies of fossil fuels are diminishing. In the meanwhile, a VAWT research on a somewhat small scale continues(2).

Wind turbine systems have been created, and scientists and engineers have studied them using a variety of methods. For VAWTs, optimal requirements have been established (3). The researchers' main findings on vertical axis wind turbines are aligned in this paper, which explains

the details of these methods. When circumstances are not too typical HAWTs, VAWTs are suitable for power ports such as high wind speed and turbulent owing to wind turbulence capabilities, according to a more thorough look at the definitions(4).

Another major benefit is that VAWTs are always available. No Yawing processes are recognized on the path. A few potential characteristics may also be utilized further, according to the table. The difference between VAWTs(5).

Small wind turbines with a rotating axis perpendicular to the ground are the most common VAWTs. This enables VAWTs to operate regardless of wind direction, which is a major benefit in urban applications where wind direction may vary quickly(6). The Darrieus rotors (lift-mounted) and the Savonius rotors are used in both main VAWT types. A number of large Darrieus turbines have been constructed in recent years, including vertical axis wind turbines being tested in America and the Musgrove turbine being tested in England. All types of turbines are now well established in the area of wind energy research (7)(8). This VAWT is intended to expand the sweeping area and power capability while maintaining the intrinsic elegance of the original design (9).

Differences in atmospheric pressure cause wind. Both the Earth's surface and the atmosphere are warmed by the sun's rays (10). While some parts of the planet have a warmer climate because they receive direct sun rays, others have a colder climate because they receive indirect sun rays(11).

Furthermore, the air we breathe is made up of hundreds of millions of microscopic particles. The weight of each of these particles is stacked on top of each other, causing the Earth's surface to be weighed (12). Atmospheric pressure is created as a result of this. Atmospheric pressure is a force that varies depending on how hot or cold the Earth's surface(13). When the surface warms up, for example, the air closest to the surface warms up as well. As a result, the particles will rise upwards and eventually spread out as shown in the Figure 1.



Figure 1: The Particles Will Rise Upwards and Eventually Spread Out(11).

With the integration of the primary motor shaft, it is intended to transverse with wind speed. The major components of the VAWT must be positioned at the base of the turbine during development(14). The major components of this device, including as generators and transmission units, are located relatively near to the ground, making turbine maintenance easy(15). Operating costs are also kept to a minimum. Furthermore, the VAWT is designed to avoid pointing in the direction of the wind, eliminating the need for wind detection and orientation devices(16). Wind turbines with vertical axes are becoming increasingly popular as a tool for producing local electricity, particularly for new buildings. Vertical axis turbines have the advantage of being much closer to the ground and are thus ideal for roof arrays as shown in the Figure 2.

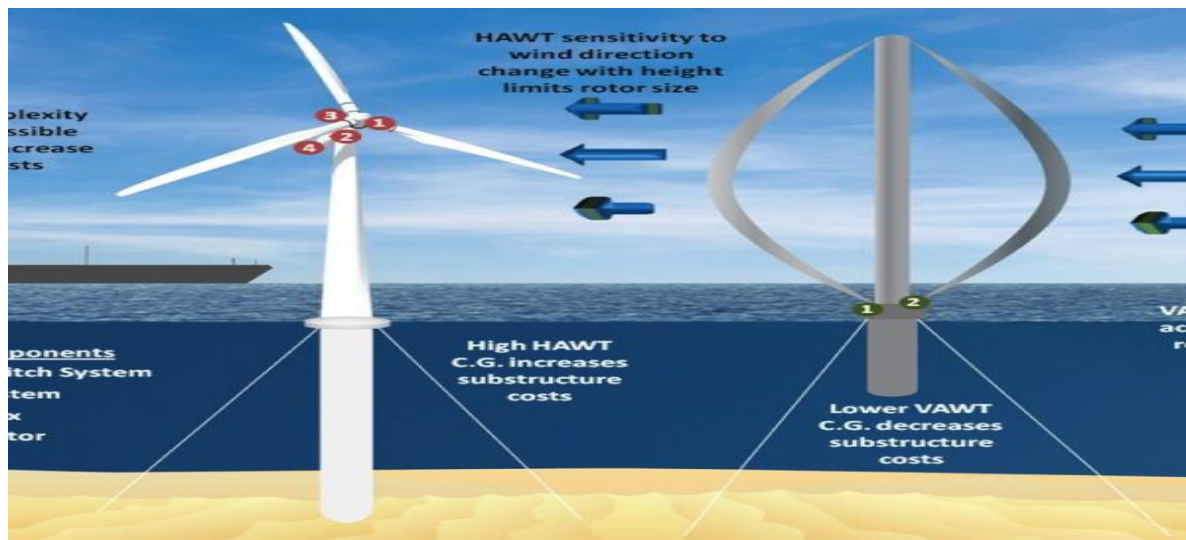


Figure 2: Vertical axis wind turbine(17).

1.1 Advantages:

Traditional horizontal wind turbines have been under development for more than a century (HAWTs). Blades and their processing, gearboxes, manufacturing technologies, angle pitches and technology, and so on are all included. The platform is quite sophisticated. Betz's Law, which governs how much energy a HAWT can extract from the environment, is based on a single disc traveling in two dimensions (the rotor)(18). As VAWTs with the lower bear anchored to the ground are frequently installed, a big and massive construction of the tower is less often employed. Without the need of yaw mechanisms, designs for fixed pitch rotors may be created. At lower start-up velocities, VAWTs are faster than HAWTs. They usually start producing energy at a speed of 6 MPH (10 km/h). On VAWTs, a lower noise signature may be observed(19).

1.2 Disadvantages:

Because of the additional drag when their blades spin into the wind, many VAWTs only reach half the productivity of HAWTs. Even when VAWTs are on the field, they are often overburdened. If not constructed correctly, the above structure will make changing components nearly difficult without dismantling the structure. VAWTs can't collect as much energy at a single place as HAWTs with the same track or height since their rotors are closer to the ground

and lower owing to the wind(20). As a result, VAWTs are seldom utilized, especially because of the severe drawbacks mentioned below:

i. Quality of low power generation

ii. They operate in narrow wind velocities and sometimes stall so that their power production is limited

iii. Weak stability limits turbine life while spinning.

Wind is a secondary source of solar energy in an area that is constantly bathed in sunlight. The kinetic energy of the circulating wind is linked to wind power. It is created by a point where the sun's energy is caused by uneven heating of the planet's surface, as well as other factors such as tilting and movement of the globe in space (21).

Small wind turbines with a rotating axis perpendicular to the earth are known as VAWTs. This enables VAWTs to operate regardless of wind direction, which is a major benefit in urban applications where wind direction may vary quickly. The Darrieus rotors (lift-mounted) and the Savonius rotors are used in both main VAWT types (22).

2. DISCUSSION

This paper discusses about the Scientists and engineers have built wind turbine systems and researched them using a number of techniques. The optimal requirements for VAWTs have been established. This article, which describes the specifics of these techniques, aligns the researchers' major results on vertical axis wind turbines. According to a more comprehensive examination of the criteria, VAWTs are appropriate for power ports such as high wind speed and turbulent because of their wind turbulence capabilities(23). Another significant advantage is that VAWTs are accessible at all times. On the route, there are no Yawing processes to be found. According to the table, a few potential characteristics could be used further. There is a distinction between VAWTs and this table.

The most popular VAWTs are small wind turbines with a spinning axis perpendicular to the ground. This allows VAWTs to function independent of wind direction, which is particularly useful in urban settings where wind direction may change rapidly. In both major VAWT types, the Darrieus (lift-mounted) and Savonius rotors are utilized(24). In recent years, a number of huge Darrieus turbines have been built, including vertical axis wind turbines in the United States and the Musgrove turbine in England. In the field of wind energy research, all kinds of turbines are now well established. This VAWT is designed to increase the sweeping area and power capabilities while retaining the original design's inherent elegance(25).

It is designed to traverse with wind speed due to the integration of the main motor shaft. During development, the VAWT's main components must be placed near the turbine's base. The device's primary components, including as generators and transmission units, are very close to the ground, making turbine maintenance simple. Operating costs are kept to a bare minimum as well. The VAWT is also intended to avoid pointing in the direction of the wind, obviating the requirement for wind sensing and orientation equipment. Wind turbines with vertical axes are becoming more popular as a source of local electricity, especially for new construction.

3. CONCLUSION

Vertical axis wind turbines are an economically feasible energy option for rural regions distant from linked grid networks. The difficulties associated with different patterns, such as poor self-

starting and low initial torque, need be addressed in order to expand the usage of VAWT. In addition, the following conclusions may be made from this study: There is ample wind energy potential accessible throughout the globe. Effective wind turbine designs must be created in order to make the most of it. The energy needs will be met by a variety of vertical wind turbines with a reasonable payback period.

The energy coefficient may be improved by utilizing an acceptable operating range for various setups. Significant breakthroughs in wind turbine building have been made feasible because to advances in new technologies. Modern wind turbine technology has been evaluated in terms of overall efficiency; factors such as wind turbine selection, wind speed, location, height, or wind power capacity have been taken into consideration as an unbiased function of probability model. For the building of wind turbines on windy locations, meteorological data is required. Experimental and analytical methods are utilized to investigate wind turbine vibration issues. Aeroacoustics measures are used to monitor noise on the aero foil. Wind turbine modeling is an important component of the structural analysis of wind turbines. The aerodynamic forces of the aerosol blades are calculated using the concept of aerodynamic simulation of blade components. The operating characteristics of the wind turbine are provided within a specified range using control system modeling. The achievements and developments in the field of wind energy drive the renewable energy industry.

Wind turbines may now be constructed at a cheaper cost than before, allowing for more efficient power production. The manufacture of blades is very significant. Efficiency and extraction of energy from turbines. With the assumption that it is located in a reasonably windy spot, with tailored blade parameters and design requirements, the vertical wind turbine produces high power and can be used to produce electricity for remote areas

REFERENCES

1. Meza CSR, Kashif M, Jain V, Guerrero JWG, Roopchand R, Niedbala G, et al. Stock markets dynamics and environmental pollution: emerging issues and policy options in Asia. *Environ Sci Pollut Res*. 2021;
2. Wilson RE. Wind-turbine aerodynamics. *J Wind Eng Ind Aerodyn*. 1980;
3. Jun W, Mughal N, Zhao J, Shabbir MS, Niedbala G, Jain V, et al. Does globalization matter for environmental degradation? Nexus among energy consumption, economic growth, and carbon dioxide emission. *Energy Policy*. 2021;
4. Akpinar EK, Akpinar S. An assessment on seasonal analysis of wind energy characteristics and wind turbine characteristics. *Energy Convers Manag*. 2005;
5. Hansen AD, Lov F, Blaabjerg F, Hansen LH. Review of contemporary wind turbine concepts and their market penetration. *Wind Eng*. 2004;
6. Lunney E, Ban M, Duic N, Foley A. A state-of-the-art review and feasibility analysis of high altitude wind power in Northern Ireland. *Renewable and Sustainable Energy Reviews*. 2017.
7. The Phan C, Jain V, Purnomo EP, Islam MM, Mughal N, Guerrero JWG, et al. Controlling environmental pollution: dynamic role of fiscal decentralization in CO2 emission in Asian economies. *Environ Sci Pollut Res*. 2021;

8. Van NTT, Vrana V, Duy NT, Minh DXH, Dzung PT, Mondal SR, et al. The role of human-machine interactive devices for post-COVID-19 innovative sustainable tourism in Ho Chi Minh City, Vietnam. *Sustain.* 2020;
9. Nagare P, Nair A, Shettigar R, Kale P, Nambiar P. Vertical axis wind turbine. In: *Proceedings - International Conference on Technologies for Sustainable Development, ICTSD 2015.* 2015.
10. Duy NT, Mondal SR, Van NTT, Dzung PT, Minh DXH, Das S. A study on the role of web 4.0 and 5.0 in the sustainable tourism ecosystem of Ho Chi Minh City, Vietnam. *Sustain.* 2020;
11. Martínez E, Sanz F, Pellegrini S, Jiménez E, Blanco J. Life-cycle assessment of a 2-MW rated power wind turbine: CML method. *Int J Life Cycle Assess.* 2009;
12. Jain V, Goyal M, Pahwa MS. Modeling the relationship of consumer engagement and brand trust on social media purchase intention-a confirmatory factor experimental technique. *Int J Eng Adv Technol.* 2019;
13. Meenu, Andeep Kumar S, Panchal VK, Kumar R. Evolution of new integrated haze removal algorithm based on haze line. *Int J Eng Adv Technol.* 2019;
14. Sharma A, Sharma MK, Dwivedi RK. Hybrid neuro-fuzzy classification algorithm for social network. *Int J Eng Adv Technol.* 2019;
15. Gola KK, Dhingra M, Rathore R. Modified version of playfair technique to enhance the security of plaintext and key using rectangular and substitution matrix. *Int J Eng Adv Technol.* 2019;
16. Agrawal T, Agrawal AK, Singh SK. An efficient key-accumulation cryptosystem for cloud. *Int J Eng Adv Technol.* 2019;
17. Pettit JL, O'Keefe JM. Day of year, temperature, wind, and precipitation predict timing of bat migration. *J Mammal.* 2017;
18. Choudhary P, Dwivedi RK, Umang. A novel framework for prioritizing emergency vehicles through queueing theory. *Int J Eng Adv Technol.* 2019;
19. Young Jr. D, Erickson W, Strickland M, Good R, Sernka K. Comparison of avian responses to UV-light-reflective paint on wind turbines. Subcontract Rep July 1999 - December 2000 Natl Renew Energy Lab. 2003;
20. Singh BK, Singh AK, Singh VK. Exposure assessment of traffic-related air pollution on human health - a case study of a metropolitan city. *Environ Eng Manag J.* 2018;
21. A REVIEW PAPER ON VERTICAL AXIS WIND TURBINE FOR DESIGN AND PERFORMANCE STUDY TO GENERATE ELECTRICITY ON HIGHWAY. *Int J Adv Eng Res Dev.* 2016;
22. Whittlesey R. Vertical Axis Wind Turbines: Farm and Turbine Design. In: *Wind Energy Engineering: A Handbook for Onshore and Offshore Wind Turbines.* 2017.
23. Gupta P, Kumar A. Fluoride levels of bottled and tap water sources in Agra City, India. *Fluoride.* 2012;

24. Khan MK, Haroon A, Hanif SA, Husain M. A study of pattern of fatal head injury at J.N.M.C. hospital, Aligarh. Indian J Forensic Med Toxicol. 2012;
25. Garg N, Jain AK, Ansari A, Sharma A, Singh J, Chugh T. Dimorphism of maxillary and mandibular canine teeth in establishing sex identity. Indian J Forensic Med Toxicol. 2012;

A CLINICAL REVIEW OF SKIN DISEASES IN AN AGING POPULATION

Dr Vinita Gupta*

*Department of Medical,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id- vinitagupta4@gmail.com

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ABSTRACT

In terms of diagnosis, treatment, and follow-up, geriatric dermatoses provide a difficult task for physicians. Because the skin of the elderly population undergoes significant changes both intrinsically and extrinsically, it is critical for physicians to have a stronger understanding of the pathogenesis of geriatric skin conditions as well as their specific management that also differs slightly from that of the adult population. This study focuses on a short overview of the pathophysiological elements of skin diseases in the aged, as well as a description of several typical geriatric skin disorders including their treatment, as well as the new developing role of mental dermatological aspects of geriatric dermatoses. Finally, ten multiple-choice questions are included to help readers expand their knowledge base.

KEYWORDS: *Clinical, Dermatoses, Diseases, Population, Skin.*

1. INTRODUCTION

The treatment of dermatoses in elderly people has been a major topic of discussion in recent years. The occurrence of geriatric skin conditions is becoming more widely recognized as the population over 65 years old grows, as does the percentage of patients in geriatric care facilities[1]. Senior people account for 37.3 million Citizens now, and by 2050, that figure is projected to rise to 86.7 million, or 21% of the population. During 2006 and 2050, the number of people aged 65 and above is expected to grow by 147 percent[2]. Elderly individuals are susceptible to a broad range of dermatological problems as a result of degenerative and metabolic changes that occur across the skin layers all through the aging process. In the senior population, neurologic or systemic illnesses, health and hygiene, socioeconomic level, climate, skin color, gender, diet, culture, or personal habits, including such smoking or drinking, may all have a part in the development of cutaneous problems[3]. Providers have a significant difficulty in diagnosing some dermatoses in the elderly population. Taking notes on history may be challenging. Patients often have numerous medical issues and drug regimes[4]. The clinical manifestations of skin diseases may vary from those seen in younger people, and they may not appear in the same way[5].

The dermatoses of the elderly differ from nation to country. Eczematous dermatitis was the most frequent condition in a study of 4099 elderly patients performed in Turkey², followed by fungal infections, pruritus, bacterial infections, as well as viral infections. In Turkey, geriatric dermatoses showed a seasonal trend as well. Infestations were particularly prevalent in the spring

and summer. In the summer, fungus infections were prevalent[6]. During the fall season, pruritus was quite prevalent. Fungal infection (49.7%) and xerosis (45.3%) were found to be the most prevalent dermatoses in another research performed in the same nation on 300 elderly individuals in three senior residences. The most prevalent diseases in Singapore were xerosis as well as asteatosis eczema, followed by scabies, infectious diseases, as well as eczematous dermatitis. Infections caused by fungi and viruses were less frequent[7]. Eczematous dermatitis was the most prevalent skin condition in Taiwan, followed by fungus, xerosis, benign tumors, among viral infections[8].

1.1.Changes in the skin as Age:

There are two kinds of skin aging: chronological skin aging as well as photoaging. Both have clinical and histological differences. Physiological changes in skin function define chronological skin aging[9]. UV rays cause photoaging, and the consequences are particularly noticeable on exposed skin. Skin changes in the older population may be intrinsic or extrinsic in nature. Intrinsic alterations are those that occur as a result of the skin's normal metabolic aging process. The upper layer of the skin thins, blood flow decreases, and the skin's natural ability to nourish as well as repair cells is jeopardized[9]. Collagen structural changes decrease overall elasticity. Furthermore, a decline in immunological function adds to skin aging by weakening the skin's capacity to protect itself against bacterial attack[10]. Variable epidermal thickness, size and form fluctuation, fewer Langerhans' cells, and fewer melanocytes, as well as occasional nuclei atypia, are all inherent alterations in the skin of the aged. Skin roughness and uneven pigmentation are caused by decreased and irregular epidermal turnover[11]. The skin's capacity to prevent water loss remains same, but it is more porous to chemical compounds. Chemical compounds enter the skin rapidly, but owing to alterations in the dermal matrix and a decrease in vasculature, they are eliminated slowly[12].

1.2.Asteatosis Dermatitis Is A Kind Of Dermatitis That Affects The Skin:

Asteatosis dermatitis (eczema craquele) is a kind of eczema that is most prevalent in the elderly but may affect anybody[13]. Dry, cracked, or fissured patches on the limbs define asteatotic eczema. It's very frequent in the winter. Predisposing conditions include the sun, wind, and low humidity. Asteatotic eczema develops as a result of lipid as well as free fatty acid depletion in the epidermis. Internal malignancy, including malignant lymphoma, should be examined in cases with extensive or widespread eczema craquele[14]. The atmosphere should be humidified and irritants should be avoided while treating asteatotic dermatitis. Baths should be kept to a minimum and should not be too hot. Soaps should be avoided at all costs, and bath oils should be used instead. Emollients should be applied every day after bathing. Weak corticosteroids based on urea are also beneficial. Because the skin of the elderly is already thin and delicate, topical steroids should be used with caution[15].

1.2.1. Pruritus:

Xerosis is the most frequent cause of pruritus or itching. It is one of the most often reported symptoms in the older population, with a prevalence rate of about 29%. The etiology of the disease is not well known. It's been hypothesized that age-related nerve alterations lead to higher touch and pain thresholds, perhaps owing to subclinical neuropathy. Liver disease, iron deficiency anemia, hypothyroidism, uremia, polycythemia, leukemia/lymphoma, atopic

dermatitis, ichthyosis, thyroid disorders, chronic renal failure, drug-induced disorders, and other systemic disorders have been implicated in 10–50 percent of cases[16].

1.2.2. Dermatitis stasis:

Because of insufficient vascular supply, stasis dermatitis (hypostatic eczema) develops on the lower legs. Chronic pruritic dermatitis occurs with times of aggravation, and varicose veins are common. Weepy or dry dermatitis, scaly or lichenified dermatitis are all possibilities. Cellulitis and lymphangitis may occur as a result of a secondary bacterial infection. The most frequent consequence of hypostatic eczema is ulcers. Stasis dermatitis may appear as a single lesion that looks like a tumor, necessitating early diagnosis and assessment. Venous hypertension, circulatory stasis, and changed situation severe stress all have a part in the inflammatory response that leads to venous dermatitis and ulceration, which is followed by leukocyte activation. External compression of the leg through bandaging as well as support socks is the only effective therapy for venous hypertension[17].

1.3.Infections:

Infections such as bacterial, viral, as well as fungal infections are common in the elderly population. A change in skin architecture but instead loss of barrier function induced by multiple physical factors, malnourishment, but instead nutritional deficiencies are common causes of superficial bacterial infections caused by staphylococcus but instead streptococcus. Impetigo can manifest in both bullous and non-bullous forms[18]. Antibiotics, both topical and systemic, are required for treatment. Cellulitis is an infection of the subcutaneous fat that can coexist with erysipelas, a skin infection caused by streptococcus pyogenes or staphylococcus aureus that affects the dermis and upper subcutaneous tissue. It is commonly seen on the lower limbs in the elderly due to venous stasis.

1.4.Infections Caused By Viruses:

Viral infections, especially herpes zoster, are common in the elderly due to weakened immune systems. Varicella zoster virus (VZV) becomes latent in the dorsal root ganglion after a young child recovers from chicken pox. VZV is reactivated after a loss of immunity[19]. The infestation is very painful and occurs in a dermatomal pattern. The annual incidence of herpes zoster is estimated to be 1,000,000 cases, with higher rates in adults over the age of 60. It's marked by a prodromal sharp stabbing pain that appears before the rash and can last for the duration of the vesicular eruption. Herpes zoster infection is linked to post-herpetic neuralgia, which is a type of pain syndrome. Sharp stabbing pain that lasts for months to years after the lesions have disappeared is known as post-herpetic neuralgia[20].

1.4.1. Infections With Fungi:

Onychomycosis, tinea cruris, tinea pedis, as well as candidiasis are prevalent fungal diseases in the elderly population. The elderly population is prone to onychomycosis, or fungal growth of the nails, especially the toenails[21]. Trichophyton rubrum, trichophyton mentagrophytes, epidermophyton floccosum, and candidal infections are the most frequent causes. In one research, 46.4 percent of the 450 cases examined had a single fungal organism cultivated, 30.4 percent had a mixed fungal infection produced, and 23.1 percent had no fungal growth cultured. Saprophytes were discovered in 59.9% of the 526 total fungal species cultivated, whereas dermatophytes were found in only 23.8 percent of the total fungal organisms produced.

Onychomycosis is characterized by clinical discolouration that begins at the free edge of the nail or at the lateral nail fold, as well as subungual hyperkeratosis that leads to separation of the nail plate from the nail bed[22].

Candidiasis may cause cutaneous, mucosal, paronychia, or onychia lesions, as well as persistent mucocutaneous or granulomatous lesions[23]. It's most prevalent in warm, moist intertriginous regions like the sub mammary folds, inguinal, anogenital, and perioral areas. Maceration, heat, humidity, obesity, diabetes, antibiotic treatment, and chemotherapy are the major predisposing factors. It appears as a reddish-brown eruption with satellite papules. The potential of diseases (e.g. must be addressed when cutaneous candidiasis is prevalent in immunocompromised individuals, such as those with diabetes, leukemia, lymphoma, transplants, or cancer. For the diagnosis, direct microscopy for pseudohyphae and culture are standard tests. Topical antifungal treatments like imidazole or allylamine derivatives help remove the lesions, and keeping the region dry speeds up the healing process. When there is resistance or a poor response to topical therapy, systemic antifungal drugs such as thiazole derivatives may be utilized[24].

1.5.Dermatological Psychiatric Diseases:

The topic of increased awareness of psychocutaneous illnesses is presently being debated. Skin disorders having psychological implications and psychiatric illnesses with skin symptoms are both classified as psych dermatological disorders. Psychocutaneous disorders in elderly people are mostly self-inflicted and affect only parts of the body that can be reached with the hands. The psychology plays an essential role in the development and evolution of the presenting lesions. Unfortunately, many doctors, including dermatologists, are unaware of and unconcerned about the link between skin and psyche, and in many instances, a psych dermatological approach is needed to treat these problems[25]. 68 Lichen simplex chronicus, neurotic excoriations, prurigo nodularis (PN), and delusions of parasitosis are all common mental dermatological diseases in the elderly. Neurotic excoriations, also known as pathological skin picking, are irregular skin lesions that don't fit into any other skin condition. Neurotic excoriations, also known as pathological skin picking, affect between 1.4 and 5.4 percent of the general population, with a greater incidence in females and mental patients. In the context of post-inflammatory scars, the lesions may appear as a variety of excoriated papules at various phases of recovery. The patient often confesses to utilizing his or her skin as a stress reliever

1.6.Eruptions Caused By Drugs:

The sudden development of a skin lesion in a patient who has never had a skin problem should always raise the suspicion of a medication reaction. Because of numerous medical problems, elderly people are prone to be on several medicines. From a physiological perspective, the elderly's respiratory, excretory, and metabolic processes weaken, and numerous medicines are more likely to collect in the body, resulting in a high rate of drug eruptions. Medication eruptions are said to account for 10–30% of all reported adverse drug responses in the general population. Exanthematic eruptions are the most frequent in the older population, and typically appear as maculopapular, morbilliform, or erythematous lesions.

1.7.Neoplasms:

Both benign or malignant neoplasms have been seen more often in the older population. The condition known as seborrheic keratosis, commonly known as seborrheic warts, is unrelated to

seborrhea. The most frequent benign lesion is this one. The origin is unclear, however lesions appear as brown or black papules or plaques with a distinctive network of indentation or crypts on their surface, as well as an abrupt edge that resembles plasticine adhered to the skin's surface. The trunk, face, or proximal extremities are the most often afflicted areas. Dermatitis papulosa nigra, stucco keratosis, inverted follicular keratosis, big cell acanthoma, lichenoid keratosis, as well as flat seborrheic keratosis are the six subtypes of seborrheic keratosis

1.8.Photo Dermatoses Are A Kind Of Dermatitis That Occurs When:

Photo dermatoses are a group of skin conditions that may develop as a result of extended exposure to sunlight. Actinic dermatitis, which is clinically comparable to contact allergic dermatitis but differs from drug-induced photosensitivity, is a disease caused by aberrant photosensitivity. In a 20-year retrospective analysis of 76 patients, Victor et al.⁹³ discovered that the number of prescription reactions increased, sunscreens as well as antibacterial agents were the most common allergens eliciting photoallergic contact dermatitis, and fragrances were the least common allergens eliciting photoallergic skin irritation, and that there was a decrease in photoallergic contact dermatitis induced by fragrances. In challenging instances, photo-patch testing as well as patch testing may be useful in detecting actinic dermatitis.

1.9.Deficiencies In Nutrition:

Chronic diseases, malabsorption, reduced metabolism, immobility, melancholy, eating disorders, social deprivation, drunkenness, narcotics, and poverty all render the elderly vulnerable to a wide range of nutritional problems. Glycation, which is the non-enzymatic interaction between free amino acids and reducing sugars, has been explored by a number of writers. This process produces new residues as well as cross-link forms (advanced glycation end-products) in the dermis' extracellular matrix. The development of these bridges between epidermal molecules is thought to be responsible for the dermis' loss of flexibility and other characteristics as it ages. As a result, glycation may play an essential role in chronologic aging

1.10. Managing Skin Disease In The Elderly: Treatment Recommendations:

The treatment of cutaneous diseases in the elderly is difficult. Several variables influence treatment adherence, including deteriorating cognitive state, such as memory loss and dementia, physical restrictions, and decreased sensory functioning. This group is psychosocially reliant on others, and many of them lack secure shelter and nourishment. Polypharmacy is prevalent as a result of a variety of medical issues, increasing the risk of cutaneous medication responses. Over-the-counter medicines, homeopathic treatments, and herbal supplements are used by a number of patients. Patients or their careers should be explicitly questioned about this, since many do not consider them to be medicines^{[24][26]}.

2. DISCUSSION

In recent years, the treatment of dermatitis in the elderly has been a hot subject of debate. As the population over 65 years old increases, so does the proportion of patients in geriatric care facilities, the incidence of geriatric skin diseases is becoming more well acknowledged. Diagnosing, treating, and following up on geriatric dermatoses is a tough job for doctors in terms of diagnosis, treatment, and follow-up. Because the skin of the old population experiences substantial changes both inside and externally, doctors must have a deeper knowledge of the etiology of geriatric skin diseases, as well as their unique management staff, which varies

somewhat from that of the adult population. It bears the weight of aging both outwardly and inwardly, resulting in pathological processes that may wreak havoc on the health and quality of life of older individuals.

REFERENCES:

1. J. K. Virk, A. N. Kalia, V. K. Gauttam, M. Mukhija, and G. Rath, "Development and characterization of spheroidal antidiabetic polyherbal formulation from fresh vegetable juice: A novel approach," *J. Food Biochem.*, 2021, doi: 10.1111/jfbc.13290.
2. T. Wei and Y. Li, "Rice Reoviruses in Insect Vectors," *Annual Review of Phytopathology*. 2016, doi: 10.1146/annurev-phyto-080615-095900.
3. P. Xu, F. Chen, J. P. Mannas, T. Feldman, L. W. Sumner, and M. J. Roossinck, "Virus infection improves drought tolerance," *New Phytol.*, 2008, doi: 10.1111/j.1469-8137.2008.02627.x.
4. G. Lima-Mendez *et al.*, "Determinants of community structure in the global plankton interactome," *Science (80-.)*, 2015, doi: 10.1126/science.1262073.
5. C. Kajihara, M. Munechika, M. Sano, M. Kaneko, and H. Jin, "Changes in the Functions for Continued Healthcare Services during a Disaster," *Prehosp. Disaster Med.*, 2017, doi: 10.1017/s1049023x17001510.
6. J. Martinez *et al.*, "Symbionts Commonly Provide Broad Spectrum Resistance to Viruses in Insects: A Comparative Analysis of Wolbachia Strains," *PLoS Pathog.*, 2014, doi: 10.1371/journal.ppat.1004369.
7. P. G. Ansari, R. K. Singh, S. Kaushik, A. Krishna, T. Wada, and H. Noda, "Detection of symbionts and virus in the whitefly Bemisia tabaci (Hemiptera: Aleyrodidae), vector of the Mungbean yellow mosaic India virus in Central India," *Appl. Entomol. Zool.*, 2017, doi: 10.1007/s13355-017-0510-3.
8. H. Guo, Y. Qu, X. Liu, W. Zhong, and J. Fang, "Female-biased symbionts and tomato yellow leaf curl virus infections in Bemisia tabaci," *PLoS One*, 2014, doi: 10.1371/journal.pone.0084538.
9. M. J. Roossinck, "Move Over, Bacteria! Viruses Make Their Mark as Mutualistic Microbial Symbionts," *J. Virol.*, 2015, doi: 10.1128/jvi.02974-14.
10. S. Li, C. Zhou, G. Chen, and Y. Zhou, "Bacterial microbiota in small brown planthopper populations with different rice viruses," *J. Basic Microbiol.*, 2017, doi: 10.1002/jobm.201700004.
11. K. LeBlanc and S. Baranoski, "Skin tears: the underappreciated enemy of aging skin.," *Wounds Int.*, 2018.
12. H. B. Kolachi, M. I. Siddiqui, M. N. Memon, M. S. Memon, G. S. Abro, and A. Kazi, "Integration of preventive and curative health services for flood survivors by LUMHS - A successful health care model for preparedness of future floods in Pakistan (A community based research survey)," *J. Liaquat Univ. Med. Heal. Sci.*, 2013.
13. E. Rosenberg and I. Zilber-Rosenberg, "Microbes drive evolution of animals and plants: The

-
- hologenome concept,” *mBio*. 2016, doi: 10.1128/mBio.01395-15.
14. J. Martinez *et al.*, “Symbiont strain is the main determinant of variation in Wolbachia-mediated protection against viruses across *Drosophila* species,” *Mol. Ecol.*, 2017, doi: 10.1111/mec.14164.
 15. D. Chakraborti *et al.*, “Contamination des eaux souterraines en arsenic et ses effets sur la santé en Inde,” *Hydrogeol. J.*, 2017, doi: 10.1007/s10040-017-1556-6.
 16. L. Qiang, R. Fujita, and A. Abeliovich, “Remodeling Neurodegeneration: Somatic Cell Reprogramming-Based Models of Adult Neurological Disorders,” *Neuron*. 2013, doi: 10.1016/j.neuron.2013.06.002.
 17. D. Chakraborti *et al.*, “Groundwater arsenic contamination and its health effects in India,” *Hydrogeol. J.*, 2017, doi: 10.1007/s10040-017-1556-6.
 18. F. P. Ryan, “Viruses as symbionts,” *Symbiosis*, 2007.
 19. H. Chandra *et al.*, “Promising roles of alternative medicine and plant-based nanotechnology as remedies for urinary tract infections,” *Molecules*. 2020, doi: 10.3390/molecules25235593.
 20. V. G. Clatici *et al.*, “Perceived Age and Life Style. The Specific Contributions of Seven Factors Involved in Health and Beauty,” *Maedica (Buchar)*., 2017.
 21. J. Bajaj *et al.*, “Antidepressant activity of *Spathodea campanulata* in mice and predictive affinity of spatheosides towards type A monoamine oxidase,” *Cell. Mol. Biol.*, 2021, doi: 10.14715/cmb/2021.67.1.1.
 22. A. Shevchenko, R. Valdes-Rodriguez, and G. Yosipovitch, “Causes, pathophysiology, and treatment of pruritus in the mature patient,” *Clin. Dermatol.*, 2018, doi: 10.1016/j.clindermatol.2017.10.005.
 23. M. Sandhu *et al.*, “RiceMetaSys for salt and drought stress responsive genes in rice: A web interface for crop improvement,” *BMC Bioinformatics*, 2017, doi: 10.1186/s12859-017-1846-y.
 24. Y. Fofana *et al.*, “Geriatric dermatoses in patients hospitalized in the department of dermatology in Bamako (Mali),” *Pan Afr. Med. J.*, 2016, doi: 10.11604/pamj.2016.25.206.10568.
 25. R. Sehrawat, M. Maithani, and R. Singh, “Regulatory aspects in development of stability-indicating methods: A review,” *Chromatographia*. 2010, doi: 10.1365/s10337-010-1612-z.
 26. L. Y. Huang, Y. C. Wang, C. C. Wu, Y. C. Chen, and Y. L. Huang, “Risk of flood-related diseases of eyes, skin and gastrointestinal tract in Taiwan: A retrospective cohort study,” *PLoS One*, 2016, doi: 10.1371/journal.pone.0155166.

REVIEW OF DIFFERENT TYPES OF BEARING FAILURE

Arun Kumar*

*Faculty of Engineering,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email Id-arun.engineering@tmu.ac.in

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ABSTRACT

Bearings is a movable item, hence friction forces should be overcome in order to progress the Bearing. To lower or bottom the frictional forces on the working mechanism, different kinds of bearing are being used. The bearing gets its derived from the fact that it is used to support a rotating axle or shaft. Because rolling bearings use balls or sphere or rollers, they are referred to as "rolling elements." You can compute bearing average lifespan depending on the material stress if you know actual operational load and speeds. Those estimations must be based on the assumption that the bearing is properly placed, lubricated, and otherwise handled. It is unable to account for the impact of unfavourable operational conditions. Bearings failures have a significant economic and industrial impact. The purpose of this research is to investigate and identify the primary factors that restrict bearing efficiency, resulting in mode of failure.

KEYWORDS: *Bearing Failure, Failure Analysis, Ball Bearings, Roller Bearing, Rolling Element.*

1. INTRODUCTION

Bearing are a key machinery element (1) that is utilized in a wide range of applications, including rotating components. In general, rolling element bearings are made up of two rings, an internal and an exterior, in which a set of balls or rollers rotate in raceways. Bearings are one of the most important machine elements (2) that are used in a wide range of industries and have shown to be dependable and long-lasting when used appropriately. The loads on the bearings can be angular, axial, or radial, accordance with the design specification (3). Although ball and roller bearings are simple mechanics, their interior processes are complicated. Early bearing failure and reduced bearing life (4) occurs under extreme conditions of heavy loads, fast speed, and also very lower or higher working temperature (5). Extreme deflection, vibrations, due to the frictional torque, and heating result when design specifications are still not met. Many key factors, including that of lubrication viscous, massive amount capability, load distribution, and power loss, are affected by bearing temperature. Thermal analysis (6) of bearing system is a topic on which many scholars are working. Ball and bearings losses are caused by a blockage in the bearing's lubrication supply or insufficient lubricating oil distribution to the racecourse contact (7).

Peripheral loads(8) are supported by circular ball bearings. For radial and tangential loads, an angle contacting bearing is used. For applied load, thrusting bearings are used. Roller bearings are utilized in moderate speed larger applications and have larger load capabilities than ball bearings for a given size(9). Cylinder, needles, tapering, and rolling element bearing are the fundamental bearings. The components of ball bearings and roller bearings are shown in Figure 1.

Bearings service life is measured in terms of the time or number of total of revolutions before breakdowns in the inner edge, outer ring, or roller element (ball or roller) occur as a result of rolling fatigue caused by repetitive stress(10). Maintenance costs rise as a result of bearing failure(11).

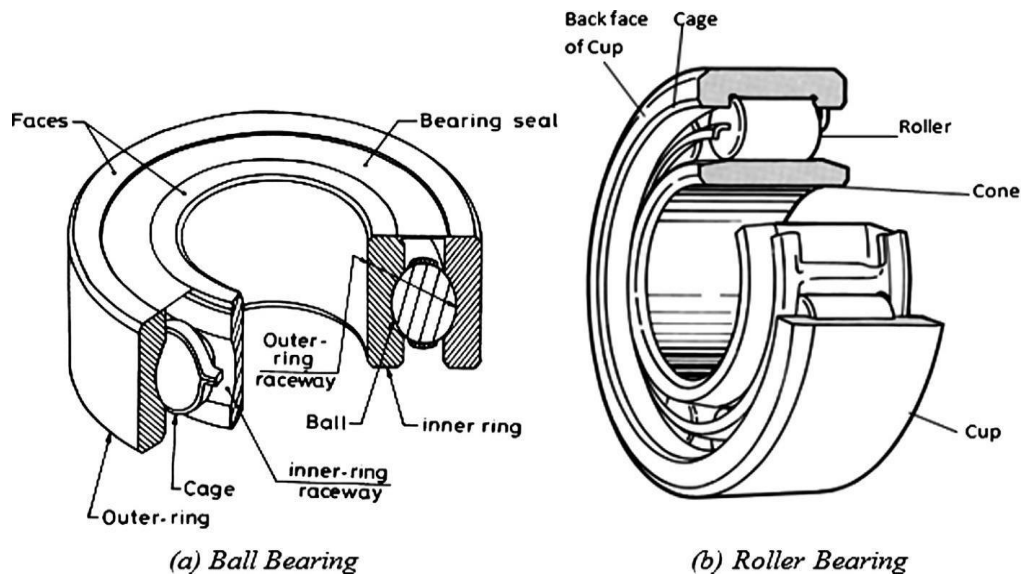


Figure 1: In the above shows the two image in which (a) Ball bearing and (b) Roller Bearing

2. ANALYSIS

One of its reasons for fatigue failure, according to Eschmann et al (1958), is that it starts with a small scissure between the raceway and the rolling parts and spreads progressively with continued operation. It also causes vibrations and raises noise levels(12). Contamination, incorrect lubrication, and dirt particles, according to Riddle (1995), cause bearing failure. Improperly placed bearings can potentially cause failure by pushing the bearing into the shaft and housing, resulting in physical damage known as brinelling (13). According to research, rolling contact fatigue arises as a result of cyclic stress. Increase the angle of oscillations to ensure roller overlapping and pull fresh lubrication into the area so that the surface of the raceway and the balls are separate by lubrication and frictional is reduced (14). The very first type is heat failure of rolling element bearings, which can occur at high rotational speeds and enormous radial loads, according to research et al (2015), and the second category is spindle bearings of high-speed machine tools. Because of the significant rollers/cage contact pressure and increased wear rate of the cage, the findings of

dynamic analysis for the first type of thermal failure demonstrate that the cage's unsteady motion can lead to an eventual bearing seizure. The simulation findings suggest that the minimal layer thickness at the raceways is the second category of thermal failure of rolling element bearings. At the raceways' contact areas, severe surface degradation and wear occur (15).

According to research (2014) investigated the tribological properties of cylindrical roller bearings. Wear rates are initially relatively low and remain constant over time. This wear is also to blame for the bearing's fatigue failure(16). The lubricant film is no longer capable of forming a hydrodynamic film between the roller and the inner race due to increased wear. Due to surface contact fatigue, a scanning electron microscope examination of the inner race and rollers revealed pits, cracks at the contact surface, and wear debris(17). The thickness of the lubrication film thins as the bearing temperature rises(15). Because of this, the lubricant film between the roller and the inner race could not be produced efficiently(18). FirstlinearmodelofvibrationinshaftbearingsystemwasproposedbyYhlandin1992duetobearingimperfectionlikeradialandaxialwaviness.

3. CAUSES OF FAILURE:

TABLE: 1: CAUSES OF FAILURE IN BEARINGS

Causes	Failure rate in %
Dirt	45.4
Misassembly	12.8
Misalignment	12.6
Insufficient Lubrication	11.4
Overloading	8.1
Corrosion	3.7
Other	3.2

The Table 1 above represents lists the major causes of premature bearing failure, along with percentage figures which indicate prime contributor to a bearing's destruction. In many cases a premature bearing failure is due to a combination of several of these causes(19).

3.1 Contamination:

Slightly dented of bearings wire harnesses and balls, as well as high vibrations and wear, are signs of contamination (20). Pollutants include dirt in the air, dirt in the bearing, or any abrasive substance that gets into the bearing(21). Dirty tools, polluted work environments, soiled hands, and interstitial fluid in lubrication or cleaning agents are the main sources of contamination(22).

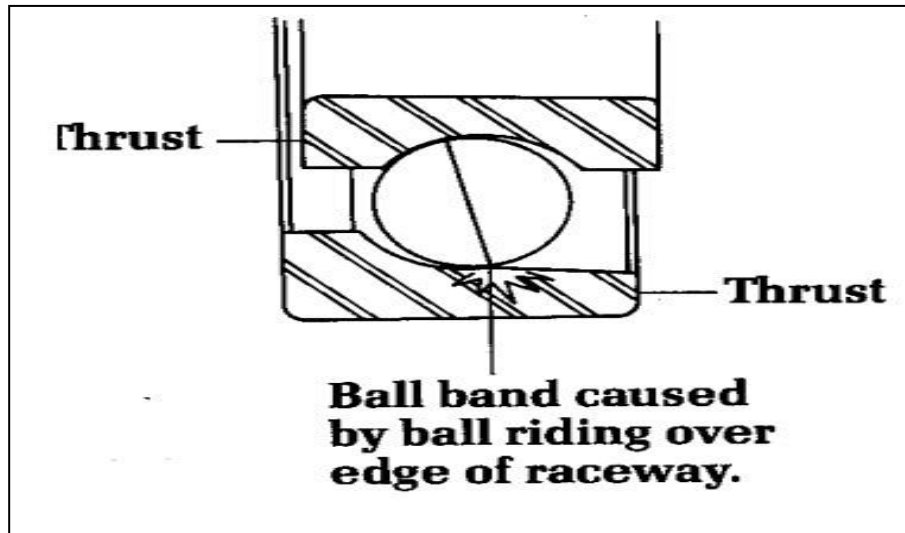


Figure: 2: Contamination

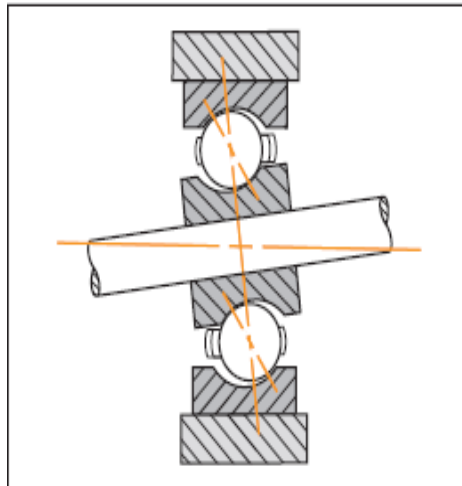


Figure: 3 Shaft misalignments

3.2 Misalignment:

Clear working areas and distance from grinding operation can reduce this type of failure and keep bearing in their original packaging until not ready for install.

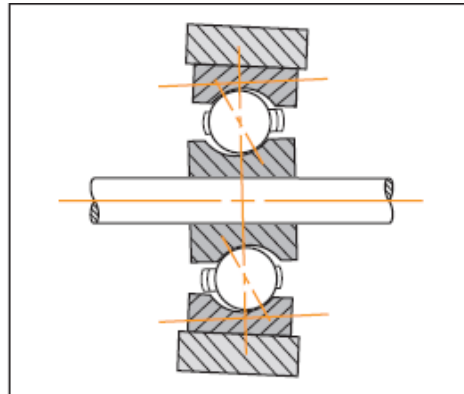


Figure: 4Housingmisalignments

If the misaligned is greater than 0.001 inch, a ball wear pathway which is not parallel to a racetrack edges can be noticed on the raceway of the non-rotating ring. An abnormal temperature increase in the bearings and housing, as well as significant wear in the caged ball pocket, can be expected. Bent shafts, burrs, or dirt on the shafts or house shoulder are most common reasons of misaligned (23). The shaft mismatch and housing mismatch are shown in Figures 3 and 4. We must take corrective measures in order to cure this. On non-hardened shafts, single statement turned threads are used; on hardened crankshaft, ground threads are used, and precise grade locknuts are used.

3.3 Corrosion:

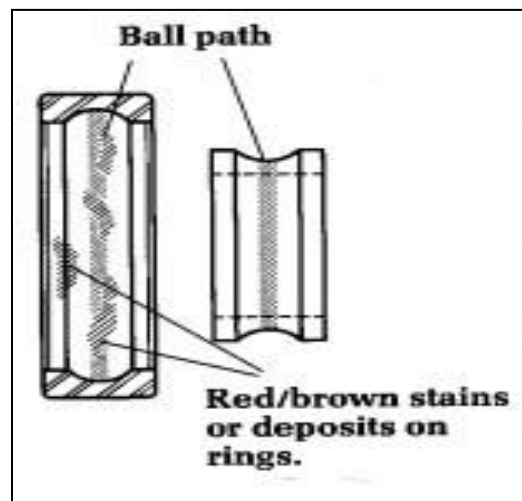


Figure 5: Corrosion

Corrosion signs include red/brown spots on ball bearing balls, conduits, cages, and bands Figure. 5 contact to chemical solvents or a corrosive environment causes this disease. Increasing vibration is usually followed by wear, with radial clearances or preload loss as a result. Only in exceptional circumstances. Early fatigue failures can be brought on by corrosion(24). Correct the

problem by directing corrosive liquids away from bearing areas and, where possible, using integrally sealed bearings. External seals, in addition to integral seals, should be considered if the environment is exceptionally harsh. It also helps that he uses stainless bearings(25).

3.4 Insufficient Lubrication:

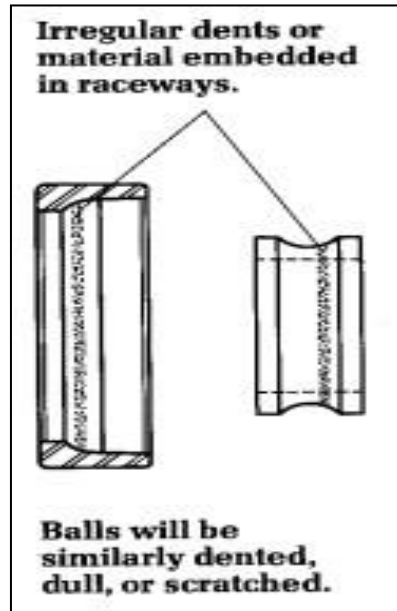


Figure 6: Insufficient Lubrication.

Ball tracks and balls that are discoloured (blue/brown) are signs of lubrication failure Figure 6. Overheating and catastrophic failure will occur as a result of excessive wear on the balls, rings, and cages. Ball bearings rely on the presence of an extremely thin lubrication film between balls and races, as well as between the cage, bearing rings, and balls, which is measured in millionths of an inch. Restricted lubricant flow or extreme temperatures that impair the lubricant's characteristics are the most common causes of failure.

3.5 Overheating:

When the bearing temperature(26) exceeds 150°C, the bearing raceway and rolling element can distort. Temperature increases can damage lubrication, and it also increases with speed. As a result, overload controls and cooling supply are effective treatments.

3.6 Excessive Loads:

Excessive fatigue life(27) can also be caused by tight fitting brinelling and incorrect preloading. Although heavy ball wear patterns, signs of overheating, and a more extensive visible with decreased life, this form of failure looks the same as normal fatigue. The solution is to lessen the load or modify the bearing to accommodate a larger capacity.

4. CONCLUSION

After reviewing all types of bearing failures, their causes, and remedies, we must take remedial action to remedy the above failures, which are primarily caused by lubricating, misaligned, and

contaminants. Premature bearings failures are caused by other indirectly failure such as poor operation condition, transportation, storage, and handling, which account for 4% of all prematurely bearing failures. Overloading, over-speeding, severe vibration, high temperature, and electric discharge, among many other indirect causes, are the worst operating conditions.

REFERENCES

1. Salih EL, Gardner L, Nethercot DA. Bearing failure in stainless steel bolted connections. Eng Struct. 2011;
2. Schmid SR, Hamrock BJ, Jacobson BO. Fundamentals of Machine Elements. Fundamentals of Machine Elements. 2014.
3. Hosseinipour M, Gupta R, Bonnell M, Elahinia M. Rotary mechanical circulatory support systems. J Rehabil Assist Technol Eng. 2017;
4. Morales-Espejel GE, Gabelli A, de Vries AJC. A Model for Rolling Bearing Life with Surface and Subsurface Survival—Tribological Effects. Tribol Trans. 2015;
5. Madan A, Prakash D. Optimization of Production Parameters for Endoglucanase Enzyme by Isolated Fungal Strain/s and Its Application in Saccharification of Cellulosic Materials. In: Lecture Notes in Mechanical Engineering. 2021.
6. Harris TA, Anderson WJ. Rolling Bearing Analysis. J Lubr Technol. 1967;
7. Agarwal AK, Rani L, Tiwari RG, Sharma T, Sarangi PK. Honey Encryption: Fortification Beyond the Brute-Force Impediment. In: Lecture Notes in Mechanical Engineering. 2021.
8. Seeman T, Epel E, Gruenewald T, Karlamangla A, McEwen BS. Socio-economic differentials in peripheral biology: Cumulative allostatic load. Annals of the New York Academy of Sciences. 2010.
9. Chauhan K, Kumar N. Man-made Intelligence and Business Decision Making. In: Lecture Notes in Mechanical Engineering. 2021.
10. Vaddi R, Dasgupta S, Agarwal RP. Two dimensional analytical subthreshold swing model of a double gate MOSFET with Gate-S/D underlap, asymmetric and independent gate features. In: International Conference on Electronic Devices, Systems, and Applications. 2011.
11. Saji J, Umapathi A, Manohara SR, Navya PN, Kumawat M, Prakash D, et al. Polyvinyl Alcohol Scaffold Incorporated with Silver Nanoparticles and Titanium Dioxide: Electrical, Dielectric, Dye Degradation, and Antibacterial Properties. In: Lecture Notes in Mechanical Engineering. 2021.
12. Vaddi R, Dasgupta S, Agarwal RP. Two dimensional analytical subthreshold current model of a generic double gate MOSFET with gate underlap. In: International Conference on Electronic Devices, Systems, and Applications. 2011.
13. Srivastava T, Nirvikar. Modified simultaneous algebraic reconstruction technique. Int J Tomogr Stat. 2011;
14. Vaddi R, Dasgupta S, Agarwal RP. Device and circuit co-design robustness studies in the subthreshold logic for ultralow-power applications for 32 nm CMOS. IEEE Trans Electron Devices. 2010;

15. Kaushik BK, Sarkar S, Agarwal RP, Joshi RC. An analytical approach to dynamic crosstalk in coupled interconnects. *Microelectronics J.* 2010;
16. Ōno R, Maeda H, Ishimoto A. The fatigue failure in rayon tire cord by repeated bending. *Sen'i Gakkaishi.* 1963;
17. Abbasi MU, Abbasi TA, Yameen M, Kumar V. A low leakage single supply level shifter design for multi voltage systems. In: 2009 16th IEEE International Conference on Electronics, Circuits and Systems, ICECS 2009. 2009.
18. Rai MK, Sarkar S. Influence of tube diameter on carbon nanotube interconnect delay and power output. *Phys Status Solidi Appl Mater Sci.* 2011;
19. Gupta N, Kumar Agarwal A. Object identification using super sonic sensor: Arduino object radar. In: Proceedings of the 2018 International Conference on System Modeling and Advancement in Research Trends, SMART 2018. 2018.
20. Gong Y, Wu D, Fan W, Guan C, Xiao F, Liao B. Effects of rolling process on microstructure and hardness of V-bearing medium carbon steel. *Jinshu Rechuli/Heat Treat Met.* 2013;
21. Chaudhary M, Prakash V, Kumari N. Identification vehicle movement detection in forest area using MFCC and KNN. In: Proceedings of the 2018 International Conference on System Modeling and Advancement in Research Trends, SMART 2018. 2018.
22. Jain S, Gupta R, Dwivedi RK. Generating patterns from pizza ontology using protégé and weka tool. In: Proceedings of the 2018 International Conference on System Modeling and Advancement in Research Trends, SMART 2018. 2018.
23. Kumar V, Mangal D, Pandey P. Is the Lean Approach Beneficial for the Manufacturing Sector: Review on Literature. In: Proceedings of the 2019 8th International Conference on System Modeling and Advancement in Research Trends, SMART 2019. 2020.
24. Chaturvadi K, Goswami G, Chauhan D. Synchronous Link Converter based Scheme of Harmonic Filtration for Non-Linear Load. In: Proceedings of the 2019 8th International Conference on System Modeling and Advancement in Research Trends, SMART 2019. 2020.
25. Kumar A, Kumar V, Kumar K, Gupta P, Khandelwal Y. G-graceful labeling of graphs. *Adv Math Sci J.* 2020;
26. Bujoreanu C, Cretu S. Temperature influence on bearing scuffing failure. *Tribol Ind.* 2004;
27. Aithal S, Siva Prasad N, Shunmugam MS, Chellapandi P. Effect of manufacturing errors on load distribution in large diameter slewing bearings of fast breeder reactor rotatable plugs. *Proc Inst Mech Eng Part C J Mech Eng Sci.* 2016;

REVIEW ON FINE-ART PHOTOGRAPHY

Annie Pervez*

*Department of Fine Arts,
Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email id-annie.pervez6@gmail.com

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ABSTRACT

This is a piece on photography as an art form. Fine-art photograph is photography that is produced in accordance with the photographer's vision as an artist, and that uses photography as a medium for creative expression. The purpose of fine-art photography is to convey a message, an idea, or an emotion. This contrasts with representational photography, such as photojournalism, which provides a documentary visual account of specific subjects and events, representing objective reality rather than the photographer's qualitative intent, and commercial photography, which is primarily used to advertise products or services. It makes you feel things, no matter how odd or basic the topic is. It does not have to motivate you to conquer the world. Beauty may be defined in a variety of ways. Nobody can tell you what is fine art and what isn't. In the same way that the printing press revolutionized the dissemination of books, photography has revolutionized the art world since its inception. The unpredictability of photography's effects on art and society can be compared to how, while the printing press was originally intended to facilitate the reproduction of bibles and manuscripts, the impact it had on the spread of ideas across social classes and borders could not have been predicted. Photography has altered our perception of the world. Photojournalism has reshaped modern history; a single picture has had a greater effect in portraying an event than the amount of words needed to describe it. Painting was massively transformed in terms of art, with the twin consequence of pushing the medium to go in interesting directions while also supplying it with new tools. Photography is more than a method of record; it is also an art form that deserves the same attention as painting, sculpture, and those well art forms.

KEYWORDS:Artistic, Fine-Art, Photojournalism, Photography.

1. INTRODUCTION

Photography has had a major effect on how people view and consume history, as well as everyday life, since its beginnings. In addition to capturing a particular moment in time, a photograph may represent a whole social movement or act as a catalyst for change. Fine-art photography is photography that is created in line with the photographer's creative vision and that use photography as a medium for artistic creation. Fine art photography is used to communicate information, a concept, or an emotion. This is in contrast to truly representative

photography, such as photojournalism, which provides a documentary visual account of specific subjects and events, rather than trying to represent objective truth but the photographer's subjective intent, and commercially successful photography, which is mainly used to publicize products and services(1). Beauty may be found in many different places. What you find appealing may irritate someone else, and vice versa. Fine art photography isn't defined in any way. It does, however, attract others who have the same goals. Artistic photographs are created with the same attention to detail. and Painting requires the same attention to detail(2).

People often ask me what fine art photography entails. Before I respond, I take a deep breath and mentally prepare myself to answer the question in the time it takes to travel a few floors in an elevator, since they typically anticipate a fast response. And, despite my trepidation about responding to their inquiry, I've come to understand that the best responses are straightforward and direct. As a result, I'll start by stating that, while being in the subjective and wide world of art, fine art photography does have objective standards(3).

The primary and underlying characteristic that differentiates fine art photographs from other types of photography is that it is not about digitally capturing a subject. Using a camera to capture what precisely appears in front of the photographer is often seen in magazines that highlight purist pictures shot with such a camera to preserve the scene as it was at a certain point in time(4).

They're frequently tough to make in a single sitting. Their details, compositions, and meanings make them stand out. Above all, they're images that go well beyond basic Marry and Howard 62 pictures. Because great art is ever-changing, these explanations seem hazy. Here are a few samples to help you understand what this genre is all about. Many conceptual photographs, particularly bizarre ones, are regarded as excellent art(5). Optical illusions, carefully positioned items, and even highly altered compositions are all used in some of them. It takes a long time to perfect them. To produce a conceptual picture, though, you don't need to be a Photoshop whiz(6). Fine art photography, on the other hand, is focused on the artist first and foremost. It's not about photographing what the camera sees; it's about photographing what the artist sees. As a result, in fine art photography, the artist employs the camera as yet another instrument in the creation of a work of art(7). Rather than recording the subject in front of the lens, the camera is utilized to create an art work that exposes the artist's vision and makes a statement about that vision. Without the use of an editing software, discovers and produces eye-catching compositions. Others, such as Alex Stoddard, prefer to take the opposite approach. Portraits and surrealism aren't the only subjects of fine art. A fine art photograph may sometimes simply concentrate on a basic item with a lot of fascinating details, such as a leaf. Your photographs may be whatever you desire. Your belief in yourself will help it grow into something even more beautiful than you could have dreamed(8). This may come off as a little airy, but it has helped me trust my own creative instincts. We often snap photographs without considering or recognizing our skills. Your responses will not provide precise outcomes, but they will provide you with a better understanding of the kind of work you do. Spending time studying your work can help you hone your fine art photography instinct(9).

1.1 Fine Art Should Make You Feel Something:

Martin Bailey, a photographer, defined great art well in his podcast about art. It makes you feel things, no matter how odd or basic the topic is. It does not have to motivate you to conquer the

world. However, its beauty, colors, or the posture of its subject may appeal to your heart. Some high art photographs will not communicate with you in any way. Their very presence will only serve to remind you of a personal encounter(10). They may evoke memories of the past, sorrow, pleasure, or something quite else. Despite the fact that this photograph was shot in Georgia, it reminds me of my hometown, which is located far from Georgia. I'm reminded of my youth thanks to the cat and the summertime mood. When I gaze at this picture, I feel at ease(11). When you look at this picture, you'll probably feel something variable depending on your life experiences.

1.2 Expose Yourself to Your Versions of Fine Art:

Glamour may be defined in a variety of ways. Nobody can tell you what is fine art and what isn't. Exposure to your interpretation of art is the greatest method to produce excellent art photographs that you like(12). Examine the work of your favorite photographers. Find musicians that make you feel something, regardless of how obscure or popular their genre is(13). The more pictures you see, the simpler it will be to figure out what you like. Don't be concerned about inadvertently duplicating their ideas or styles. You'll be able to capture pictures that properly and distinctively represent your love for art after you've a better understanding of what you like about it(14).

1.3 Brief History of Photography:

In the same way that the printing press revolutionized the dissemination of books, photography has revolutionized the art world since its inception. The unpredictability of photography's effects on art and society could be compared to how, despite the printing press's primary purpose of facilitating the reproduction of religious books and manuscripts, its impact on the distribution of ideas across social classes and borders could not have been predicted. Photography has altered our perception of the world(15). Photojournalism has reshaped modern history; a single picture has had a greater effect in portraying an event than the amount of words needed to describe it(16). Painting was massively transformed in terms of art, with the twin consequence of pushing the medium to go in new directions while also supplying it with new technological skills(17).

In the decades after its invention, there was much discussion over whether photography could be considered art or not. It was the result of an attempt to incorporate a mechanical medium with conventional emotive creative styles. Several methods were employed to achieve this goal: some used a camera to mimic the themes and forms of traditional "high" art, while others used it to aid their observation and as a source of fresh ideas and information(18). The transmission of art objects was also a significant development in the use of photography; it had a significant impact on changing society's visual culture and making art more accessible to the general public, thereby altering people's perceptions, notions, and knowledge of art, as well as their appreciation of beauty. It also paved the way for the development of art history as a serious subject(11). Photographers have drawn inspiration from artworks from the beginning of the medium. However, as a new exhibition at London's National Gallery demonstrates, the connection was reciprocal.

People have been debating whether photography is art for almost 180 years. One of the members of the Photographic Society of London, which was founded in 1853, protested that the new method was "too realistic to compete with works of art" because it lacked the ability to "elevate the imagination" during an early meeting(19). The idea of photography as a mechanical recording medium was never completely abandoned. Even in the 1960s and 1970s, art

photography - the notion that photos might record more than simply surface appearances – was a "photo ghetto" of specialized galleries, enthusiasts, and magazines, according to photographer Jeff Wall. However, during the last several decades, the inquiry has been less and less common(1). The argument was essentially settled when Andreas Gursky's picture of a grey river Rhine against a similarly colorless sky sold for a world record price of £2.7 million last year(20). The National Gallery is now hosting its first significant photography show, *Seduced by Art: Photography Past and Present*, as if to send its own aristocratic signal of approbation(20).

The exhibition is not a research rather, it looks at how photography's early practitioners turned to paintings when they were initially exploring the technology's possibilities, and how their contemporary successors are turning to both those digital old masters and the old mentor paintings(21). Paintings provided a library of transferrable themes, ranging from portraits to nudists, still lifes to landscapes, which photographers could imitate and adapt. Moving subjects were difficult to catch because to the long exposures required by early cameras(15). When Louis Daguerre one of photography's two great pioneers - put up his camera far above the Boulevard de Temple in Paris in 1838, he took the first known picture of a human accidentally(22). Passing vehicles and people moved too quickly for his 10-minute exposure period to register on the plate, but a boulevardier remained motionless long enough for both him and the bootblack who polished his shoes to be recorded forever(19).

1.4 Olden days Photography:

According to one photographic historian, "John Edwin Mayall, "who showed daguerrotypes depicting the Lord's Prayer in 1851," was the first proponent of 'Fine Art' or composition photography. Julia Margaret Cameron, Charles Lutwidge Dodgson, Oscar Gustave Rejlander, and others made successful efforts to create fine art photography throughout the Victorian period. F. Holland Day, Alfred Stieglitz, and Edward Steichen were important in establishing photography as a fine art form in the United States, with Stieglitz being particularly noteworthy for bringing photography into museum collections(9). Photography was not considered a Fine Art in the United Kingdom until 1960. When he founded the Photographic Fine Art Association at the time, stated - "At the present, photography is seen as a hobby rather than a profession. In certain governmental circles in the United States, photography has already been publicly recognized as Fine Art. It is displayed as art in galleries and exhibits. In this nation, there is no such recognition(17).

1.5 Modern days Photography:

Instead of expecting to "find" it ready-made, there is currently a tendency for meticulous staging and lighting of the image. Photographers like Gregory Crewdson and Jeff Wall are known for their high-quality staged images(18). Furthermore, new technical developments in digital photography have opened up a new path in entire spectrum photography, where precise filtering choices throughout the ultraviolet, transparent, and infrared ranges lead to new creative visions(23). Since about 1980, as printing technology improved, a photographer's art prints reproduced in a finely-printed limited-edition books have been a popular topic among collectors(13).

2. DISCUSSION

The 15 art market indices, there are 59 meaningful causal connections, or around 28% of all possibilities. When the two global indices are removed, the proportion drops to 23%. These findings show relative evidence of integration in international art markets, which is consistent with Bakhouché's findings that now the world's largest fine art markets were weaker compared to moderately integrated from 1985 to 2007, but differs from Worthington and Higgs's findings that found significant integration. Granger causality only shows the most important direct causal connection, according to our findings(24). In other words, the findings may show a direct causal connection between one art market indicator and another, but this does not imply that it may affect other market indices indirectly. Photography, for example, has just one major causal connection to current, but it may have an indirect impact on non-Granger-caused market indices. Because some art market indices must be seen as breaching weakform efficiency for additional information, this discovery of causation has implications for investors. Since previous marketplaces (Artprice Global Index with paintings and contemporary and the Global Index Euro with paintings and drawings)

3. CONCLUSION

Photography is more than a method of record; it is also an art form that deserves the same attention as painting, sculpture, and other well-known art forms. Photographs, like paintings, are artificially created depictions that need meticulous composition, lighting, and production. It's easy to understand why photography has battled for so long to be recognized as a genuine art form. Photographers, like other artists, use pictures to demonstrate their understanding of art. We have arrived at a moment in history where pictures are more approachable than they have ever been, and taking photographs is simpler and more convenient than ever before because to advances in digital technology. Photography is worthy of respect, and its visibility and impact in the art world are comparable to those of other art genres Discovers and creates eye-catching compositions without using any editing tools. Others, like Alex Stoddard, want to go in the opposite direction. Fine art encompasses more than portraits and surrealism. A fine art photograph could focus on a simple object with a lot of interesting details, such as a leaf.

REFERENCES

1. Schwartz D. Camera clubs and fine art photography: The Social Construction of an Elite Code. J Contemp Ethnogr. 1986;
2. Jain V, Goyal M, Pahwa MS. Modeling the relationship of consumer engagement and brand trust on social media purchase intention-a confirmatory factor experimental technique. Int J Eng Adv Technol. 2019;
3. Meenu, Andeep Kumar S, Panchal VK, Kumar R. Evolution of new integrated haze removal algorithm based on haze line. Int J Eng Adv Technol. 2019;
4. Sharma A, Sharma MK, Dwivedi RK. Hybrid neuro-fuzzy classification algorithm for social network. Int J Eng Adv Technol. 2019;
5. Gola KK, Dhingra M, Rathore R. Modified version of playfair technique to enhance the security of plaintext and key using rectangular and substitution matrix. Int J Eng Adv Technol. 2019;

6. Kusuma SS. Colour Splash untuk Model Perempuan dalam Fotografi Ekspresi. REKAM J Fotogr Telev dan Animasi. 2016;
7. Agrawal T, Agrawal AK, Singh SK. An efficient key-accumulation cryptosystem for cloud. Int J Eng Adv Technol. 2019;
8. Choudhary P, Dwivedi RK, Umang. A novel framework for prioritizing emergency vehicles through queueing theory. Int J Eng Adv Technol. 2019;
9. Shafie N, Abdul Aziz MN, Azuddin MA. Fine Art Photography: A New Perspective in Documenting Architecture. Ideology J. 2018;
10. Singh BK, Singh AK, Singh VK. Exposure assessment of traffic-related air pollution on human health - a case study of a metropolitan city. Environ Eng Manag J. 2018;
11. Helbig E. A New "Vision": Early Works of Ahmad Aali and the Emergence of Fine Art Photography in Iran (1960s–1970s). Asiat Stud - Études Asiat. 2016;
12. Gupta P, Kumar A. Fluoride levels of bottled and tap water sources in Agra City, India. Fluoride. 2012;
13. Johnson-Roehr C. From visual data to fine art: Photography collections at the kinsey institute. Vis Resour. 2009;
14. Khan MK, Haroon A, Hanif SA, Husain M. A study of pattern of fatal head injury at J.N.M.C. hospital, Aligarh. Indian J Forensic Med Toxicol. 2012;
15. Salam J (Universitas MB. TINJAUAN ESTETIKA FOTO HITAM PUTIH PADA FOTOGRAFI LANSEKAP KARYA HENGKY KOENTJORO. Narada J Desain dan Seni. 2017;
16. Garg N, Jain AK, Ansari A, Sharma A, Singh J, Chugh T. Dimorphism of maxillary and mandibular canine teeth in establishing sex identity. Indian J Forensic Med Toxicol. 2012;
17. Buse P. Polaroid, aperture and Ansel Adams: Rethinking the industry-aesthetics divide. History of Photography. 2009.
18. The Focal encyclopedia of photography. Choice Rev Online. 1993;
19. Syafriyandi S. SEMUT RANGRANG (OECOPHYLLA SMARAGDINA) DAN BENDABENDA BERTEKNOLOGI DALAM FOTOGRAFI EKSPRESI. REKAM J Fotogr Telev dan Animasi. 2017;
20. Solaroli M. The rules of a middle-brow art: Digital production and cultural consecration in the global field of professional photojournalism. Poetics. 2016;
21. Lunney E, Ban M, Duic N, Foley A. A state-of-the-art review and feasibility analysis of high altitude wind power in Northern Ireland. Renewable and Sustainable Energy Reviews. 2017.

22. Akpınar EK, Akpınar S. An assessment on seasonal analysis of wind energy characteristics and wind turbine characteristics. *Energy Convers Manag.* 2005;
23. Meza CSR, Kashif M, Jain V, Guerrero JWG, Roopchand R, Niedbala G, et al. Stock markets dynamics and environmental pollution: emerging issues and policy options in Asia. *Environ Sci Pollut Res.* 2021;
24. Martínez E, Sanz F, Pellegrini S, Jiménez E, Blanco J. Life-cycle assessment of a 2-MW rated power wind turbine: CML method. *Int J Life Cycle Assess.* 2009;

AN OVERVIEW OF HOME AUTOMATION SYSTEM USING RASPBERRY PI & ARDUINO UNO

Dr. Varun*

*Faculty of Engineering,
TeerthankerMahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email id- drvarun.engineering@tmu.ac.in

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ABSTRACT

This paper shows how to create a versatile and low-cost home control and monitoring system using a Raspberry Pi networking and an Arduino Microcontroller. Using an Android-based Mobile apps or a server computer, an interface will be created between the Access Point and switches with IP connection for accessing devices and appliances and managing them remotely. The Smart Switch system for Smart Home development consists of two main parts: the smart switching device and the base station. This switch node is linked to electrical equipment that may be controlled via sensors and remotely controlled through an entry point. Raspberry Pi, Arduino Microcontroller, nRF24L0+ Wireless Transceiver, Relay Modules, Gang Switches, Lamps, Plugs, Sensors, and Wire Set are the major components of this system. This system is expected to provide the following results: programming using Python, which is included with Raspbian, and a wireless module adapter to link the Arduino Microcontroller to the nRF24L0+ Wireless Transmitter.

KEYWORDS:Arduino Uno R3, Android, Home Automation, Raspberry Pi, Smart Home.

1. INTRODUCTION

Security devices play an essential part in the protection of lives and assets in today's world. This is accomplished by combining different security subsystems into a single control module, such as surveillance, intrusion detection, access control, and fire detection. A smart house is one that has lighting, heating, and electrical equipment that can be controlled remotely via a smartphone or the internet(1). An internet-based home automation system allows you to manage your house's electrical equipment from anywhere in the world(2). House automation allows a person to manage many aspects of their home remotely or automatically(3). A home appliance is a device or instrument that is intended to fulfill a certain purpose in the home, particularly an electrical equipment such as a refrigerator(4). The terms "appliance" and "device" are used interchangeably in this context. Things are being controlled automatically, typically the fundamental duties of turning on/off specific gadgets and beyond, either remotely or in close proximity, according to today's reality(5). Human judgment is reduced to the bare minimum by automation, yet it is not entirely eliminated. The idea of controlling home gadgets remotely over the internet from anywhere in the globe at any time is now a reality.

Consider a system in which the user can see the state of the devices from his office desk and chooses to take control by adjusting his TV to his favorite channel, turning on the cooling system, such as the air conditioner, and turning on or off some of the lights(6). This individual might return home and discover just a really comfortable, pleasant environment(6). Recent technological advancements that allow for the usage of Bluetooth and Wi-Fi have allowed many gadgets to communicate with one another (7). The use of a WIFI shield as a Micro web server for the Arduino removes the need for physical connections between the Arduino board and the computer, lowering costs and allowing it to function as an independent device(8). The Wi-Fi shield requires internet access through a wireless router or hotspot, which serves as the gateway for the Arduino to interact with the internet. An internet-based home automation system for remote control of household appliances has been developed with this in mind(9). House automation refers to everything your home does for you to make your life easier or more productive. A Smart Home seems to use intelligence to do this. It's nice to be able to email your light switch nodes, however. After all, you have command over it(10).

Your home will be able to make choices on its own after receiving information from the outside world. The distinction between a Smart Home and an Automated Home is this. Home automation improves safety, security, comfort, convenience, and energy savings by using smart devices that detect physical events and convert them into a stream of data. Sensor nodes and a Building Management System are two key components of home automation (BMS)(11). Sensor Web components are utilized as part of the process of bringing a BMS to a global level(12). As a result, home automation may be described as a mechanism that replaces human involvement in different household activities as much as is theoretically feasible and desired with programmed electronic devices. This system, which was managed by a central computer, was utilized to regulate HVAC (Heating, Ventilation, and Air-Conditioning) as well as fire safety(13)(14).

Security, surveillance, lighting, energy management, interfaces and software, entertainment appliances, and access control are all included in home automation. The home automation system should be simple to use and expandable to meet the requirements of the users and their unique budgets. It is critical that home automation offers an alternate option for lowering energy usage, lowering costs, and increasing convenience (15)(16). Wireless sensor network technology has shown to be a feasible option for a wide range of novel applications. The wireless sensor network systems described in this article were created utilizing open-source hardware platforms such as the Arduino UNO R3 and the Raspberry Pi Model B computer. The system is low-cost and highly scalable in terms of both the number of sensor nodes and the types of sensors, making it well-suited for a variety of monitoring-related applications(17)(18).

Our Smart Home system's goals are to build smart switches utilizing a low-cost embedded technology, and to create software that allows the system to monitor and manage lights, room temperature, alarms, and other home equipment. Also, to provide a Smart Home system that was developed and built using a Raspberry Pi network and an Arduino Microcontroller UNO R3 to interface between the Access Point and switches(19). Vujovi and Maksimovi have provided an example of system creation for monitoring and assessing the confidence of fire in a building, demonstrating the Raspberry Pi's potential in home automation(20). As a result, the created Raspberry Pi prototype Sensor Web node is built on RESTful services in order to establish the infrastructure that enables rapid critical event signaling and remote access to sensor data over the Internet (critical event detection is done using fuzzy logic)(21). Both client means for data

processing are only one example of a potential application. With the proposed method, using a Raspberry Pi as a Sensor Web node opens up a world of possibilities. Xinrong Li, Sheikh Ferdoush. Designed a wireless sensor network system using Raspberry Pi, xBee, Arduino, and a variety of open-source applications. Compact, low-cost, scalable, easy-to-customize, easy-to-maintain, and easy-to-deploy are just a few of the system's characteristics(22).

The integration of the Wireless Sensor Network (WSN) gateway node, database, and web server into a single small, low-power, credit-card-sized computer Raspberry Pi is the main benefit of this concept. It's simple to set up to operate headless (that is, without a keyboard, monitor, or mouse). Many environmental monitoring and data gathering applications use this architecture. The DigixBee module combines an 802.15.4 radio transceiver with the ZigBee protocol stack, allowing it to create a sophisticated mesh network topology without the need for user application programs running on the microcontroller or CPU platform. As a consequence, the creation of wireless sensor network systems has become less complicated(23). Many researchers used Arduino microcontroller boards to demonstrate Smart Home automation. K. Baraka, M. Ghobril, S. Malek, R. Kanj, and A. Kayssi used Home Automation methods to develop and construct a remotely controlled, highly scalable and energy efficient Smart Home with basic features that ensure the inhabitants' comfort and security. Their system comprises of a house network (sensors and appliance actuators that collect and regulate data from the home environment). As a central controller, they utilized an Arduino microcontroller, which communicated with an Android application, which served as the user interface(24). Their home network combines wireless ZigBee and wired X10 technology, resulting in a cost-effective hybrid solution.

1.1 System Design:

The system was designed with appropriate size components, which led to system modifications such as making devices smaller so they could fit inside the existing switch casting. As a result, the cost of the components will decrease. All System architectures are shown in Figure 2. The major components of the system architecture are:

- **A Base Station Or Access Point:** The nRF24L01+ Wireless Transceiver is used to control all smart switches. The base station, is made up of a Raspberry Pi that can connect to the internet and send data to a hosting server or a smartphone. The data may be sent and received by the hosting server, which can then be stored in a database. The data from the database is sent to a web page on the hosting server, where it is displayed. The database may be read and updated by the web page on the hosting server. The base station is made up of the following components: Raspberry Pi (Raspberry Pi) is a credit card-sized single board computer. Raspberry Pi 1 was utilized as the base station. The Raspberry Pi 2 B architecture with GPIO connections is shown in Figure 1. The board's CPU is an ARM processor with a clock speed of 900 MHz. A Pentium II 300 MHz processor may be used to compare CPU performance. HDMI connector, USB port, 1 GB RAM, SD card storage, and a 40 pin GPIO interface for expansion are among the interfacing peripherals. The Raspberry Pi 2 may be linked to a monitor, keyboard, and mouse through HDMI and USB connections and used as a desktop computer. It supports a variety of operating systems, including Caspian, a Debian-based Linux distribution that is utilized in this design(25). Using an Ethernet wire or a USB Wi-Fi adapter, the Raspberry Pi 2 may be connected to a local area network and subsequently accessible through remote login. Gateway application, database, and web application are

functional building elements of the base station [2]. TABLE I lists the specifications for the Raspberry Pi 2 Model B. It is 6X quicker than the B+ and has 1GB of RAM, which is twice as much as the previous generation. It has a new ARMv7 quad core CPU that is very fast, runs an upgraded operating system, and is compatible with all B+ accessories. Almost all of your current Raspberry Pi accessories are backward compatible with the new Raspberry Pi. The Raspberry Pi 2 is connected to the nRF24L01+ Wireless Transceiver. A more detailed comparison of the new Pi 2 may.

- **The Wireless Transceiver nRF24L01+:** It's utilized to send and receive data between the access point and the appliance. The nRF24L01+ is a 2.4 GHz Wireless Transceiver designed for low-cost, low-power wireless applications. The voltage range is 3.3V to 5V. There is no 3.3V output pin on the Arduino UNO R3. A voltage adapter is used to convert the Arduino UNO R3 output pin from 5V to 3.3V, which is appropriate for the nRF24L01+. The ISM frequency range of 2.40 GHz to 2.48 GHz is used by this wireless transceiver. It may be set and managed to send and receive data through Serial Peripheral Interface (SPI). The packet data was sent via broadcast by the nF24L01. In an open environment, the communication range of the nF24L01 transceiver is 100 meters. The nF24L01 Wireless Transceiver.
- **The Intelligent Switch:** The smart switch gadget links the existing wiring of electrical appliances in a home to transmit power to them, such as a light or ceiling fan. These gadgets will be powered by the home supply's live and neutral wires. It will use an adaptor to convert 240V AC electricity to 5 DC (Direct Current) to provide appropriate power to the Arduino UNO R3. A relay links the live wire to the light. The relay module's function is similar to that of a standard switch, in that it turns a switch node "ON" or "OFF." Sensors are used as inputs, while the Arduino UNO R3 outputs are a light emitting diode and a relay. A smart switch may be linked to four infrared detection systems, allowing it to manage four electrical items in a home. This implies that only one electrical equipment may be controlled by a single infrared detection system. The Arduino UNO R3 is the third generation of the Arduino platform. The Arduino UNO R3 is a microcontroller board based on the ATmega328. The ability of the Arduino UNO R3 to connect with the Raspberry Pi allows us to add a wide variety of devices. It features 14 digital input/output pins, including 6 PWM output pins, 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, an ICSP header, a power connector, and a reset button. It includes nearly everything we'll need to get the microcontroller up and running. To get started, just connect the Arduino UNO to a computer through USB or power it with an AC-to-DC converter or battery. The Arduino UNO R3 differs from previous Arduino boards in that it does not have the FTDI USB-to-serial driver chip. Instead, the Atmega16U2 has been designed to function as a USB to serial converter. The Arduino UNO R3 is connected to the NF24L01 Wireless Transceiver.
- **PIR Motion Sensor:** PIR sensors can detect motion. It was formerly used to determine if a human had entered or left the sensor's range. They're tiny, low-cost, low-power, simple to operate, somewhat robust, and simple to interact with, and they have a broad lens range. As a result, they are often seen in houses and businesses. When a person enters or leaves a room or the home, or approaches, a PIR sensor sends a signal to the Arduino UNO, which turns on or off lights, fans, or an alarm system. We've used it to switch lights on and off in our system.

- *Relay Module:* The relay module has been used to switch on and off the appliances. An Arduino UNO R3 microcontroller is used to control it. This relay module operated on 5V, which was already supplied by the microprocessor. Because of the suitable voltage to work with the microcontroller and cheap cost, a four channel relay module. The LED is likewise placed across the relay, and it will light up to show the condition of the relay when it is switched on. The Arduino UNO R3 is linked to the relay module.

2.DISCUSSION

This article proposes and implements a new architecture for a low-cost and flexible home management and monitoring system based on an Android-based smart phone. For interacting between the distant user and the home gadgets, the suggested architecture uses a tiny web server and Bluetooth communication as an interoperable application layer. Because PHP is not a client-based programming language, any Android-based Arduino microcontroller serves as a client and PHP acts as a server (Wamp, IIS, or Apache servers may be utilized). The metro style was selected for the online pages because it provides user friendliness as well as a vivid presentation of the web products. When the PHP and Ajax http requests are linked to the Arduino's IP address, they will be able to transmit information via this IP address, which will be processed by the Arduino. A smart phone with built-in Wi-Fi connectivity may be used to access and control home gadgets. When a Wi-Fi connection is unavailable, the system may be accessed through mobile cellular networks such as 3G or 4G. The system also makes use of Google's speech recognition engine, obviating the requirement for a third-party voice recognition module. Incorporating SMS and call alerts, as well as minimizing wiring modifications for installing the suggested system in pre-existing homes by establishing a wireless network inside the home environment for managing and monitoring the smart home environment, are some of the potential future developments.

3.CONCLUSION

A smart house is a home with sophisticated automated systems for temperature management, lighting control, security, multimedia, window and door automation, and a variety of other tasks. Compact, low cost, scalable, simple to modify, quick to deploy, and easy to manage, a wireless sensor network using Arduino UNO R3, Raspberry Pi, and a variety of open-source software packages offers a lot of appealing characteristics. One of the design's main advantages is the combination of the wireless sensor nodes, server software, and web server into a single tiny, low-power Raspberry Pi computer that can be simply configured to operate (i.e., without a display, keyboard, or mouse). Many surveillance and data gathering applications benefit from such a setup.

REFERENCES

1. Asadullah M, Raza A. An overview of home automation systems. In: 2016 2nd International Conference on Robotics and Artificial Intelligence, ICRAI 2016. 2016.
2. Vaddi R, Dasgupta S, Agarwal RP. Device and circuit co-design robustness studies in the subthreshold logic for ultralow-power applications for 32 nm CMOS. IEEE Trans Electron Devices. 2010;
3. Mehdi G, Roshchin M. Electricity consumption constraints for smart-home automation: An overview of models and applications. In: Energy Procedia. 2015.

4. Agarwal R, Garg N, Kashyap SR, Chauhan RP. Antibacterial finish of textile using papaya peels derived silver nanoparticles. Indian J Fibre Text Res. 2015;
5. ttitalla S, Choksi V, Potdar MB. Web and Cloud Based Home Automation Systems: An Overview. Int Res J Eng Technol. 2016;
6. Duksh YS, Kaushik BK, Agarwal RP. FDTD technique based crosstalk analysis of bundled SWCNT interconnects. J Semicond. 2015;
7. Malik N, Bodwade Y. Literature Review on Home Automation System. IJARCCCE. 2017;
8. Sinha A, Jayanand, Kumar V. Role of green silver nanoparticles in suppressing various human pathogenesis. Rev Adv Mater Sci. 2017;
9. Spadacini M, Savazzi S, Nicoli M. Wireless home automation networks for indoor surveillance: technologies and experiments. Eurasip J Wirel Commun Netw. 2014;
10. Hari Charan Tadimeti MP. Overview of Automation Systems and Home Appliances Control using PC and Microcontroller. Int J Sci Res. 2013;
11. Kumbhar A. Overview of ISM Bands and Software-Defined Radio Experimentation. Wirel Pers Commun. 2017;
12. Nwobi-Okoye CC, Ochieze BQ. Age hardening process modeling and optimization of aluminum alloy A356/Cow horn particulate composite for brake drum application using RSM, ANN and simulated annealing. Def Technol. 2018;
13. Kodali RK, Soratkal SR. MQTT based home automation system using ESP8266. In: IEEE Region 10 Humanitarian Technology Conference 2016, R10-HTC 2016 - Proceedings. 2017.
14. Thermochemical Processes. Green Energy Technol. 2010;
15. Brennan R, Etizoni Z, Feeney K, O'Sullivan D, Fitzgerald W, Foley S. Consumer-managed federated homes. IEEE Commun Mag. 2014;
16. Mishra S, Jain S, Rai C, Gandhi N. Security challenges in semantic web of things. In: Advances in Intelligent Systems and Computing. 2019.
17. Kodali RK, Soratkal S, Boppana L. IOT based control of appliances. In: Proceeding - IEEE International Conference on Computing, Communication and Automation, ICCCA 2016. 2017.
18. Rahul M, Kohli N, Agarwal R, Mishra S. Facial expression recognition using geometric features and modified hidden Markov model. Int J Grid Util Comput. 2019;
19. Agrawal T, Agrawal AK, Singh SK. An efficient key-accumulation cryptosystem for cloud. Int J Eng Adv Technol. 2019;
20. Rouse M. RSA algorithm (Rivest-Shamir-Adleman). TechTarget. 2014;
21. Tange H, Andersen B. SPDH - A secure plain diffie-hellman algorithm. J Cyber Secur Mobil. 2012;
22. Aryanti A, Mekongga I. Implementation of Rivest Shamir Adleman Algorithm (RSA) and Vigenere Cipher in Web Based Information System. In: E3S Web of Conferences. 2018.

23. Kumar V, Sharma A, Mitali VK, Sharma A. A survey on various cryptography techniques. Int J Emerg Trends Technol Comput Sci. 2014;
24. Haddaji R, Bouaziz S, Ouni R, Mtibaa A. Comparison of Digital Signature Algorithm and Authentication Schemes for H.264 Compressed Video. Int J Adv Comput Sci Appl. 2016;
25. Francis N, Monoth T. An Analysis of Hybrid Cryptographic Approaches for Information Security. Int J Appl Eng Res. 2018;

SATYAGRAHA AND THE PUBLIC SPHERE

Dr Archana Verma*

*Associate Professor,
Department of History,
Hindu College University of Delhi,
Delhi, INDIA
Email id: arbverma@yahoo.co.in

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ABSTRACT

The first Satyagraha was launched by Mahatma Gandhi in Champaran in 1917, the district known for oppressive European indigo planters excessively exploiting indigo producing peasants in the region of Bihar in colonial India. The Champaran Satyagraha led by Gandhi transformed the nature of the Indian National Movement by involving ordinary masses as participants in the freedom struggle. In the process, a new public sphere was created that focused on non – literate, uneducated peasants, whose lives were marked by many differences. The Champaran peasants joined the Satyagraha voluntarily and during its course ceased to be strangers to each other thus becoming part of a new paradigm in the Indian National Movement. As Satyagraha progressed, it made Champaran turn into an exemplary community, tied together to shared commitments simply as satyagrahis.

KEYWORDS: Gandhi, Satyagraha, Champaran, European Indigo Planters, Champaran Peasants, Indian National Movement.

INTRODUCTION

The Champaran Satyagraha of 1917 is treated as a watershed event in the history of India's freedom movement as through its success Gandhi rose to prominence not just as a regional leader but as a leader of national stature. By launching the Satyagraha, and also contributing to its progress, Gandhi helped create a unique sense of public sphere in Champaran that generated intense public opinion against the colonial state. Gandhi succeeded in using and accommodating the public arena while castigating, with singular focus, Champaran's European planters as a certain interest group. In doing so, he shaped the imagination of protesting peasants to question the colonial administrative measures that impacted and primarily suited colonial interests.

At Champaran, the public opinion crystallised in the form of peasant protest under the leadership of Gandhi. From Champaran the masses were brought centre – stage in the public sphere, pointing to the manner in which colonial context was used for modelling the public sphere in modern times. [1] Gandhi challenged the might of colonial power by taking resistance to the rural locales of Champaran and making it the site of protest, thus reconfiguring the western conception of the use of public sphere. Gandhi's involvement in Champaran helped the indigo cultivators to participate in new temporal locations, with public sphere acquiring new meanings and new forms in twentieth century. [2] The use of "particular" to "public", or replacing "khaas"

log by “amm” log, proved to be path changer through the creation of alternate terminologies that contributed to change the nature of Indian nationalism.

The place and the context in which the Champaran Satyagraha occurred mattered in the creation of the Gandhian variant of the concept of public sphere, more so because the number of peasant participants continued to increase as the Satyagraha progressed. [3] Once the networking spread, the peasants began to participate voluntarily in the movement. They indulged in open and free discussions with Gandhi and his co – workers, thus giving a semblance of egalitarian practice to the whole process. By entering into conversations with Gandhi, the protesting peasants became aware of common purposes that emerged from questions directed towards their living and working conditions, thus giving rise to a two - way communicative process. People came to share not just ideas, but attitudes and information through conversations, giving rise to arguments that were based on practical rationality of viewing the oppressive conditions under which indigo cultivators lived. [4] As common experiences were brought forth, the Champaran peasants transcended, or even ignored, the importance or relevance, of inherent socio – cultural differences such as the ones based on caste, that helped create a sense of distinct identity among them as protesters against the pattern of immense colonial exploitation. In the process a public sphere was formed that was received, and made habitual on the one hand, and made reflective as part of peasant culture on the other hand. [5]

Some scholars have argued that in pre – Gandhian colonial India, the public sphere was best described through the associational life and institutions that were set up by the nationalist ‘elite’ [6] such as the voluntary associations Brahmo Samaj or Prarthna Samaj or Poona Sarvajanik Sabha, or even earlier, the Deccan Educational Society or the Indian Association. Emerging during the late nineteenth century socio - reform era, all such bodies aimed at removing evils and superstitions from the Indian society by targeting such socio – cultural practices as polygamy, female infanticide, child marriage, negation of widow remarriage or reforming the practice of caste system. [7] To attain the goal to free society from evils, the reformers looked towards education to bring about enlightenment among the people. The purpose was not simply to ‘purify’ social practices but to ‘protect’ the rights of people on equal basis in the public sphere, thus adopting an approach that was conformant with the ideals of rationalism. The rationalist approach so adopted may well fit in the much popular imagery of the 18th century conception of public sphere in Habermas terms. For instance, in this definition public sphere connotes a gathering together of private people representing the civil society, as public, that tries to articulate societal needs. Such an interpretation concentrates on public sphere arising from within the private realm and coextensive with public authority. The ideological basis of this theory is that the public sphere should steer government’s policies and laws. [8]

In the nineteenth century India however, the reformers worked in a colonial context and seemingly, the British colonial state responded to their call. But in reality, what the colonial state did was to take over certain retrograde private practices and make laws against them in order to make its power visible in the social arena. The colonial purpose was not to create a public sphere for making the change viable but to provide stability to its rule. The state’s governing ideology was rooted in the mentality that being the most progressive in outlook, the British colonials had a duty to help Indians improve. So, while the social reformers exposed private practices as evil such as the marriage issue, the colonial state went ahead and legislated only against certain practices. The Widow Remarriage Act of 1856, the Age of Consent Bill of 1891 were some such

legislations that affected the private arenas of people. [9] These, however, did not remain uncontested. Those who opposed social reforms in colonial India held that family matters were private hence beyond the jurisdiction of the colonial state. This made “the personal” as the “political”, something akin to Habermas concept of the basic distinction between private sphere and public sphere. Habermas held that private sphere was meant only for those allowed to enter it. [10] So, opposition to reforming the private familial domain by colonial efforts can well be translated in Habermas terms. But then, what happened with the entry of Gandhi in the post 1915 period of the Indian National Movement? It is notable that the whole concept of the private and the public sphere got re – calibrated. [11]

Till at least 1917, the Indian National Congress too refused to take up social reform in its meeting agendas based on concerns that such issues would disrupt the political unity of people that has been built up in the past so many decades. The social reform, particularly in reference to untouchability, did not become a legitimate concern with the Indian National Congress till the rise of Gandhi in 1919. It was after the launch of the Non – Cooperation Movement in 1920 under Gandhi’s leadership that the Indian National Congress initiated major change in its approach towards such exclusionary practices as untouchability, generally considered a feature of the private domain of its practitioners. [12] However, it was during the Champaran Satyagraha in 1917 that Gandhi became known for making reform a quotidian social practice. He worked to adjust private caste differences of those participating in the Satyagraha by bringing these into public view and, instead, making satyagrahis understand to treat the strength of Satyagraha as the only shared practice among them. This allowed the Satyagraha participants to overcome caste differences, majority of whom came from non – literate rural backgrounds.

We are informed that most Gandhian led movements focused on rural, caste – ridden, majorly non – literate communities which were deeply infiltrated by symbolism, relationships and traditional practices. [13] Champaran represented one such model. Its people could not be placed into straightjacket categories of either literacy or urbanity. Majority of the Champaran indigo peasant cultivators were poor and illiterate. They had approached Gandhi and called him over to help save them from intense exploitation exercised by the European planters and the destitution they faced as a result. By agreeing to lead the Champaran villagers Gandhi worked towards turning them into satyagrahis to join in peaceful, non – violent resistance movement against the British colonial state. It is notable that Champaran Satyagraha witnessed various forms of communication between their leader, Gandhi and satyagrahis, the led.

Located in the north of Bihar, Champaran district was in the backwaters of India’s national movement, rather unknown in the political flow in early decades of the twentieth century. Gandhi himself visited Bihar for the first time when he consented to go to Champaran. [14] This was primarily a rural district, with a handful of small towns, having a majority of peasants working as tenant cultivators and growing indigo in their fields under lease agreements that they signed with European indigo planters, the estate owners, as required by the British colonial law. The system was known as the tinkathia system in local parlance i.e. a system in which the tenant cultivator was to compulsorily grow indigo in 3/20th parts of the land leased out to him. [15] The European planters supervised indigo plantations in Champaran in two ways – a) on lands held by European factories and b) on plots of land owned individually by the planters. It is stated that in late nineteenth century close to about 100,000 acres of land produced indigo in Champaran alone that Indian cultivators supplied to England’s markets from where the natural dye reached

European markets. [16] The district's European planters handled, controlled and supplied Champaran's indigo to the European markets. They had started indigo plantations originally under the aegis of the English East India Company and were continuing to dominate the economy of the region in the early decades of the twentieth century.

In practice this system was too rigorous and was monitored with harshness by the planters. If an indigo cultivator failed to produce required proportion of the cash crop he faced punishment in the form of increased rent, payable as sharabeshi to the planter. In case peasants could not, or even those who refused to fulfil the tinkathia obligation, they invariably ended up losing their land that was liable to be confiscated for failure to fulfil the lease terms pertaining to the cash crop production. Not only this, many times the European planters used their influence with the colonial state to force tenant cultivators to grow and cultivate indigo even on communal pasture lands. [17]

The Champaran peasants had long been unhappy, and dissatisfied, with forcible demands of European planters to go on producing indigo. Their grievances began to multiply from late nineteenth century when the German synthetic indigo dye was invented in 1897. The impact of this was very hard pressing on indigo peasants because the use of synthetic dye meant that colonial trade of natural indigo was badly affected, impacting the fortunes of European planters with a steep fall in the price of naturally grown indigo. There followed a drastic fall in indigo production in Champaran as fall in prices affected the demand for naturally grown indigo. In 1896, the indigo that was produced in about 112 plantations in Bihar alone, measuring an average yield of about 2.6 million kilograms of indigo, fell down to just about 59 plantations producing 300,000 kilograms a piece by 1914. [18]

However, the steep fall in demand was contained for some time as the First World War started when the allies stopped indigo trade dealings with Germany. This meant that Champaran indigo planters received renewed demand from European markets for the naturally grown indigo. As the War progressed it is stated that the prices of natural indigo tripled, with European planters once again becoming eager to take advantage of the situation. They began to hard press and force tenant cultivators throughout the Champaran district to go on cultivating indigo. Resultantly, the indigo acreage that had reduced to a mere 8,100 at the onset of the First World War began to expand so that by 1916, two years after the First World War began, it covered 21,900 acres in Champaran. However, the production levels could not match pre – 1914 days. [19] There was no respite for the tenants involved in indigo cultivation from the pressures of the European planters.

The Champaran peasants desired freedom from the compulsory tinkathia system and wanted to grow crops of their choice, including cash crops other than indigo. However, they had no recourse from the brutal and brash treatment meted out by the European planters to enforce indigo cultivation on them. This, the indigo cultivators began to resent. Moreover, external pressures mounted because in Europe the demand for use of the German synthetic dye continued to rise and consequently its sale could not be stopped. As a result, the European planters in Champaran attempted to reap advantages for themselves even while the indigo cultivators continued to be adversely affected with enforced plantation system.

The Planters' sense of resuming indigo fortunes meant more intensive exploitation of tenant cultivators. Even the peasants who wished to opt out of the tinkathia system and tried to seek release from that compulsion were not relieved of the burden to produce indigo. There were

many ways by which the planters attempted to secure their position. One way to achieve this was by simply increasing the sharabeshi rent, which usually meant 50% to 60 % more than the previous rent. [20] The other form of exploitation involved the manner in which peasants were made to pay tawan or “compensation” to the planters. Under this system the estate owner allowed tenant cultivator to switch to other crops but only on condition that peasant paid “compensation” to the planter for loss of indigo cash crop supply. It is said that the amount charged as tawan was very high. Yet another way of exploitation was to transfer indigo factories’ plots to the cultivators often by imposing high rent rates. Not only this, the indigo cultivator was often threatened with evictions from tenancies in case they refused to take factory plots on rent. Besides, the planters continued to levy illegal dues like abwabs and also imposed other fines. Failure to pay these also meant either evictions or threats of evictions faced by the tenant cultivators. [21] The peasants were not only paid less for the produce but tortured for extra revenues.

As tinkathia system continued to be enforced, the peasantry began to protest against their oppressive conditions. They sent petitions to the British colonial government from early twentieth century. They followed this up by holding meetings among themselves to make each other aware of developments. We are told that somewhere between 1907 and 1908 Champaran villagers came together and took a collective vow to not grow indigo in their fields. [22] But they had no recourse, as the planters remained in the mode of exploitation and oppression for a long time. However, in 1914 a Champaran peasant named Raj Kumar Shukla joined others in protest but was sent to prison briefly on charges of quarrelling with a European manager. Two years later i.e. in 1916 Raj Kumar Shukla made efforts and took the issue to the Lucknow Congress. After this, Shukla played an important role in the cultivators’ resistance as he became the medium in persuading Gandhi to personally visit Champaran. [23]

Raj Kumar Shukla, a local man from Champaran, followed Gandhi while he was touring all over the country, stopping at distant villages, to get a sense of the pulse affecting village people under the colonial rule. Shukla eventually succeeded in persuading Gandhi to come to Champaran and personally investigate the grievances and problems faced by the indigo peasant cultivators. Although Gandhi consented to Shukla’s call but before heading for Bihar, he expressed the desire to first meet Rajendra Prasad, a professional lawyer from Bihar. [24] This was an indication that Gandhi justified the use of relationship potential in the opening up of Champaran. Shukla complied and the two set out for Rajendra Prasad’s house but the duo did not meet Rajendra Prasad when they reached his home in Patna.

Both Shukla and Gandhi were received by the house servants at their destination, they asked the visitors to wait in the verandah believing that the two were of humble origin, akin to lower castes. Gandhi was even denied the use of house latrine to relieve himself – “the servant promptly directed me to the outdoor one.”[25] The outdoor latrine was meant for use of the untouchables. The experience was unpleasant in Gandhi’s eyes, certainly not a happy one. Gandhi felt injured about such a treatment but seemed to have rationalised the experience – “the servants were most likely following Rajendra Prasad’s wishes!” [26] Gandhi underwent a similar act of discrimination while enroute Champaran and staying at Bankipur, a small town in Bihar. Shukla had accompanied Gandhi to Bankipur but he had to proceed to another place so he left Gandhi alone in the house where they lodged. Gandhi penetratingly observed that the house

servants, yet again, suspected him as a low caste individual because they refused to share either the bathroom or food with Gandhi. [27]

The two experiences made Gandhi extremely conscious of the caste orientation of the servants discriminating in “private”. He was immensely consternated as the treatment he received reminded him of his South African days, though there was a difference. In Bihar he was outcasted because of his appearance and not because of his race. But such experiences were “chilling” for Gandhi, denoting the servants’ personal preoccupations with caste. Significantly, the experiences made Gandhi preoccupied with his own determination to work towards rooting out “this great and indelible crime”. [28] Although Rajendra Prasad and local leaders like Dharnidhar Prasad and Mazharul Haq accompanied Gandhi to Champaran district, he remained extremely perturbed. Later, when he confronted the practice of untouchability during the course of Champaran Satyagraha, Gandhi denounced discrimination on the basis of caste prejudice openly and thus accorded a public meaning to an innate private practice.

Gandhi reached Muzzaffarpur, one of the large towns in the Champaran district, on 11th April, 1917. The next morning, he announced his arrival to the district commissioner L. F. Morshead with the stated purpose to study the conditions in the indigo plantations. [29] He expressed the hope that the local administration would cooperate in his efforts. Gandhi followed up the letter by his personal meeting with the commissioner Morshead on April 13, 1917. The meeting seemed to have unsettled the British commissioner for after meeting Gandhi the commissioner cautioned the Champaran district magistrate, W. B. Heycock, that Gandhi’s object was more likely an agitation rather than a genuine search for gathering knowledge. Commissioner Morshead further warned Heycock that “there is a danger of disturbance to the public tranquility should he visit your district”. [30] This was a forewarning and the commissioner continued with his advice to the district magistrate to levy section 144 of the Criminal Procedure Code and to at once “deport” Gandhi from Champaran under its provisions. [31]

Two days later i.e. on 15th April 1917 when Gandhi reached the town Motihari, the district headquarters, local authorities did not welcome him. The district magistrate promptly served him the notice to leave the district “by the next available train”. [32] Gandhi after receiving the notice wrote on the receipt that he would not obey the order without accomplishing his task. Gandhi was then summoned to appear in the court on 18th April charged for having violated section 144. [33] He demurely accepted the court summon but declined to leave Champaran in defiance of the law, and, defiantly too he wished to plead guilty to the surprise of the magistrate. It seemed evident that Gandhi would be jailed for his direct impertinence. From Gandhi’s perspective the response was in line with civil disobedience to an unjust order, served as an ultimatum to him. [34] He had come to Champaran “purely and simply for a genuine search for knowledge”. [35] However, the Motihari trial was settled sooner than expected. The Lt. Governor of Bihar, Sir Edward Albert Gait had ordered the withdrawal of case against Gandhi. Meanwhile, he sent a communication to Lord Chelmsford, the viceroy, stating that “the ryots are living under a reign of terror and their property, their persons and their minds are all under the planter’s heels”. [36] Whether this made any difference or no could not be predicted.

Gandhi’s commitment to the cause became apparent to all when he was found collecting testimonies from indigo cultivators on the morning of April 18th, the day he was to appear before the district magistrate in the court. By then scores of Champaran peasants had gathered in protest outside the court so that Gandhi had to wade through a large crowd to enter the courtroom. [37]

He went to the court shortly after noon for the hearing where he categorically stated that he was in Champaran to render both, a national and a humanitarian service and that the ryot had invited him and that he was bound to see why and how planters were not treating them fairly. In his reply in the court Gandhi also made clear that he had no intentions to disturb the peace in the district. More significantly, however, he asserted that as a “self - respecting man” he felt bound to stay on. [38] This was an unusual form of resistance that spilled no violence and it troubled the colonial government officials. But the government not yet ready to treat Gandhi as a rebel, found impelled to let go of him. Later, the Collector wrote to Gandhi that he was free to conduct the inquiry. [39] It is stated the colonial government was not wanting to make an issue out of Gandhi’s Champaran venture, and, thus allowed Gandhi to proceed with his search. Gandhi, however, agreed to abide with the district magistrate’s entreaty to not venture further into the villages, an order that was subsequently rescinded.

Once made free to make inquiry, Gandhi embarked on a drive to investigate the indigo peasants’ complaints and grievances accompanied by professional lawyers and other co – workers from Bihar coming forward as volunteers committed to Gandhi’s cause. They included Rajendra Prasad, Jivatram Bhagwandas Kriplani, Dharnidhar Prasad, Gorakh Prasad, Sambhusaran, Gorakh Prasad and Anugraha Narain Sinha among others. [40] The volunteers were to help in recording statements of witnesses and also to draft confidential reports based on correct statements. [41] Gandhi initially concentrated on two main towns in the district – Motihari and Bettiah treating these as centres of Inquiry. Once preparations were made the entourage led by Gandhi worked from dawn to dusk. Surveys were conducted by volunteers who found the response from peasants so overwhelming that they were barely able to cope with work on day - to- day basis. [42] Apart from this, Gandhi’s entourage travelled across the district visiting several villages, talking personally to tenant farmers, and visiting and querying hundreds in their homes. [43] Gandhi made elaborate notes of the complaints and sufferings narrated by tenant cultivators against enforced indigo plantation, he recorded the peasants’ statements, cross checked these by regular questioning to find out whether the information given was correct or not. Some days Gandhi even ventured alone in the villages, meeting the peasants in their premises. He also found audience for his record taking among the indigo planters and factory managers though they shunned such meetings where tenant cultivators, the ryots in their eyes, were present. But they met Gandhi through their delegation and projected themselves as benefactors of the ryots. [44]

To the Champaran peasants, the method of gathering information introduced by Gandhi appeared infectious, living as they did under the law - and - order conditions of the colonial rule, and, the oppression of planters. The result was that many strangers came together and freely exchanged ideas, engaged in open discussions, opened up their private realms to scrutiny, thus began the voluntary associational life for many in Champaran. A public arena was created wherever Gandhi travelled to approach and reach masses in rural Champaran. While the colonial officials remained suspicious and constantly kept Gandhi under a watchful eye, the news that Gandhi was compiling information through his campaign continued to spread very rapidly in the district. Within a month i.e. by mid May 1917, Gandhi succeeded in collecting almost 8,000 testimonies of the peasants. [45] With each testimony, Gandhi’s understanding deepened about the conditions under which indigo cultivators lived and laboured. This enhanced his credibility. [46] The manner in which Champaran peasants responded to Gandhi’s call was an indication that the

national movement was on the verge of getting transformed into a popular agitation, one that germinated and spawned collective action in the public sphere.

Meanwhile armed with his repository, Gandhi travelled to Ranchi, the summer capital of Bihar, and placed the evidence collected by him before the Lt. Governor of the state, Sir Edward Albert Gait. For Gandhi the collected evidence was great in amount and was also very strong. It seemed that the colonial government had no choice but to take a note of it. Soon, a Champaran Inquiry Committee was appointed with four British colonial officials from the Indian civil service and significantly, including Gandhi as a member. [47] As the committee got together, it began its meetings on July 11, 1917. The Inquiry Committee studied the peasants' testimonies submitted by Gandhi. The committee also decided to allow the planters to present their case before it. Among the handful of planters who appeared before the committee was one W. S. Irwin who deposed arrogantly, "if Mr. Gandhi were to remain in this part of the country for the length of time I have (and it is 35 years), he would be convinced how consummate liar the Champaran peasant is". [48] After several meetings and site visits, the committee came down to discuss the legality of imposing sharabeshi and also whether the tinkathia system was to continue or not. The Inquiry Committee submitted its final report and recommendations on October 4, 1917. [49]

The Champaran Inquiry Committee took a considered view of the situation from the testimonies of indigo growing peasants and deposition of the European planters, through consistent deliberations with Gandhi aboard. The Inquiry Committee came to believe that the evidence had adequately demonstrated that planters had exploited and abused indigo peasant cultivators for decades. [50] It therefore reached a conclusion and made recommendations – a) partial compensation in the case of existing agreements between the tenant farmers and the planters, with about twenty percent reduction in sharabeshi and significantly, b) instituting a "voluntary system" where "the tenant must be absolutely free to enter into the contract or refrain from making it". [51] This was an indication that on the tinkathia system the ryot demands were accepted in full, meaning that the tinkathia system was to be done away with --- it had to be abolished. The decision was to the advantage of the Champaran indigo cultivator. The peasant testimonies, collected and compiled by Gandhi and his co – workers, contributed largely to end the practice. The colonial government accepted the recommendations proposed by the Inquiry Committee and on 4th March, 1918 the Champaran Agrarian Act was passed in Bihar & Orissa legislative council. [52] The bitter European planters could not prevent the passage of the Act. The scourge of indigo plantation ended in Champaran.

The evidence that Gandhi had placed before the Inquiry Committee concerned potential 'protestors' who could neither read nor write but their testimonies, as indigo cultivators, were presented as grievances in a highly rational approach. These became part of Champaran's growing public opinion in which Gandhi was depicted as a 'messiah'. [53] He gained immense popularity in Champaran's public sphere that was created anew, as he had helped settle the conundrum through peaceful Satyagraha, something that was beyond Champaran's public imagination. Gandhi thereafter enjoyed a popular presence in Champaran for he had assertively put peasant grievances on the table. His voluntarism contributed to settle one of the most difficult situations and conditions faced by indigo cultivators. Thus, by challenging economic exploitation Gandhi became the medium through which Champaran became the resistance site in full public view. Gandhi's 'victory' became the subject of daily discussions as if in a road show of the public sphere.

This is what recreated forms of life in Champaran after the success of a peaceful, non – violent Satyagraha. People began to interact with each other in the public realm as Gandhi's leadership made indigo cultivators realise the importance of 'publicness' as a shared space. As indigo cultivators got inducted into a life dedicated to self - help, the sense of an exemplary community was weaved together and it was tied to the belief that the life of a "toiler of the soil" was worth living. This was to be displayed in public as a community of virtue as reflected in the maxim that "good of the individual is contained in the good of all". [54] Champaran thus began to be viewed as a site of resistance against the gambit and machinations of control exercised by colonial Britain on Indian peasants. This was no mean achievement in colonial India.

Yet many questions remained to be answered because most Champaran people had private preoccupations for example the belief in caste that was treated as inviolable. During the course of the Champaran Satyagraha, concerns of caste backgrounds often shielded the possibility of inter – dining between peasants from different castes, particularly mingling with the untouchables. How was the preparation of food, dining and later, cleaning of dishes to be arranged? Who was to be made responsible to wash dirty pots and dirty pans – a chore that had the notions of polluted and polluting attached to it. Then, there was the question of vegetarians who were distinct from meat eaters?

It is important to note that caste differences were important among the upper caste co-workers of Gandhi as well, the likes of Rajendra Prasad for example. However, the simplicity with which Gandhi dressed, and the sincere dedication with which he collected the testimonies, the simple language that he conversed in, all this began to be treated as exemplary performances by the people in Champaran. And, during Gandhi's tireless work on behalf of the indigo cultivators, his own volunteer supporters too, hailing from prosperous and upper caste backgrounds, set an example. They helped in challenging the hostile indigo labour laws by taking oral testimonies as witnesses from ordinary peasants. Their example set the precedent to treat any caste background as compatible with upper-caste living conditions and its way of life. [55]

The upper castes shared common social premises with protestors of all caste backgrounds. Similarly, inter-dining, cleaning each other's pots and pans, washing one's own clothes or even disposing of one's own wastes – these acts and activities not only dignified labour but also helped generate respect for tasks generally performed by the humble in Champaran. [56] It is notable that the upper caste lawyers who joined Gandhi voluntarily perhaps had not counted on cleaning their own chamber pots, but as part of Satyagraha they did it. In the process those who joined Gandhi found their private domains becoming public. The public sphere so created helped confute deepest caste inequalities and thus gave a new meaning to the ways of life for satyagrahis while they worked against the prevailing colonial practices unleashed by the indigo planters against them. Champaran Satyagraha thus provided a more holistic vision on how to improve human condition, as Gandhi's public sphere began to grow in the political arena.

Gandhi had initially put himself up in a pleader's house, Babu Gorakh Prasad, but later rented his own accommodation through a known person of influence in Champaran. [57] After housing himself in the new place, Gandhi made avid observations about his upper caste co – workers from Bihar. Practically all of them observed not just caste discrimination but also caste restrictions as customary practice. Many of Gandhi's co – workers had joined the resistance accompanied by their servants but found that the cooking was not part of their chores because none of them was a Brahman. The struggle at times was made difficult at individual levels

because most co – workers from Bihar held that they would take the food cooked only by a Brahman. [58] Gandhi on witnessing such inflexibility felt immured, but could not restrain himself from reacting against such dogmatic attitudes. For such satyagrahis Gandhi laid down certain principles because as satyagrahis they were participants engaged in a public setting. He reasoned with himself that working in opposition to caste restrictions was like winning a losing battle.

The logic appeared to be sound and Gandhi conveyed to all his co – workers that they became “one caste” the moment they decided to join the resistance as “satyagrahis”. True to his personality, Gandhi insisted on engaging the “satyagrahi caste” to execute his non – violent Satyagraha. [59] This meant that everyone shared common kitchen, common places to bathe and common latrines to use. To Gandhi this denoted the path towards social change. This also indicated the transformation of the inner selves of the individual voluntary co – workers. However, no force was to be used in this, as satyagrahis the individuals were free to exit or enter the movement that had evolved in Champaran’s public sphere. There was an unsaid condition attached as an act of justice to this, “entry by merit and exit by choice”. [60]

There were some upper caste co – workers about whom Gandhi believed that they assumed they could serve the movement in public but wanting to retain caste consciousness in private. Gandhi often shamed them, trying to coax them into adopting an egalitarian way of life. The following excerpt speaks about this dimension in Gandhi’s own words – “The curious ways of living of my companions in the early days were a constant theme of raillery at their expense. Each of the vakils [lawyers] had a servant and a cook and therefore a separate kitchen and they often had their dinner as late as midnight. Though they paid their own expenses, their irregularity worried me, but as we had become close friends there was no possibility of a misunderstanding between us, they received my ridicule in good part. Ultimately it was agreed that the servants should be dispensed with, that all kitchens should be amalgamated and that regular hours should be observed. As all were not vegetarians, and as two kitchens would have been expensive, a common vegetarian kitchen was decided upon. It was also felt necessary to insist on simple means”. [61]

A close associate of Gandhi at Champaran, Rajendra Prasad recalled how Gandhi’s experiments were shaped with simplicity. Gandhi often struggled to lower a clay pot for water using the village well rope, the locals watched him immensely amused. [62] The practice was reflective of sharing of common social premises by satyagrahis of all backgrounds. Likewise, professionals or lawyers who had joined Gandhi’s cause for peasants’ struggle were ready to co -operate, but they did it in a manner that made them put behind the claims of privacy. For example, they did not shield their caste so their backgrounds remained exposed in the open and working with Gandhi at Champaran they shed or agreed to dismantle their private boundaries for public good. As they excluded their private life from public sphere, the locus of communicative action extended, through which a sense of “fellow feeling” began to be imparted among the satyagrahis.

Gandhi had built up the notion of ‘mass public’ that also defined matters of public opinion. Thus, the idea of public sphere was expanded as Champaran’s private realm had been breached by Gandhi’s concept of public sphere. There was to be no more emphasis on discursive exchanges only among the educated elites. On the other hand, the new political quotient was meant to trigger discussions at mass level. This meant that indigo growing peasants of Champaran engaged in public sphere on issues that mattered to them the most.

Thus, the Champaran Satyagraha had an overreach quotient in particular reference to caste inequalities. Gandhi honed in largely illiterate masses from the villages in the Champaran district alongside the literate, often English - speaking elites. He thus opened up a new window for dialogue, starting a new conversation giving rise to a deliberation process involving reformed individuals. The Champaran Satyagraha obliged even adversaries to look or imagine themselves in each other's shoes and thereby open up the possibility of reaching out on a common ground. Thus, making the public sphere of Gandhi all inclusive.

REFERENCES:

1. Bhattacharya, Neeladri, 'Notes Towards a Conception of the Colonial Public', in Rajeev Bhargava and Helmuth Reifeld, (eds.), Civil Society, Public Sphere and Citizenship: Dialogues and Perceptions, Delhi, Sage Publications, 2005, pp. 130-156.
2. Binod Kumar Verma, 'Champaran Movement of 1917 and Pandit Raj Kumar Sukla', Proceedings of the Indian History Congress, Vol. 44 (1983), pp. 388-391.
3. Calhoun, Craig, (ed.), Habermas and the Public Sphere, Cambridge, The MIT Press, 1996 (repr.).
4. Champaran Satyagraha: How India's First Civil Disobedience Movement Began, The Times of India (TOI), 10 April 2018, <https://timesofindia.indiatimes.com/india/champaran-satyagraha-how-indias-first-civil-disobedience-movement-began/articleshow/63680575.cms>
5. Chandra, Bipan, et al., India's Struggle for Independence, New Delhi, Penguin Books, 1989.
6. Chatterjee, Partha, 'Beyond the Nation? Or Within', Economic and Political Weekly, Vol. 32, No. 1/2 (Jan 4 -11, 1997), pp. 30-34.
7. Desai, Narayan, My Life is My Message: Satyagraha, 1915-1930, Vol. 2 (translated Tridip Suhrud), New Delhi, Orient Blackswan, 2009.
8. Dutta, Priyadarshi, 'Hundred Years of Champaran Satyagraha', Press Information Bureau, 7 April 1917, <https://pib.gov.in/newsite/printrelease.aspx?relid=160650>
9. Eley, Geoff, 'Nations, Publics and Political Cultures: Placing Habermas in the 19th Century', in Craig Calhoun, (ed.), Habermas and Public Sphere, Cambridge, The MIT Press, 1996 (repr.), pp. 289-339.
10. Gandhi, Mohandas Karamchand, An Autobiography or The Story of My Experiments with Truth, Vol. 2, (translated by Mahadev Desai), Ahmedabad, Navajivan Publishing House, 1929.
11. Gandhi, Mohandas Karamchand, The Collected Works of Mahatma Gandhi (CWMG), 100 Vols., New Delhi, The Publications Division, Ministry of Information and Broadcasting, Government of India, 1956-94.
12. Guha, Ramchandra, 'What Champaran Gave to Gandhi and India's Freedom Struggle', Scroll, 18 April 2017, <https://scroll.in/article/834784/what-champaran-gave-to-gandhi-and-indias-freedom-struggle>
13. Guha, Ramchandra, Gandhi: The Years That Changed the World, 1914-1948, New Delhi, Penguin, 2018.

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14. Habermas, Jurgen, 'Further Reflections on the Public Sphere', in Craig Calhoun, (ed.), Habermas and the Public Sphere, Cambridge, The MIT Press, 1996 (repr.), pp. 421-461.
 15. Habib, Irfan, 'Celebrating the Champaran Satyagraha: A Hundred Years On', The Wire, 25 April 2017, <https://thewire.in/history/champaran-satyagraha-centenary>
 16. Heberle, Renee, 'The Personal is Political', in Lisa Disch and Mary Hawkesworth, (eds.), The Oxford Handbook of Feminist Theory, Oxford, Oxford University Press, 2016.
 17. Heimsath, Charles, Indian Nationalism and Hindu Social Reform, Oxford, Oxford University Press, 1964.
 18. Henningham, Stephen, 'The Social Setting of the Champaran Satyagraha: The Challenge to an Alien Elite', The Indian Economic & Social History Review, Vol. 13, No. 1 (January 1976), pp. 59-73.
 19. Keane, John, Civil Society: Old Images, New Visions, Stanford, Stanford University Press, 1998.
 20. Khan, Shaikat Ali, 'Gandhi, Agrarian Unrest in Champaran and the Nationalist Movement in Bihar', Proceedings of the Indian History Congress, Vol. 65 (2004), pp. 735-745.
 21. Kumar, Rajesh, 'Peasants' Perception of Gandhi-Champaran 1917-1918', Proceedings of the Indian History Congress, Vol. 49 (1988), pp. 389-393.
 22. Misra, B. B., (ed.), Select Documents on Mahatma Gandhi's Movement in Champaran, 1917-1918, Bihar, The Government of Bihar, The Superintendent, Secretariat Press, 1963.
 23. Mittal, S. K., and Krishan Dutt, 'Raj Kumar Sukul and the Peasant Upsurge in Champaran', Social Scientist, Vol. 4, No. 9 (Apr., 1976), pp. 25-36.
 24. Parel, Anthony J., 'Symbolism in Gandhian Politics', Canadian Journal of Political Science, Vol. 2, No.4 (Dec. 1969), pp. 513-527.
 25. Pouchepadass, Jacques, 'Local Leaders and the Intelligentsia in the Champaran Satyagraha (1917): A Study in Peasant Mobilization', Contributions to Indian Sociology, Vol. 8, No. 1 (January 1974), pp. 67-87.
 26. Pouchepadass, Jacques, Champaran and Gandhi: Planters, Peasants and Gandhian Politics, New Delhi, Oxford University Press, 1999.
 27. Prasad, Rajendra, 'Gandhi in Bihar', in Homer A. Jack, (ed.), The Gandhi Reader: A Sourcebook of His Life and Writings, Bloomington, Indiana University Press, 1956, pp. 149-59.
 28. Prasad, Rajendra, At the Feet of Mahatma Gandhi, London, Asia Publishing House, 1961.
 29. Prasad, Rajendra, Autobiography, Bombay, Asia Publishing House, 1957.
 30. Prasad, Rajendra, Mahatma Gandhi and Bihar: Some Reminiscences, Bombay, Hind Kitab Ltd., 1949, pp. 25-26.
 31. Prasad, Rajendra, Satyagraha in Champaran, New Delhi, Prabhat Prakashan, 2018 (repr.).

32. Rudolph, Lloyd I., and Susanne Hoeber Rudolph, 'The Coffee House and the Ashram Revisited: How Gandhi Democratized Habermas' Public Sphere', in Lloyd I. Rudolph and Susanne Hoeber Rudolph, Postmodern Gandhi and Other Essays: Gandhi in the World and at Home, Chicago, University of Chicago Press, 2006, pp. 140-174.
33. Seal, Anil, The Emergence of Indian Nationalism: Competition and Collaboration in the Later Nineteenth Century, Cambridge, Cambridge University Press, 1968.
34. Seidman, Steven, Jürgen Habermas on Society and Politics: A Reader, Boston, Beacon Press, 1989.
35. Sen, Amiya P., (ed.), Social and Religious Reform: The Hindus of British India, New Delhi, Oxford University Press, 2003.
36. Singh, Bhojnandan P., 'Ideological Foundations of the Gandhian Movement: Reflections on the Champaran Satyagraha', Proceedings of the Indian History Congress, Vol. 78 (2017), pp. 431-445.
37. The Story of Champaran Satyagraha: India's First Civil Disobedience, India Today, 19 April 1917, <https://www.indiatoday.in/fyi/story/champaran-satyagraha-100-years-gandhi-first-civil-disobedience-movement-972335-2017-04-19>
38. Zelliott, Eleanor, 'Congress and the Untouchables, 1917-1950', Richard Sisson and Stanley Wolpert, (eds.), Congress and Indian Nationalism: The Pre-Independence Phase, Delhi: Oxford University Press, 1988, pp. 182-197.

A REVIEW ON MEMBRANE FABRICATION: STRUCTURE, PROPERTIES AND PERFORMANCE RELATIONSHIP

Krishan Raj Singh*; Dr. Arminder Kaur**

*SBAS, Sanskriti University,
Mathura, Uttar Pradesh, INDIA
Email Id- hodbio-tech@sanskriti.edu.in

*SBAS, Sanskriti University,
Mathura, Uttar Pradesh, INDIA
Email id: arminder.smas@sanskriti.edu.in

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ABSTRACT

The methods for fabricating polymeric membranes for pressure-driven membrane technologies and membrane distillation are addressed in this study. The manufacturing method, the characteristics of the produced membranes, and water desalination performance are all linked. The crystalline structure of the membrane-based polymer, porous structure, hydrophobicity/hydrophilicity, membrane charge, and surface finish are all significant factors influencing membrane performance. Deny the reality that there is a lot of knowledge about how to tailor membrane pore structure, which include surface properties and cross-section morphology, using the right fabrication methods, producing reliable membranes with anti-fouling properties, chemical resistance, high mechanical strength, and high flux and sensitivity is still a challenge. To guarantee continued development in membrane performance, typical membrane manufacturing methods such as phase inversion and interfacial polymerization must be improved. Simultaneously, the possibility of new manufacturing methods like electrospinning and track-etching must be evaluated. For continued research and advancement in membrane technology for water desalination, a thorough knowledge of the relationship between structure-surface characteristics and performance is essential.

KEYWORDS: Fabrication, Membrane, Polymer, Porous, Structure.

INTRODUCTION

The global population clock estimates that the population has surpassed 7 billion people and will surpass 1 trillion by 2045. Healthy water supply would be a significant issue for the world's developing nations. To address the shortage of portable water, enhancing the productivity and affordability of water treatment is a significant problem (1). Water treatment has included microfiltration, ultrafiltration, Nano filtration, reverse osmosis, and membrane distillation, among other membrane techniques. Water treatment methods such as UF and MF are well-developed, while RO is extensively utilized for desalination and purification. MD is a novel method under development that has the potential to desalinate extremely salty water. Membranes serve an essential importance in membrane-based water treatment processes, determining the

technical and economic efficiency of the technologies listed; membrane enhancement may have a significant impact on existing technology performance (2). The membrane's material and pore size are determined by the purpose for which it will be employed. The average pore size required for membranes for various water treatment procedures is shown in Figure 1.

In the upcoming chapters, we'll go over the manufacturing process in detail as well as the material's structural properties. The recent advancement of polymeric membranes and membrane production techniques will be addressed in this paper(3).

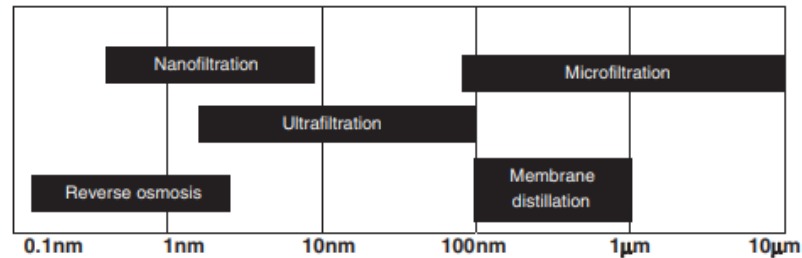


Figure 1: The above figure shows the Average pore size of the membranes used in different membrane processes.

Fabrication techniques for membranes

The polymers employed and the membranes desired architecture dictate the procedure for producing polymers screens. Crystallization, interface crosslinking, elongation, and tracks stripping are some of the techniques used, and electro spinning are some of the most popular methods for producing polymeric membranes(4). Figure 2 shows the Schematic representation of a film/bath interface.

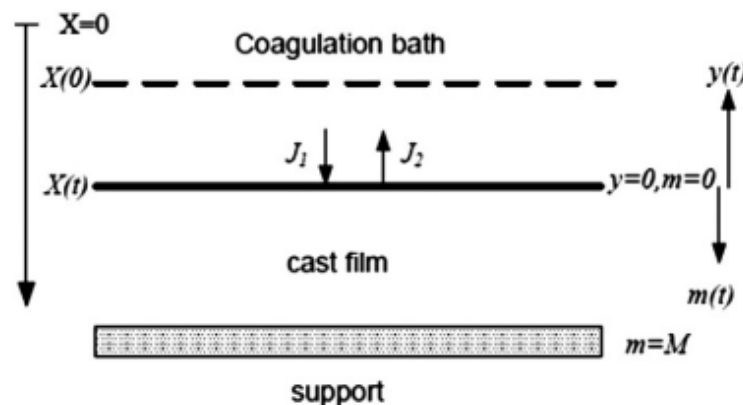


Figure 2: Schematic representation of a film/bath interface

According to Saljoughi et al., Increased PVP concentration in the casting films from 0 to 1.5 wt% aided macrovoid development in the transmembrane sub-layer, culminating in improved pure flowing liquid. According to the same study, increasing the PVP accumulation from 1.5 to 3, 6, and 9 wt. % tends to result in a decrease in flowing water, implying that the microeconomic void was gradually repressed. PVP-added PES membranes have a reduced wettability and more

water flow than pure PES membranes. The friction coefficient decreased by 16 % when the PVP content in the castings fluid was 10%. The introduction of PVP to the dispersion suspension enhances the UF PES membrane's penetration while having no effect on selection(5).

Enhanced cell wall permeation once PVP is introduced, as per Marchese et al., is due to the increasing trend in connector concentration, a reduction in the factors were determined of the thick coating due to quantitative empty spaces in the substratum, and then an enhance in the wettability of the ground layer on the lipid bilayer inside the pore spaces. The development of macrovoids, which are enormous elongated gaps under the membrane's top surface, has received a lot of attention (6).

According to Arthanareeswaran et al., adding a molecules strength PEG addition to the casting solutions sheet improved the wettability of the membranes formed. Increasing PEG content in the casting films facilitates the formation of fragmentation in the transmembrane comment thread, which improves the passage and rejections of human's plasma. Susanto and Ulbricht looked at how three different complex biochemical additives affected the transmembrane shape and endurance in the PES membrane's polymers polymeric barrier: PVP, PEG, and poly-b-poly. They discovered that adding Pluronic as a modifying agent improved membrane performance and stability the most. The hydrophilic element of Caprolactone, according to the scientists, boosts the PES-additive contact, therefore justifies the outcome. Smaller compounds were thought to be made to stop from actually touching the cell wall by a density and strongly rehydrate poly(ethylene oxide) thermoplastic main asset on the epithelial exterior, and that substances gathered on the poly(ethylene oxide) layer might be usually undone by repeated scrubbing(7).

The use of nanostructured materials as inclusions to frictional polymerization has notable times captivated interest due to augmented epithelial features, such as greater elastic modulus, that give rise from both the electrode surface communication conversations the nanostructures have for the all-around it composite material. The cell barrier was unaffected by the addition of Nano materials. So according SEM images, the addition of nano-sized Alumina particles had no influence on the interface, bridge, or internal pore membranes topologies. Both pure PVDF and PVDF Al₂O₃ screens with finger-like pores have an asymmetrical shape.

Evaporation-Induced Phase Separation

Thermal decomposition emulsification is a quick and easy way to create screens for a range of applications. In the first stage, a viscosity monomer prototype is produced in a solvents and a non-solvent. The produced liquid solutions is then cast on a planar substratum using surgeon blades process. When the flammable solvents from of the molded solutions dissipates, a polymeric coating develops on the porosity substrate. The form of solutions molded movies may be changed by utilizing solutions with different melting degrees. PEG-based films were utilized as pore formers. By adjusting the casting temperature and liquid paraffin content, the membranes' pore size and pore shape could be fine-tuned.

Interfacial Polymerization Is A Kind Of Polymerization That Occurs Between Two Surfaces

- **Stretching**

Extruder accompanied by stretching is used to make microporous membranes, which are widely employed in MF, UF, and MD. Stretching polymer membranes was created in the 1970s, and the patents were held by the businesses. This is a solvent-free method that involves heating the polymer beyond its melting point, extruding it into thin sheet shapes, and then stretching it to make it porous. The ultimate porosity structure and characteristics of the membranes are controlled by the material's physical properties and the applied processing parameters in this procedure. They observed that the molecule mass of PP, in addition to bending and heating, is an essential component in determining the form of screens. Some other study used blended barriers constructed of extended sequence branched PP and straight chained PP to evaluate the effect of mixing on the orientations of crystallized and unstructured in the predecessor films. The inclusion of long diverging PP increased the diameter of the laminate in the mix and increased the breathability of the bilayer. They also made parts of a system out of PVDF with varied metal flow coefficients and studied the effect of emulsion polymerization rheological characteristics on the bench seat membranous architecture. PVDF screens' liquid water resistance was improved by combining PVDF with varied melt rheology.

• Track-Etching

Figure 3 shows a schematic of a single ion-irradiation system. This process involves irradiating a nonstick polymers sheet with powerful ion beams, which results in the formation of linear damages footprints all through the bombarded polymers surfaces. Porous structure and particle densities are autonomous variables that may be modified in a wide range with this technology, from a few nonmetric scale to micrometers and $1\text{--}10^{10}\text{ cm}^2$, correspondingly.

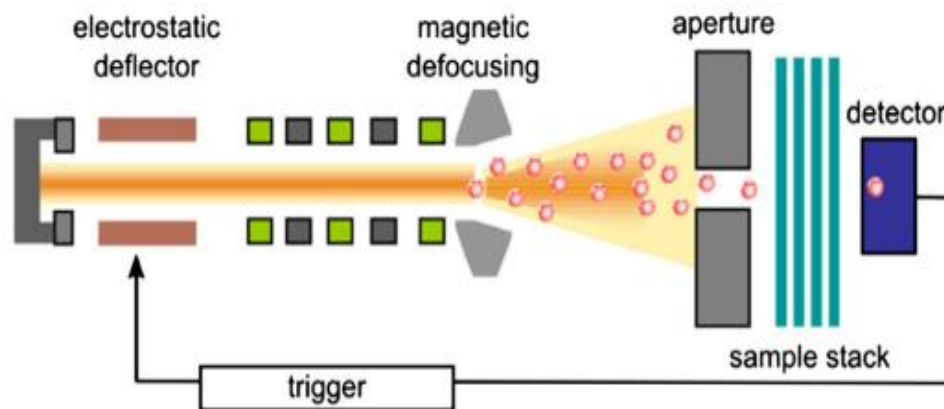


Figure 3: Schematic showing single ion-irradiation setup used to fabricate track etched membrane

This method entails bombarding a frictionless polymeric sheets with intense incident electron, resulting in the production of harm accumulation imprints across the blasted materials regions. Permeability and nanoparticle concentrations are independent factors that can be changed on a large scale using this innovation, ranging from a few nanometers to microns in size and $1\text{--}10^{10}\text{ cm}^2$. The book contains fundamental information on particle track creation, track manufacturing mechanisms, track etching recipes, and possible applications. The irradiation time and temperature influence membrane porosity, whereas the etching time and temperature determine pore size.

- **Electrospinning**

Electrospinning is a relatively new method of producing parts of a system for filter and salinity purposes. A high current difference is generated in among polymerization droplets and the grounding collection. When the electromagnetic current becomes extremely enough and surpasses the mechanical energy of the droplets, an issue that causes jet is created, as illustrated in Figure 4. Controllable aspect ratios and morphology of the Nano/microfibers are unique characteristics of these fibrous membranes, which may have been produced by changing the solution viscosity, ambient conditions, transmitted electric potential, and solution flow velocity.

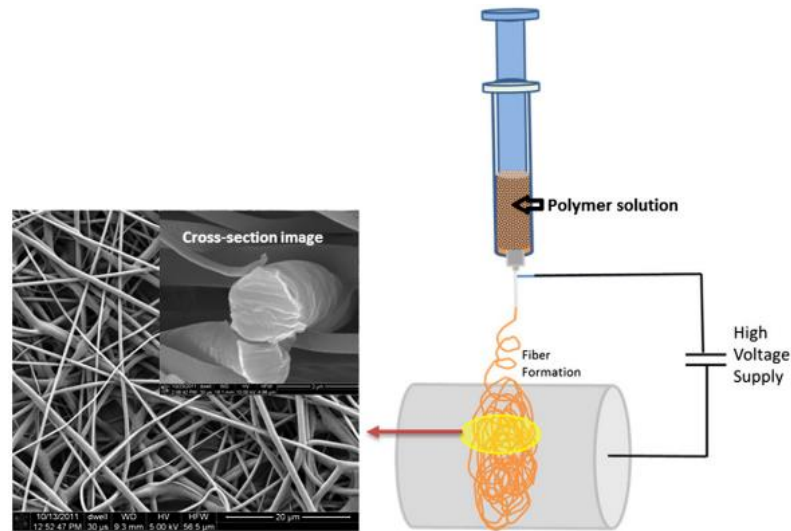


Figure 4: Schematic showing electrospinning of polymer solution

DISCUSSION

A detailed understanding of the link among structural and chemical features and transmembrane efficiency in wastewater treating systems is important for the continued preparation of polymeric screens and the optimization of manufacturing procedures. The biochemical content of the barrier, as well as specific features of the highly porosity and extracellular fluid, such as lipophilic tails, substrate charging, exterior quality, particle diameter, and porosities, all influence cellular uptake. More efforts are required to enhance existing membrane manufacturing processes as well as create new fabrication procedures to guarantee success in these areas. Despite several research attempting to relate transmembrane physical and chemical properties to solvent rejections, the role of transmembrane architecture and morphology properties in operating parameters remained unknown.

CONCLUSION

This research looked at the connections among composite membranes manufacture, architecture, interface features, and effectiveness. It was displayed that great development has been made in the manufacture of system for water purification to recently. Developing trustworthy substrates with anti-fouling properties, high hardness, high chlorinated tolerance, and a thin barrier surface to allow for high flux remain a challenge. More methodical studies are needed to better understand the role of material properties in genderqueer transit, the effect of exterior quality on

cell wall fluid flow all through cell wall treatment of multiple feed remedies with carbonaceous organisms, the impact of membrane charge on epithelial high porosity at numerous pH, and antifouling interrelations all through sequester cuts. The identification of that and other variables that can be used to predict relationships amongst membranes manufacture, architecture, surface composition, and effectiveness might be quite beneficial in the creation of lattice wastewater purification facilities.

REFERENCES:

1. Lalia BS, Kochkodan V, Hashaikh R, Hilal N. A review on membrane fabrication: Structure, properties and performance relationship. *Desalination*. 2013;326:77–95.
2. Lalia BS, Kochkodan V, Hashaikh R, Hilal N. A review on membrane fabrication: Structure, properties and performance relationship. *Desalination*. 2013.
3. Otitoju TA, Ahmad AL, Ooi BS. Polyvinylidene fluoride (PVDF) membrane for oil rejection from oily wastewater: A performance review. *Journal of Water Process Engineering*. 2016.
4. Chi HY, Hung SH, Kan MY, Lee LW, Lam CH, Chen JJ, et al. Metal-organic frameworks for dye sorption: Structure-property relationships and scalable deposition of the membrane adsorber. *CrystEngComm*. 2018;
5. Yang Z, Peng H, Wang W, Liu T. Crystallization behavior of poly(ϵ -caprolactone)/layered double hydroxide nanocomposites. *J Appl Polym Sci*. 2010;116(5):2658–67.
6. Marchese J, Ponce M, Ochoa NA, Prádanos P, Palacio L, Hernández A. Fouling behaviour of polyethersulfone UF membranes made with different PVP. *J Memb Sci*. 2003;211(1):1–11.
7. Arthanareeswaran G, Thanikaivelan P, Raguime JA, Raajenthiren M, Mohan D. Metal ion separation and protein removal from aqueous solutions using modified cellulose acetate membranes: Role of polymeric additives. *Sep Purif Technol*. 2007;55(1):8–15.

AN ANALYSIS OF HEALTH BENEFITS OF CASHEW NUTS

Gulshan Rathore*

*SOP, Sanskriti University,
Mathura, Uttar Pradesh, INDIA
Email id- gulshan.ips@sanskriti.edu.in

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ABSTRACT

Cashew nut is necessary for bodily & mental health. It's an energizing diet that also happens to be finest dietary medicine for a variety of ailments. Nuts defend against cancer, heart disease, circulatory strain, & a variety of degenerative diseases associated with age. It might be used to treat a variety of ailments. Cashew has therapeutic qualities in all of its parts. Proteins, carbs, minerals, & lipids in cashew kernels help you build energy. Cashew nuts are used for variety of things, including blood sugar control, weight reduction, cancer prevention, cold & flu treatment, aging, urinary & digestive problems, & bone relaxing. When compared to other nuts, cashew kernels have better protein, carbohydrate, fiber, & mineral characteristics than almond, hazelnut, & walnuts. When matched to Almonds (20.8 percent), Hazelnuts (15.6 percent), & Macadamia Nuts, Cashew Kernels have most protein (21 percent) (60.9 percent). When compared to other nuts such as almonds, walnuts, & so on, cashews have a high carbohydrate content (22 percent). Cashew nuts provide a number of health advantages. They help to strengthen immune system, serve as an antioxidant, dissolve gallstones, & are good for anaemia. They are high in healthful fats, which our bodies need to absorb fat-soluble vitamins. Antihypertensive & glucose-lowering properties of its bark are well-known. It has a positive impact on eyes & skin. Because it is high in vitamin C, it might be used to treat acne, remove freckles, skin wrinkles, & fight against aging.

KEYWORDS:*Anacardiaceae, Cashew, Fiber, Health, Nut.*

INTRODUCTION

Cashew is a perennial evergreen plant that belongs to Anacardiaceae family. There are 400-600 species in this family. Solitary cashew species in genus *Anacardium* is valued because of its nourishing kernel. Cashew is South American & Brazilian tropical vegetation. Plant's height ranges from 5 to 14 meters. Trunk is typically small & uneven, with branches that begin near ground. Leaves are green & spiral in spiral arrangement concerning end of stem. After 20-25 days, leaves are fully grown. Individual blooms are small & comprise of 5 yellowish-green sepals & 5 white to reddish petals. Flowering might occur at any time. In 2011, around 4.7 million ton raw nut were harvested globally, with 1.8 million cashew apples harvested in Asia & Africa, respectively. Cashew has basically cultivated, & entire fruit, such as apple & kernel, is utilized for medical & culinary reasons. Cashew nut shell liquid, major by-product of cashew nut, rose to prominence during World War II as a result of its use. Cashew nut is rich in

nutrients & has a nice taste. Lower-density lipoprotein levels of cholesterol & coronary risk illnesses have linked to cashew nuts. Proteins & lipids are found in cashew portion. Lysine, valine cysteine, arginine tyrosine, , & several vitamin such as vitamin C, E, & D are among proteins (1).

Cashew gum has long used to treat a variety of ailments. These have increased fraction of unsaturated fatty acid than saturated fatty acid. Its medicinal properties have utilized to lower risk of cardiac disease, oxidative stress, , high cholesterol, inflammation & diabetes. Cashew nut is utilized for variety of therapeutic reasons & have a significant health impact, as shown by studies. Fatness, diabetes, cardiac disease, urinary problems, digestive disorders, & a variety of additional rapeutic applications such as bone relaxation, cold & flow, & so on are all treated with se. It is also beneficial in treatment of cancer & in prevention of aging (2).

1.1 CASHEW COMPOSITION:

Nuts of Cashew tree might be found in north-eastern Brazilian areas, with a kidney seed form that retains bottom half of this, tree's output. It is a popular dried organic food with a delicious & vibrant flavor. Portuguese introduced cashew to India & Africa in 16th century. Cashew tree is very important because its valuable wood contains analgesic properties; nevertheless, cashew tree did not become well-known until early twentieth century. India is now world's largest producer, processor, & exporter of cashew nuts. It is used to distribute bread rolls, frozen yogurts, & chocolates as a mixed drink or in meals. It's also good for natural goods like juice, wine, & sweets. cashew nutshell fluid contains a damaging astringent oil that is used in brake coatings, paints, & plastics (3).

1.2 CASHEW REFINING:

These nuts must be processed in order to remove edible portion, which is very nutritious. It is gared over a lengthy period of time in April & Might in India, & it is marketed quickly from re. Cashew has a thick exterior surface & a somewhat thinner interior surface. pieces obtained during preparation are classified as wholes, portions, or bits, among or things (4).

1.3 ROLE OF CASHEW NUTS IN HEART DISEASES:

Because of ir high fat content, nuts have deemed unfit for consumption. However, new research suggests that nuts might be helpful to heart. About 66 percent of cholesterol is produced by liver, not by diet, & is fuelled by saturated fat. Soaked fat, in & of itself, might be harmful to heart. Soaked fats are often found in manufactured products, including dairy products. People might lower their cholesterol levels by eating foods that are lower in saturated fats & high in unsaturated fat. Tree nuts have recently shown a significant medicinal benefit. Previous epidemiological & clinical investigations, for example, have indicated that tree nuts are beneficial in treatment of cardiac disease. Cashew portion with less saturated fat & more monounsaturated fat lowers overall cholesterol levels & low-density lipoproteins (LDL) - so-called "bad cholesterol" linked to cardiac disease - while increasing high-density lipoproteins (HDL) & so helping to keep heart healthy (5). It is a popular dried organic food with a delicious & vibrant flavor. Portuguese introduced cashew to India & Africa in 16th century. Cashew tree is very important because its valuable wood contains analgesic properties; nevertheless, cashew tree did not become well-known until early twentieth century. India is now world's largest producer, processor, & exporter of cashew nuts.

Nuts are likely to influence indicators of atherosclerosis or than lipid profile & carbohydrate metabolism because of its distinctive fat & non-fat content. Nuts' effects on new CHD risk variables, such as oxidative stress, inflammation, & vascular reactivity, have been studied more recently, as reviewed. Beyond well-established cholesterol reduction, regular nut intake seems to have positive impacts on cardiovascular variables (6).

- **Oxidation:** Nuts are high in tocopherols & phenolic compounds, which have powerful antioxidant properties, as evidenced by studies in vitro that showed nut extracts reduced lipid peroxidation or oxidative DNA damage, along with advantageous effect of nut consumption on lipid oxidation, antioxidant enzyme activity, & formation of cholesterol oxidation products in both acute & chronic experimental animal studies. Walnuts were recently discovered to contain large levels of melatonin, which had a strong antioxidant impact in an experimental rat model. Furthermore, since MUFA makes up a large portion of fat in most nuts & is not an oxidation substrate, enriching lipoprotein lipids with these fatty acids following nut intake might reduce its susceptibility to oxidation. Nuts, particularly walnuts, are high in PUFA, & double bonds in these fatty acids' molecular structures are favored starting sites for oxidation processes. As a result, unless endogenous antioxidants in walnuts offset negative changes in lipoprotein oxidation, adverse changes in lipoprotein oxidation might occur following walnut intake (7).
- **Inflammation:** According to cross-sectional research, high concentration of phenolic chemicals in nuts, especially in the pellicle, might predict an anti-inflammatory impact of regular nut intake. For two reasons, walnuts are thought to be more anti-inflammatory than other nuts. To begin with, as previously said, walnuts is only nut containing significant quantities of ALA, considered among one of most anti-inflammatory fatty acids. Walnuts are especially high in phenolic component ellagic acid that had proven in tests to have strong anti-inflammatory effects. Nonetheless, in controlled feeding studies with almonds, or mixed nuts, walnuts plasma levels of CRP, classic marker of systemic low-grade inflammation, were generally unchanged. Or inflammatory mediators including plasma levels of ICAM-1, vascular cell adhesion molecule [VCAM]-1, & IL-6, on or off, reduced following nut diets in 2 trials. It should be emphasized that inflammatory biomarkers are usually secondary outcomes of nut-feeding studies, posing statistical power issues in detecting significant changes. Current small interventional trial comparing diets supplemented with 2 doses of almonds to a healthy, nut-free diet found similar results. However, almond diets were shown to be superior to control diet in terms of lowering circulating CRP & E-selectin, a powerful inflammatory cytokine, but not IL-6.
- **Vascular Reactivity:** Endothelial dysfunction is key step in atherosclerosis that has linked to perfusion irregularities & cause of ischemia episodes in both early & advanced atherosclerosis. Increased production of pro-inflammatory cytokines & cellular adhesion molecules, along with reduced bioavailability of endogenous vasodilator, which is generated from L-arginine, as previously mentioned. We all want our skin to be fresh, perfect, & radiant, & we avoid using cosmetics on damaged skin. We can prevent our skin from acne & damage by eating a few Cashews every day. This is Cashew nut's most helpful impact for beautiful & bright skin of atherosclerosis.

Food consumption influences vascular reactivity, which has recognized for a long time. SFA-rich diets have repeatedly found to decrease endothelial function in short-term feeding trials. Furthermore, a single fatty meal high in SFA is typically followed by temporary endothelial dysfunction & increased triglyceride-rich lipoproteins. Provision of beneficial nutrients, such as n-3 PUFA, antioxidant vitamins & phenolic compounds, & L-arginine, all of which are nut components, might offset the negative effects, whether acute or chronic. As a result, it's possible that nut intake will have a positive impact on endothelial function.

1.4 CASHEW NUTS FOR DIABETES :

Daily use of foods that quickly raise blood sugar levels contributes to development of heart disease & diabetes. Cashew nuts have a high mono saturated fat content, which helps to lower blood glucose levels & boost insulin production. As a result, cashew pieces might help control diabetes. They're necessary for those with type 2 diabetes. They are lower in sugar & higher in fiber; when these two variables are combined, blood glucose levels are lower & type 2 diabetes is prevented.

1.5 CASHEW NUTS FOR RHINITIS:

As Vitamin B is abundant in cashew components, & it is a naturally occurring cell strengthener with high power invulnerability. As a result, burning cashew pieces throughout winter & cold season will increase an individual's resistance to infection.

1.6 CASHEW NUTS FOR OBESITY:

According to Harvard University, a healthy diet includes abundant fat from tree nuts, & olive oil is a powerful agent for weight loss as a little calorie, maintained for a low eating regimen, & a significant advantage for weight loss. These nuts are so rich in vitamins & fiber that they will satisfy your hunger with less energy than or snacks. Total cholesterol, triglycerides, LDL, & VLDL cholesterol are all reduced significantly by cashew extract.

1.7 PROTECTION FROM CANCER:

Nuts might also be used to kill this illness. Cashew pieces high in selenium are beneficial for lung, liver, skin, cerebrum, & gastrointestinal cancers. Due to its high fiber content, it also aids in battle against cancer. By eliminating free radicals from body, they function as an antioxidant & inhibit development of cancer cells. Proanthocyanidins are a kind of flavonoid that fights tumor cells & stops them from multiplying. Cashew nuts have a high copper level & contain proanthocyanidins, which assist to prevent colon cancer.

1.8 EYE PROTECTION:

Today's women prefer to work from home, which means they spend a lot of time on their phones & computers, which is bad for their eyes. Cashew contains zeaxanthin, a pigment that protects retina from UV light damage & therefore protects eye when consumed.

1.9 FOR SKIN:

We all want our skin to be fresh, perfect, & radiant, & we avoid using cosmetics on damaged skin. We can prevent our skin from acne & damage by eating a few Cashews every day. This is Cashew nut's most helpful impact for beautiful & bright skin.

1.10 HELPFUL FOR AGEING:

Vitamin E is a powerful antioxidant. Vitamin E supplementation seemed to halt aging-related decline in sensitivity, according to a recent study of 65-year-old individuals. Cashew pieces contain 46mg of Vitamin E per 100g, which helps to prevent aging by containing free radicals that keep body free of wrinkles & lines around eyes. Cashew is utilized to re-mineralize skin & to cure premature aging.

1.11 Allergic Reactions:

Nuts are recognised source of food allergies, with probable incidence rate of 1% in general populace. According to recent comprehensive analysis of populace-based research, when analysis is depending on food contest test, prevalence is 4.3 percent & 1% when sensitization is evaluated through skin prick test. Allergic seed storage proteins stimulate particular IgE antibodies, which cause allergic responses to nuts. y mostly affect young children & might be very severe, even fatal. It has reported that allergic responses to nuts might be deadly. Severity of concomitant atopic disorders [asthma, rhinitis, & eczema] predicts which individuals might have life-threatening allergic responses to tree nuts & peanuts. With time, a small percentage of youngsters with peanut allergies acquired tolerance. Once a nut allergy has confirmed, patient & family education about avoiding all kinds of nuts & being wary of concealed nut products in processed foods is essential for preventing future episodes, which tend to be clinically worse. Patients & family members must be taught how to identify early signs of an allergic response & how to manage an anaphylactic reaction quickly.

LITERATURE REVIEW

Mgaya J et al. discussed Chemical Valorization of Cashew Nut Shell Waste in which y discussed how Cashew nut shells are agro-waste from cashew nut processing plants that contain 30–35 wt% oil, referred known as cashew nut shell liquid (CNSL). This liquid contains anacardic acid, cardanol, cardol, & 2-methyl cardol, which are all possible chemicals. Components of cashew nut shell liquid have converted into industrially significant compounds via a variety of processes, which are detailed below. Transfer hydrogenation processes, isomerization reactions, metasis reactions, carbonylation reactions,, isomerizing metasis reactions, polymerization reactions & isomerizing carbonylation reactions are some of reactions used in transformation. Through se explanations, it becomes clear cashew nut shells aren't waste, but rare valuable source of CNSL, a potentially renewable resource for synsizing a variety of industrial compounds (8).

Barimah J et al. discussed Sensory evaluation, microbial load & nutrient composition of cashew nut. Goal of this research is to see wher cashew nuts can be used to make chocolate spreads instead of cocoa. Cashew nut slurry (CNS) & cocoa powder were used to make spread (CP). CNS content of formulations varied from 75% to 95%, with a 5% to 25% CP content. On samples, a sensory assessment was performed. Harvesting of a cashew nut/chocolate composite spread will exp& number of food applications for cashew nut & promote ir usage, decreasing postharvest losses & contributing to food security (9).

Gerth Van Wijk R et al. discussed allergy of cashew nut in which y discussed how According to recent research on allergy of cashew nut, incidence of allergy of cashew nut is on rise. When allergic people eat cashew nuts, y might have severe responses, including anaphylaxis. This paper highlights current information on allergy of cashew nut in order to aid in early clinical identification & raise physician awareness of this new food allergy. Objective of this research is providing comprehensive review of clinical features of cashew nut allergy, including cashew nut

characteristics, diagnosis cross-reactivity prevalence, allergenic components, & treatment. A total of 255 publications were found in literature search, with 40 of them meeting our selection criteria & being deemed relevant for this study. One prospective research, 6 reflective studies, & 7 case report were among 40 publications. Remaining 26 articles have nothing to do with cashew nut allergies. Although quality of evidence for this is limited, research indicates that incidence of allergy of cashew nut is rising. A little quantity of cashew nut allergen might produce a serious allergic response, implying a high potency similar to that of tree nuts & peanuts. Cashew allergy is an underappreciated yet serious health issue, particularly among youngsters (10).

2. DISCUSSION

Nuts (tree nuts & peanuts) have complicated matrices filled with unsaturated fatty acids & or beneficial components, including high-quality vegetable protein, fiber, phytosterols minerals, tocopherols, & phenolic compounds. Nut is likely to have positive consequence on health because of their unique makeup. Nut intake has connected to lower risk of heart disease & gallstones in both men & women, along with diabetes in women, according to epidemiological research. Limited data also indicates that it has anti-hypertensive, anti-cancer, & anti-inflammatory properties. Even in context of healthy diets, interventional studies consistently indicate that nut consumption lowers cholesterol, & there is growing evidence of positive effects on oxidative stress, inflammation, & vascular reactivity. Nut intake seems to have a beneficial effect on blood pressure, visceral obesity, & metabolic syndrome. As a result, it is evident that nuts have a protective effect against a variety of cardiac risk factors. Contrary to popular belief, epidemiologic research & clinical trials show that frequent nut intake does not cause obesity & might even aid weight reduction. rare incidence of nut allergies in youngsters is only cause for worry. To summarize, nuts are nutrient-dense foods that have a broad range of cardiac & metabolic advantages & might easily be included into a balanced diet.

CONCLUSION

Cashew tree might be found in Brazil, where being a natural product is prized. Cashew was introduced to additional countries by Portuguese in sixteenth century, including several African countries & India. Cashew nuts have a delicious taste & a lot of health advantages. Nuts are high in calories, with 100g providing 553 calories. They include soluble fiber, nutrients, minerals, & a variety of health-promoting phyto-synthetic compounds that might help with infections & cancers. Furthermore, cashews contain less fat than tree nuts, with approximately 75% of its fat being unsaturated lipids, with oleic acid accounting for around 75% of this unsaturated fat. Studies have demonstrated that oleic acid is beneficial for heart disease, especially in diabetics. They might be used to keep your eyes & skin safe. Because it is high in vitamin C, it is helpful for all skin problems such as acne & freckles. They also have monounsaturated fats, copper, & a high phosphorus & magnesium content.

Cashew has a lower amount of oxalic acid than green leaves & vegetables, which is beneficial for calcium absorption. It might help with cravings, depressed symptoms, sorrow, disappointment, anxiety, shortcoming, scurvy, paleness, & treatment of stomach, chest, urinary, & liver issues. Cashew pieces might be made into a herb to cure snakebites, & nut oil can be used to heal cracked heels or as a fungal specialist, according to study. bark & leaves of natural product are used to treat parasite activity, wounds, rashes, & might also be used as an antipyretic

& for diarrhea. se nuts, on or h&, have a lower cholesterol content, making m ideal for those with heart problems. Furrmore, re is a mono unsaturated fat component that contributes to production of healthy cholesterol & improvement of blood circulation. y have enormous wholesome qualities that might be furr explored & used as a potential h&y & helpful meal. Leafy foods can prepare a few more things that might be used in cooking. biopharmaceutical properties of Cashew need to be investigated furr.

REFERENCES

1. van der Valk JPM, Gerth van Wijk R, Vergouwe Y, Steyerberg EW, Reitsma M, Wichers HJ, et al. sIgE Ana o 1, 2 and 3 accurately distinguish tolerant from allergic children sensitized to cashew nuts. Clin Exp Allergy. 2017;
2. Harlita, Niken Satuti NH, Sagi M, Astuti P. Acute toxicity of cashew nut shell extract (*Anacardium occidentale* L.) in albino rat (*Rattus norvegicus* Berkenhout 1769). Pakistan J Biol Sci. 2016;
3. Ojolo SJ, Olatunji OO, Orisaleye JI. Ergonomic evaluation of cashew nut shelling machine. Agric Eng Int CIGR J. 2016;
4. Krepl V, Kment P, Rajdlova G, Kapila PF. African countries' agricultural trade value chain assessment case study: Tanzania (Cashew nut exports). Agris On-line Pap Econ Informatics. 2016;
5. Gandhi TS, Dholakiya BZ, Patel MR. Extraction protocol for isolation of CNSL by using protic and aprotic solvents from cashew nut and study of their physico-chemical parameter. Polish J Chem Technol. 2013;
6. Morais SM, Silva KA, Araujo H, Vieira IGP, Alves DR, Fontenelle ROS, et al. Anacardic acid constituents from cashew nut shell liquid: NMR characterization and the effect of unsaturation on its biological activities. Pharmaceuticals. 2017;
7. Milhome MAL, Lima CG, de Lima LK, Lima FAF, Sousa DOB, Nascimento RF. Occurrence of aflatoxins in cashew nuts produced in northeastern Brazil. Food Control. 2014;
8. Mubofu EB, Mgya JE. Chemical Valorization of Cashew Nut Shell Waste. Topics in Current Chemistry. 2018.
9. Amevor PM, Laryea D, Barimah J. Sensory evaluation, nutrient composition and microbial load of cashew nut–chocolate spread. Cogent Food Agric. 2018;
10. Van Der Valk JPM, J. Dubois AE, Gerth Van Wijk R, Wichers HJ, De Jong NW. Systematic review on cashew nut allergy. Allergy: European Journal of Allergy and Clinical Immunology. 2014.

CHILD LABOR IS A BARRIER TO INCLUSIVE GROWTH OF NATION BUILDING

Dr. Annie*; Sachin Kumar Sharma**

*SBAS, Sanskriti University,
Mathura, Uttar Pradesh, INDIA
Email Id- annie.sobas@sanskriti.edu.in

**SBAS, Sanskriti University,
Mathura, Uttar Pradesh, INDIA
Email id: sachin.mba@sanskriti.edu.in

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ABSTRACT

The child labor is significant issue of virtually every growing nation and populated country. This issue requires a serious response since children are the future of countries. India is considered as the youngest nation as the number of the young people are highest in India and these young people is viewed as the future power of the country. This is the reason to avoid the child labor and give the children with essential amenities like education, decent food and other fundamental services like health. The future is of the skilled worker and there were no scope for unskilled worker, but if children is not being given with a decent education that will leave them as unskilled worker and that put a burden on the countries well as on the community. The life of every individual is equally valuable irrespective of their socioeconomic position and everyone has a right to study and work at proper age. The article emphasize the current issue as well as propose new method to prevent the child labor.

KEYWORDS:*Child Labor, Education, Unemployment, Government, Policy.*

INTRODUCTION

The children and youngster are backbone of the development of a countries and it is responsibility of every country to groom its children and youngster in such a manner that they would participate in the progress of the nation. If nation is not able to give them adequate facilities to have them groomed for the development of the country, then it is significant problems to solve as soon as possible. Moreover, on a serious note ,this issue cannot be waited for too long to solve as the globe has been moving surprisingly quickly on the technological innovation and if one left behind other country then it will be require huge money and resources to catch up with the world's development (Fig. 1). Therefore, it is essential to take care of children since they are future of any nation (1).



Fig. 1: Representational Picture of Child Labor

There are many countries which are still trying to offer a suitable atmosphere for their children in order to obtain them basic education. The major issue in front of the many nations, particularly developing one, is to offer a decent education system but primarily and first, these country need to address problem of hunger. It has been observed that many youngsters need to engage in some kind of the job early simply to earn their bread and butter. In this scenario, education became a question of neglect. The result of this come in the shape of the child labor and nothing will be a bigger curse than child labor for a country. The growing youngsters find themselves working someplace simply to get food and this will robbed them from school. Consequently, they spent their entire lives in an unorganized sector, where there was no security of their life (2).

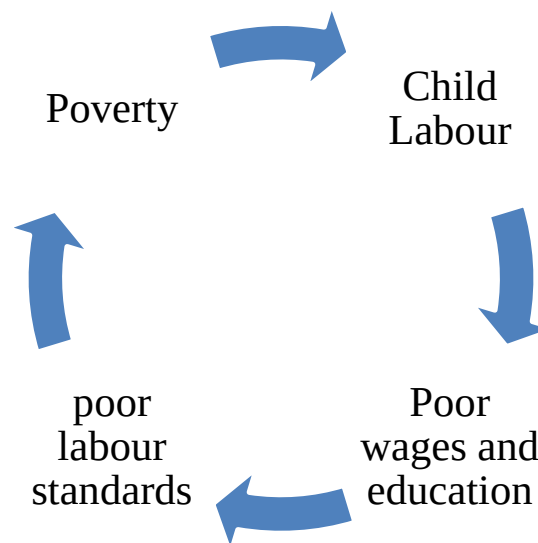


Fig. 2 A Cyclic Consequence of Child Labor

As shown in fig.2, child labor is consequences of poverty primarily and ones a kid gets into child labor, then it is extremely hard to break out for him out of this cycle as shown in fig.2. When a kid begins any kind of income due of the poverty, then he has to deny himself from formal basic education. Consequently, he is not able to acquire any talents to make his living and he has to bound to work at low pay for rest of his life yet one need to work and earn his living for surviving over this planet earth and he never ever come out of this cycle . In most of the

instances, it has been observed that the man who begins his life as child labor, his offspring have to start his life also as child labor.

Therefore, there is no way appear to get out from this mayhem for the man. It is widely known truth that children are the future of nation and they should be given with excellent education in addition to nutrition's based diet. In Indian context, Mid-day meal plan of the government of India was regarded as a milestone in this issue since this scheme is giving children education and food at the same time. Under this scheme, all the government and government aided school in India have given the direction from the government to provide a onetime meal to all students and for this purposes, government has release an adequate fund to each school to arrange all arrangement including cook for cooking the meal (3).



Fig. 3 Cycle through Which Child Labor Effect the Nation

The impact of the child labor is not only borne by engaged individual in child labor , but this effect may be observed upon the family of that person and most crucially country is being worst affected. For understanding, this cycle may be begun from point as indicated in fig.3. For instance, this may be understood from the perspective of adult unemployment. Adult unemployment leads a deprived existence for that person's children and his children need to start earn in his childhood simply to fulfill his hunger and once these children enter into working life, they have to miss even their basic education. Moreover, due of lack of formal education, they are not able to obtain any white collar job and they have to spend their entire lives working in an unorganized sector, where they have no security of life and their money as well (4).

This will impact their personal and family member's lives like anything and this will continue from one generation to another one. The unskilled labor is not that much recognized in the community and will not give a decent pay to the worker. This lack of money will further worsen the situation of the family and children of that family need to go out for job in order to support his family. The unorganized sector also have extremely low working standard and having little opportunity to develop , thus an unskilled worker's life cannot change too much and his children needs to start work early. Now a days, government is coming with lot of choice for these labor to scale up their ability in order to obtain the better option at work place and get recruited by the large company at attractive pay (5).

The issue of child labor is growing day by day and this problem is seen nearly in every country of the globe but this problem is predominant in developing nations. There is a scope of lot of effort to perform for these vulnerable youngsters and also address this problem with sustainable development aim. There are some additional problem that needs be deal with child labor such poverty eradication, education for everyone, and battle with HIV, raising awareness for gender equality. The policy maker need to address first education for all and poverty reduction program in order to tackle the child labor issue.

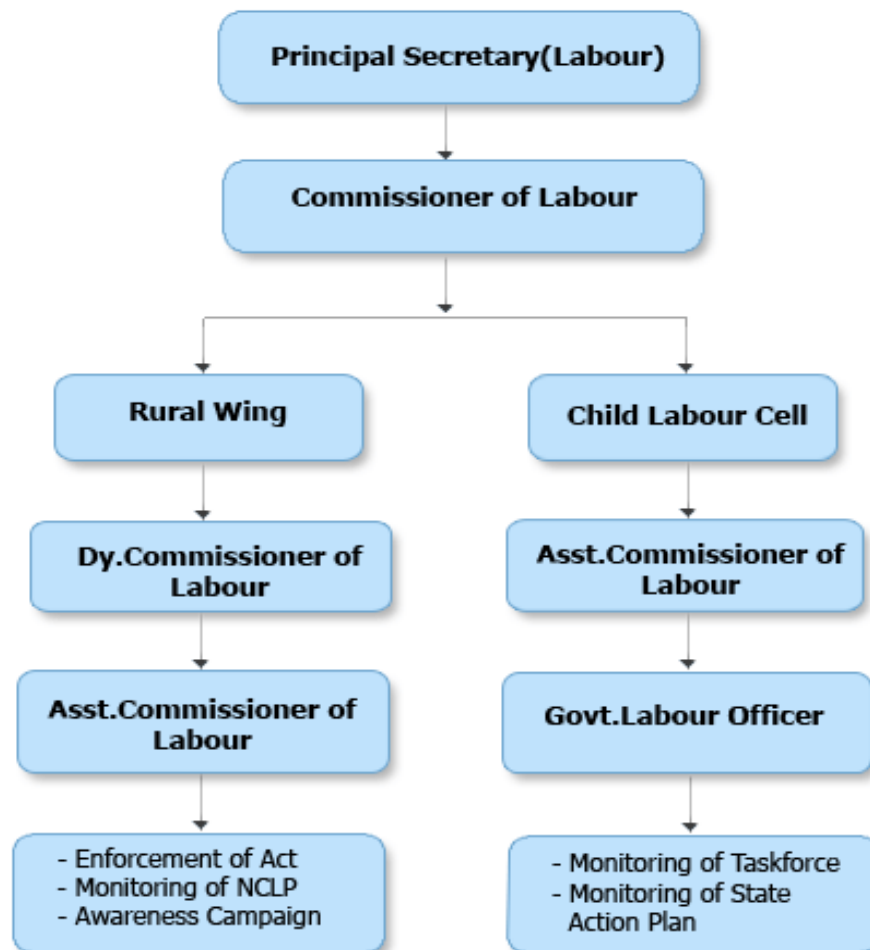


Fig. 4 A representation of governing body of labor Directorate in India

The fig.4 has been displaying a hieratical system utilized in India in government office to handle issue connected with labor and child labor is also come under this department. The problem of child labor is solve only through implementation of a good policy that will provide a good but affordable education to all children and should be form some rule for given the basic education to every child so that he can learn to write and read and this will be helpful to learn in skills at work place. There are one more problem that need be tackled with a passion and this is to give financial and health security to all individuals living below poverty line. These fundamental measures encourage the people and also improve their living standard that would, in turn, drive

them to lead a decent life and this also assist to build an atmosphere to become literate for these youngsters (6).

As per definition given by the International Labor organization, the child labor is defines as if a child less than the 18 year age engaged in harmful condition of work in labor market and children below 15 year age engaged full time employment are considered as the child labor in addition to all children who are engaged in some in-house business and that will create an interference for their education, also counted as the child labor. Therefore, child labor is not considered as the measurement of the physical work, but it is also measured with the interference with the kid life with education, childhood and health problems etc. (7).

Children's Rights:



Fig. 5 Child's Labor in the Context of Environment, Marketplace and Workplace

The fig.5 has been demonstrating the rights that must be experienced by a kid in order to complete his childhood problem. The government as well as community together should make effort to preserve the dignity of a kid in term of their education at basic level and should be able to guarantee the nutritious meals for every youngster. There should be regulations that may protect the kid from child work. There must be good quantity of quality and secure job where one may earn reasonable level of pay in order to provide a nice standard of life to their dependent. There should be laws enforced with full seriousness that should prevention the exploitation of kid. There should be a check on the goods and services accessible for usage of the youngsters so that their safety may be guaranteed. Children's right even save in case of land acquisition , for example , if at any location any land is acquire by some agency or government and also preserve the environment connected problem concerned with kid.

Poverty and Child Labour:

The use of child labor in early phases of development in many nations has required particular attention. It was to be unsaid that child labor baskets the development of humanoid resources. It not just lowers person's instruction achievements but also decreases the impact besides quality of education organization. Further, child work has significant consequences on labor marketplace (8). Child labor is shared in families wherever poverty is congenital from one age group to another. Hence, battle in opposition of child labor has gained a worldwide momentum over the past time and formed a significant test for Millennium Development Goals (MDG). This momentum besides knowledge should be used to assist strengthen effort towards the satisfaction of MDGs (Fig. 6).

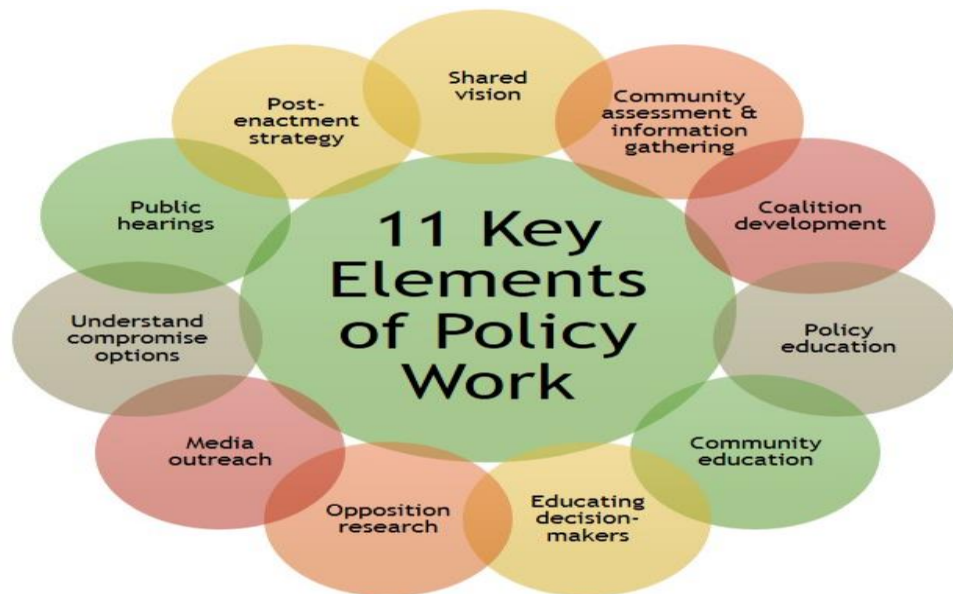


Fig.6 Key Element to Protect the Children Right at Every Stage of Life

As research is investigative and usages systematic works review to discover vulnerable youngsters in addition to bring out problems in relevant to MDGs primarily in deficiency elimination, instruction for all. The research on kid labor defines in this regard a largely unexplored supply of knowledge for politicians in areas of education program besides poverty discount program. Custody in view above facts and attempt is made in essay to show how improved opportunities and enhanced wellbeing lowers youngster labor (9). An effort is complete in this item to show how augmented schooling chances and enhanced welfare lowers kid labor.

Kid labor is distinguished as an activity having detrimental effect on child. That does not imply that it does not sight any enhancements for home. The improvements or reoccurrence on child labor can be dignified in a quantity of ways: child's money income; value of the child's work in family initiative, at family plot, or in household; augmented income chances for adult memberships of household; and skills or augmented labor market chances child learnt while working (10). Several educations have attempted to estimate value of income of children as a percentage of total domestic income (Fig. 7).

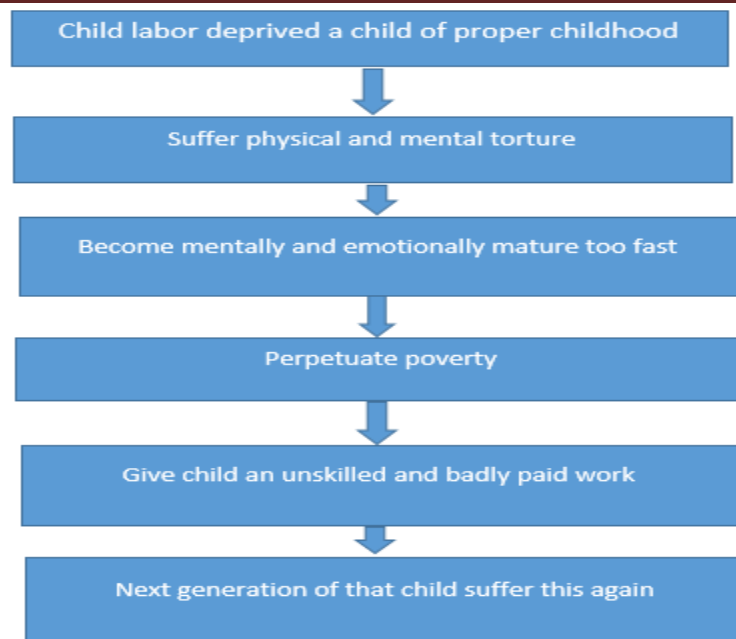


Fig.7 Representation of Consequences of Child Labor in Child Life and Family

CONCLUSION

The child labor has been changed the basic qualities of a child, they become mature before time and their working and living condition make an unprecedented pressure on their health and mind and some times that pressure has come out in the form of some sort of violence and this behavior of children not good nether for society nor for a nation. Their thoughts and physical strength can be utilized some undesirable individuals in incorrect way. Ultimately, child work is not desirable in whatever form there are certain relaxations provided by the government when writing the law for child labor. Although, these laws are powerful enough to prohibit the child labor but there is need to implement them with honesty and rehabilitation of these deprived children so that they may start their life again as that of a normal kid. This article may be ended with a recommendation to create more strong legislation to avoid child labor but first give them essential amenities that must be required to live a decent life.

REFERENCES

1. Yadav SK, Sengupta G. Environmental and Occupational Health Problems of Child Labour: Some Issues and Challenges for Future. J Hum Ecol. 2009;
2. Nawaz M, Nasir M, Ali A, Chaudhry W. Trade Liberalization and Child Labor: A Case Study of Pakistan. Transit Stud Rev. 2011;
3. Zhao L, Wang F, Zhao Z. Trade liberalization and child labor in China. IZA World Labor. 2015;
4. Edmonds E V., Pavcnik N. The effect of trade liberalization on child labor. J Int Econ. 2005;
5. Andre P, Delesalle E, Dumas C. Returns to Farm Child Labor in Tanzania. SSRN Electron J. 2017;

6. Edmonds E, Theoharides C. WITHDRAWN: The Short Term impact of a productive asset transfer in families with child labor: Experimental evidence from the Philippines. J Dev Econ. 2018;
7. Ab-Rahim R, Tariq B. The effect of trade openness on child labor: Empirical evidence from developing economies. Int J Econ Manag. 2016;
8. Thị Tuyết Vân P. Education as a breaker of poverty: a critical perspective. Pap Soc Pedagog. 2018;
9. Adonteng-Kissi O. Parental perceptions of child labour and human rights: A comparative study of rural and urban Ghana. Child Abus Negl. 2018;
10. Swanson T. Consensus-as-a-service: a brief report on the emergence of permissioned, distributed ledger systems. Work. World Agric. 2015;

A BRIEF STUDY ON DENGUE FEVER

Manjeet Kaur*

*SOP, Sanskriti University,
Mathura, Uttar Pradesh, INDIA
Email Id- manjeet.pharmacy@sanskriti.edu.in

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ABSTRACT

Dengue infection is a mosquito borne viral illness that is quickly spreading throughout the globe, with significant death and morbidity rates, particularly in tropics as well as subtropical areas. Aedes is the mosquito responsible for dengue transmission. Several variables affect the spread of dengue fever, including terrain, rainfall, temperature, and fast urbanization or globalization. Clinical signs may vary from subtle to severe, with deadly consequences. Dengue fever is a main public health's concern owing to its rapid world wide spread, and its burdens remain unmet due to a lack of accurate treatment, a simple diagnostic technique for the early stages of illness, and an effective and well-organized vector control strategy. Dengue virus-related diseases include Chikungunya, Zika Virus, and Malaria. The symptoms of dengue fever, as well as preventative strategies and clinical presentations, are discussed in this article. This work may be utilized as previous art for the idea of dengue disease in the future.

KEYWORDS: Aedes, Dengue Fever, Illness, Malaria, Virus.

1. INTRODUCTION

Dengue fever is a flavivirus illness spread by mosquitoes and produced by four carefully connected but antigenically dissimilar dengue viruses (DENVs, serotypes one to four). Dengue fever is regarded as a "Poverty Disease" because it is more often linked with impoverished people in tropical as well as subtropical areas. Dengue fever is one of the world's 17 neglected tropical illnesses, rendering to the World Health Organization. Dengue fever is prevalent in over 100 countries (mainly in Southeast Asia and South America), and outbreaks of increasing size and severity are quickly spreading to new areas (WHO, 2015). Every year, around 390 million individuals are infected; only 96 million have severe symptoms, and about 20,000 people die. Dengue Fever (DF) and Dengue Hemorrhagic Fever have been reemerging and spreading at alarming rates throughout the world in the last 50 years. Dengue infection results in either no symptoms or moderate self-limited sickness (fever, , retroocular discomfort, muscle headache and nausea, joint pain, vomiting, as well as rash); a tiny percentage of infections develop to severe illness, with capillary leakage, hemorrhage, thrombocytopenia, and liver damage [1].

There is currently no therapeutic alternative, therefore therapy is solely supportive. Fluid replacement is used to treat illness in the majority of instances. Early indicators of illness progression to severe disease are critically required, in addition to early and correct diagnosis. Because the majority of infected people are asymptomatic or have a moderate undifferentiated

fever, identification based on clinical signs is unreliable, and laboratory testing is required. The etiology, transmission, and risk factors linked with transmission, as well as techniques for early diagnosis, treatment, prevention, and control measures, are discussed in this study [2]–[4].

1.1 Etiology:

Dengue virus (genus *Flavivirus*, family *Flaviviridae*) includes four subtypes (DENV-one, DENV-two, DENV-three, and DENV-four) and is spread by infected mosquitoes (*Aedes* spp). (*Aedes aegypti* and *albopictus*). Long-term immunity to one serotype is conferred by infection with that serotype, but cross-immunity to other serotypes is only transitory.

Some of the properties of the dengue genome are as follows: a single-strand messenger (positive) sense RNA of roughly 11 kb in length enclosed in a glycoprotein envelope and contains a small spherical particle (diameter 40.00 - 50.00 nm). The envelope is involved in the hemagglutination phenomena, neutralization, including interaction between both the virus and the host cell during the early stages of infection. The Dengue virus and its soluble membrane-associated NS one activate the human complement system as well as express in the blood during the early stages of infection. The viral loads, the terminal SC5b-9 complement complex, as well as NS1 antigenemia have all been associated to dengue severity.

1.2 Transmission:

Dengue viruses is spread by the cosmopolitan mosquitos *Aedes aegypti*, which is prevalent in urban centers across various tropical as well as semitropical parts of the globe. It is anthropophilic and feeds on blood. It breeds mostly in stagnant water found in abandoned containers as well as vehicle tires. Female mosquitoes have a critical role in viral transmission to humans. The mosquito has four distinct phases in its life cycle: egg, and then larva, after that pupa, and adult. At 25°C, the larval and pupal stages last seven to nine days and 2-3 days, respectively. The virus may be transmitted after an eight to 10 days extrinsic incubations periods after feeding on a diseased host. The rate of larval development increases as the temperature rises, as does the appearance of adult vectors and the rate of vector bites. A two°C increase in temperatures reduces DENV's EIP, which increases the frequency of mosquito bites. *Aedes albopictus*, a mosquito vector that was formerly confined to Asia, has recently expands its worldwide range and led to the extent of dengue fever [5].

1.3 Symptoms:

Figure 1 shows the various symptoms related to Dengue.

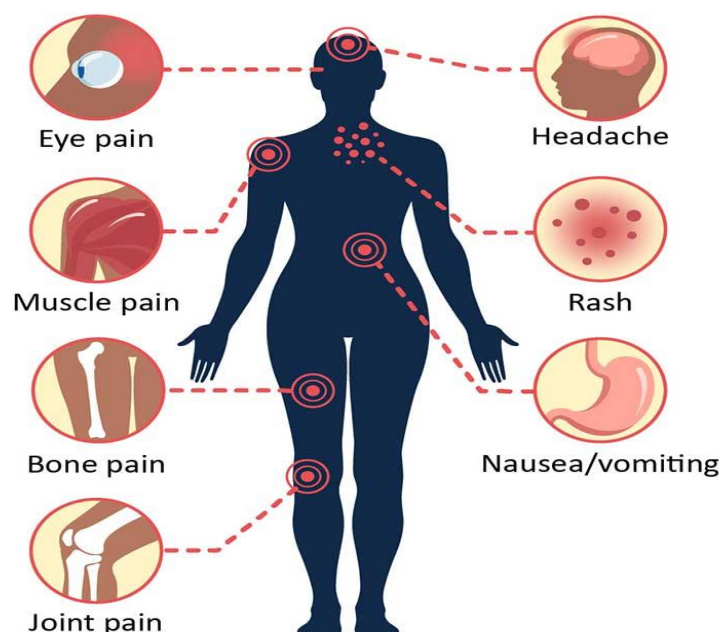


Figure 1: Illustrates various symptoms to identify dengue fever [6]

1.4 Risky Factors Related With Dengue:

The risk variables involved in the spread of Dengue include vector capacity, host immunity, circulating DENV, weather or dengue control capability, climate, as well as population mobility. Climate change has an effect on dengue epidemiology because it has an indirect impact on mosquito life cycles and DENV incubation durations inside mosquitos. Stagnant water in the open may serve as a breeding ground for dengue-carrying mosquitos. Dengue fever has resurfaced as a result of urbanization and fast population increase. Unplanned urbanization has resulted in significant restrictions on community infrastructure, mainly water supply as well as solid excess removal, increasing the reproductive potentials of vector species, exposing a high number of people to the mosquito vector *Aedes aegypti*. The spread of entirely dengue viruses sero types to major populations centers throughout the globe has been largely attributed to a lack of mosquito control infrastructure, increasing air travel, and globalization of commerce.

1.5 Clinical Manifestations:

1.5.1 Undifferentiated fever:

This stage occurs most often during the main infection as well as after the first secondary infection. Often is difficult to differentiate from other viral illnesses in the clinic, therefore it goes untreated.

1.5.2 Dengue Fever:

Dengue infection is a common symptom of both primary and secondary illnesses. Adults and older children are the most frequently affected. It is distinguished by a biphasic, higher grades

fever that lasts for three to one weeks. Severe headache, lack of appetite, vomiting, stomach discomfort, and diarrhea are among the additional symptoms. It's also called as break bones fever because of the myalgia and joint discomfort it causes. Due to capillary dilatation, maculopapular, or morbilliform eruption, about 50-82 percent of infected people have cutaneous rash lesions. Even though epistaxis, gingival bleeding, petechiae, prolonged menstruation, as well as gastrointestinal tract hemorrhage may occur in DF, bleeding is uncommon [7].

1.5.3 Dengue Shock Syndrome (Dss):

DSS is a kind of DHF that has an unstable pulse, narrow pulse pressure, restlessness, cold, clammy skin, and circumoral cyanosis. Due to multi-organ failure and disseminated intravascular coagulation, patients with DSS have a significant mortality rate. The shock lasts for a short time, and with supportive care, these individuals recover quickly from their illness.

1.6 Dengue Treatment:

Dengue infection is linked with a wide range of clinical symptoms, therefore therapeutic treatment should be straightforward and low-cost, with the goal of saving lives via well implemented and timed therapies. Because there are no effective antiviral medicines for dengue, clinical therapy focuses on supportive care, with careful fluid control being especially important. Individuals who are in the early stages of a febrile illness and have no complications may be able to recover without the need for hospitalization if they are closely monitored daily for any signs of bleeding. Patients who are in the early stages of plasma leakage or who are in the critical phase must be admitted to the hospital.

Maintaining organ perfusion during this crucial time requires careful and optimal fluid resuscitation. According to WHO guidelines, in the case of DSS, isotonic crystalloid solutions such as 0.9 percent normal saline, Ringer's lactate, or Hartmann's solution may be used as a first fluid management approach. The main objective of fluid resuscitation is to avoid vascular leakage and the subsequent hypovolemic shock. Despite receiving fluid therapy, 30percent of total of DSS patients were predicted to have recurrent episodes of shock. Transfusions of blood products such as packed red cells, platelets, or fresh-frozen plasma may help patients with severe bleeding.

1.7 Laboratory Diagnosis Of Dengue Virus Infections:

Dengue virus infection may be diagnosed in the lab by looking for particular viruses, viral antigens, genomic sequences, and/or antibodies.

Virus isolation has long been thought to be the gold standard for identifying DENV infection. Samples from patients are grown in mammalian (BHK-21, Vero, and LLCMK2 cells) or mosquito (CLA1, Tra-284, AP-61, C6/36, AP64 cells) cell lines or in live mosquitoes for viral isolation. The old diagnostic technique has been superseded by fast diagnostic tests NS1 antigen-capture enzyme-linked immunosorbent assays and reverse transcription polymerase chain reaction (RT-PCR) (ELISAs). Molecular approaches such as RT-PCR and nucleic acid hybridization have proved successful in detecting DENV infection. Lanciotti originally reported a very sensitive 2-step heminested RT-PCR test, which was eventually adapted into a widely used single-step multiplex realtime RT-PCR assay. Viral isolation methods are less sensitive, specific, time-saving, easy, and cost-effective than PCR-based approaches. An antigen-capture ELISA approach was utilized to detect NS1 in patient blood in the year 2000. The NS1 viral

protein, which is generated by infected cells and found in higher concentration in the blood of infected persons, might be used as a diagnostic target. It might appear anywhere from the onset of the sickness to 9 days or more after the start of the illness. This protein may be found with viral RNA during early infections, before an antibody response is activated. As a diagnostic tool, the NS1 has a high sensitivity and specificity.

1.8 Prevention and Control:

Dengue infection is mostly managed by eradicating dengue vectors, which may be targeted at either the juvenile aquatic stages or adult's mosquitoes. Direct vector control methods include using pesticides to kill mosquitos or using repellents to keep them from biting. As an indirect vector control technique, environmental change or sanitation developments that decrease possible larval growth sites or housing modifications that restrict mosquito entrance may be employed (WHO, 2009 and Kuehn, 2014). In contrast to space-spraying and larviciding, which need professional people, the elimination of possible larval growth sites may be accomplished by homeowners. Some community-based initiatives, including as education and lobbying to empower impacted and other communities, may help organize and undertake successful control operations.

2. LITERATURE REVIEW

Maria G. Guzman et al. discussed a review on Dengue infection[8]. Dengue fever is prevalent in the tropics, and rainfall, temperature, urbanization, and the location of the main mosquito vector, *Aedes aegypti*, all play a role in dengue virus transmission. Dengue virus transmission is endemic in the Eastern Mediterranean, America, Southeast Asia, the Western Pacific, and Africa, with sporadic local transmission reported in Europe and the United States as a result of virus introduction to areas with the secondary vectors *Aedes aegypti* and *Aedes albopictus*. Although the disease's global impact is uncertain, its epidemiological tendencies are alarming for human health and the global economy. Dengue fever has been identified as a disease of the future due to trends toward increased urbanization, restricted water supplies, and perhaps environmental change. According to the WHO, dengue control is theoretically attainable with coordinated international technical and financial support for national initiatives. Dengue fever epidemiology, control, treatment, disease processes, diagnosis, as well as research aims are all covered in this primer.

Niyati Khetarpal et al. discussed a review on Dengue Fever [9]. Dengue fever is an extremely infectious tropical infectious disease that is rapidly spreading over the globe. Dengue fever is caused by any of the four dengue virus serotypes and is spread to humans by female *Aedes* mosquitos. Dengue fever may vary in intensity from a mild fever to dengue hemorrhagic fever and shock syndrome. Globalization, increased air travel, and unplanned urbanization have all led to an increase in dengue fever infection rates, as well as its geographic and demographic expansion. The existence of four antigenically distinct dengue virus serotypes, each capable of eliciting cross-reactive and disease-enhancing antibody responses against the other three, has complicated the development of a dengue vaccine. Sanofi Pasteur's chimeric live-attenuated dengue vaccine candidate was recently authorized for use in adults aged 9 to 45 in Mexico, Brazil, and the Philippines. It is necessary to assess the effect of its limited use on the public health system. Simultaneously, the vaccine candidate's limited use necessitates ongoing research into a dengue vaccine candidate that is also effective in babies and those who have never had the

disease. Alternative methods for creating a tailored vaccination candidate that does not enable the development of enhancing antibodies should be investigated in this context, as they may broaden the effectiveness umbrella to encompass babies and naive people.

G N Malavige et al. discussed a review on Infection of Dengue Viral [10]. Dengue fever is a mosquito-borne sickness that affects people all around the world. They may produce asymptomatic fever, dengue fever, dengue haemorrhagic fever (DHF), or dengue shock syndrome, or they can cause undifferentiated fever, dengue fever, or dengue haemorrhagic fever (DHF). Dengue fever affects 100 million people worldwide each year, with half a million instances of dengue hemorrhagic fever. Ninety percent of DHF participants are under fifteen years old. Dengue fever has spread to 112 nations throughout the world. There is no vaccine available to protect against this disease. Early identification and rapid initiation of appropriate medication are crucial if disease-related morbidity and mortality are to be minimised. This research covers the epidemiology of dengue infections, the dengue virus and its mosquito vector, clinical features and pathophysiology of dengue infections, as well as therapy and control of these diseases.

3. DISCUSSION

Dengue fever is caused by a virus family that is transmitted by mosquitos that have been infected. Dengue fever is transmitted by the bite of a female Aedes mosquito carrying the dengue virus. Dengue fever is caused by one of four viruses (DENV 1-4). Mosquitoes carry Zika, Chikungunya, and other diseases. More than half of the world's population is infected with dengue disease. It's an acute disease with a benign course that includes symptoms including headache, fever, fatigue, severe muscular and joint pain, enlarged lymph nodes (lymphadenopathy), and rash. Dengue virus-related diseases include Chikungunya, Zika Virus, and Malaria. The symptoms of dengue fever, as well as preventative strategies and clinical presentations, are discussed in this article.

4. CONCLUSION

Dengue fever is a major public health concern in almost all tropical and subtropical countries. Dengue fever is a mosquito-borne disease that has a significant social and economic effect. Dengue and other mosquito-borne virus infections may be reduced in morbidity and death if high-risk people are identified early and severe cases are treated properly. So that treatment measures may be implemented rapidly, a novel approach for identifying early dengue infection and predicting severe risk early in the course of the illness is necessary. Only a few of the significant problems in creating a successful dengue vaccine include the necessity for an efficient tetravalent DENV vaccine, the absence of a suitable animal disease model, and immunological correlates of disease protection. Due to the fact that wild type mice do not duplicate clinical indications of human dengue fever, genetically altered mouse models that imitate certain elements of human illness have been established with great success. The symptoms of dengue fever, as well as preventative strategies and clinical presentations, are discussed in this article. This work may be utilized as previous art for the idea of dengue disease in the future.

REFERENCES

1. D. T. T. Toan, L. N. Hoat, W. Hu, P. Wright, and P. Martens, "Risk factors associated with an outbreak of dengue fever/dengue haemorrhagic fever in Hanoi, Vietnam," *Epidemiol.*

Infect., 2015, doi: 10.1017/S0950268814002647.

2. S. Pothapregada, B. Kamalakannan, and M. Thulasingham, "Clinical Profile of Atypical Manifestations of Dengue Fever," *Indian J. Pediatr.*, 2016, doi: 10.1007/s12098-015-1942-9.
3. A. H. Fagbami and A. B. Onoja, "Dengue haemorrhagic fever: An emerging disease in Nigeria, West Africa," *Journal of Infection and Public Health*. 2018, doi: 10.1016/j.jiph.2018.04.014.
4. M. Bouzid, F. J. Colón-González, T. Lung, I. R. Lake, and P. R. Hunter, "Climate change and the emergence of vector-borne diseases in Europe: Case study of dengue fever," *BMC Public Health*, 2014, doi: 10.1186/1471-2458-14-781.
5. S. Harish, S. Srinivasa, P. Shruthi, R. A. Devaranavadagi, G. Bhavya, and S. K. Anjum, "Knowledge, attitude and practice regarding dengue infection among parents of children hospitalized for dengue fever," *Curr. Pediatr. Res.*, 2018, doi: 10.18203/2349-3291.ijcp20181509.
6. "DengueSymptoms." <https://www.cdc.gov/dengue/symptoms/index.html> (accessed Aug. 17, 2018).
7. S. A. M. Kularatne, K. G. A. D. Weerakoon, R. Munasinghe, U. K. Ralapanawa, and M. Pathirage, "Trends of fluid requirement in dengue fever and dengue haemorrhagic fever: A single centre experience in Sri Lanka," *BMC Res. Notes*, 2015, doi: 10.1186/s13104-015-1085-0.
8. M. G. Guzman, D. J. Gubler, A. Izquierdo, E. Martinez, and S. B. Halstead, "Dengue infection," *Nat. Rev. Dis. Prim.*, vol. 2, pp. 1–26, 2016, doi: 10.1038/nrdp.2016.55.
9. N. Khetarpal and I. Khanna, "Dengue Fever: Causes, Complications, and Vaccine Strategies," *J. Immunol. Res.*, vol. 2016, no. 3, 2016, doi: 10.1155/2016/6803098.
10. G. N. Malavige, S. Fernando, D. J. Fernando, and S. L. Seneviratne, "Dengue viral infections," *Postgrad. Med. J.*, vol. 80, no. 948, pp. 588–601, 2004, doi: 10.1136/pgmj.2004.019638.

AN OVERVIEW ON COMPLICATIONS CAUSES, & VACCINE STRATEGIES OF DENGUE

Gulshan Rathore*

*SOP, Sanskriti University,
Mathura, Uttar Pradesh, INDIA
Email Id-gulshan.ips@sanskriti.edu.in

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ABSTRACT

Dengue infection is a highly contagious steamy infectious illness that is rapidly scattering over globe. Dengue fever is affected by any of four dengue virus sero kinds as well as is spread to humans by female Aedes mosquitos. Dengue fever may vary in intensity from a mild fever to dengue hemorrhagic fever including shock syndrome. Increased air travel, Globalization, as well as unplanned urbanizations have all led to an increase in dengue fever contagion rates, as well as its geographic as well as demographic expansion. Development of a dengue vaccine has been hindered by presence of four antigenically diverse dengue virus serotypes, each capable of triggering cross-reactive possibly disease-enhancing antibody responses against or three. Sanofi Pasteur's chimeric live-attenuated dengue vaccine c&idate was recently authorized for use in persons aged 9 to 45 in Mexico, Brazil, & Philippines. Impact of its restricted usage on public health system must be assessed simultaneously, vaccine c&idate's limited applicability necessitates ongoing research into a dengue vaccine c&idate that is also effective in babies & naïve people. Alternative methods for creating a tailored vaccine c&idates that doesn't allow for development of improving antibodies should be investigated in this context, as y may broaden efficacy umbrella to encompass babies & naïve people.

KEYWORDS:*Dengue, Disease, Fever, Illness, Vaccine.*

1. INTRODUCTION

DENVs 1–4 produce dengue fever, which is a transferrable illness produced by slightly of four dengue germs serokinds. It is a mosquito's boranes illness that is spread to people mainly by females Aedes mosquitos. Illness is predominantly prevalent in steamy as well as subtropical areas, hitting about a third of world's populations at danger. DENV infections may result in a variety of symptoms, reaching from mild a symptomatic dengue fevers to plain dengue hemorrhagic infection as well as its shock syndromes, all of which are potentially fatals. DENV's amazing worldwide growth has been aided by rapid urbanization, increasing international travel, a lacks of effectives mosquito controls tactics, as well as globalizations. Sanof Pasteur has stated that its vaccine has been licensed in Brazil, Mexico, Philippines, as well as El Salvador, despite fact that no prescription has been approved.[1]–[3].

Dengue fever is among world's greatest reemerging mosquitos allowed diseases. In last five decades, dengue fever has increased by 30 times. Dengue fever has spread to 128.00 countries,

mainstream of which are emerging, placing an estimated 3.970 billion peoples in danger each years. Dengue fever affects 390.00 million people each year, as per a new dengue distribution model, with 96 million cases documented. Dengue fever is prevalent over Indian subcontinent, despite fact that occurrences are often underestimated. As a consequence, re has been an increase in number of improve. As a result, improved sero-surveillance is urgently needed to allow authorities to properly prepare for an epidemic [4], [5].

Female Aedes mosquitos of subgenus Stegomyia transmit dengue viruses to humans. Both in tropical regions Aedes aegypti environments, it has been most prevalent epidemic vectors. Anor species have been identified to function as secondary vectors, including Aedes albopictus, Aedes polynesiensis, Aedes scutellariscomplex, as well as Aedes niveus. On or h&, Ae niveus is solely careful a sylvatic vectors. At room temperatures, an Aedes mosquito's life cycle lasts eight to ten days, depending on amount of food ingested. It is divided into two stages: aquatic (larvae as well as pupae) & terrestrial (adults) (eggs & adults). Because of its capacity to adapt to a variety of settings, including temperate temperatures, Aedes albopictus has become a more important vector in recent years. Dengue viruses have been able to spread to new locations & cause sickness as a result of its growth into Aedes aegypti-free countries[6].

1.1 Viruses of Dengue:

1.1.1 Genomic Structures:

A positive senses RNA of eleven kb makes up viral genome. This RNA is translate into a single polyproteins that contains 3 structural proteins, premembrane, as well as envelope (E), as well as seven nonstructural proteins (N) (NS4A, NS2A NS1, , NS3, NS2B, , NS4B, as well as NS5) [7].

A single open reading frame & two noncoding sections make up this sequence at three' as well as five' ends. It is made up of a solitary poly proteins precursor that is broken during & after translation by viral as well as host proteases. In viral replication regulation, subordinate structures as well as conserved sequences in five' & three' NCRs are crucial. Type I methylation cap structure is present in five' UTR (100 nucleotides), but not in three' UTR (450 nucleotides). Protein synsis takes occur in Rough Endoplasmic Reticulum in cytoplasm, whereas structural proteins are attached to ER just on luminal side, wherein virion assembly & maturation take place.

1.1.2 Structures of Virion as well as Envelope Protein:

Adult dengue virus has a diameter of 50 nm & is made up of an external a lipid bilayer, protein shells, as well as a nucleocapsid core that is less well known, according to a 3D image reconstruction. Dengue virus's surface structure varies throughout maturations as well as infections, & se conformational variations are caused by envelope protein's characteristic suppleness. Hinge motion among EDI-EDII as well as EDI-EDIII supports transitions amongst oligomeric forms. E proteins is complete up of 3 domains: EDII (yellow), EDI (red), as well as EDIII (blue). Each of 60.00 trimeric surface spikes on immature viral particle is made up of three pr M-E heterodimers.

1.1.3 Cellular Targets as well as Receptor Interactions:

Current hypothesis of flavivirus cell entrance includes employment of two functionally distinct sets of molecules: attachment factors, which assist virus in focusing on cell surface, & main receptor(s), which assist viruses in navigating to endocytic pathways.

Virus infects & replicates in mononuclear cells such monocytes, progenitor cells, macrophages, including Langerhans cells, which mosquito transmits to humans via epidermis. Viremia & systemic infection of liver, organs, as well as spleen arise from virus's spread to lymph nodes, where it doubles. In mosquitoes, however, epithelium of midgut is major target of Dengue infection, where virus initially replicates before moving to & replicating in salivary glands, from whence virus is transferred by saliva to next vertebrates hosting during blood feeding.

1.2 Disease- Dengue:

1.2.1 Classifications:

Clinical disease can manifest itself in a variety of ways, from asymptomatic illness to a wide range of syndromes with severe clinical symptoms. In DHF patients, symptomatic infections may vary from mildly debilitating DF to life-threatening DHF & DSS owing to plasma leakage. Severe symptoms & signs are almost certainly part of a larger dengue fever spectrum. Regardless of introduction of a new categorization system, they are still recognized in many areas of world since they are based on previous WHO categorization cases criteria. New classification system, which is based on a single trait, provides for better cases collections, but it is incompatible with endemic regions' limited health-care resources, especially during epidemics.

1.2.2 DF:

It is a self-limiting fever that typically lasts five to seven days. It might be devastating during severe illness period. DF has different clinical features according to patient's age. Babies & young children may be affected by an undifferentiated febrile illness with a maculopapular rash. High fever, retroorbital pain, myalgia, severe headache, arthralgia, vomiting, nausea, as well as petechiae are all symptoms of slight febrile syndromes or severe illness in older children & adults. People of all ages suffer from thrombocytopenia & leukopenia. DF may cause bleedings problems such as haematuria, gastrointestinal bleeding, epistaxis, as well as menorrhagia.

1.2.3 DHF or DSS:

DF symptoms, as well as hemorrhagic signs, thrombocytopenia, as well as plasma leakage, define DHF. A positive tourniquet test may indicate DHF; however, owing to its poor sensitivity/specificity, this is now being disputed. In DHF, severity of illness is determined by plasma leakage. It's also maximum significant difference among DHF as well as DF. Severity of disease & clinical symptoms are graded from I - IV, with grading IV being one of the greatest severe. During febrile phase, many people develop fine petechiae on their limbs, face, axillae, as well as soft palate. A rapid decrease in temperature characterizes critical phase of a febrile illness, which is often accompanied by circulatory abnormalities such as hemoconcentration, plasma leakage, as well as thrombocytopenia.

1.2.4 Primary & Secondary Dengue Infections:

Primary dengue infection occurs when a person is first exposed to one of four dengue virus serotypes. It may or may not cause signs of infection. High titers of immunoglobulin M (IgM) & immunoglobulin G antibody arise three to five days after infection & six to ten days after

infection, respectively, in early stages of illness. IgM is only present for a few months after an illness begins, but IgG is present throughout one's lifetime. As a result, an initial infections with a certain serotype confers lifetime immunity to that sero type. On or h&, cross-protective immunity against various serotypes is not maintained.

1.2.5 Diagnosis & Clinical Management:

In most cases, presence of viral genomics like RNA, or anti bodies, antigens, produced by dengue infection is confirmed. To identify dengue virus's NSI protein, which is generated by infested cells as well as emerges early in circulation, antigen detections methods founded on NS1 detection were developed. A three-in-one test for detection of IgM, NSI, as well as IgG is now obtainable. ELISA founded serological tests for dengue detection are straightforward to uses as well as cost effectiveness.

1.3 Dengue Vaccine Plans:

Despite difficulties in developing best dengue vaccine, substantial progress has been made in previous decade, with a number of vaccine c&idates entering clinical trials in both endemic as well as nonendemic countries. Following are current techniques to producing dengue vaccines:

1.3.1 Nonreplicating Viral Vaccines:

se vaccine c&idates may give protection without risk of infection since y are unable to reproduce. DNA vaccines, subunit proteins, & VLPs are only a few of ways that have been used to generate this kind of vaccination:

- **Benefits:**

Decreased reactogenicity, improved appropriateness for immuno-compromised people, as well as balanced immune reply in case of tetravalent formulations.

- **Drawbacks:**

Lesser wide, powerful, as well as long-lasting immune reply, this may lead to ADE & need administration of adjuvant.

1.3.2 Duplicating Viral Vaccines:

Live-attenuated viruses are created by lowering a disease's potency without endangering its survival. Scientists utilize targeted mutagenesis, serial passage in cell lines, as well as generation of chimeric vaccines viruses to create live-attenuated viruses for dengue vaccines:

2. LITERATUREREVIEW

G N Malavige et al. discussed a review on Dengue viral infections[8]. Dengue fever is a disease spread by mosquitos that affects individuals all over globe. y may cause undifferentiated fever, dengue fever, dengue haemorrhagic fever, or dengue shock syndrome, or y can induce asymptomatic fever, dengue fever, dengue haemorrhagic fever. Every year, 100.00 million individuals are infected with dengue fever, with half a million cases of dengue hemorrhagic fever. Ninety percent of DHF participants are under age of fifteen. Dengue fever has been reported in 112.00 countries throughout globe. Re is no vaccination that can prevent you from this illness. If disease-related morbidity & death are to be reduced, early detection & prompt commencement of suitable rapy are critical. Epidemiology of dengue infections, dengue viruses

& thus its mosquito vector, clinical aspects & pathophysiology of dengue infections, as well as treatment & control of these illnesses are all covered in this study.

Maria G. Guzman et al. discussed a review on Dengue infection[9]. Dengue virus transmission in tropics is influenced by rainfall, temperature, urbanization, & location of main mosquito vector, *Aedes aegypti*. Dengue virus transmission is endemic in Eastern Mediterranean, America, Southeast Asia, Western Pacific, as well as Africa, with sporadic local transmission reported in Europe & United States as a result of virus introduction to areas with *Aedes aegypti* & *Aedes albopictus* as secondary vectors. Despite the fact that disease's worldwide effect is unknown, its epidemiological trends are concerning for human health & global economy. Due to tendencies toward growing urbanization, limited water resources, & perhaps environmental change, dengue fever has been designated as a disease of the future. Dengue control is theoretically possible, according to WHO, with coordinated international technical & financial assistance for national programs. Dengue fever epidemiology, disease processes, control, treatment, diagnosis, as well as research aims are all covered in this primer.

[Shamimul Hasan](#) et al. discussed a review on Dengue Virus [10]. Dengue fever is an acute viral infection transmitted by *Aedes* mosquitoes and caused by an RNA virus from the Flaviviridae family. Fever may range from asymptomatic to life-threatening complications including hemorrhagic fever and shock. The most frequent symptoms are high fever, muscle and joint pain, myalgia, cutaneous rash, hemorrhagic episodes, and circulatory shock. Dengue infection symptoms in the mouth are uncommon; nonetheless, in certain instances, oral manifestations are the sole symptom. To decrease mortality, it's vital to get a diagnosis as soon as feasible. Dengue fever is a public health hazard in tropical and subtropical countries, despite the fact that it is typically self-limiting. This article covers dengue virus infections, their various clinical symptoms, diagnosis, differential diagnosis, prevention, and therapy.

3. DISCUSSION

Dengue fever is a viral virus carried by mosquitoes that is quickly expanding over the globe, with significant fatality and morbidity rates, particularly in tropical and subtropical nations. Dengue fever is spread by the *Aedes* mosquito. Topography, rainfall, temperature, and fast urbanization or globalization are all elements that contribute to dengue disease transmission. Clinical symptoms may vary from moderate to severe, with life-threatening consequences. Dengue fever is a severe public health issue because of its rapid worldwide expansion, and the disease's burdens are still unmet owing to a lack of effective treatment, a simple diagnostic test for early stages of illness, and a well-organized vector control strategy.

4. CONCLUSION

Only a few of the significant problems in producing a successful dengue vaccine include the necessity for an efficient tetravalent DENV vaccine, the absence of an appropriate animal disease model, and immunological correlates of disease protection. Due to the fact that wild type mice do not mirror clinical indications of human dengue fever, genetically altered mouse models that mimic certain elements of human illness have been established with great success. Using mouse-adapted DENV-two & AG129 mice that lack IFN- receptors has shown to be the most effective technique. The IFN pathway is shut off, which shuts down a critical branch of the host immune system and permits DENV to propagate. When AG129 mice are infected with DENV-2 that has been modified for mice, vascular leakage occurs without neurological effects, replicating the

clinical indications of severe dengue fever in people. By passive transfer of anti-DENV antibodies and exposure to a nonlethal dose of mouse-adapted DENV-two, this mouse model has also been proven to be beneficial in evaluating ADE. If mice get diseased and die, passively transmitted antibodies are likely to exacerbate illness. Since mouse-adapted DENVs are not naturally circulating, AG129 mice are also being investigated as a dengue model using clinical isolates. The AG129 mouse model has also been suggested by the WHO for testing dengue vaccine candidates. It should be highlighted that since this model lacks both type I and type II IFN pathways, it can only be studied to a limited extent. As a consequence, high-titer neutralizing antibody synthesis is limited, which may lead to ADE. As a result, a lot of effort is being devoted on developing the animal models so that results from mice may be extrapolated to people more accurately.

In the absence of cross-reactive neutralizing antibodies, a dengue vaccine must be developed that elicits primarily DENV serotype-specific neutralizing antibodies. Dengue vaccine development is progressing, and despite its low efficiency, a dengue vaccine may be accessible for human use in the not-too-distant future.

REFERENCES

1. D. A. Muller, A. C. I. Depelsenaire, & P. R. Young, "Clinical & laboratory diagnosis of dengue virus infection," *J. Infect. Dis.*, 2017, doi: 10.1093/infdis/jiw649.
2. M. F. Chew, K. S. Poh, & C. L. Poh, "Peptides as therapeutic agents for dengue virus," *International Journal of Medical Sciences*. 2017, doi: 10.7150/ijms.21875.
3. K. I. P. J. Hidari & T. Suzuki, "Dengue virus receptor," *Tropical Medicine & Health*. 2011, doi: 10.2149/tmh.2011-S03.
4. T. M. Ross, "Dengue virus," *Clinics in Laboratory Medicine*. 2010, doi: 10.1016/j.cll.2009.10.007.
5. A. El Sahili & J. Lescar, "Dengue virus non-structural protein 5," *Viruses*. 2017, doi: 10.3390/v9040091.
6. Y. S. Tian, Y. Zhou, T. Takagi, M. Kameoka, & N. Kawashita, "Dengue virus & its inhibitors: A brief review," *Chemical & Pharmaceutical Bulletin*. 2018, doi: 10.1248/cpb.c17-00794.
7. A. P. S. Rathore & A. L. St John, "Immune responses to dengue virus in skin," *Open Biology*. 2018, doi: 10.1098/rsob.180087.
8. M. G. Guzman, D. J. Gubler, A. Izquierdo, E. Martinez, & S. B. Halstead, "Dengue infection," *Nat. Rev. Dis. Prim.*, vol. 2, pp. 1–26, 2016, doi: 10.1038/nrdp.2016.55.
9. G. N. Malavige, S. Fern&o, D. J. Fern&o, & S. L. Seneviratne, "Dengue viral infections," *Postgrad. Med. J.*, vol. 80, no. 948, pp. 588–601, 2004, doi: 10.1136/pgmj.2004.019638.
10. S. Hasan, S. F. Jamdar, M. Alalowi, & S. M. Al Ageel Al Beaiji, "Dengue virus: A global human threat: Review of literature," *Journal of International Society of Preventive & Community Dentistry*. 2016, doi: 10.4103/2231-0762.175416.

A REVIEW OF THE STATE OF SCIENCE IN THE GLOBAL WARMING DEBATE

Namrata Arya*; Krishna Raj Singh**

*SBAS, Sanskriti University,
Mathura, Uttar Pradesh, INDIA
Email Id- namrata.sobas@sanskriti.edu.in

**SBAS, Sanskriti University,
Mathura, Uttar Pradesh, INDIA
Email id: hodbio-tech@sanskriti.edu.in

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ABSTRACT

This article provides an overview of the current state of global warming research. The phrase "global warming" is now widely used to refer to a recent rise in the earth's mean surface temperature, which has been linked to increased human activity, particularly higher levels of greenhouse gases (carbon dioxide, methane, and nitrous oxide) in the atmosphere. This issue has been the subject of heated and frequently passionate discussion since the mid-to-late 1980s the media's portrayal of the global warming issue typically focuses on the earth's rising mean temperature, related severe weather occurrences, and future climate predictions of increased frequency of extreme weather events across the globe. In fact, the problem of climate change is much more complicated than a rise in the earth's mean temperature or severe weather occurrences. Several recent studies have cast doubt on several of the IPCC reports' climate change predictions, and there is now a growing dissident perspective of global warming science that differs from the IPCC's understanding of the origin and consequences of global warming. According to our findings, the dissenting perspective provided by skeptics or opponents of global warming seems to be much more believable than the proponents' supportive position. Furthermore, projected climate change predictions for the next fifty to one hundred years are based on climate models that have not been adequately validated, and therefore are not regarded trustworthy at this time.

KEYWORDS: Carbon Dioxide, Extreme Weather Events, Global Warming, Land Use Effects, Sea Level, Solar Influence.

INTRODUCTION

In the nineteenth and most of the twentieth century, research and arguments regarding global warming and the coming of ice ages remained essentially a scientific topic. This conversation started in the mid to late 1980s and has since moved to the journalism, the general public, and even the political arena. The issue has gotten increasingly heated, with both believers and opponents of global warming strongly entrenched in their perspectives. (1). Following the

publication of the report mostly on scientific consensus on climate change, which includes the phrase "the balance of probability shows a discernible human effect on climate," the present global warming argument appears to have risen. As illustrated by a range of scientific remarks and publications, this hallowed phrase has provoked major controversy among atmospheric physicists, environmentalists, and politicians. (2). These articles questioned the relationship between temperature increase of the earth's surface and growing greenhouse gases released into the atmosphere. In the last five years, the global climate change dispute has spurred the development of a number of monographs and publications, the most famous of which are *Satanic Gases* and *The Greenhouse Delusion*. The book by Harvey adopts a pro-global-warming perspective, but the other three have a contrarian one (3).

The present manuscript is broken out as follows: The ' greenhouse effect, the circumstance for global warming, the complaint against global climate change, global warming in geological and biographical times, urbanization or rather land-use change, its impact of spread over a wide and sun's brightness, water variations, severe storms, and finally recap and conclusions are mentioned. (4). When the planet originated 5 billion years ago, all of the components that comprise the atmosphere and oceans were considered to be contained inside it. Around 4.5 billion years ago, the oxygen began as a mixture of water vapor, electro, hydrogen chloride, particulate matter, carbon dioxide, and nitrogen. It ultimately acquired its present makeup by interaction with surface minerals and living things some 280 million years ago, and has remained basically unchanged since then. Between 4.5 BY and 280 MY, widespread plant life transformed most of the carbonic acid (CO₂) into oxygen, notably during the carboniferous age, because most of our dirty energy reserves were formed.(5).

In an all around blended setting, four chief dry-air gases and related separate sums. Numerous other follow gases, additionally including helium, methane (CH₄), nitrogen oxide (N₂O), krypton proton, and others, have too little a rate by volume to be huge in this conversation. Ozone harming substances (GHG) incorporate the gases ethanol and nitrous oxide, alongside carbon dioxide, and their radiative properties are presently being contemplated. We haven't thought about the most factor element of the climate, water fume, and this is the main gas and impacts the humanity's normal worldwide temperature structure . The amount of water that might be kept in vaporous (fume) type in the environment does to be sure have a breaking point at any temperature. Water fume may possibly increment to a maximum of 5% of the entire air (by volume) at the most noteworthy temperature recorded at the world's surface; by and by, truly, various 2% of water fume noticeable all around is viewed as a high worth intelligent of an extremely muggy climate. As we'll see later, the presence of water fume noticeable all around causes a warming pattern, which keeps the geosphere warm and agreeable for natural life. Aside from the bright piece of sun based energy, which again is consumed by ozone gas, the sun's radiation is generally short frequencies and goes through the barometrical with insignificant ingestion.

Longwave radiation is made when sun based energy warms the earth and oceans, which then, at that point, discharges radiation back to space in longer frequencies

(6). A few gases in the climate, as water fume and CO₂, assimilate longwave radiation from the earth (and seas) and, therefore, keep the yearly worldwide surface temperature consistent. The nursery impact is named from the way that this peculiarity is tantamount to keeping plants warm in a nursery(7). Vertical blending is limited in the genuine nursery by the glass sheets, while the

environmental ozone depleting substance impact diminishes radiative misfortune to space through CO₂, O₃, and water fume retention and ensuing re outflow descending for long wave radiation. The world's yearly normal surface temperature would change if not for this regular nursery warming. Subsequently, the normal nursery impact assumes a part in deciding the yearly normal surface temperature of the planet. The nursery impact comes to starting from the earliest stage the stratosphere (6). The global electricity balance is computed under annual mean conditions. At the peak of the atmospheric, the world receives 343 units, whereas long wave radiation from the planet is averaged globally. At the apex of the atmosphere, a total of 237.3 sets are lost to universe (often referred to as Equivalence ratio Longwave Radiation). The intervening environment and clouds generate the Greenhouse Effect, which results in a negative of energy units(8). The earth's mean temperature maintains at a balmy 289 K, or around 33 C warmer than it would be without it, thanks to this natural greenhouse effect. The average evident higher density cloudy-sky radiation budget, based on ERBE (Earth Radiat Budget Experiment) data collected earth-orbiting satellites. The ERBE data distinguished clear-sky radiation with average cloudy-sky radiation during a five-year period, with a difference of around 18 W/m² attributed to cloud radiative. This average "cloudy-sky" climate is changing due to rising GHG concentrations "As we'll see later, the force is significantly larger than 2.45 W/m², which might be a key cause of anxiety in the carbon dioxide climate change hypothesis (9). JOSEPH FOURIER, a French scientist, proposed that perhaps the greenhouse effect acts like a greenhouse glass, having allowed sunlight (shortwave light rays) to transfer through while retaining a portion of the long - wave rays produced from the earth's surface. He expanded on this idea by performing a comprehensive experiments to evaluate the thermal radiative characteristics of light and carbon pollutants, trying to demonstrate that evaporation is the most significant g. Svante Arrhenius, a Finnish scientist, was the first to calculate how fluctuations in global carbonic acid concentrations affect human health "More than a century ago, (a key trace gas now more commonly known as carbon dioxide) may impact mean global surface temperature. The earth's temperature rises when CO₂ content in the atmosphere is increased by a factor of two.

Following Arrhenius' study, an American geologist focused on the role of CO₂ in the genesis of glacial periods throughout geological ages. At the time, the results were met with skepticism by the atmospheric scientific community, since it was commonly considered that liquid water absorbed all that much longwave radiation released from the surface that carbon dioxide absorption was negligible(10). CO₂ possesses absorption bands beyond those dominated by liquid water, and rising CO₂ concentration may have significant global consequences on the frequency of extreme weather events, according to laboratory research. Calendar proposed for the first time that people may have a significant influence on CO₂ concentrations in the atmosphere, but he projected that increasing the concentration would take millennia of constant industrial emissions. "Humans are undertaking a large-scale hydrological experiment through international industrial activity that might also result in a build-up of CO₂ higher than the rate of CO₂ creation from volcanoes," claimed Roger Process of implementation, a really well American geophysicist, in a significant essay. As part of a research program on the probable influence of people on the climate system, Revelle was instrumental in the creation of the first laboratory for long-term observation of atmospheric CO₂.

DISCUSSION ON SIGNIFICANCE OF GLOBAL WARMING

The most immediate and noticeable proof for environmental change is the adjustment of sea warming, not really the (world's) surface normal temperature record, in spite of the truth that those have gotten the best consideration from the IPCC and the media. Heat is best estimated in joules rather than degrees Celsius (or cooling). The earth framework's warm stockpiling component is clarified, just as why utilizing temperature ascend as an environmental change screen is wasteful in estimating heat stockpiling changes there in earth framework. We will, notwithstanding, focus our talk on air temperature patterns since surface temperatures is the regularly referred to and most effectively comprehended fixing in the present an unnatural weather change banter. The real confirmation for warming introduced above seems interesting, and it gives off an impression of being observed by a straightforward however engaging quantum hypothesis thinking: expanding Carbon dioxide in the environment traps seriously cordial blackbody radiation, making the planet become adequately warmed to legitimize the expression "an Earth-wide temperature boost." As recently said, various complex cycles are responsible for a dangerous atmospheric deviation and related environmental change issues, and it is important to more deeply study these instruments prior to arriving at firm decisions about the reason and ramifications of an unnatural weather change. The impact of urbanization and land use anticipating mean temperature computation; mean temperature changes on territorial and worldwide sizes and their adjustment of the setting of full scale air creation and different cycles are a portion of the significant subjects we cover. The effect of sunlight based inconstancy on rising temperatures all through land time periods just as require less stretches of time of not many dozen to a couple two centuries.

The impacts of worldwide ascending as far as a "expansion in relative ocean and outrageous climate occasions over the world." There are a plenty of different worries inside all of these three essential defects that put question on the center warming/CO₂ relationship, making the warming serious climate interface feeble, best case scenario. A few investigations distributed as of late have pushed a portion of the issues referenced above into more honed center: The impact of urbanization just as land use anticipating environment is currently assessed to be like or bigger than that of ozone harming substance discharges. Sun oriented inconstancy appears to affect mean temperature change all through topographical and more youthful time-frames. Likewise, enormous scope meteorological flow designs and their decadal variances appear to essentially affect normal worldwide temperature calculation. At long last, the impact of environment warming on growing in climate examples and ocean level ascent is loaded with uncertainty because of an absence of precise information on serious climate events throughout broadened timeframes and other regular fluctuation. At the point when these contemplations are considered, an obviously unique perspective on an unnatural weather change research arises. The Global normal temperature doesn't change in an anticipated manner. It rises and falls in exceptionally sporadic cycles with a wide scope of abundancy changes. Regular causes have driven the Earth's environment to move after some time, particularly topographically and by and large, consequently it is captivating to examine the temperature vacillations on the globe. Since there is no broad settlement on the worldwide climate history, there is by all accounts some settlement on the succeeding temperature history, which itself is fixated on a large number of sources, that numerous intermediaries for the lithologic past, climate diaries throughout the previous a few centuries, and acoustic records for the cutting edge time frame and part of the seventeenth century. Boreholes, ice sheets, corals, tree rings, sedimentation, dust, butterflies, marine species, waterway stream, rise relocation, precious stones, crop numbers, and other substitute records are

covered here. The request for importance of unmistakable intermediary information is truly not addressed in the rundown gave underneath, which is in randomized request. Beside the metropolitan/provincial split, the impact of land-use change and spatial elements on the earth's environment is being seen and explored to an ever increasing extent. The impact of land-use change and related scene elements here on earth's environment was reported in an original exploration. It is likewise contended that joining the climatic impact of soil properties and different instruments would offer a more complete image of human impact to environmental change. A significant number of these cycles would have major local ramifications that would be disregarded by a worldwide mean appraisal. The concentrate by PIELKE et al. shows an extensive 'environment improvement's in the earth barometrical environment framework's light spending plan. Later on, environment compelling from land use arranging and scene elements might offset GHG constraining. Different discoveries feature how land-cover changes if there should be an occurrence of rural works on spreading over different spots, and the related leaf-region list, may affect the worldwide climate designs. These and related exploration have given the environment warming proposal another aspect.

All in all, the impact of urbanization and woodland cover on the worldwide mean calculation seems, by all accounts, to be essentially higher than recently expected. There is an unmistakable need to fundamentally the mean normal temperature estimation and decide the "genuine warming" actuated simply by GHG driving. The past conversation further burdens the prerequisite of enough representing the impact of an area change in existing and future environment models. Other most recent explores have looked to assess sunlight based brilliance over fossil record and have plainly shown that the sun has a prevailing impact in deciding the normal nursery impact all through land time. The most noticeable of these tests. Expanding CO₂ levels all through land periods were not related to higher temperature, as per their discoveries. There is no connection between hotter ages in the world's temperature and Carbon dioxide levels, as indicated by the rising temperatures history. Varieties in gravitational wave motion are unequivocally connected with varieties in the worldwide normal temperature. At long last, two late review are worth focusing on: In an endeavor to decide sun oriented impact on tropospheric and prefrontal temperature patterns, played out a measurable examination of satellite-determined appreciate benefits and stratospheric temperature anomaly and sun illumination. Research uncovers that over scales longer surpassing two months, the overall mean tropospheric temperature peculiar and sun powered irradiance irregularity act in much the same way and show hostile to persistency. A careful clarification of the expression an aggregate negative analysis in the world's normal surface temperature, as gone against toward the positive input proposed. The concentrate likewise underlines the pertinence of sunlight based irradiance fluctuation and observes no signs for anthropogenic environmental change.

Continuous changes in sun powered enlightenment might uncover a missing connection between the daylight and environment in a significantly later examination. As indicated by study, sun powered effect on the current warming might be produced through altering UV radiation transition, plasmas, and fields by means of more perplexing instruments than direct climatic dissemination temperature driving. In synopsis, a few ongoing review has brought the job of spread over a wide and sun light on the current warming into nearer accentuation. These disclosures additionally propose to a fundamentally higher sun powered impact on the climate and seas than recently envisioned. Ongoing review uncovers a solid connection between's sun

based variance and climate designs, which would impact the world's surface temperature. The importance of spread over a wide, yet this isn't an examination of ocean level vacillations, but instead an assessment of the reason that worldwide environmental change is presently and in the great beyond driving faster ocean level ascent. The ocean level qualities are considerably more one-sided than climate stations. They're regularly situated in Northern Quarter ports, and they're dependent upon nearby, moderately short, and upper piece changes that might have been difficult to break down for. There is minimal indication of ongoing ocean level varieties at areas in remote, low-populace districts, like the lesser Pacific Islands. The water level of Tuvalu, a little atoll in the Pacific Islands, is exceptionally consistent. So agreeing Southaustralian Tidal Field (NTF), there is actually no apparent indication of any flood in ocean level vacillations in the verifiable story. They believe that shore and sinking sea shores around FunaFuti were driven by regular powers rather than expanding ocean levels. The slow softening of Ice cover masses, which have been logically vanishing for around 18,000 decades (the hour of the last interglacial period), is answerable for proceeded with ocean level ascent. Just temperature minor departure from a thousand years time frame, as indicated by land information, may affect this rate. Environment has changed that last ages or even centuries are too short to even consider affecting the removal rate. Thus, provided that an ice age comes in the span, ocean level will continue to increment at a comparative speed as it does today. It's additionally essential to take note of that, just as softening of ice sheets 3D shapes in a beverage of water doesn't some way or another reason the glasses to flood, dissolving polar ocean ice doesn't exactly goal long - term changes levels. Sea temperatures would possibly rise enough to overpower seaside settlements in the event that enormous volumes of inland Argentinian and Greenland glaciation softened. It couldn't have ever happened assuming the globe had been six percent more noteworthy 5,500 years prior. At 120,000 decades back, ocean level was scarcely two meters taller than it is presently, and temperatures were almost six degrees higher than they are currently.

CONCLUSION AND IMPLICATION

In the earth's lengthy geologic time, there would never be a link between average temps as well as carbon Dioxide in the atmosphere amounts. The Earth has been getting warmer at highly random intervals, with equally erratic thermal slope amplitudes. As a result of increased human activity, contemporary global warming has generated discussion regarding anthropogenic influence on the climate. However, a thorough assessment of the earth's surface temperatures reveals that present warming may be primarily attributable to the impacts of urbanization and forestland, rather than growing CO₂ and also other atmospheric methane levels. Apart from forest cover, solar variability and the luminosity of the sun appear to have a higher effect on air quality and seas than previously anticipated. Recent research demonstrates that solar impact was a driving force of the earth's temperature across ancient eras. Even over a relatively short timescale, insolation and its oscillations may have contributed to more approximately 60 percent of the entire warmth of the seventeenth century. Although the influence of solar activity, mainly included cosmic ray flow, largely on earth's poor weather hasn't even been entirely investigated, it may have a function in the change in the galaxy's mean temperature. So far, there is no apparent correlation between increasing temperatures and severe weather occurrences around the globe. The increased economic effect of heat storms in the U.s. appears to have been connected to sociocultural changes in income and number, rather than climate change. Only just few reports have been conducted from outside the U.s.a. that offer a thorough examination of the economic

effect of severe weather occurrences. There was no rapid sea-level rising anywhere during the modern period. According to our results, the current status of global warming research is at a juncture. There is a real need to revisit the study and explore the various difficulties presented and addressed in this article.

REFERENCES

1. Foukal P. Can slow variations in solar luminosity provide missing link between the sun and climate? Eos (Washington DC). 2003;
2. Fourier JBJ. The analytical theory of heat. The Analytical Theory of Heat. 2009.
3. Fourier's "Analytical Theory of Heat." Nature. 1878;
4. Pifer A, Aurani KM. The analytical theory of heat of Joseph Fourier: An analysis of the conceptual and epistemological foundations. Anal theory heat Joseph Fourier An Anal Concept Epistemol Found. 2015;
5. DUFRESNE J-L. Jean-Baptiste Joseph Fourier et la découverte de l'effet de serre. La Météorologie. 2006;
6. Akrouch GA, Sánchez M, Briaud JL. An experimental, analytical and numerical study on the thermal efficiency of energy piles in unsaturated soils. Comput Geotech. 2016;
7. Hathaway DH. The solar cycle. Living Rev Sol Phys. 2015;
8. Cambié D, Noël T. Solar Photochemistry in Flow. Topics in Current Chemistry. 2018.
9. Sampaio PGV, González MOA. Photovoltaic solar energy: Conceptual framework. Renewable and Sustainable Energy Reviews. 2017.
10. Kannan N, Vakeesan D. Solar energy for future world: - A review. Renew Sustain Energy Rev. 2016;62:1092–105.

A REVIEW OF DROUGHT AS A RESULT OF GLOBAL WARMING

Dr. Arminder Kaur*; Dr. Durgesh Wadhwa**

*SBAS, Sanskriti University,
Mathura, Uttar Pradesh, INDIA
Email Id- arminder.smas@sanskriti.edu.in

**SBAS, Sanskriti University,
Mathura, Uttar Pradesh, INDIA
Email id: hodchem@sanskriti.edu.in

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ABSTRACT

This article examines current research on millennium droughts, then provides an update on worldwide aridity trends from 1950 to 2008. Aridity projections for the future are based on current research and our examination of model simulations. Many times over the past millennium, dry periods spanning years to decades happened in places like North America, West Africa, and East Asia. Anomaly tropical sea surface temperatures (SSTs) were likely to blame for the droughts, with La Nina-like SST anomalies producing dryness in North America and El Nino-like SST anomalies causing drought in East China. The new Sahel dry seasons are the aftereffect of a southern shift of the most sweltering SSTs in the Atlantic and warming in the Indian Ocean over Africa. Neighborhood criticisms can possibly enhance and expand dry season. Because of ongoing drying across Africa, southern Europe, East and South Asia, and eastern Australia, worldwide aridity has risen altogether since the 1970s. Notwithstanding the way that the El Nino-Southern Oscillation (ENSO), tropical Atlantic SSTs, and Asian storms have all assumed a part in the new drying, ongoing warming has expanded climatic dampness interest and reasonable adjusted air course designs, the two of which have added to the drying. A large portion of Africa, southern Europe, and the Middle East, just as the greater part of the Americas, Australia, and Southeast Asia, are relied upon to encounter expanding aridity in the twenty-first century, as per environment models. Due to natural climatic fluctuations, regions like the United States have escaped severe droughts in the past 50 years, but droughts may continue in the next 20–50 years. The capacity of models to predict tropical SSTs will be critical in future drought forecasting attempts.

KEYWORDS:Al-Nino, Drought, Global Warming, Indian Ocean, Surface Temperature.

INTRODUCTION

Drought is a recurrent severe climatic phenomenon that occurs across land and is marked by below-normal precipitation for months or years. In contrast to chronic aridity in arid regions, drought is a brief dry phase (1). Dry season happens in pretty much every edge of the globe, including soggy and moist regions. This is because of the way that dry season is characterized as

a dry period in contrast with the typical conditions nearby. Bone-dry areas, then again, are inclined to dry spell since their precipitation is profoundly subject to a couple of precipitation occasions. Dry spell is typically isolated into three classifications: (1) A meteorological dry season is characterized as a time of beneath ordinary precipitation enduring a long time to years. It is frequently joined by better than expected temperatures, and it ordinarily goes before and causes different sorts of dry seasons (2). A drawn out peculiarity (for example high tension) in enormous scope climatic dissemination designs causes meteorological dry season, which is commonly determined by unusual tropical ocean surface temperatures (SSTs) or other far off conditions. Nearby inputs like diminished dissipation and stickiness related with dry soils and high temperatures regularly intensify air inconsistencies. Dry season in agribusiness alludes to a time of dry soils brought about by sub optimal precipitation, solid however less regular downpour occasions, or higher-than-typical vanishing, all of which bring about lower crop result and plant advancement. (3) When waterway streamflow and water stockpiling in springs, lakes, or supplies fall underneath long haul mean levels, hydrological dry season creates(3). Since it incorporates diminished yet not reestablished put away water, hydrological dry season takes more time to happen. Dry seasons in agribusiness and hydrology are regularly brought about by an absence of precipitation, albeit different factors like more extreme yet less continuous precipitation, helpless water the executives, and disintegration may likewise make or worsen dry spells. Overgrazing, for instance, caused expanded disintegration and residue storms, which exacerbated the Dust Bowl dry spell of the 1930s over the Great Plains of North America. Dry spell, which impacts a large number of individuals across the globe every year, is one of the most financially and naturally harming serious events(4). Dry spells might significantly affect farming, water supplies, the travel industry, biological systems, and principal human prosperity. Dry season costs the United States \$6–8 billion every year by and large, yet as much as \$40 billion out of 1988. Dry spell related disasters killed almost a large portion of 1,000,000 individuals in Africa during the 1980s. Dry spell has various impacts relying upon one's capacity to adapt. Individuals in regions with complex water system frameworks, like those in well off countries, can, for instance, cradle the impacts of dry spell obviously superior to ranchers in Africa and other agricultural nations, who normally have less means to battle dry seasons and other regular fiascoes. As the world keeps on warming, helpless countries' restricted limits will turn into an inexorably critical issue in worldwide endeavors to diminish the hurtful impacts of environmental change (5).

Depict the pointers that are often used to screen and quantify dry spell in this part. Dry season has three significant qualities: seriousness, length, and geological inclusion. The force of the precipitation, soil dampness, or water stockpiling insufficiency, just as the seriousness of the going with impacts, are generally factors to consider. Dry seasons typically last a couple of months to a couple of years, albeit serious dry spells might proceed for quite a long time, or even a long time on account of purported uber dry spells. The last option is identified with decadal SST changes in the Pacific and Indian Oceans, just as the North Atlantic Ocean, at low scopes. Dry spells that keep going for months or a long time might be separated by brief rainstorms. Dry seasons might influence a little region (for example a couple of areas), yet serious dry seasons can influence a whole landmass, as occurred during the Dust Bowl during the 1930s in North America. Basic precipitation peculiarities, obviously changed by standard deviation (SD) across wide angles, are regularly utilized to portray dry and wet circumstances in displaying research. Neighborhood dry seasons and wet spells are controlled by the combined impact of the

unevenness between air water supply (for example precipitation or P) and request (i.e., expected evapotranspiration or PE) notwithstanding the way that precipitation is frequently the prevailing variable deciding the aridity of an area (6). The previous (P) is primarily impacted by barometrical cycles, though the later (PE) is affected by close surface net radiation, wind speed, and stickiness.

Different dry spell markers have been made to more readily screen and measure dry season. examines and differentiates the most generally utilized dry season pointers. A dry spell file, in view of its verifiable appropriation, surveys the deviation from the nearby typical state in a dampness variable. Precipitation is the principle variable in working out meteorological dry season lists, with extra commitments from surface air temperature to represent the effect of vanishing in specific lists, like the Palmer Drought Severity Index (PDSI). Soil dampness content (which isn't normally evaluated) is oftentimes used to survey horticultural dry spell, while streamflow is generally used to gauge hydrological dry season(7). In view of information from two neighborhood environment zones in Oregon, USA, the presentation of various usually utilized dry spell files was analyzed, and it was found that precipitation deciles (RD), registered soil dampness (CSM), and absolute water shortage are the best performing records for meteorological, farming, and hydrological dry season, individually. In the United States, the PDSI is the most broadly utilized meteorological dry spell marker. It has likewise been utilized to assess long haul varieties in aridity across overall land in the 20th and twenty-first hundreds of years, just as in dry season recreations dependent on tree rings. The PDSI was created determined to decide the total change in surface water balance. A hydrological bookkeeping framework joins predecessor and present dampness supply (precipitation) and request (PE). Albeit the PDSI is a normalized proportion of the surface dampness express that empowers examinations across distance and time, common climatic conditions in the Great Plains will generally create more extreme PDSI than in other US regions, going from around 10 (dry) to +10 (wet). To work on spatial equivalence, neighborhood PDSI can be renormalized to have a standard deviation (SD) like that of the Palmer model's alignment area in the focal United States, or oneself adjusted PDSI can be utilized, which re-adjusts to nearby conditions and gives off an impression of being a prevalent dry spell file (8). The PDSI is additionally erroneous in its show of all precipitation as quickly open precipitation (for example no postponed overflow from dissolving snow), its absence of impact of vegetation or frozen soils on vanishing, and a few different cycles. Since the Thorn Thwaite PE depends just on temperature and scope, the PE computation utilizing the first Palmer model might prompt errors in energy-restricted regions. The Penman-Monteith (PM) condition, which represents the impacts of radiation, moistness, and wind speed and performs best over Australia in an examination of various PE plans, may decrease this error(9).

In spite of these restrictions, PDSI esteems are exceptionally connected with noticed warm-season soil dampness content and streamflow in many pieces of the globe, and in this way might be utilized as a dry spell list at low and medium scopes. Moreover, not at all like numerous other dry spell records, the PDSI uses both precipitation and surface air temperature as information, while numerous others depend just on precipitation. This empowers the PDSI to represent the central effect of surface warming on dry spells and wet periods, for example, that which occurred during the 20th century and may happen in the twenty-first century. PE is liable for the effect of surface temperature, which represents 10–30% of the variety in PDSI. Since precipitation and

surface air temperature are the main two climatic factors with extended authentic records, the PDSI utilizes both and can be figured effectively in the course of the last century or so for most topographical areas. Dry spell files that exclusively survey precipitation and don't represent changes in air interest for dampness inferable from expanding radiative warming and surface warming may not work successfully in a model-projected 21st century environment with critical warming (10). In any event, for files like the PDSI, which incorporate the entire surface water spending plan, the translation of their outcomes for the future environment might should be changed. Since all of the dry spell pointers have been created and aligned for the current environment, this is the situation. Nonetheless, given the 21st century's huge warming inclination, in this segment, first give chronicled setting by checking out how dry season has changed all through the globe over the previous thousand years, and afterward show aridity patterns later 1950, when observational information are very abundant and critical warming has happened, especially since the last part of the 1970s. The reasons of late aridity shifts, especially their association with ozone harming substance instigated a worldwide temperature alteration, are next examined.

DISCUSSION ON DROUGHT RESULTING FROM GLOBAL WARMING

Dry season is an unavoidable part of environmental change. Enormous scope dry spells have happened many occasions in the course of recent years in many areas of the planet, including North America, with remarkable diligence (20–40 years) yet comparative in seriousness and spatial appropriation to the significant dry seasons experienced in advanced North America, as indicated by tree-ring and other intermediary information, just as instrumental records. Current dry spells during the 1930s and 1950s had equivalent seriousness yet more limited lengths than past multi-decadal dry seasons. Multi-decadal patterns in the tropical Pacific Ocean are thought to have caused these archaic super dry seasons. A critical number of studies have been directed in West Africa, where the extreme and inescapable Sahel dry seasons of the 1970s and 1980s wrecked the native populace. Exceptionally dry and blustery periods happened in the early and late nineteenth hundreds of years, separately, across West and East Africa, as indicated as a substitute proof for African lake levels. In the viewpoint of the most recent three centuries, the current Sahel dry season is normal, 66 demonstrating that regular storm vacillations in West Africa are fit for delivering cataclysmic dry spells later on.

Many examinations have observed that the new Sahel dry seasons were fundamentally brought about by a toward the south shift of the hottest SSTs and the related between tropical assembly zone (ITCZ) in the tropical Atlantic, just as consistent warming in the Indian Ocean, which intensifies subsidence over West Africa by means of waves. Diminished plant cover and surface vanishing might have gone about as a positive input circle, intensifying and delaying dry seasons. Instrumental records of precipitation, stream, shadiness, surface radiation, mugginess, winds, and other dry spell related variables are not many in many regions of the planet preceding 1950. Quick expansions in worldwide surface temperature, climatic CO₂, and other GHGs have likewise happened beginning around 1950. Therefore, aridity changes starting around 1950 may offer knowledge into whether dry season might turn out to be more normal and inescapable later on a very long time because of a dangerous atmospheric deviation, however regular variances, for example, those demonstrated as a substitute information are needed for assessing long haul patterns.

Many exploration has taken a gander at current hydro environment changes in various regions, and some have utilized land model-mimicked soil dampness to depict past dry spells utilizing perception based climatic compelling. The overall evaluations of precipitation, 96–98 PDSI, stream, and model-mimicked soil dampness are refreshed and blended in this part to show aridity patterns across worldwide land from 1950 to 2008. The incorporation of a few elements in the review should assist with beating the constraints of individual dry season markers and lift certainty. Land precipitation information for the period before 1979 to the present were acquired by joining month to month irregularity information. Re-scaling the different informational indexes to accomplish similar mean across a typical information period (1979–1996) was utilized to blend them. Since around 1950, the pattern maps for yearly surface air temperature, precipitation, and spillover (as assessed from streamflow information). Most noteworthy topographical districts warmed by 1–3 degrees Celsius somewhere in the range of 1950 and 2008, with northern Asia and northern North America seeing the most warmth. Precipitation fell over quite a bit of Africa, southern Europe, South and East Asia, eastern Australia, Central America, the focal Pacific shorelines of North America, and parts of South America during a similar time span. As a result, overflow there's stream bowls has diminished. The for the most part comparative pattern designs between the autonomous precipitation and streamflow records demonstrate that the precipitation information's expansive patterns are probable dependable. The precipitation change designs, for instance, across Australia during the 1980s, are viable with satellite-noticed vegetation changes. Likewise figured was oneself aligned The Penman-Monteith PE (PDSI pm).

Extra constraining information from the NCEP/NCAR reanalysis, including surface explicit mugginess, wind speed, and pneumatic force, just as overcast cover from surface perceptions and surface net sunlight based radiation from the Community Land Model variant 3 (CLM3) reenactment, in which noticed cloud was utilized to assess surface descending sun based radiation, were utilized notwithstanding the precipitation and temperature information. Seen close surface air temperature, fume tension, and cloud rate were utilized to ascertain surface net longwave radiation. We stress that the information for surface breeze speed and radiation used here are probably going to have huge blunders, since gridded, excellent information for the two regions is inaccessible across the entire globe. As a result, the discoveries of the PDSI may not precisely address the impact of genuine changes in wind speed and radiation on aridity beginning around 1950. More data on the PDSI attributes might be seen as here. Since the aftereffects of PDSI pm are indistinguishable from those of PDSI pm, they are not introduced. Albeit the charts differ, they all show similar year-to-year variances and a solid descending (i.e., drying) pattern from the last part of the 1970s to the mid-1990s. The CLM3-mimicked soil dampness has shown an unobtrusive bounce back since the mid-1990s, however the PDSI has kept on declining. The PDSI pm bounce back to some degree in the mid-to-late 1990s prior to continuing its declining pattern around 1999, while the PDSI and PDSI pm with steady temperature have been moving higher since the center of the 1980s. The worldwide dry region as an extent of absolute land region might be determined by characterizing the most reduced 20 percentiles of the month to month PDSI, PDSI pm, and soil dampness as dry periods locally. That the rate dry region stayed stable somewhere in the range of 1950 and 1982, when it expanded drastically (by 10%) inferable from the 1982/83 El Ni no, which diminished precipitation across a few geological locales.

From 1983 to 2008, all aside from the PDSI and PDSI pm with set temperature cases display an expanding pattern, except for the PDSI and PDSI pm with fixed temperature cases, which show no pattern. In contrast with the PDSI pm and CLM3 occasions, the PDSI case will in general overstate ongoing drying. These discoveries show that until the mid-1980s, precipitation was the essential driver of changes in the earthly water financial plan; from that point onward, surface warming, cloud-initiated changes in sun powered radiation, and different fields (e.g., wind speed and stickiness) turned out to be more critical. Besides, the PDSI pm is by all accounts a more precise proportion of aridity than the first PDSI, since it considers varieties in aridity. The huge drops in the PDSI and soil dampness from the last part of the 1970s to the mid-1990s are generally because of diminished precipitation in Africa and East Asia. As recently expressed, the momentum dry spell in Africa is connected to shifts in Atlantic SST designs and consistent warming in the Indian Ocean. The ebb and flow an unnatural weather change, which is fundamentally owing to human-incited GHG increments, is probably going to fault for the warming in the Indian Ocean. Albeit the impact of anthropogenic sprayers can't be precluded, the southern shift of the most sizzling SSTs in the tropical Atlantic is probably a characteristic vacillation since GHG-actuated warming is more prominent in the North Atlantic than in the South Atlantic Ocean. Over East Asia, there has been a decadal shift in precipitation designs and related summer rainstorm dissemination since the last part of the 1970s, which has become more vulnerable from that point forward. Expanded spray stacking from human-caused air contamination, just as warming in tropical SSTs, may have both had a huge impact in the progressions in East Asian precipitation. Expanded spray stacking over the Northern Hemisphere might have additionally had a section in late drying over the Sahel and other tropical precipitation varieties, as indicated by model recreations; in any case, current models actually experience issues demonstrating the peculiarity. In this part, I inspect how dry seasons might develop later on, utilizing mathematical models to anticipate future temperatures. Outrageous climatic events, like dry spells, are expected to experience critical rate shifts, which is cause for stress. The barometrical interest for water fume (i.e., PE) may rise when the land surface warms attributable to expanding lower longwave radiation from expanded water fume and other GHGs, as shown when series inconsistencies between the occasions. PE is affected by an assortment of factors, including surface net sun oriented radiation, moistness, and wind speed. Aridity will rise assuming air water supply (i.e., precipitation) over a space doesn't rise to or outperform expansions in PE. The IPCC AR4 multi model outfit mean change in yearly (a) precipitation, (b) soil dampness, (c) overflow, and (d) vanishing from 1980–1999 to 2080–2099 under the SRES A1B (medium emanations) situation. Dissimilar to vanishing, which rises all around the world besides in a couple of dry land areas and a couple of marine spots (where cooling happens), precipitation falls generally across the subtropical zones. The extension of the plummeting parts of the Hadley course and more prominent environmental steadiness at the edges of tropical convection are liable for the decrease in precipitation. Over land, in any case, the changing examples of dissipation and precipitation are similar, recommending that vanishing is chiefly managed by precipitation. The essential driver of overflow, land precipitation ordinarily follows spillover change designs. Soil dampness, then again, shows very unmistakable examples of progress, demonstrating drying across a significant part of the land, including the vast majority of the northern mid high scopes, where precipitation is expanding. Soil dampness varieties don't really reflect precipitation changes, even at low scopes (e.g., southern Asia and northern South

America). This shows that complete precipitation alone ought not be utilized to survey changes in aridity or dry spell, as many examination do.

CONCLUSION AND IMPLICATION

A short survey of the meaning of dry spell, normal dry season files, and ongoing writing on the event and reasons for dry season in the 20th and prior hundreds of years is introduced in this article, which is trailed by a refreshed examination of worldwide aridity changes from 1950 to 2008 utilizing numerous information sources. Another investigation of model result from reproductions under the SRES A1B situation by coupled models that partook in the IPCC AR4 is likewise introduced, in light of distributed examinations and our new investigation of model result from reenactments under the SRES A1B situation by coupled models that took part in the IPCC AR4. Tenacious dry periods traversing quite a long while to a very long while have happened various occasions during the beyond 500–1000 years in North America, West Africa, and East Asia, as per ongoing examination. Dry season in East China has been identified with tropical SST variances before, with oddities in the tropical Pacific causing far and wide dry spell in North America and El-Ni no-like SST warming in the Pacific causing dry season in East China. The new Sahel dry spells are basically brought about by a southern shift of the most sultry SSTs in the tropical Atlantic and warming in the Indian Ocean over Africa. Diminished neighborhood dissipation and relative dampness during dry spells as a general rule, just as expanded residue stacking during the Dust Bowl dry season over North America during the 1930s, diminished vegetation cover in the Sahel during the 1970s and 1980s, and decreased nearby vanishing and relative mugginess during dry spells as a general rule, may compound and delay dry spells set off by tropical SSTs or different irregularities in climatic disseminations. Worldwide aridity and dry season districts have risen altogether since the center of the 20th century, owing for the most part to broad drying since the 1970s across Africa, southern Europe, East and South Asia, eastern Australia, and many bits of the northern mid-high scopes. Albeit normal varieties in ENSO, tropical Atlantic SSTs, and Asian rainstorm added to the new drying, quick warming since the last part of the 1970s has expanded air interest for dampness and probable modified environmental course designs (e.g., over Africa and East Asia), the two of which have added to the new drying over land. Considering that human-prompted GHG increments are answerable for a generous part of late warming, 90 it is sensible to induce that human exercises have played a huge part in the new drying pattern.

REFERENCES

1. Sun Y, Solomon S, Dai A, Portmann RW. How often does it rain? J Clim. 2006;
2. Biondi F, Kozubowski TJ, Panorska AK. A new model for quantifying climate episodes. Int J Climatol. 2005;
3. Cook BI, Miller RL, Seager R. Amplification of the north american “Dust Bowl” drought through human-induced land degradation. Proc Natl Acad Sci U S A. 2009;
4. Méndez M, Magaña V. Regional aspects of prolonged meteorological droughts over Mexico and central America. J Clim. 2010;

5. Heim RR. A review of twentieth-century drought indices used in the United States. Bulletin of the American Meteorological Society. 2002.
6. Keyantash J, Dracup JA. The Quantification of Drought: An Evaluation of Drought Indices. Bull Am Meteorol Soc. 2002;
7. Clarke JM, DePauw RM, Townley-Smith TF. Evaluation of Methods for Quantification of Drought Tolerance in Wheat. Crop Sci. 1992;
8. Mandeel QA. Biodiversity of the genus *Fusarium* in saline soil habitats. J Basic Microbiol. 2006;
9. Rana B, Kumar S, Kumar S. Evaluation of drought tolerant indices for quantification of drought tolerance in wheat. Vegetos. 2012;
10. Macías Palma DL. Percepción De Riesgos Oculares Durante El Uso De Lámparas De Fotocurado Por Parte De Estudiantes Ucsq 2015. Univ Santiago Guayaquil. 2015;

IMPACTS OF POVERTY AND EDUCATION ON THE PREVALENCE OF GIRL CHILD MARRIAGE IN INDIA, AND EARLY MARRIAGE IMPLICATIONS

Dr. Annie*; Sachin Kumar Sharma**

*SBAS, Sanskriti University,
Mathura, Uttar Pradesh, INDIA
Email Id- annie.sobas@sanskriti.edu.in

**SBAS, Sanskriti University,
Mathura, Uttar Pradesh, INDIA
Email id: sachin.mba@sanskriti.edu.in

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ABSTRACT

Marriage is a religious tradition all over the globe, but the bride and groom must be mentally and physically engaged with each other, so they must promise to spend the rest of their lives together. As a result, there must be some age limit for the minimum marriage age. Early marriage, also known as child marriage, is a social blight, and many organizations, as well as government bodies, are working hard to prevent child marriage and persuade families to delay child marriage for their daughters and sons until they reach the ages of 18 and 21, respectively. The purpose of this article is to determine the effects of early marriage on girls, as well as the causes of child marriage and what can be done to avoid child marriage. The paper's conclusion is that education is a method to raise awareness regarding child marriage and, second, to make individuals economically independent by allowing them to make their own decisions.

KEYWORDS:*Bride, Child Marriage, Education, Groom, Government.*

1. INTRODUCTION

The birth of a child is seen as a joyous occasion, but if the newborn is a female, it is not regarded as such in certain parts of the globe, and the reason for this is the girl's marriage arrangements. Girls always go to someone else's house after marriage, and parents must set aside some funds to make arrangements for that girl's marriage. Marriage is seen as a costly event in India since a large sum of money is involved. In certain communities, dowry is an important element of finding the appropriate match for a girl's marriage, and in other instances, demand comes from the groom's side (Figure 1). Although dowry has been deemed a criminal offense by an honorable court, it is still practiced as a comprehensive culture in many parts of India and the globe (1–5).

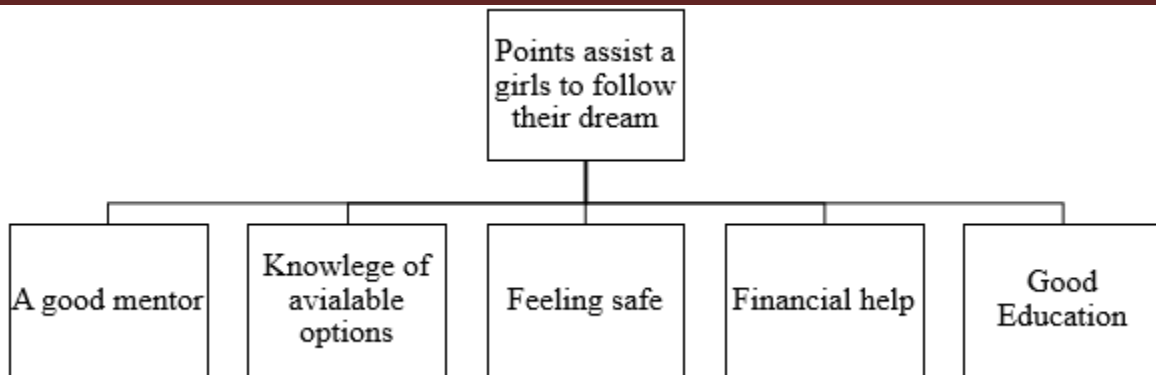


Figure 1: Influences on a Girl's Life in Order to Feel Empowered and Self-Motivated

Girls have been regarded an inferior gender for a long time, and their situation is particularly terrible in developing countries. If a family is living in a developing country and does not have a decent financial situation, the situation of a girl in that household is made much worse. This is due to a lack of basic amenities and services, such as a lack of excellent earning sources and a fixed income; it is likely that the family will not be able to find employment on a regular basis, and there will be fewer earning members in relation to the family size. In today's world, it is a well-known truth that nearly every nation is experiencing inflation, with even basic goods seeing increases in price. The situation of impoverished families would deteriorate even more as a result of this.

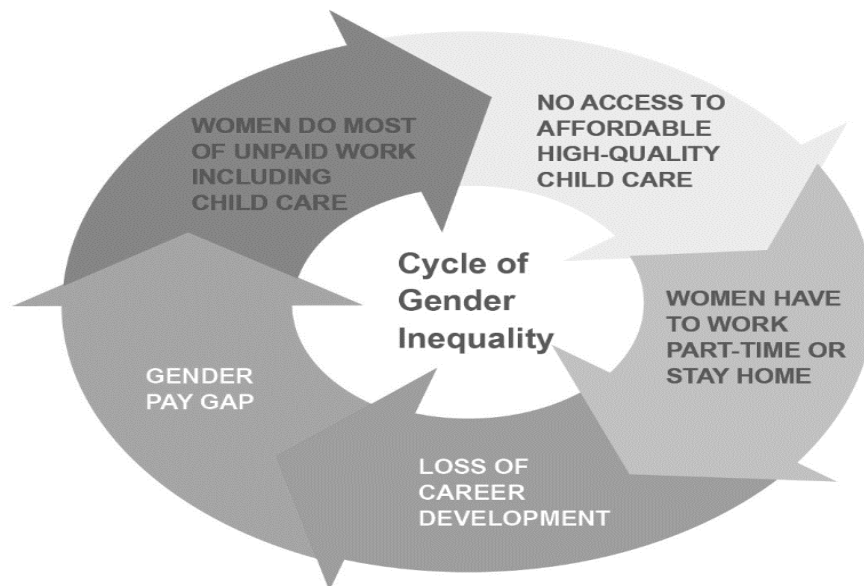


Figure 2: Adverse Effect of Practice of Gender Equality on Women Life at Work Place.

Marriage is a legal requirement for young boys and girls, but everyone have to go through the procedure, yet there was a period when there was no age limit for girls and boys marrying. Girls as young as ten years old were being married, and the most pitiful part was that although the groom's age was sometimes compatible with the girl's, in many instances the husband was considerably older than the girl (Figure 2). This made things difficult for girls since they had to

endure labor pains when still in adolescence, and most of the time, either the girl or the baby perished as a result of the mother's immaturity. There were several situations in which a poor girl was forced to marry an elderly man in order to avoid paying the dowry, or when the girl's parents were unable to provide funds for the dowry(6–8).

The dowry issue is as significant as the preparations made in a girl's marriage. The dowry's original purpose was noble, but as time has passed, people have become more prejudiced about it, and they have begun to demand a large sum of money, as well as a large number of goods and other items, and it has become customary in all communities to demand a large sum of money, regardless of the girls' family's position or financial situation. Money in marriage is not a commendable deed since it destroys the ideals of a civilized country and also has an effect on the married life of a couple because some people are ready to demand more dowry even after they have married. To preserve the ideals of a civilized society, this tradition should be abolished.

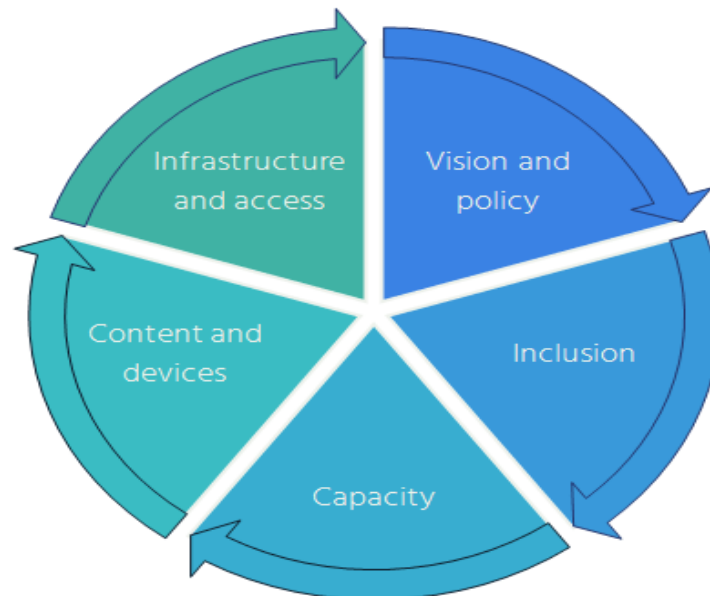


Figure 3: Key Factors That Should Be Implemented In Social Life to Ensure Growth and Development of a Women.

According to ancient religious texts, a girl is considered the foundation of life since she has the ability to give birth, and so every religion has regarded girls and women as a kind of goddess, yet there are still many negative practices widespread in society that may harm a woman's life and dignity. As a result, a concerted effort should be made to improve the situation of women, particularly young girls, so that they may be educated in begin to experience empowered and participate in household and other decision-making processes (Figure 3). Apart from the significant efforts made by numerous NGOs and the United Nations, many government organizations have been trying to improve the situation of the girl.

Marriages are said to be made in paradise, and that is not the case, as many girls have suffered much after marriage due to a lack of understanding and a dowry issue. Most instances of cruelty towards women have been reported, and this is a significant issue since after marriage, a woman in the form of a mother in law or a sister in law does not assist the newly married bride in the

majority of cases, which may be solved with appropriate education and awareness programs. Many nursing moms are not supplied with a nutritious diet, which is a leading cause of baby and maternal mortality. Despite many laudable attempts, the situation in underdeveloped nations is a really deplorable one (9,10).

In many developing nations, marrying a girl is still a difficult task since families do not have enough money, and people's attitudes are changing as they desire a profitable marriage for their son. The funny thing is that when parents are looking for a bride for their son, their mindset is completely different than when they are looking for a groom for their daughter (Figure 4), and this gap must be bridged with equal thought processes regardless of whether a parent is looking for a groom or a bride. There should be no disparities between a girl and a boy, and this is one of the reasons for the issues and inequalities between girls and boys to be addressed.

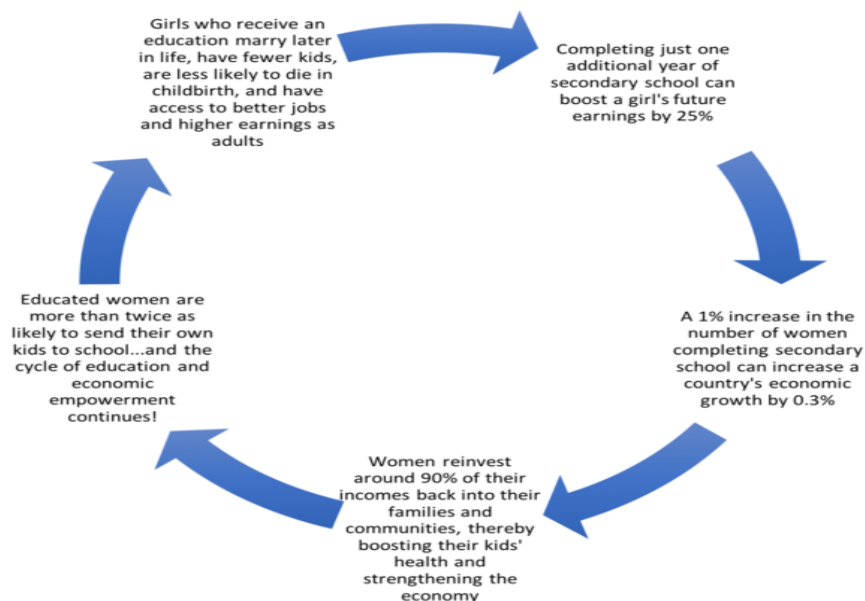


Figure 4: Effect of Education of a Women in Society, Family and Nation

Main problem comes in girl marriage is the availability of a good groom and arrangement of fund. There one thing should worthwhile to mention that if groom would have been earning good or belong to a wealthy family , then there expectations are high for dowry , although this is not true in every case but most of cases are inspired from this theory. The burden of marriage have been suffered by the bride's family. This problem has become more regressive shape if the family belong to a middle class income group. Early marriage was very much in prevalence but after impose of many laws regarding this , early marriage have been controlled but still ,one more problem has arisen and this is marriage of girl before completing their education.

In India, minimum age of marriage fixed at 18 year and if any case has been found that a girl with age less than 18 year is going to marry, that will be counted as a crime. Moreover, early marriage is counted as a forced marriage and also is a human right violation as this is impact the life of a girl in every manner like social, physical and her education as well. There are many countries, where early child marriage are still in practices, and child marriage should be aimed to stop latest by 2030 in every part of the world according to sustainable development goal. A lot of

effort are continuously being made but early child marriage condition have not improved in some of the sub Saharan as well as south Asian nation. The fact behind these countries are that they are in more vulnerable condition as per their political and economic status. Table 1 has been showing the literacy rate of Indian states.

TABLE 1: DATA OF LITERACY OF WOMEN IN INDIAN STATES AND UNION TERRITORY OF INDIA.

State or UT	<u>Census 2011</u>		
	Average	Male	Female
<u>A&N islands^[UT]</u>	85.17	89.01	82.73
<u>Andhra Pradesh^[a]</u>	68.56	74.46	58.63
<u>Arunachal Pradesh</u>	66.85	73.59	58.47
<u>Assam</u>	72.07	77.79	66.17
<u>Bihar</u>	63.76	73.28	52.22
<u>Chandigarh^[UT]</u>	86.38	90.42	81.27
<u>Chhattisgarh</u>	70.02	81.34	60.46
<u>Dadra and Nagar Haveli^[UT]</u>	76.54	85.34	65.73
<u>Daman & Diu^[UT]</u>	87.06	91.36	78.46
<u>Delhi^[UT]</u>	85.23	90.02	79.83
<u>Goa</u>	86.30	91.71	80.72
<u>Gujarat</u>	78.21	86.12	70.62
<u>Haryana</u>	75.52	84.27	65.65
<u>Himachal Pradesh</u>	82.64	90.72	75.50
 <u>India</u>	73.03	81.13	64.34
<u>Jammu and Kashmir</u>	67.64	77.16	56.01
<u>Jharkhand</u>	65.30	77.36	55.11
<u>Karnataka</u>	74.40	81.75	67.12
<u>Kerala</u>	92.81	95.01	91.78
<u>Lakshadweep^[UT]</u>	91.27	95.01	87.15
<u>Madhya Pradesh</u>	70.59	79.42	59.32
<u>Maharashtra</u>	81.86	88.71	74.37

State or UT	<u>Census 2011</u>		
	Average	Male	Female
Manipur	78.74	85.38	72.16
Meghalaya	74.37	76.16	72.65
Mizoram	90.47	92.61	78.30
Nagaland	80.01	82.18	75.57
Odisha	72.23	81.30	63.25
Puducherry^[UT]	85.34	91.10	80.11
Punjab	75.58	79.38	72.23
Rajasthan	67.06	77.41	50.42
Sikkim	81.18	86.26	75.32
Tamil Nadu	79.23	85.71	72.75
Telangana	-	-	-
Tripura	86.75	91.17	82.14
Uttar Pradesh	68.62	78.13	58.15
Uttarakhand	79.52	88.23	70.60
West Bengal	76.07	81.58	70.15

Though early girl wedding is a worldwide concern, an appraisal of works on this sensation brochures clear communal susceptibilities that intensify risk for youngster marriage at nationwide and separate levels. Educations consistently demonstration that nuptial of slight aged child is more probable to happen in rural in addition to disadvantaged zones with little admission to healthcare; provincial conflict in addition to instability added exacerbate to vulnerabilities (11). Nevertheless, primary related factor intensifying danger for girl child wedding is sex inequity, often considered, by inferior access to schooling besides employment occasions for females comparative to males. Crossways national backgrounds, it is poorest in addition to least cultured girls who are most susceptible to early wedding, and girls getting an education, in that case premature marriage seems to impede continuance of the education.

It is also a fact that early child marriage is a result of gender inequality in some extent as it is something related with gender type opposition from others in addition to violence and forcing for marriages. It might have seen that marriages have fixed by parents of girl or some other relatives are in form of mediator or someone else , the finalization of marriages have done by parent in most of the cases even without the consent of the girl . Only few cases have seen, where the consent of a girl have asked. The girl age is immature in case of the early or forced marriage and

she has to face many adversity at their in law's home. The reason behind these adversities may be because of the age differences between bride and groom and girl was not mature enough to accommodate with married life as married life brings a lot of responsibilities with her.

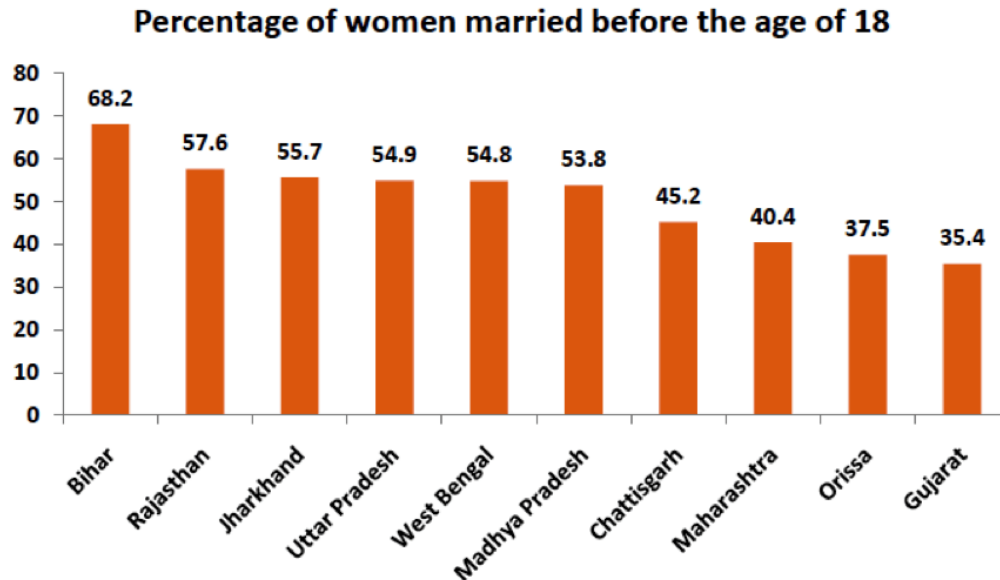


Figure 5: Percentage of Girls Married Before the Age of 18.

The child marriages are responsible for social disturbance and this should be address as soon as possible. The one more fact is that economic status of parent of a girl child decide the future of a girl as what will be her educational status or she will end her days in just completing the house hold jobs (Figure 5). The condition of the health care is also not up to mark in the developing countries or health facilities are too expensive that a normal family can not avail the good medical facilities at affordable prices. Although, government has taken many steps to overcome these problems but large population make the things more problematic. The education is not only important just to earn living but it is also important to have a decent position in society as well as in the family. It might be possible that being a girl or women ,you have been over looked but an educated person can easily put her point and take a part in decision making processes of the family and also be able to put his career and life choice. Therefore, education is important to change the perspectives of the society and other persons towards the girl and may help or assist her to achieve her life goals. There are many case, where girl is not educated and she is not able to read and neither understand the logical words, might be cheated. The child marriage is a curse because a girl has to marry against her wish that too when a girl is not attain maturity in term of mental as well as physical. The problem of the child marriage has been prevalent because of some tradition that are continuously followed since a long time and deeply rooted in their custom, but it is a nothing but a violation of human right and law in addition to this also equal to a curse for an immature girl (12). Early marriages are like a scar for a girl life in term of psychological, emotional as well as physical as because of start of sexual activities just after the marriage tend to early pregnancy and motherhood in an immature age that will increase the chance of infant death.

2. DISCUSSION

Education is the only means by which individuals may become more aware of the dangers of early marriage and motherhood at a young age. For a girl, an early marriage is nothing short of a nightmare. Marriage is a partnership that comes with a lot of duty as well as happiness, and one must be mature enough to make the correct decisions after marriage while still managing their job, schooling, and other responsibilities. Birth is difficult for a girl since it is like a second birth for her, and many girls have died as a result of their labor agony. These issues may be better comprehended by a literate individual, which is why society can be altered by providing people with a good and well-organized education. The individual's financial situation is a second factor in avoiding early marriage in this period, but child marriage was also common in previous times among affluent individuals. The mindset of the weaker section is that early marriage of a daughter will relieve them of responsibility, even without considering that marriage at an immature age is not appropriate.

3. CONCLUSION

The purpose of this article is to determine the frequency of child marriage and the problems that may arise as a result of it in a girl's life. A girl's life is not simple since she is responsible for giving birth; in fact, a girl is the true foundation of life on the planet. Because of a male's authority, as well as certain ancient traditions and myths, individuals were compelled to marry their daughters at a young age. Poverty and bad economic conditions may have contributed to a girl's early marriage. The government has also set a minimum age for a girl's marriage, and if any participation in a girl's marriage before this age is discovered, all parties involved will face a court prosecution. As a result, eradicating underage marriage of a girl, as well as other harmful social practices, may be accomplished by giving quality education to all citizens in both urban and rural areas of the nation. As a result, the government has decided that the marriage age for girls should be 18 years and for boys should be 21 years, following the efforts of many noble people and social welfare organizations. The legislation was enacted via a bill in parliament and controlled across India by consensus or force, whatever method is most appropriate for enforcing the law.

REFERENCES:

1. Laub JA. Assessing the servant organization; Development of the Organizational Leadership Assessment (OLA) model. Dissertation Abstracts International,. Procedia - Soc Behav Sci. 1999;1(2):1–10.
2. Awan M, Malik N, Sarwar H, Waqas M. Impact of education on poverty reduction. Int J Acad Res. 2011;
3. Chaudhry IS, ur Rahman S. The impact of gender inequality in education on rural poverty in pakistan: An empirical analysis. Eur J Econ Financ Adm Sci. 2009;
4. Januardi RW, Utomo AP. Application of spatial error model using GMM estimation in impact of education on poverty alleviation in Java, Indonesia. Commun Sci Technol. 2017;
5. Siddique H, Shehzadi I, Shaheen A, Manzoor 4Muhammad. The impact of governance and institutions on education and poverty alleviation: a panel study of SAARC economies. Sci Int Lahore. 2016;

6. Díaz BZ. Different impact channels of education on poverty. *Estud Gerenciales*. 2010;
7. Pervez S. Impact of Education on Poverty Reduction: A Co-integration Analysis for Pakistan. *J Res Econ Int Financ*. 2014;
8. Aref A. Perceived impact of education on poverty reduction in rural areas of Iran. *Life Science Journal*. 2011.
9. Litschig S, Morrison KM. The impact of intergovernmental transfers on education outcomes and poverty reduction. *Am Econ J Appl Econ*. 2013;
10. Mustaqimah K, Hartoyo S, Fahmi I. PERAN BELANJA MODAL PEMERINTAH DAN INVESTASI PEMBANGUNAN MANUSIA DALAM MENGURANGI TINGKAT KEMISKINAN DI INDONESIA. *J Ekon DAN Kebijakan Pembang*. 2018;
11. Nirmal BC, Singh RK. Contemporary issues in international law: Environment, international trade, information technology and legal education. *Contemporary Issues in International Law: Environment, International Trade, Information Technology and Legal Education*. 2018.
12. Mishra PK, Mishra US, Mishra SK. Money, price and output: A causality test for India. *Int Res J Financ Econ*. 2010;

AMINO ACIDS AND DESIGN OF THE POLARIZABILITIES OF AMINO ACID REMAINS: A REVIEW PAPER

Dr. Arminder Kaur*; Krishna Raj Singh**

* SBAS, Sanskriti University,
Mathura, Uttar Pradesh, INDIA
Email id- arminder.smas@sanskriti.edu.in

** SBAS, Sanskriti University,
Mathura, Uttar Pradesh, INDIA
Email id: hodbio-tech@sanskriti.edu.in

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ABSTRACT

Amino acids are chemical molecules that include carboxyl and amino functional groups, as well as a distinct side chain for each. Although some amino acids contain additional atoms in their side chains, hydrogen, carbon, nitrogen, and oxygen are required for an amino acid to function. Nonpolar molecules and atoms have polarizability, which helps us understand how they interact with other electrically charged species like polar or ionic molecules with dipole moments. This article discusses the electronic polarizabilities of amino acid residues and the fundamental facts about amino acids. A bar graph depicting the abundance of different amino acids in SwissProt Volume 36, a curated protein sequence database that aims to offer a high degree of annotated data, as well as amino acid production and catabolism in the human body, is included in this review article. Amino acid residue is the subject of the rest of this article. In this research, the Polarizability is also addressed. Finally, this study estimates the polarizabilities of amino acid residues using a time-dependent density-functional approach. Many areas of computational molecular sciences rely on polarisation molecular models. The electric field of the environment, for example, polarises molecules when they interact with one another. Explicit polarisation has been incorporated in force fields in a number of instances, and its significance for protein simulations has been highlighted, which will help in the future.

KEYWORDS: Acid, Amino, Polarizability, Protein, Residue.

INTRODUCTION

A hydrogen (H) atom and the R group usually fulfill the remaining two bonds of the α -carbon atom. In biochemistry, amino acids having an amine group attached to the carbon atom next to the carboxyl group are especially significant(1). Amino acids are divided into two categories: α and β . The term "amino acid" is often used to describe them (2). Among them are the twenty-two proteinogenic amino acids, which combine to form protein molecules, which are the fundamental components of a broad variety of proteins. Although few D amino acids are present in bacterial envelopes, they are entirely L stereoisomers in neuromodulators and some antibiotics

(3). In SwissProt Volume 36, a curated protein sequence database with a high degree of annotations, Table 1 displays the abundance of different amino acids.

TABLE 1: THE VARIOUS AMINO ACIDS ABUNDANCE IN SWISSPROT OF THE VOLUME 36 PERCENT

Name	Abundance Sport of percentage 36 percent in volume
Cysteine	1.66
Alanine	7.59
Phenylalanine	6.34
Aspartic Acid	5.29
Histidine	6.82
Glycine	4.09
Lysine	5.79
Isoleucine	2.25
Methionine	9.41
Leucine	5.94
Proline	4.46
Asparagine	2.38
Proline	3.98
Glutamine	4.92
Serine	7.14
Arginine	5.15
Valine	6.55
Theronine	5.7
Tyrosine	3.17
Tryptophan	1.25

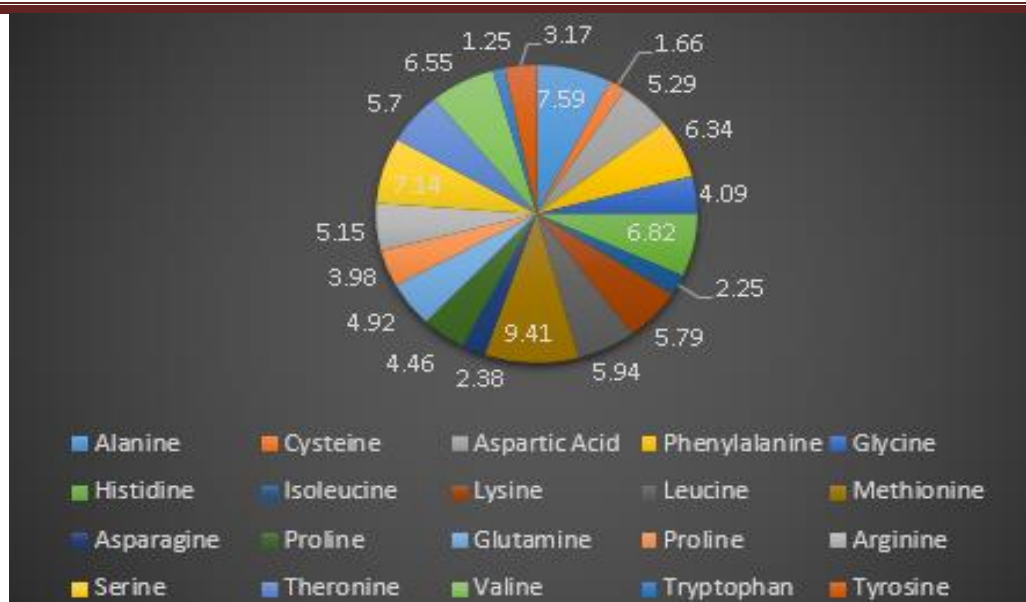


Figure 1: Pie Chart of the Various Amino Acids Abundance in SwissProt of the Volume 36 Percent.

Figure 1 displays a pie chart showing the relative abundance of different amino acids in SwissProt's volume 36 percent. Alanine, cysteine, histidine, lysine, leucine, glycine, and other amino acids are represented in this pie chart. The highest amino acids abundance in volume 36 percent is alanine, with a percentage value of 7.59 percent, and the lowest amino acids abundance in volume 36 percent is alanine, with a percentage value of 1.66 percent, as seen in this graph.

BIOSYNTHESIS AND CATABOLISM OF AMINO ACIDS IN HUMANS BODY

All tissues are capable of synthesising non-essential amino acids, remodeling amino acids, and converting non-essential amino acid carbon skeletons into amino acids and other nitrogen-containing derivatives. On the other hand, the hepatic is the brain's main nitrogen metabolism area. In times of food excess, potentially dangerous N_2 of the amino acid is eliminated through transamination, deamination, and urea production; the carbon skeleton is usually preserved as glucose via gluconeogenesis or fatty acid via fatty acid development pathways (4)(5). All amino acids, with the exception of lysine and leucine, are partly glucogenic. The production and catabolism of amino acids in the human body are shown in Figure 2 (6).

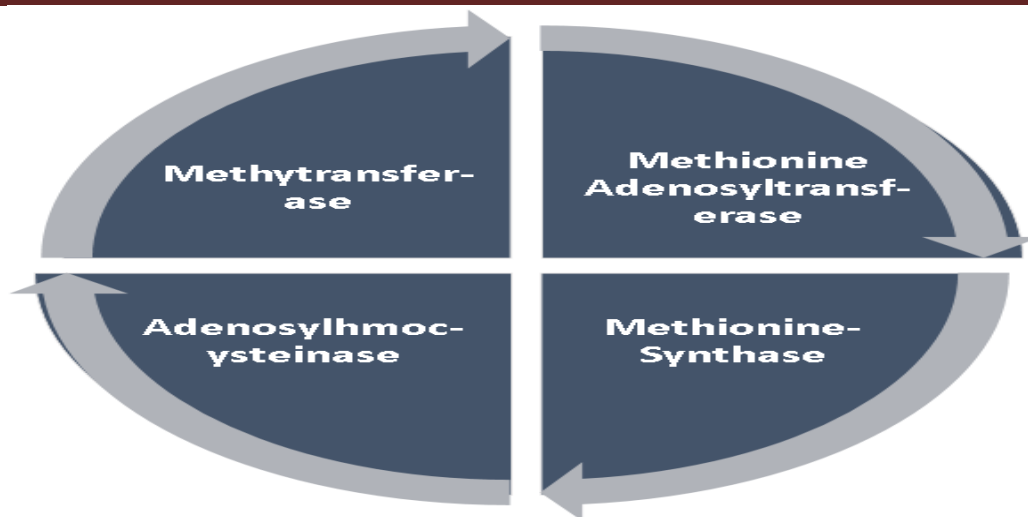


Figure 2: The Amino Acid Biosynthesis and Catabolism in the Human body.

AMINO ACID RESIDUE

When two or more amino acids unite to create a peptide, the water components are eliminated, and what's left is known as an amino-acid residue. Amino-acid residues are structures that lack an amino group hydrogen atom, a carboxyl group hydroxyl moiety, or both. All units of a peptide chain are thus amino-acid residues (7). The formulae may not apply because residues of amino acids having two amino groups or two carboxyl groups may be linked by is peptide bonds. The N-terminus of a peptide refers to a residue with a free amino group, or one that has not been acylated by another amino-acid residue (8). A residue with a free carboxyl group or that does not acylate another amino-acid residue is referred to be C- terminal. Figure 3 shows the structure of a protein, with the symbol R representing a residue.

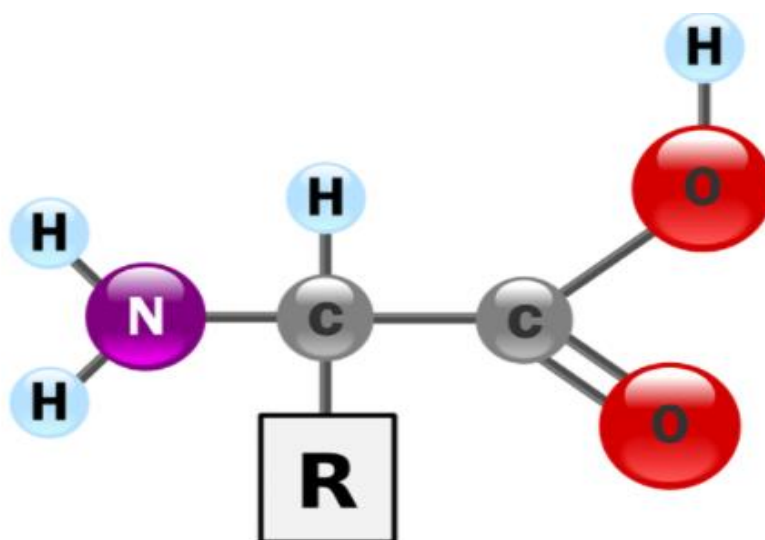


Figure 3: The Structure of Protein which shows the Residue and Denoted by Symbol R.

POLARIZABILITY

Polarizability provides information on non-polar atom and molecule interactions with electrically charged species such as polar ions or dipole moment molecules. The electrons in the cloud of electrons in neutral nonpolar species are arranged in spherical symmetry (9). As a consequence, when they are exposed to an electric field, the cloud of electrons is deformed, as shown in the figure below, with the ease of distortion dictated by the species 'Polarizability'. The dipole moment will be gained by the distorted nonpolar molecules. The following is the connection between polarizability, induced dipole moment, and electric field strength for atoms and molecules (10).

$$\mu_{ind} = \alpha E$$

Where,

μ_{ind} = induced dipole moment

α = polarizability of atom and molecules

E = electric field strength

The Unit of the Polarizability is C m² V⁻¹

LITERATURE REVIEW

A number of researchers have studied and analyzed the subject of amino acids and the determination of polarizabilities of amino acid residues. Here are a few examples. Hildebrandt, Tatjana et al. discussed the geometries, relative energies, and gas phase dynamic and static dipole polarizabilities of the two most stable neutral forms and the zwitterionic form of the twenty naturally occurring amino acids were determined using density conventional and functional theories with correlation consistent basis sets. Electronic polarizabilities vary, with minimal reliance on amino acid framework structure and conformation. Because of the connection between α and the number of electrons in the molecule, amino acids are categorized as one of the most polarizable chemical families(11).

Because of its significance in understanding biological activity, biomolecule conformation has gotten a lot of attention in recent years, according to Wolfson et al. It was investigated using IR, CD, ORD, Raman scattering, and other methods. From a theoretical perspective, the conformational map has shown to be very useful. Molecule polarizability is one of the conformation-dependent characteristics. The study of molecular polarizability is important not only for quantitatively analyzing Raman spectra, but also for comprehending biomolecule optical behavior. In their study, they looked at the molecular polarizabilities of the two most basic amino acids, L-alanine and glycine (12).

Salazar et al. investigate an innovative method for identifying functional and structural amino acid residues in proteins with known three-dimensional structure, which is based on residue involvement in intramolecular hydrophilic and hydrophobic interactions, as well as additional information on residue conservativity. To homologous cardiotoxins and neurotoxins families, the technique is employed. Both groups of toxins have similar folds but different mechanisms of action, thus the results on the role of amino acid residues are consistent. Their technique may be

used to thoroughly characterize protein spatial structures as well as for rational protein engineering (13).

DISCUSSION

From the fundamental facts of amino acids, such as organic molecules made up of a basic amino group, an acidic carboxyl group, and a unique organic R group for each amino acid, this article covers everything about the electronic polarizabilities of amino acid residues. -amino carboxylic acid is abbreviated as amino acid. Each molecule has a core carbon atom, known as the α -carbon, to which an amino and carboxyl group is attached. In this review article, the abundance of different amino acids in SwissProt Volume 36, a curated protein sequence database that strives to offer a high degree of annotated data, is also provided with a bar graph, as well as amino acid production and catabolism in the human body. The amino acid residue is formed when two or more amino acids unite to create a peptide, the water components are removed, and what is left of each amino acid is termed an amino-acid residue. Amino-acid residues are structures that lack an amino group hydrogen atom, a carboxyl group hydroxyl moiety, or both. All units of a peptide chain are thus amino-acid residues. This article also addresses Polarizability, which provides further information on non-polar atom and molecule interactions with electrically charged species such as polar ions or dipole moment molecules. The electrons in the cloud of electrons in neutral nonpolar species are arranged in spherical symmetry. Finally, using a time-dependent density-functional method, this study calculates the polarizabilities of amino acid residues.

CONCLUSION

According to this article, the amino acid, which has an acidic carboxyl group and a unique organic R group for each amino acid, is vitally important for human survival. The phrase "amino acid" refers to a -amino carboxylic acid. A core carbon atom, known as the α -carbon, is connected to each molecule by an amino and carboxyl group. The amino acid alanine has the highest abundance in volume 36 percent, at 7.59 percent, and the amino acid alanine has the lowest abundance in volume 36 percent, at 1.66 percent, and frequency-dependent polarizability also characterises the reaction to an external electric field.

REFERENCES:

1. Ferrari A, Robertson J. Interpretation of Raman spectra of disordered and amorphous carbon. Phys Rev B - Condens Matter Mater Phys. 2000;
2. Avila G, Fernández JM, Tejeda G, Montero S. The Raman spectra and cross-sections of H₂O, D₂O, and HDO in the OH/OD stretching regions. J Mol Spectrosc. 2004;
3. Fitch CA, Karp DA, Lee KK, Stites WE, Lattman EE, Bertrand García-Moreno E. Experimental pK_a values of buried residues: Analysis with continuum methods and role of water penetration. Biophys J. 2002;
4. Jensen L, Åstrand PO, Sylvester-Hvid KO, Mikkelsen K V. Frequency-dependent molecular polarizability calculated within an interaction model. J Phys Chem A. 2000;
5. Lewis M, Wu Z, Glaser R. Polarizabilities of carbon dioxide and carbodiimide. Assessment of theoretical model dependencies on dipole polarizabilities and dipole polarizability anisotropies. J Phys Chem A. 2000;

6. Kiss IZ, Mándi G, Beck MT. Artificial neural network approach to predict the solubility of C60 in various solvents. J Phys Chem A. 2000;
7. Ma B, Lii JH, Allinger NL. Molecular Polarizabilities and Induced Dipole Moments in Molecular Mechanics. J Comput Chem. 2000;
8. Reid Asbury G, Hill HH. Using different drift gases to change separation factors (α) in ion mobility spectrometry. Anal Chem. 2000;
9. Jensen L, Schmidt OH, Mikkelsen K V., Åstrand PO. Static and frequency-dependent polarizability tensors for carbon nanotubes. J Phys Chem B. 2000;
10. Kumar C, Fliegl H, Jensen F, Teale AM, Reine S, Kjærgaard T. Accelerating Kohn-Sham response theory using density fitting and the auxiliary-density-matrix method. Int J Quantum Chem. 2018;
11. Hildebrandt TM, Nunes Nesi A, Araújo WL, Braun HP. Amino Acid Catabolism in Plants. Molecular Plant. 2015.
12. Wolfson RL, Sabatini DM. The Dawn of the Age of Amino Acid Sensors for the mTORC1 Pathway. Cell Metabolism. 2017.
13. Salazar A, Keusgen M, Von Hagen J. Amino acids in the cultivation of mammalian cells. Amino Acids. 2016.

A BRIEF DESCRIPTION ON TEA

Narendra Nath Saxena*; Dr Prafull Kumar**

* SOA, Sanskriti University,
Mathura, Uttar Pradesh, INDIA
Email Id- narendra.ag@sanskriti.edu.in

** SOA, Sanskriti University,
Mathura, Uttar Pradesh, INDIA
Email id: prafull@sanskriti.edu.in

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ABSTRACT

After water, tea is the most popular beverage. Camellia sinensis leaves are used to make it (family: Theaceae). Oolong, green, black, and Ilex teas are among the many kinds of tea produced, contingent on the region's post-harvest treatments as well as palatability. Tea, which is high in natural antioxidants, is said to help against malignancies of the colon, esophagus, and lungs, as well as urinary stones and dental cavities. Tea, which has been exposed to be anticariogenic, antimicrobial, anti-carcinogenic, anti-inflammatory, as well as anti-oxidant, may be used as a preventative measure. Nowadays, healthy foods that include active free radical scavengers are extremely popular. Polyphenols, caffeine, and amino acids are the main chemical components of green tea. Tea also includes flavonoids, which are anti-oxidant chemicals with a variety of health benefits. It is generally recognized that some foods' phenolic chemicals may have health advantages. Polyphenols, which are found in tea, has been related to positive benefits on human health. India is one of the world's foremost tea growers, exporters, and consumers. The present research focuses on tea production, composition, and health advantages.

KEYWORDS: Black Tea, Health, Tea, White Tea.

1. INTRODUCTION

Tea is the world's probably the most prevalent non-alcoholic caffeine covering beverage, as well as its infusions is ready by brewing processed *Camellia sinensis* tea leaves[1]. Tea is the world's second most popular beverage, behind water. Black, green, as well as long tea are the greatest popular, and they're all manufactured from the *Camellia sinensis* plant, which belongs to the Theaceae family. Each year, around three million metric tons of dried tea are produced, with green tea accounting for 20 percentage, oolong 2 percentage, as well as black tea accounting for the rest. In Asian nations, green and oolong teas are popular, whereas black tea is popular in India as well as the Western world. Tea is grown in sixteen states in India, with about 96 percent of the country's total tea output coming from Assam, Tamil Nadu, West Bengal, as well as Kerala. North East India accounts for 78 percent of the entire area under tea growing in India, according to the land usage pattern[2]. The tea is well-known for its origins in Assam, Darjeeling, as well as the Nilgiris, which are known for their exceptional excellence all over the world.

Tea exports make up a significant amount of the country's foreign exchange revenues. Assam has its own tea variety, *Camellia assamica*, which is found nowhere else on the earth. It has a malty sugariness as well as earthy taste, in contrast to the florals scent of highland tea. Tea may be used as an effective infection prevention agent because of its anticariogenic, antibacterial, anti-inflammatory, anti-carcinogenic, anti-oxidant, and other qualities. This research offers light on the several actions of tea as a prophylactic and agent of anti-infectious, in addition to manufacture as well as consumption.

1.1 Past of the Tea:

The following are historical events related to the spread and development of tea:

- The 'T Sang dynasty,' which ruled from 650 AD to the fourth century, is credited with the birth of China's tea business.
- Scholars disagree on the origins of the tea shrub. It is only found in a few places, spanning from the inner of Southern China to Assam's border.
- There is just one species of tea, *Camellia sinensis*.
- The first shipment of tea from China arrived in Benton in the years 1606, and from there, tea made its way to non-tea-drinking Europe.
- The tea industry in India started in 1823, when the tea plant was discovered in Assam.
- It is significant to highlight that Darjeeling tea, which is cultivated and manufactured in India's north east area as well as is recognized as a geographical indicator by the Indian government, is one of the most well-known teas.
- It is important to highlight that Darjeeling tea, and it is cultivated and manufactured in India's north-east region and is recognized as a geographical indicator by the Indian government, is one of the most well-known teas.
- It has long been considered that the East India's Company's ships carried tea plants into the country out of curiosity in the early 1700s. Col. Kyd, a well-known botanist from Calcutta, found tea plants rising in his garden in years 1780. In 1788, Sir Joseph B. found indigenous tea growing wild in the Bengali provinces of Coochbehar and Rangpur and advised that it be cultivated.

1.2 Tea Industry Development:

- In 1823, Robert Bush discovered an indigenous tea plant in Assam, which marked the start of the Indian tea industry.
- Tea production increased when the East India Company lost its monopoly on the tea trade in China in 1833. Tea trees were identified in various sites in the highlands between Assam and Burma by a scientific delegation dispatched to Assam in 1835 to report on the tea industry's possibilities.
- In Assam, the 2nd limited corporation, Jorhat Corporation, was incorporated in 1859. Between 1862 and 1867, tea was first planted in Chittagong as well as Chotta Nagpur.
- Tea was finally planted in a number of locations around India where there was a prospect of success. India and Sri Lanka had taken control of the world tea trade in only a few months.
- Other states having small businesses include Himachal Pradesh, Karnataka, Tripura, Manipur Sikkim, Nagaland, Bihar, Meghalaya, Mizoram, as well as Orissa.
-

- A tiny number of growers in Himachal Pradesh's Kangra Valley produce a special sort of tea, however in modest amounts. Green teas, which are the region's specialty, are well-known in this valley.

1.3 Production:

Tea output worldwide (green, black, as well as instant) rose by six % to 5.070 million tons in years 2013. Black tea production climbed by 4.5 per cent, while green tea production jumped by 5.1 percent, as a result of the continued good price. The upsurge in worldwide output may be attributed to significant growths in the main tea-producing countries and the China continued the world's largest tea producer in 2013, producing 1.9 million tonnes, or more than 38percent of global output, while India, the second largest producer, increased production to 1.2 million tonnes in year 2013. Kenya's and Sri Lanka's production increased as well, hitting 436 300.00 tons in Kenya as well as 343100.00 tons in the SriLanka, respectively. Apart from Vietnam, which saw its production decline by 7.500 percent to 185 000.00 tonnes, other major producers saw increases: Indonesia will get 152 700 tonnes, Tanzania will receive 32 400 tonnes, Uganda will receive 58 300 tonnes, Malawi will receive 46 500 tonnes, Bangladesh will receive 66200.00 tonnes, and Rwanda will receive 25200.00 tonnes. Burundi's exports grew to 8,800.00 tonnes, Zimbabwe's to 8,500.00 tonnes, as well as South Africa's to 2,500 tonnes, while other African nations had tiny increases.

1.4 Types of Tea:

Different types of Tea are displayed in Figure 1.



Figure 1: The above diagram shows different types of tea[4].

1.4.1 New Tea:

Fresh tea leaves are high in water soluble poly phenols, particularly flavanols, flavanol gallates, as well as flavanol glycosides. The primary catechins in green tea are), -epigallocatechin-three-gallate (EGCG), -epicatechin-three-gallate (ECG), -epicatechin (EC -epigallocatechin (EGC), -epicatechin-three-gallate (ECG), -epicatechin (EC), -epicatechin-three-gallate (ECG), -

epicatechin (Caffeine accounts for three to six% of the total. The composition, on the other hand, varies according to the growing conditions and subsequent processing of the tea[5].

1.4.2 Black Tea:

Devastating the tea leaves promotes enzymatic oxidations as well as succeeding condensations of tea polyphenols, which results in the production of theaflavins and thearubigins in a process known as fermentations. The micro biologically actives compounds in black tea are catechins as well as theaflavins[6]. In today's globe, there are three types of black tea. Stick-shaped black tea, granular black tea, and black tea bags are the three types of black tea. The finished goods have a varied look despite the fact that they are manufactured utilizing the identical processing processes. Stick-shaped black tea preserves the original form of tea leaves, which are composed of delicate buds and leaves and are immediately identifiable. Thousands of small fragments of granular black tea have been mechanically pulverized into a product that has lost its original form. Granular black tea bags packaged in filter paper bags with or without added flavors are known as black tea bags.

1.4.3 Green Tea:

Green tea is made with the primary purpose of preserving natural polyphenols in the tea leaf so that the all-out amounts of tea poly phenols helpful in a cups of tea is accessible for decent health. To get polyphenols, farms green tea is brewed by steaming or pan roasting fresh leaves from the garden as soon as feasible (antioxidant). During steaming, polyphenol oxidizing enzymes are inhibited by the high temperatures, as well as the leaves becomes physiologically inactive[7]. Some of the procedures include rolling, drying, steaming, plucking, grading, as well as packaging. Green tea is made by steaming or pan roasting tea leaves to inactivate enzymes before drying. As a result, the tea leaves' constituents are kept in the dried tea leaves. When 2.50 g of tea leaves are steeped for 3 minutes in 250.00 ml of hot water, about 30percent of total of the solid material are released into the water. Green tea solids, a spray-dried powdered of the aqueous leaf extract, was employed in animal research.

Green tea is the least fermented of all the teas and has the most catechins. After harvesting, tea leaves are rolled swiftly to inactivate the enzyme poly phenol oxidase, which can oxidize teas catechins to oligomeric as well as polymeric derivatives such aflavins & thearubigin.

1.4.4 White Tea:

Another's kind of tea modes from freshly steamed as well as dried growth buds as well as young leaves to avoid polyphenol oxidation. White tea is unique of the greatest expensive teas for customers while also being one of the most lucrative for farmers[8]. White tea is produced from unopened tea buds that have pubescence, which gives the finished product a silvery look. Due to the greatest proportion of polyphenols in the bud, the percentage of polyphenols in the leaves progressively declines with age. White tea is considered to provide a wide range of health benefits. White tea is quite popular among health-conscious people, notably in America and Europe, due to its characteristics.

1.4.5 Oolong Tea:

This types of tea is a hybrid of black and green teas that is semi-fermented. Oolong tea contains features of both black and green teas.

1.4.6 Brick Tea:

Brick tea is a low-quality tea produced from tumbled as well as old leaves that have been agitated as well as crushed into the bricks. Nothing in a tea garden is without economic worth. During dormancy, when the tea plantation is maintained via various cleaning and pruning operations, old leaves or pruning litter are utilized to make black as well as green tea, which is then crushed into bricks. Brick tea is not similar to regular black or green tea in terms of quality, appearance, or market value. However, certain individuals in some regions, particularly in Africa, like this tea.

1.5 Advantages:

1.5.1 Antioxidant property in Tea:

Different defensive systems exist in the human body to fight unrestricted radicals. Furthermore, there is a balance among pro-oxidative as well as antioxidant processes, and oxidation stress occurs when this symmetry is disrupted in favor of allowed radicals[9]. Lipoprotein oxidation shows an significant parts in the improvement of athero sclerosis by oxidizing low density lipo proteins (LDL) in artery walls. LDLs are heavy in cholesterol and induce alterations in the anatomy of the artery wall. Because of these structural alterations, macrophages may take up oxidized LDL and produce foam cells. The earliest obvious alterations in cellular tissue generated by a concentration of these cells in artery walls are fatty streaks. These changes might cause angina or vascular occlusion if the artery closes entirely. Other clinical diseases produced by oxidation processes include cancer, rheumatoid arthritis, especially ischemia reoxygenation damage to the liver and other organs.

1.5.2 Anti-cancerous activity:

Green tea polyphenols have been widely researched as chemopreventive agents in the fight against cancer. Catechins are polyphenols that include, (-)-epigallocatechin-three-gallate (EGCG), (-)-epigallocatechin, (-)-epicatechin-three-gallate (ECG), as well as (-)-epicatechin. EGCG is the greatest prevalent as well as potent molecule that may slow the cancer growth.

1.5.3 Anti-Microbial Activity:

S. mutans and S. sobrinus were shown to be both inhibitory and bactericidal in the presence of green and black tea catechins. Individual catechin inhibitory values ranged from 50.00 to 500.00 mg/L, showing that a cup of tea catechin concentration is inhibitory and typically bactericidal. Mutans streptococci's rate of acid generation was found to be inhibited by oolong tea, which has been followed by a decrease in the microbes' growth rates. Green tea extract, when used as a mouthwash, was shown to significantly inhibit both streptococci and lactobacilli, indicating that it might be a valuable adjunct to normal dental hygiene practices, especially for those who have a high risk of caries[10].

1.6 Disadvantages:

- Too much of a good thing might lead to tooth discolouration. Such discolouration is predicted to result from the interaction of tea components with together surfaces integuments likes the assimilated salivary pellicle as well as maybe minerals crystals in the teeth enamel.
- Due to its components and frequent intake, coffee as well as tea are regarded stained solutions for esthetic restorative materials. Tea discoloration was caused by the adsorptions of polar colorants onto the surfaces of materials, which may be eliminated by brushing your teeth.

2. DISCUSSION

Tea is the world's oldest as well as most popular caffeine-free beverage, made from the brewed leaves of the *Camellia sinensis* tea plant. Tea is the second most extensively drank beverage on the planet, behind water. Herbal tea is sometimes mistaken for tea, which is only a marketing trick. Herbal tea, on the other hand, is made from plants other than *Camellia sinensis*. On a routine trip to the grocery store, one may discover a range of tea preparations supplemented with various extracts of mangos, strawberry, grape, lemons, as well as other fruits and vegetables, at least in US markets, due to the popularity of tea. As a consequence of these marketing strategies, tea products have gained appeal among non-tea consumers. Tea extracts are also used in cosmetics and other products that are sold to the public.

3. CONCLUSION

Tea is a well-known natural health beverage that has been shown in several scientific studies throughout the world. Tea has been widely consumed in human culture as a consequence of good scientific findings on the health advantages of tea drinking. Tea is one of the most explored plant-based pharmaceuticals, despite the fact that it has yet to be acknowledged as a therapeutic agent. In-vitro research is pointing to the possibility of oral health advantages. Tea is more than just a pleasant and gently stimulating beverage because of its medicinal potential in the prevention of tooth cavities and periodontal issues. Before any definite conclusions can be drawn, further longer-term, well-controlled humans experiments are necessary. Meanwhile, it's fair to believe that tea intake, without the addition of sugar, could be included in dietary guidelines to help avoid dental problems, so improving general health and well-being in the most cost-effective way possible. Now that we've uncovered this ancient marvel, we need to put it to good use. Tea is an expense beverage with natural medicinal potential when compared to current hard drinks with little health benefits.

REFERENCES:

1. R. Jayabalan, R. V. Malbaša, E. S. Lončar, J. S. Vitas, and M. Sathishkumar, "A review on kombucha tea-microbiology, composition, fermentation, beneficial effects, toxicity, and tea fungus," *Comprehensive Reviews in Food Science and Food Safety*. 2014, doi: 10.1111/1541-4337.12073.
2. S. A. Villarreal-Soto, S. Beaufort, J. Bouajila, J. P. Souchard, and P. Taillandier, "Understanding Kombucha Tea Fermentation: A Review," *Journal of Food Science*. 2018, doi: 10.1111/1750-3841.14068.
3. C. T. Ho, X. Zheng, and S. Li, "Tea aroma formation," *Food Sci. Hum. Wellness*, 2015, doi: 10.1016/j.fshw.2015.04.001.

4. "5type_cups." <https://teabotanicals.com/pages/five-types-of-teas> (accessed Aug. 17, 2018).
5. S. M. Karori, F. N. Wachira, J. K. Wanyoko, and R. M. Ngure, "Antioxidant capacity of different types of tea products," *African J. Biotechnol.*, 2007, doi: 10.5897/AJB2007.000-2358.
6. P. Subramaniam, U. Eswara, and K. R. Maheshwar Reddy, "Effect of different types of tea on *Streptococcus mutans*: An in vitro study," *Indian J. Dent. Res.*, 2012, doi: 10.4103/0970-9290.99037.
7. J. Hu, D. Webster, J. Cao, and A. Shao, "The safety of green tea and green tea extract consumption in adults – Results of a systematic review," *Regulatory Toxicology and Pharmacology*. 2018, doi: 10.1016/j.yrtph.2018.03.019.
8. Y. F. Lasheen, N. S. Awwad, A. El-Khalafawy, and A. A. Abdel-Rassoul, "Annual effective dose and concentration levels of heavy metals in different types of tea in Egypt," *Int. J. Phys. Sci.*, 2008.
9. M. Bartoszek, J. Polak, and M. Chorążewski, "Comparison of antioxidant capacities of different types of tea using the spectroscopy methods and semi-empirical mathematical model," *Eur. Food Res. Technol.*, 2018, doi: 10.1007/s00217-017-2986-z.
10. K. Hayat, H. Iqbal, U. Malik, U. Bilal, and S. Mushtaq, "Tea and Its Consumption: Benefits and Risks," *Crit. Rev. Food Sci. Nutr.*, 2015, doi: 10.1080/10408398.2012.678949.

THE ENZYMATIC DECOLONIZATION OF TEXTILE DYES BY ACIDIC PROTEASE: A REVIEW

Namrata Arya*; Dr. Arminder Kaur**

*SBAS, Sanskriti University,
Mathura, Uttar Pradesh, INDIA
Email id: namrata.sobas@sanskriti.edu.in

**SBAS, Sanskriti University,
Mathura, Uttar Pradesh, INDIA
Email id: arminder.smas@sanskriti.edu.in

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ABSTRACT

Proteases are the enzymes which are responsible for the breaking the peptide bonds into amino acid. Acidic protease is the protein digesting enzymes which are activated at a pH value of 2-5 and at a temperature range of 20-70° C. The protease enzymes are found in various types of organisms such as plants, animals, bacteria and fungi. Our project's major goal is to identify protease-producing microorganisms from soil samples and to characterise protease-producing bacteria. Pleurotus ostreatus, Schizophyllum commune, Neurospora crassa, Polyporus sp., Sclerotium rolfsii, Trametes villosa, and Myceliophthora thermophila enzyme solutions successfully decolor commercial azo, triarylmethane, anthraquinonic, and indigoid textile colors. Enzyme activity is influenced by the kind of substituents on the dyes' ben-zene rings, and hydroxyl and amino groups aid decolorization. Laccase is supplemented with lignin peroxidase and/or manganese peroxidase (P. ostreatus, S. commune, S. rolfsii, N. crassa) to boost decolorization by up to 25%. Auxiliaries for textile dyeing have varying effects relying on the enzymes involved. Copper and iron chelating compounds, as well as anionic detergents, inhibit Polyporus sp. and T. villosa enzymes by up to 20%, while S. commune enzymes decrease up to 70% of their total activity.

KEYWORDS: Acidic, Bacteria, Enzyme, Fungi, Plants.

1. INTRODUCTION

Synthetic colors are used in a variety of industries, including textiles, leather, paper, rubber, plastics, cosmetics, medicines, and food. The effluent of these businesses' wastewater, particularly textile wastewater, comprises a range of huge amounts of inert colours that may be harmful at the concentrations released into receiving water. Most of these dyes, which do have complicated chemical chemical structures, are harmful to living beings and even carcinogenic, presenting a serious threat. Enzymatic dye treatments have a lower energy cost and are more ecofriendly than physicochemical processes such as precipitation, filtration, and absorption, but they are still not widely employed in the textile industries(1).

Unfortunately, traditional wastewater treatment methods are ineffective in removing dyes and come at a high cost, produce toxic by-products, and need a lot of energy. Furthermore, it is impossible to completely remove the colour. This has sparked interest in biotechnological procedures and other alternative ways. The use of enzymes to remove phenolic contaminants from aqueous solutions has recently sparked a lot of attention. Peroxidase, proteases, and other enzymes have a role in the breakdown and removal of aromatic pollutants from diverse polluted sites. Acids, alkalis, carriers, and dyes are all pollutants produced by the textile industry. Textile mills emit a significant volume of effluents in the form of wastewater. As a result of the pollutant's chemical makeup, the physiological behaviour of aquatic animals is affected, resulting in alterations in their capacity to reproduce, breathe, and osmoregulate. As a result, pH, Biological oxygen demand, and Chemical oxygen demand all alter(2).

1.1 Classifications of Protease:

Firstly on the basis of protease ability to degrade N- or C- terminal peptide bond it can be of two types:

- Endopeptidase
- Exopeptidase

Endopeptidases are more often utilised in industries than exopeptidases, and they are divided into four classes depending on their active site and susceptibility to inhibitors: Proteases of aspartic, cysteine, metallo, and serine. Secondly on the basis of the different behavior of the enzyme in different concentration of the solution Acidic conditions, basic conditions and neutral conditions. They are categorized as:

- **Acidic Protease:** These enzymes are active at the pH of less than 7. They can function at the lower pH. The best function they perform is at the pH between the range of 2 to 5. Fungi are able to produce the acidic proteases.
- **Neutral Proteases:** These enzymes are active at a pH equal to 7.0 they can function at a neutral pH. The sources of neutral proteases are generally plants so these types of proteases are produced by plants.
- **Alkaline Proteases:** These enzymes are active at a pH higher than 7 and pH at which they require to function are 8.0 at this pH they can function. Microbes are able to produce the alkaline proteases as they can function in basic conditions the conditions having the pH higher than 7 favors them (3).

2. REVIEW OF LITERATURE

Microbial proteases, according to Kalisz's research, are one of the most significant hydrolytic enzymes that have been intensively investigated since the beginning of enzymology. The discovery that proteolytic enzymes not only play a key part in cellular metabolic processes, and they've also caught the curiosity of industry has rekindled interest in their research. Since their debut as soap additives in 1914, these enzymes have been widely employed in the detergent industry. Microorganisms generate a wide spectrum of intracellular and external proteases. Intracellular proteases have a role in sporulation and differentiation, protein turnover, enzyme and hormone maturation, and cellular protein pool control, among other cellular and metabolic activities. In cell-free conditions, extracellular proteases are required for protein hydrolysis,

allowing the cell to obtain and use hydrolytic products. Extracellular proteases, on the other hand, have been commercially employed to help break down proteins in a range of industrial applications. In a range of industrial industries, such as detergent, food, pharmaceuticals, leather, diagnostics, waste management, and silver recovery, proteases currently account for nearly 40% of total enzyme sales(4).

Ward's research focused on the beginnings of microbial proteases and their alleged functional significance in nature, while Aunstrup's research focused on microbial selection and fermentation. Outtrap and Boyce's research focused on industrially important proteases, their applications, as well as the involvement of molecular biology in protease research. The bio-industrial perspectives on microbial alkaline proteases have also been addressed, from origins to cellular function, manufacturing and downstream processing, characterization, and commercial use (5).

Borriss' research looks at microbial proteases, which are classed as acid, neutral, or alkaline proteases depending on how active they are at different pH levels. Alkaline proteases are essential since of their stability and activity at alkaline pH. The single most common use of alkaline protease is as an active component in laundry detergent. The optimal pH for an alkaline protease from *Bacillus licheniformis* N3 was determined to be 7.0 to 8.0, and it was unaffected by inoculum size (0.5-8.0ml) 60°C was shown to be the best temperature for enzyme activity(6).

3. DISCUSSION

Acidic protease enzyme is very widespread among the world having the great market value as they have various applications in the field of medicine as it helps in the diagnosis of diseases, industry of food and it also plays a major role in helping the silver to get recovered from X-RAYS. So with such important uses various industries produce this enzyme at commercial value.

- **Chemical Industry:** The alkaline proteases an enzyme that behaves as a biocatalyst in the reaction of synthesis of peptide in the aqueous medium due to the presence of highly stable organic solvent.
- **Detergent Industry:** The detergents used in industries have greatly developed due to the enzyme alkaline proteases. The detergents show its effect even at higher pH and at any temperature. These detergents are used to clean the industry various enzymes are used in the detergent industry like amylases, lipases and proteases. The alkaline proteases at higher pH perform the function of removal of various stains like stain of blood and the stain of egg etc.
- **Medicinal use:** The alkaline protease from *Bacillus Subtilis* is used as the non-woven tissue, applied as an ointment. Protease from *Aspergillus oryzae* is involved in the correction of Enzyme deficiency syndrome.
- **Waste Management:** Keratin, a waste that is generated by the leather industry as well as the poultry industry. These industries produce large amount of keratin waste and it is compactly packed. Covalent interaction like hydrogen bonding and the non-covalent interaction like hydrophobic interactions stabilize this keratin waste. The chemical hydrolysis degrades them but they also pollute the environment thus the best method for this is the enzyme degradation for which the enzyme alkaline protease is best.

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- **Food Industry:** Proteases are used to produce the hydrolysates of protein which have a very high nutritional value and thus they are added in food to increase its nutritional value. The proteases mostly in food industry are involved in the process making of cheese as in the preparation of yoghurt for the coagulation of milk the lactic acid bacteria is used. These bacteria for their growth require the source of nitrogen and they highly depend on the enzymes that are involved in proteolysis i.e. the breaking of peptide bonds as alkaline proteases bring about proteolysis so these are used for the production of cheese (7).

3.1 Centrifuge:

A centrifuge is a machine that spins an item in a circle around a fixed axis while providing a strong force perpendicular to the axis (outward). Due to centrifugal acceleration, the centrifuge exploits the sedimentation principle to enable denser substances and particles to flow outward in a radial direction. Less dense items are displaced at the same time as they move toward the center. Radial acceleration causes denser particles that settle at the hole's end in a laboratory centrifuge with sample tubes, while low-density materials flow to the surface.

There are three basic kinds of centrifuges, each with a different purpose. To sediment suspended solids or separate immiscible liquids, industrial size centrifuges are extensively utilized in industry and waste processing. The cream separator seen in dairies is an example. Fine particles down to the nanoscale, as well as molecules of various weights, can be separated using high-speed centrifuges and ultracentrifuges capable of delivering extreme accelerations. Large centrifuges are used to imitate extreme gravity or acceleration circumstances (for example, high-G training for test pilots). Medium-sized centrifuges are used in washing machines as well as certain swimming pools to wring water out of garments(8).

3.2 Ph Meter:

The acidity or alkalinity of water-based solutions is measured using a pH meter, which is expressed as pH. The pH meter is frequently referred to as a "potentiometric pH meter" because it evaluates the difference in electrical potential between a pH electrode and a reference electrode. The acidity or pH of a solution is related to the fluctuation in electrical potential. The pH meter may be used for a variety of purposes, such laboratory testing and quality control. The pH system detects the voltage between two electrodes and converts the result to the proper pH level. A pH-calibrated display, a pair of electrodes, or a combination electrode, and a basic electrical amplifier are all included. The most significant feature is the electrode design: These are rod-like devices with a bulb at the bottom that contains the sensor and are usually made of glass. A glass bulb constructed particularly to be sensitive to hydrogen-ion concentration is used in the glass electrode for pH monitoring. When the glass bulb is submerged in the solution to be tested, hydrogen ions in the suitable dilution exchange for positively charged ions on the glass bulb, resulting in an electrochemical potential across the bulb. The electronic amplifier detects the electrical potential differences between these two electrodes created during the test and converts it to pH units(9).

3.3 Water Bath:

A water bath is a scientific equipment made out of a container filled with water. It's used to keep samples submerged in water at a consistent temperature for a long time. Every water bath has a digital or analogue interface that enables users to choose the temperature they want. Applications

include warming reagents, melting surfaces, and incubation cell cultures. It's also utilized to make high-temperature chemical reactions possible. To avoid fire, a water bath is preferable over an open flame while heating combustible chemicals. Depending on the application, many kinds of water baths are employed. It may be used in any water bath with a temperature of up to 99.9 degrees Celsius. Other treatments, such as an oil bath, silicone bath, or sand bath, may be utilized when the temperature surpasses 100 °C(10).

3.4 Weighing Balance:

A weighing balance (also known as a weighing scale) is a device that determines an object's weight or mass. It has a magnet-ic plate/disc that recognizes the component that is placed on it. It can convert grams to milligrams and the other way around. The masses on both plates are equal, therefore one plate has an unknown mass (or weight) while the other is filled with known masses untill static equilibrium is established and the plates level off. To calculate mass, a spring scale will employ a spring with a certain rigidity (or weight). Suspending a mass will extend it by a different amount, according on the spring's hardness (or spring constant). According to Hooke's law, the heavier the item, the more the spring expands(6).

3.5 Incubator:

A device used to produce and sustain microbiological or cell cultures is referred to as a "incubator." The incubator's temperature, humidity, and other variables, such as CO (CO₂) and oxygen levels, are all maintained at the proper amounts. Because they are used to develop both bacterial and eukaryotic cells, incubators are vital for a lot of experimental work in cell biology, microbiology, and molecular biology. Incubators are sealed boxes with an adjustable heater that can reach temperatures of 60 to 65 degrees Celsius (140 to 150 degrees Fahrenheit), while some may reach greater temperatures (usually no more than 100 degrees Celsius). The most common temperature for bacteria like E. coli and mammalian cells is 37 °C (99 °F), because these organisms thrive at about this temperature. A growth temperature of 30 °C (86 °F) is acceptable for certain species employed in biological research, including such budding yeast. *Saccharomyces cerevisiae* is a kind of yeast(5).

3.6 Pipette:

In chemistry, biology, and medicine, a pipette (also known as a pipet) is a laboratory tool used to transmit a specified quantity of liquid, usually as a media dispenser. From simple single-piece glass pipettes to even more complicated adjustable or electronic pi-pettes, pi-pettes come in a variety of forms and sizes, with differing degrees of precision and accuracy. Many pi-pettes work by creating a partial vacuum just above liquid-holding chamber and then releasing it selectively to draw up and disperse liquid. Depending on the style, measurement accuracy varies significantly. Pipettes function by using a piston to displace air. The vertical movement of a metal or ceramic piston inside an airtight sleeve creates a vacuum. A vacuum occurs in the area left unoccupied by the piston as it rises, propelled by the plunger's depression. The liquid surrounding the tip (together with the air in the tip) travels into this vacuum and may then be transferred and released as needed. These pipettes provide a high level of precision and accuracy. They are, however, prone to errors induced by the changing environment, notably temperature and user technique, since they depend on air displacement.

3.7 UV-Spectrophotometer:

It's used to figure out what the optical density of a liquid sample is. It is the measurement of the light beam's diminished effect after passing through a liquid sample or after being reflected from the sample's surface. Absorption measurements may be made at a single wavelength or across a wide range of wavelengths(4).

3.8 Process Of Culturing:

The process of inoculation started where all the broth Medias which had been prepared were inoculated with the soil sample. The inoculated sample was incubated at the temperature of 30°C for two days i.e. 48 hours (5).

3.9 Serial Dilution:

It is the method in which we successively dilute the inoculum which is further added to the petri plates that have been sterilized. Now this method is started in which the sample is diluted and after the dilution the sample is poured onto the agar plates (7).

3.10 Pour Plate Method:

In this method the diluted sample is added to the sterilized petri plates containing the media that has been melted, cooled and agitated and the plates are left for solidification, after the incubation the colonies developed are identified. We then isolated the bacteria for which we needed the sample of soil that was air dried and this sample of soil was added to the conical flask having Distilled Water. This conical flask was taken for the hot water bath for 21 Mins at a temperature of 81degree Celsius with proper mixing. The pieces of soil sample that we diluted before was now put and by using the spreader it was spread on various agar plates having acidic bacteria. Now these agars plated are taken for the incubation for 2 days at a temp of 3 degree Celsius. After incubation the result was noted and we had the procedure of spreading. In this the culture was spread on the various agar plates with the help of spreader. Thus we were able to isolate the different colonies that are morphologically different. The colonies which we isolated from the poultry farm waste and the seawater sample (1).

3.11 Screening Of The Protease Producing Bacteria:

The isolates that we got from the poultry farm waste had been inoculated on the agar plates containing media named casein-yeast extract peptone having the pH value of 4.0. The isolates that we got from the seawater sample were inoculated in the media named as casein yeast extract peptone along with 5% NaCl. After this we have to incubate the sample; thus the agar plates are taken for the incubation the temperature required is 30 degrees Celsius for 3 days(4).

3.12 Protease Production:

Now we have to observe the production of enzyme acidic protease. The Amido Black solution is used for the flooding of agar plates because this solution will help us to identify the positive effect of enzyme acidic protease producers. During primary screening, we identified the producers for Acidic Protease. These producers will now be inoculated in the medium containing casein yeast extract peptone with pH value. Now this inoculated culture is taken for incubation at a temperature of 30 °C for 72 hrs. The culture is centrifuged at a high speed i.e. 10,000 rpm at temp of 4 degrees Celsius for 10 minutes. After centrifugation, the supernatant which is cell free

is collected. The supernatant which we collected is now fractioned with a solution of ammonium sulphate. The Precipitated enzyme is collected (8).

4. CONCLUSION

Proteases are a special kind of enzyme in that they are both physiologically and commercially important. They have features that are both derivative and synthetic. Proteases are found in animals, plants, and microorganisms because they are physiologically required. Microbes, on the other hand, are a goldmine of proteases and are the favored source of enzymes due to their fast growth, minimum space requirements for culture, and easy genetic modification. Since ancient times, microbial proteases have been widely employed in the food, dairy, and detergent sectors. Proteases have rekindled attention as potential targets for creating therapeutics against illnesses that spread rapidly, such as cancer, malaria, and AIDS. Advances in micro-organism genetic manipulation, such as cloning the protease-producing gene, bring up new options for the introduction of predesigned modifications, culminating in the manufacture of tailor-made proteases with unique and desired features. Ex-tremophile microorganisms are being studied in an attempt to identify proteases. One of the most potential future solutions is to use biodiversity to supply microorganisms that create proteases that are well suited for their various uses.

REFERENCES:

1. Bhunia A, Durani S, Wangikar PP. Horseradish peroxidase catalyzed degradation of industrially important dyes. *Biotechnol Bioeng*. 2001;
2. Bishnoi SW, Rozell CJ, Levin CS, Gheith MK, Johnson BR, Johnson DH, et al. All-optical nanoscale pH meter. *Nano Lett*. 2006;
3. Dunn BM. Introduction to the aspartic proteinase family. In: *Aspartic Acid Proteases as Therapeutic Targets*. 2011.
4. Husain Q, Jan U. Detoxification of phenols and aromatic amines from polluted wastewater by using phenol oxidases. *J Sci Ind Res (India)*. 2000;
5. Kuddus M, Ramteke PW. Recent developments in production and biotechnological applications of cold-active microbial proteases. *Critical Reviews in Microbiology*. 2012.
6. Nandi BK, Goswami A, Purkait MK. Adsorption characteristics of brilliant green dye on kaolin. *J Hazard Mater*. 2009;
7. Patel PN, Patel HS. Removal and decolorization of dye bearing textile effluents by sulfonated furfural-acetone resin. *Pelagia Res Libr Adv Appl Sci Res*. 2012;
8. Pengthamkeerati P, Satapanajaru T, Chatsatapattayakul N, Chairattanamanokorn P, Sananwai N. Alkaline treatment of biomass fly ash for reactive dye removal from aqueous solution. *Desalination*. 2010;
9. Rimminen H, Lindström J, Linnavuo M, Sepponen R, Dissertation A, Description G, et al. MIT OpenCourseWare <http://ocw.mit.edu> Haus, Hermann A., and James R. Melcher. *Lect Notes Comput Sci (including Subser Lect Notes Artif Intell Lect Notes Bioinformatics)*. 2012;
10. Shin HS, Woo HM, Kang BJ. Optimisation of a double-centrifugation method for preparation of canine platelet-rich plasma. *BMC Vet Res*. 2017;

THE KNOWLEDGE LEVERAGING CONUNDRUM OF OPEN INNOVATION

Sh. Sachin Gupta*

*SOMC, Sanskriti University,
Mathura, Uttar Pradesh, INDIA
Email id-chancellor@sanskriti.edu.in

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ABSTRACT

Effective research and convergence of internal and external knowledge are becoming increasingly essential to creativity and business results. Companies enter into various open innovation partnerships to achieve this goal with the aim of creating and extracting value in a multi-stakeholder context. The concept of “paradox within a paradox” is explored with the knowledge mining paradox being discovered in the open paradox. We integrate a knowledge-based approach with paradox theory to develop a mathematical model that detects significant knowledge transfer and contact conflicts. We then show how innovation-related information uncertainty adjusts these pressures in the other direction. This uncertainty exacerbates transferability tensions by making knowledge transfer and integration across organisational orders more difficult while reducing exposure tensions for the same reasons. We explore potential approaches for resolving these major information related issues by developing differentiation and consolidation procedures that may enable simultaneous knowledge exchange while minimizing disclosure risks.

KEYWORDS:Conundrum, External Knowledge, Organizational Boundaries, Open Innovation, Value.

1. INTRODUCTION

Firms are continuously seeking external information possibilities in an attempt to innovate since technological knowledge is considerably more diffused and easily accessible than ever before (1). As a result many inter-organizational agreements have been established to facilitate the exchange of information across corporate boundaries and stimulate innovation. These terms are often referred to as Open Innovation (OI) (2). Co-development partnerships and supplier agreements (3); innovation and R&D networks (4); and innovation environments. Although expanding organizational boundaries in environmental accounting contexts can be beneficial and even appropriate it also comes with its own set of difficulties and dangers.

The forced engagement and convergence of internal and external information which can cause friction is one of the most important challenges in any OI collaboration. Previous OI research has documented the effective integration of information and resulting value creation and capture but it also highlights problems of accidental knowledge leakage and barriers to capturing the value of creativity (4). Indeed the most pressing conflicts in today’s IO landscape arise from the need to

share information between parties to create value despite the fact that not all knowledge is or is not. can cover (5). These difficulties are related to the classic paradox of disclosure (6), which was recently renamed the Open Paradox (7) the need to exchange useful information with external actors while avoiding leakage and misappropriation of this knowledge (8).

We argue that information is at the heart of the transparency paradox: Knowledge shared between actors is essential to creating new meaning but this knowledge is frequently exposed in such a way that undesirable exposing actors to the risk of value recovery. As a result the function of information in the IO context is fraught with contradictions causing significant organizational and management difficulties. In IO going beyond organizational boundaries when interacting with external partners is a big strategic issue as is a company's willingness to face difficulties. The document has not yet fully conceptualized or defined the knowledge-related aspects that constitute the paradox of openness. By conceptualizing the transparency paradox from a knowledge-based approach we provide insight into this important phenomenon. We connect our conception to literature that views meaning creation and capture as a recurrent contradiction in inter organizational interactions and OI (2). We use paradox theory methods to highlight the processes of division and reorganization that have the potential to alleviate the stress associated with the transparency paradox. We take a knowledge-based approach to the transparency paradox to conceptualize the underlying stresses that arise from simultaneously creating and capturing value in IO and explore methods deal with these tensions.

Our research complements using paradox theory as a mirror y emphasizing the idea of a paradox within a paradox (9). We explore the origin and central tensions of the openness paradox from a knowledge-based perspective y identifying the knowledge mining paradox as rooted in the openness paradox. This leads to a broader understanding of the underlying components of this growing problem as well as the functional implications for how managers can best handle the corporate dilemma IO context (10).

2. LITERATURE SURVEY

N. J. Fosset *al.* explained the importance of external intelligence sources in identifying strategic chances is emphasized in studies, but the role of such sources in leveraging or achieving possibilities is less well known. We propose that realized opportunities often requires significant interactions with external information sources, based on the knowledge-based viewpoint. Organizational design may help a business deal with these channels more efficiently while still maintaining coordination among members of the organization that are seeking possibilities. The use of external information sources is positively correlated with opportunity utilisation, according to our study of a double respondent survey involving 536 Danish companies, but the extent of this correlation is greatly affected by organisational designs that allow the company to access external knowledge during the process of leveraging opportunities (1).

H. Chesbrough *al.* narrated academics and doctors alike have been paying careful attention to open innovation. Prior open engineering research has mainly focused on collaborative innovating. Comprehending the processes and outcomes of collaborative inventing, on the other hand, is inadequate for understanding long-term open innovation practises and the comparative advantages of open innovation players. Instead, improving our knowledge of continuous open innovation practises needs a deeper understanding of value creation and capture. Open innovation requires collaboration among distant but interconnected players who rely on one

another's skills to generate and capture value. The desire of actors to capture value, as well as their capacity to produce value, drives value in open creativity. Although the open innovation literature addresses value creation and capture, the field's growth is hindered by methodological ambiguity, especially in regard to the concept of value capture. This article offers a value-based approach to open innovation, provides coherent conceptualizations of value creation and capture, and suggests potential study topics at the confluence of open innovation, value production, and value capture (2).

A. Y. Al-Aali *et al.* presented that Intellectual Property (IP) management that is systematic and simplified is a relatively recent concept. Despite the fact that intellectual property has been established for decades, this is also the case. Today's problems are more complicated, requiring integrated IP management. Through integrated IP management, we don't just assume that all types of intellectual property (patents, trade secrets, trademarks, and copyright) are handled together; we also mean that intellectual property management is integrated with overall business plan architecture and organisational strategy. Integrated management involves more than just establishing a licencing model or generating a product from a new invention (5).

3. THE OPENNESS PARADOX

3.1 The Paradox of Secrecy from a Knowledge-Based Viewpoint:

Organizations are often designed as a data processing machine. Researchers began emphasizing the importance of businesses as information-generating organizations in the early 1990s as the ability to create and deploy knowledge is critical to its retention competitive advantage. The well-understood dichotomy and exchange between these types of knowledge is at the heart of the knowledge-creation process. Individual's contribute to knowledge creation by sharing and transmitting it while organizations contribute to knowledge creation by sharing and transferring it.

The literature has increasingly questioned the dependence on domestic capital in recent decades. External awareness has become more essential as the growing literature on IO shows. For example information is transferred and exposed across organizational boundaries in the "mixed mode" of OI in an attempt to co-create meaning. Likewise the partnership literature shows how companies use them to seek and gather information to learn discover and exploit and to transfer knowledge both near and far across organizational boundaries. The order-crossing character of knowledge flows in these IO connections gives rise to a well-known paradox: the disclosure of technological information exposes the author to the risk of inadvertent exposure and the risk of not knowing profit from technology. Selling technology through businesses within reach between sellers and potential buyers poses a challenge: It is conceivable that before information about a particular technology is disclosed to customers or potential buyers that technology has actually been transferred. Patents and other intellectual property (IP) proceedings may partially solve this problem but the inconsistency remains.

This issue has been termed the "paradox of transparency" by recent study. The paradox of transparency is concerned with the advantages and dangers connected with cross order information flows as well as the manifestation of conflicts between creating and capturing value as well as sharing and protecting knowledge. The paradox of transparency has received a lot of notice at the corporate level but it has gotten less attention at the person level which focuses on micro foundations. Individuals often differ in how they perceive and respond to tensions and

these reactions influence how organisational tensions are managed. The micro level continuum of information sharing in OI is essential because people frequently vary in how they perceive and react to conflicts. However these micro-bases are beyond the scope of our study because our study focuses on the active component of the openness paradox. However since the exchange and transmission of information mainly takes place between people our conceptual approach implicitly provides arrangements at the individual level. This makes sense at the organizational level.

While the parameters and names of the transparency issue vary the issue itself - disclosure of information to third parties and difficulty in leveraging that knowledge - appears to be constant. Thus the paradox of transparency is knowledge-based and the risks involved in sharing information. Information also plays a contrasting function in OI acting as an important resource for creating and capturing meaning. The knowledge-based literature emphasizes "the fundamental contradiction that coding and simplifying information frequently increases the likelihood of imitation" in this regard. Technology transfer is a desirable technique for cloning and expanding a business (in terms of size and profitability); imitation is an important limitation. The "knowledge mining paradox" was then invented.

We believe that the dilemma of knowledge mining is entangled in the paradox of openness making it a contradiction within a paradox. This lens is useful for highlighting the micro-bases of the transparency paradox while highlighting the complexity of its potential resolution. We use methods from paradox theory and follow the recommendations of previous research to deepen the dynamics of the openness paradox which has established the important but paradoxical place of knowledge in the openness paradox openness logic.

3.2 Using Paradox Theory To Solve The Openness Paradox:

The development of paradox theory attempted to offer alternatives to the traditional view of scientific ideas as fundamental direct and limited. Traditional theories cannot represent the complexity of real-world dynamic events which often contain paradoxes. The goal of paradox theory is to acknowledge the diverse and dynamic presence of events. Unlike the conventional "either or" method commonly used in business management research this method is often expressed in terms of "both and". Accepting opposing tensions and creating synergies between them is driven by the "both and" mind-set. The paradox lens was useful in this study because it helped distinguish the underlying stresses underlying the open paradox as well as examine potential ways to alleviate these stresses.

The juxtaposition of contradictory but interrelated components became apparent when the theory of the paradox was formulated. These characteristics are often thought of as the poles of a particular duality such as continuity and change discovery and exploitation or cooperation and competition. Between the poles of contradiction hidden or obvious conflict will arise. Although potential stresses occur beyond the scope of experience agents are aware of the stresses that do exist. In some cases the goal is to align or satisfy the two poles of the paradox while successfully resolving the tensions.

Although the literature on paradox theory has grown recently the content of paradoxes within paradoxes has received little attention. We approach this question by examining the openness dilemma from a knowledge-based perspective including the inherent contradiction in knowledge mining. We consider how the dynamics of paradox theory can play out in terms of an open

paradox. We propose a conflicting delineation emerging from the paradox of the two metaphors of openness defining the dilemma as a long struggle between creation and the grasp of meaning. This contradiction like the presence of a fallacy persists over time. We will demonstrate that there are circumstances and processes that lead to paradoxical conflicts as well as to allay the tensions that are fundamental to the paradox.

4. MODEL OF CONCEPT

Through the lens of documenting value creation and the paradoxical tensions associated with knowledge we construct a philosophical model of the paradox of transparency in IM. Knowledge-seeking procedures in which actors engage in IO interactions especially within or outside organizational boundaries are the starting point of the model. Organizations that depend on inside information incorporate common or well-known components of knowledge which reduces the amount of support needed for learning. However relying on internal knowledge alone has limitations such as limited recombination space between known components. In addition over-reliance on internal R & D leads to path dependence organizational rigidity and myopia. Overreliance on external knowledge creates disadvantages such as difficulty testing foreign ideas. As a consequence the utilization of internal information and the acquisition of external knowledge must be properly balanced. The more companies depend on external information and collaboration the more they must disclose knowledge which is a key element of this balance. Higher degrees of stress arise from the connection of intelligence search and disclosure.

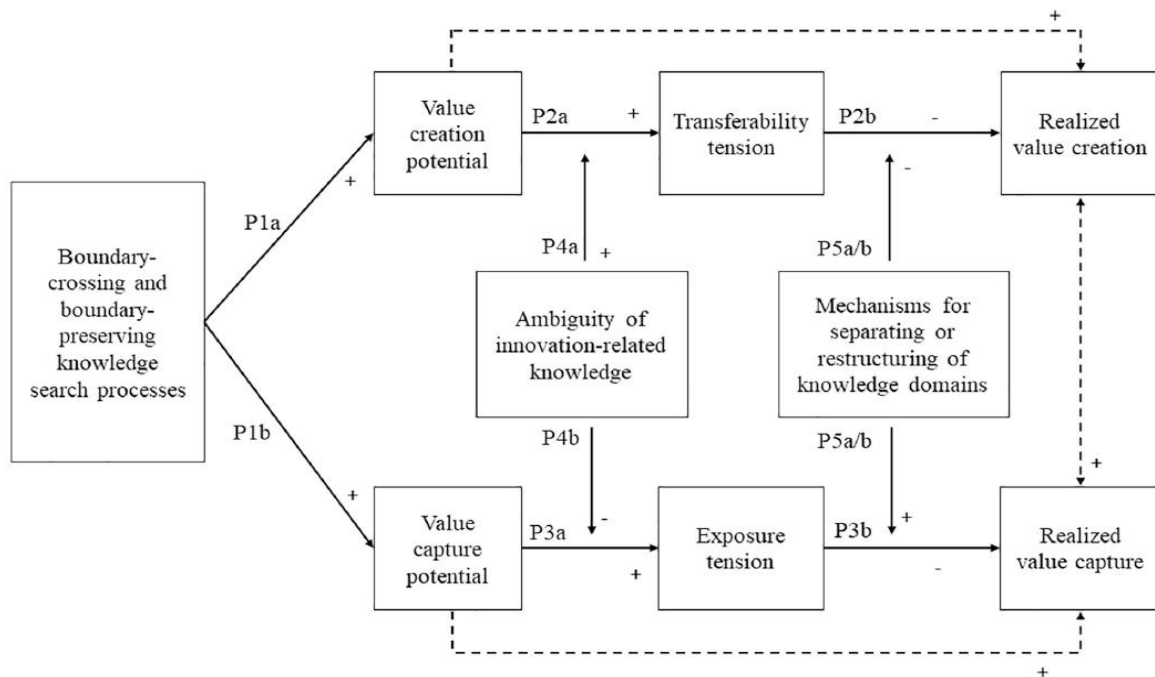


Fig. 1: Knowledge-seeking processes and their impact on value creation and capture in the conceptual model of open innovation

We explain the role of information-seeking processes in creating and value capture as well as the paradoxical tensions and solvability associated with IO knowledge and mechanisms. The model's

final logic is shown in Fig. 1. We construct propositions to describe the model's key assertions in the following sections.

4.1 Processes Of Knowledge Discovery And The Capacity For Value Creation/Capture:

Within and across organizational boundaries the search for knowledge has implications for both creating and capturing value in IO. The search for information applied to the components of knowledge as well as the different methods of combining these components make advances when viewed from a recombinant point of view. Internal research (that is a company that wants to incorporate new information within the company's boundaries for efficiency reasons) and international and cross-order research are distinguished in this study. The benefits of external collaboration for value creation and internal separation for value capture are highlighted in these two types of research following a roader dichotomy in the collaborative analysis of innovation. The potential to create and extract value is created by these two research processes; however this potential can only be achieved if the associated stresses are addressed.

5. DISCUSSION

Boundary-crossing awareness quest is linked to value creation in OI because it provides high-value opportunities for innovation beyond organisational boundaries. Information typically travels in both ways in a linked mode of OI, benefitting both senders and receivers. Explorative search helps businesses in reaching into their own information worlds from the perspective of a seeking person. Boundary-crossing knowledge search will reveal a range of knowledge areas that are frequently helpful in developing or new markets. External information sharing provides new approaches and market entry methods indicates the possession of important or relevant knowledge promotes the development of essential skills and competencies while also improving ones position in a particular innovation network from the senders point of view. In a nutshell, external information interchange improves the probability of effective knowledge transmission and integration, as well as allowing innovation. In conclusion, the more cross-order research activities taking place within the framework of IO the greater the potential for value creation shown in Fig. 2.

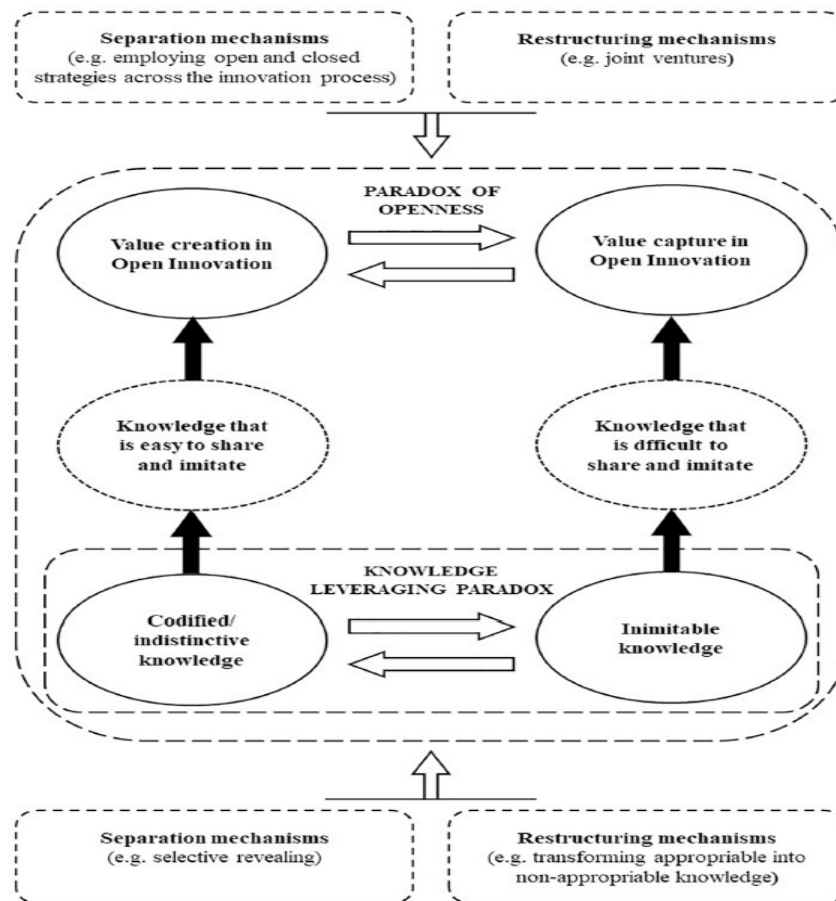


Fig. 2: Isolation and restructuring mechanisms to resolve the tensions of contradictions embedded in free innovation: A Paradox inside a Paradox

5. CONCLUSION

We tackled the fundamental problem of transparency faced by inventors and innovators in this essay which was originally raised by Arrow and is now known as the "paradox of openness." We have drawn attention to the concept of "paradox within a paradox" by highlighting the dilemma of knowledge extraction hidden in the paradox of openness. This highlights the crucial importance of information in the transparency paradox as well as the major contradiction between transferability and visibility regarding value creation and capture respectively. This issue is more important than ever as companies move towards IM through more diverse and competitive innovation ecosystems. To understand the role of order crossings and frontier conservation information seeking as drivers of value creation and potential capture in IO as well as the dynamics of transferability and vision stress we I have developed a conceptual model (Fig. 1). We developed assumptions regarding the contingency function of information complexity, as well as two types of resolution frameworks based on paradox researchers' separation and restructuring logics. Finally, we suggest that differentiation and restructuring procedures must be utilized to effectively manage conflicts between producing and catching value in OI settings, both on the underlying stress on the leverage effect of knowledge and on the roader stress on value creation and capture (Fig. 2). Our theoretical proposals and conceptual models offer a new

vision of how companies should combine internal and external information capital in partnerships with different stakeholders and reduce the strain on transferability and visibility as well as meeting the need to create and capture value. The following parts delve into the fundamental theoretical contributions, management impacts, and future research prospects.

REFERENCES

1. Foss NJ, Lyngsie J, Zahra SA. The role of external knowledge sources and organizational design in the process of opportunity exploitation. *Strateg Manag J.* 2013;34(12):1453–71.
2. Chesbrough H, Lettl C, Ritter T. Value Creation and Value Capture in Open Innovation. *J Prod Innov Manag.* 2018;35(6):930–8.
3. Fernandez AS, Chiambaretto P. Managing tensions related to information in coopetition. *Ind Mark Manag.* 2016;53:66–76.
4. Dhanaraj C, Parkhe A. Orchestrating innovation networks. Vol. 31, *Academy of Management Review.* 2006. p. 659–69.
5. Al-Aali AY, Teece DJ. Towards the (strategic) management of intellectual property: Retrospective and prospective. *Calif Manage Rev.* 2013;55(4):15–30.
6. Arrow KJ. Economic welfare and the allocation of resources for invention”, in *Universities-National Bureau (Ed.). Rate Dir Inven Act Econ Soc Factors , Natl Bur Econ Res Princeton.,* 1962;609–26.
7. Laursen K, Salter AJ. The paradox of openness: Appropriability, external search and collaboration. *Res Policy.* 2014;43(5):867–78.
8. Frishammar J, Ericsson K, Patel PC. The dark side of knowledge transfer: Exploring knowledge leakage in joint R&D projects. *Technovation.* 2015;41:75–88.
9. Schad J, Lewis MW, Raisch S, Smith WK. Paradox Research in Management Science: Looking Back to Move Forward. *Acad Manag Ann.* 2016;10(1):5–64.
10. Olivier E. Value Creation and Value Capture in Open Innovation Chair of Strategic Management and Innovation. *J Prod Innov Manag.* 2013;

INVESTIGATION ON DISCONTENTS FOR PARTISAN BIAS

Dr. Anubhav Soni*; Mr. Pooran Singh**

* Sanskriti University,
Mathura, Uttar Pradesh, INDIA
Email id- anubhavs.somc@sanskriti.edu.in

** Sanskriti University,
Mathura, Uttar Pradesh, INDIA
Email id: registrar@sanskriti.edu.in

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ABSTRACT

The two dissidents and traditionalists criticize the political opponents for being biased, but is there actual verification that one side is more one-sided than the other. Dissidents and moderates had equivalent degrees of political inclination: the examinations took a gander as slanted toward discovering even predisposition among nonconformists and preservationists, the investigations took a gander at don't quantify hardliner predisposition but instead level headed Bayesian refreshing, and social brain science isn't one-sided for nonconformists yet rather toward making bogus equivalencies. To reply to this inquiry, the propensity to evaluate in any case indistinguishable facts effectively sustains beliefs or devotions convictions or loyalties. Examinations scope struggle and decently looked at inclination by setting up conditions in which the two nonconformists and preservationists would have comparable inspirations and freedoms to exhibit predisposition; contemplates that were least helpless against Bayesian counter clarification, and most cynic of Bayesian counter clarification; and while cause worried predisposition in friendly brain science, this doesn't preclude other possible inclinations, all of which represent a peril to logical trustworthiness. Two suspicions depending on previous research were scrutinized: an evenness speculation and a deviation hypothesis.

KEYWORDS: *Information, Liberals and Conservatives, Partisan Bias, Prejudice, Public Opinion.*

INTRODUCTION

Partisan bias, at its most basic level, refers to a general tendency for individuals to unintentionally support people's political organisation or portray ideologically motivated ideas in a positive light. Politically engaged individuals, of course, hold a range of views that support the chosen political party or ideology, and many of them take actions with which principles. However, there is considerable interest in instances where the favouritism is less conscious and intentional, and individuals aren't aware that the political preferences have affected the judgments or conduct (1).

Every time political power is passed without bloodshed, the world gets more evidence that decisions are brought out the greatest in people. Though, as shaking hands, rousing speeches, and kissing infants seem to be as much a part of the election scene as strange telephone calls meant to dissuade elective besides all sort of misuse done against billboards bumper stickers, and, yard signs, while the media likes to portray politicians and activists as having reached dirty practises, new lows upon the movement path are nothing novel. During the presidential campaign, for example, a phony letter claimed one of the candidates' favoured unrestricted Chinese immigration. While peaceful democratic power transfers are reassuring, elections frequently appear, whether activists, candidates, or ordinary voters (2).

Selectively exposing oneself to information that supports one's own political group or views, selectively remembering information that supports one's own political group or views, and, most prototypically, selectively evaluating information in ways that support one's own political group or views are all examples of partisan bias. Voting fraud has grabbed scholarly interest in the underbelly of the election process. However, because election deceit, then misbehaviour upon the operation track in general, is regarded undesirable (and often illegal), researchers researching electoral fraud generally assume that the public is hostile to shady campaign tactics. As a consequence, academics now know a lot occurrence, causes, severity, as well as impacts of electoral fraud in many countries, but researchers know very little about the influence of public opinion (3).

According to the study individuals concentrated on topics that aren't "statistically typical entire variants". In its place, experts say study's investigators were motivated to select individuals that would result in symmetrical bias patterns. First, researchers found that the treatment was successful and that responders are changing. The fake is regarded by the participants to be a more serious and less justifiable breach (4).

Particularly instructive since little is known about public opinion on the subject. Because techniques are more likely to irritate more voters, the fact that respondents perceive and encourage. Researchers find that altering the perpetrator's partisanship shows that partisans evaluate dirty methods in a biased way. When it comes to execution, partisans respond by rating the violation serious justifiable than when it comes to people's co-partisans. To put in another manner, researchers find the illness of public opinion that people expected to see. However, in the context of the trial, the sceptics proved benign since there is virtually no effect over over-all confidence in administration (5).

Going through the implications of the results in depth, including the possibility that alienation could develop (regardless of what individuals learn) in the event of real and more severe election fraud. These reasons are worth considering, even if they are hypothetical. To begin, it is correctly pointed out enormous articles in the intended to study. Maximum didn't even post results separately (6).

LITERATURE SURVEY

S. I. Abramowitz et al. clarified the role of intellectual inclinations in composition audits, which were gradually assigned to specialists and non-specialists in politically liberal locales, sent one of two adaptations of a brief experimental report distinguishing the mental well-being of political activists and non-activists in understudies. The structure was fairly similar, but in the results and discussion section, all references to activists and non-activists were deleted. Commentators were

asked to evaluate how well particular criteria of article exposure and logical quality were followed, creating the appearance that they were engaging in a convenience study of a closed-end unique evaluation system. The primary results supported the notion that distribution choices could be influenced by commentators' political leanings, and were followed by research including social pay data. However, the results are often erroneous owing to a defencelessness to consider interruption of scholastic thinking founded on a different basis. The inner self's function in the shifting cycle as a halfway person of the predisposition effect (7).

O. Eitan et al. presented in the article that this research offers the first comprehensive experimental evidence for the involvement of government issues in scholastic testing. The creator discovered assessment disparities in a huge number of logical rundown exams from the area of social brain study. Preservationists, for example, present contrasting views and contrasts more vividly than rebels. Traditionalism is more likely to be the centre of debate than progressivism. In light of the current discussion over politicised research, a prognostic review enables academics to make inferred experimental predictions of outcomes and then change their views depending on the data. Despite correctly predicting the route of evaluating and establishing the difference, the taking an interest researcher fundamentally underestimated the quantity of the two effects. Researchers' more general views on political inclination were also revised as a consequence of the studies, offering a model for addressing cross-disciplinary logical problems (8).

DISCUSSION

What is the public's view of dirty tricks? Is it true that certain individuals are extra affronted than others? The aforementioned research emphasizes upon factors besides results (rather than opinions), is mainly performed in impoverished countries, and election fraud. Author determines the sorts encountered (in the over the telephone appearances) plus circuitously (through broadcasting tales) by studying less severe forms of election fraud. Author explores the idea of universal aversion empirically by looking at public opinion reactions to filthy methods (9).

Experiments presented vignettes describing one of two hypothetical dirty campaign tactics to a nationally representative sample of survey respondents to determine how they responded to the news. The main experimental alteration was to modify the party affiliation of the dirty trick perpetrator. Research evaluated respondents' assessments of the severity and legitimacy of the dirty trick, as well as general confidence in government, after they were exposed to a news vignette. These teachings rely upon a rationale for demonstrating bias prevalent in psychology research, although typically implicit, and is based on the logic of expected benefit theory (10).

The notion of invariance is a fundamental premise of all rational choice analyses: judgements should not be affected by small changes in the way information is presented (i.e., changes that are irrelevant to the decision). Similarly, political bias is recommended similarly evaluated it helps liberals or conservatives. The magnitude (difference in research evaluated) may be analysed to determine whether it is significantly more evident for political left or right participants. People had no previous ideas about either hypothesis and did the best to perform a fair assessment of the existing research. In fact, think of the heroic, a lot came from genuine anxiety about the findings of the meta-analysis. The utilizing research meets a range of difficulties belies the simplicity of this approach.

Working against odds, unintentional informational inequalities between treatments, the information given to participants must be experimentally changed and properly matched. This lowers the likelihood that the changed data includes crucial may explain judgments comparable normative viewpoint. Nonetheless, for decades, academics investigating motivated perception and reasoning have failed to rule out other explanations including expectations. Such counter theories are notoriously difficult to completely rule out, but the plausibility is reduced to the point where they are no longer probable.

1. Evidence for Asymmetrical Partisan Bias:

The desire to identify predispositions across the political spectrum has strong conceptual foundations, going back to Adorno and his colleagues' work on the tyrant soul. Despite the fact that specifics have changed over time, the central hypothesis of this investigation is that profound situated resistance (psychodynamic or relational) is characterised by a mix of customs, hostility toward minority groups, the flavour of strong legitimate pioneers, and a strong highly contrasting, positive or negative personality. The writer's research team has effectively distributed broadly valuable information for both unevenness and balance. Despite the fact that the scientific method is accurate, current political brain science research has shown that orthodox political beliefs are linked with one-sided thinking, especially protection from new and possibly harmful information.

For example, political traditionalism is a kind of driven societal, related to a number of human traits associated with change resistance (unyieldingness, low degrees of transparency for experience, request, high demands for design and conclusion) (unyieldingness, low degrees of transparency for experience, request, high requests for design and conclusion). Acknowledgement is how it's characterized. Traditionalism has been related to risk affectivity in many studies, aversion search techniques, shallow framework mistakes, and the importance of collecting dedication and inspiration for personal development. This collection of factors should theoretically not conflict with political beliefs, and it may be more probable for political conservatives to select the data over political nonconformists. Scientists have observed instances of sectarianism on a regular basis. That is, they will usually score better when similar data is verified rather than opposing their political criteria.

2. Evidence for Symmetrical Partisan Bias:

Other examination customs do not support the probability of larger one-sided advancement than moderate. Nonetheless, there is both conceptual and empirical evidence that incentives do not build bias. Accidents Caused by Others Psychological writing is widely documented, especially as a self- and group-reinforcing tendency seen in a range of contexts and scenarios. There is no reason to think that political radicalism shields individuals from being persuaded, and there is reason to believe that political and good judgements are especially susceptible to the influence of intents and emotions. Tests reflecting such instances of judgement were selected at this point to represent the general sort of bias that is usually deplored in regular political debate and typical in the precise writing. In the political arena, favor side over the other.

Moreover, the notion that extreme ideologues will be intellectually unbending at the two extremities of the political spectrum is virtually irrelevant to the "rights inflexibility" theory that underlies the tyrant character. Recent research indicate that a significant number of what are frequently believed to be a distinct component of maintenance catastrophes are actually the

same: Dissidents have also found it. Perspectives, arrangements, and good sensitivities vary depending on the political spectrum, and reformists and moderates will usually concentrate in on bias and Pontypool on different topics and targets for comparative purposes. Limited investigation in examinations mentioned to settle on evaluative choices or, on the other hand, politically unseemly, analysts can bring hands down the most grounded thinking for predisposition, particularly politically great, with practically the same data controlled to the goal of both advancement and upkeep members

Although liberal and moderate inclinations may be worsened by what explicit political choices imply for the two sides' core responsibilities, this study coordinates decisions across politically important topics. Then it recommends that a similar tendency be found for both one-sided data sets. As stated in this inquiry, the brain science of the examination gave particular attention to the bias of political moderates, in part because of the sensitive sides of the political liberal-overwhelmed academic local area. The research revealed facts that helped the notion of balance. Comparative material is discovered instead of evaluating the political inclinations of both progressive and conservative members, according to 51 studies that vary significantly in their evaluation political topics and the exact methods in which they are employed. It looked more genuine and appealing to individuals.

3. The Current Study:

Overall, we are sure that individuals are pleased with the meta-planning exams and execution, and that the results provided are a good reflection of current test data on this kind of political predisposition. The designers selected a meta-investigation as the preferred method to take use of the huge quantity of data on political inclination collected previously. In meta-analysis, a range of political data or other obstructive controls may be utilized to look at hardliner propensity across considerations utilizing left and right political orientations, as well as judgements on other policy-related issues. Given the difficulties of separating political inclination from the renewing of any reasonable beliefs, the experts restricted their study to people who could make the most grounded inclination choices. Analyses like those performed by Lord and colleagues and Cohen, who utilized concordant data plans to look at hardliner tendency in political preparedness for and against data.

These investigations are being performed at a number of research institutions, with academics that believe in both balance and lop-sidedness. The aim is to give a thorough review of the current mental research on reformist and traditionalist political biases. Individuals, on the other hand, are equally persuaded that the results have failed to solve the philosophical balancing problem, leaving many interesting issues regarding the relative judgement excellences of progress and traditionalism. Commending strong replies in that regard, believe the investigation and goals are not appropriate from many perspectives, but the assertion should be examined and disentangled to highlight the substantial methodological and calculated difficulties, believe it is valuable and will begin the conversation here.

Respond to each investigation before going on to the next part of the inquiry. The authors' postscript, which is accessible on the internet, shows and alludes to the investigation's unusual discoveries. It is essential to react to the demand for more than collecting an even philosophical debate into a one-dimensional issue of whether one side of a political split has a predisposition over the other. The structure is attractive, and given that it admits that it impacted the writer's

creation, it promotes two views that are both overly political and lacking in subtlety from the aspect of mental analysis. In the end, we suggest a more varied approach. Opportunity and traditionalism are different in-house depictions, including distinct political and mental elements, and context-oriented variables are significant in how, when, and in whom political inclinations will show up in the data preparation grouping, and context-oriented variables are significant in how, when, and in whom political inclinations will show up job.

4. Biased Processing of News about Dirty Tricks:

Residents, on the other hand, are especially sensitive to poor news in a political framework that has inflamed hardliners, and the impact of bad news in the political framework on the supporters of the opponent is jeopardised, due to concentrated false news. Individuals from the Communist Party who died as a consequence of the deaths have been retired. Researchers who aren't interested in looking at the inclinations of both sides of a one-sided decision may inadvertently or deliberately benefit individuals who make equal propensity on both sides. Simultaneous thinking has a lengthy and distinguished history, especially when compared to other recorded instances of intentional cognition. Understudies were given a video of the authority call made after the 1951 Dartmouth versus Princeton football game and were asked whether they favoured the outcome.

Understudies are faced with identical situations and make radically different choices, the assessment of which is completely based on who they have heard. Likewise, problems in distinguishing a person comes from recognising wants that are diametrically opposed to preservationists, or from the fact that one may more clearly detect conservative tendency because of involvement. It's also conceivable that it'll draw progress scientists to topics that poke fun of progress tendency. Imperfection in judgement, clearly, the assumption that all cases described in the literature are consistently symmetric or diverging is just that. Meta-examination has the benefit of enabling conclusions to be made from a collection of analysts who don't all have the same thinking processes or methodological faults.

The fact that the bulk of the studies we included were not performed with fundamental assumptions in mind is, we would like to think, a benefit rather than a disadvantage of meta-research. When experts accept theories that affect plan and examination choices, they rely on the murky exploratory methods that underlie the field's current reproducibility problem. Concerns about scientists' coordinated expectations are mitigated by the fact that the limited number of trials included were intended to contrast the nature of free and moderate judgement. Whether or not the scientist was especially interested in the degrees of liberal and traditionalist inclinations, a fair trial of that subject should have an equal probability of showing predisposition for everyone for the same reason. Despite the fact that the expert took up the subject thinking that nonconformists and preservationists had inverse inclinations (for example, in support of death punishment), balanced inclinations do not have to appear as even predispositions.

Liberals and Republicans may have a comparable goal to aid people' gatherings, but when it comes to strategy, Democrats must be assessed based on the particular content and communicated practicality of a plan, while Republicans are likely to depend largely on party signals. The meta-goal examination's aim to separate and analyse these kinds of impacts, differential inclinations based on comparable political circumstances in each gathering. To address these difficulties, it has been suggested that a "sufficiently wide" sample of topics be

identified, since the difficulty is universal to all political subjects. Individuals may characterize a population of political conclusions, or assign a demonstrable agent test of those emotions, which is reversible in a very short duration, and all or most analysts (and political academics) can agree.

The most disputable signature melody meta-investigation in current political talk, including capital punishment, firearm guideline, early termination, government assistance, clinical consideration, a dangerous atmospheric devotion, same-sex marriage, against segregation measures, migration, instruction, restraint schooling, charge strategy, president, and so on was remembered for conduct, re-appropriating, effort strategies, clinical Maryjane. People do not have evidence that this list includes all conceivable political topics, but as stated, Halfway chose to restrict philosophical departure, very limited. In Choice of problems without a pen delegate, it's virtually undetectable. Nonetheless, there is grounds to think that sectarian prejudice differs according to political topic and time, and that these differences may offer valuable information about drivers and limit conditions. In any case, given the consistency of research findings across a broad variety of subjects, the most deductively justifiable views right now are that these particular kinds of hardliner biases are faultless and philosophically balanced.

CONCLUSION

Politicians and pundits often contrast the political opponents' biased views with people side's objective evaluation of the facts in public discussion. Instead, the meta-analysis indicates that political prejudice is a nonpartisan problem, and that individuals may just be better at detecting bias in others than they are in themselves. Nonetheless, if the results are generalised, minor Republican misbehaviour does not seem to have a major effect on Democratic trust. Finally, the fact profession concerned potential of the practises and results does not preclude the possibility of other kinds of bias in the practises and perceiving equality existing, just as terrible either.

Although researchers are suspicious of usage of an example to support the argument, researchers think that certain academics are similarity groups, particularly characteristics like reason and intelligence. In terms of normative standards of assessment, employing different criteria to evaluate information when it supports political views when it challenges them is an obvious problem. Still, it may be argued that a desire to adjust one's political views to fit the norms of significant social or cultural groups makes sense in terms of individual self-interest. Republicans would likewise be indifferent with minor Democratic misbehaviour.

Many academics have had the opportunity of utilizing clear logical facts to give fair responses to honest and problematic inquiries, as well as to serve as the foundation for proof-based arrangement suggestions. It's possible to propose it. In any case, the creator's results suggest that it is likely to be a stumbling barrier to this proposed layout. Ideological groups responded similarly to how they reacted preferentially to informal circumstances about logical facts, as the arbitrator's questioning showed. This study shows no indication that inspired thinking may assist in extortion, but the stimulated rating design is so powerful that further research into the public assessment impact of dirty creative news from governmental worries is required. It is essential to develop improved methods based on mental inquiry that begin to overcome political biases and build a less divided, more pleasant, and proof-based political culture.

In any case, evaluating the general responsiveness of watching to be as a method of supporting an ideological group is an essential first step. Consider a situation in which information concerning government misconduct is shared on a regular basis. What if the cheating is more

genuine? In this test, inspiring assessments of stunts did not transfer into articulations of awakened trust, but high degrees of openness made it feasible to move beyond the persuasive evaluations of stunts, articulating more broad political views.

REFERENCES

1. Ditto PH, Munro GD, Lockhart LK, Scepansky JA, Apanovitch AM. Motivated Sensitivity to Preference-Inconsistent Information. *J Pers Soc Psychol.* 1998;75(1):53–69.
2. Liu BS, Ditto PH. What Dilemma? Moral Evaluation Shapes Factual Belief. *Soc Psychol Personal Sci.* 2013;4(3):316–23.
3. Uhlmann EL, Pizarro DA, Tannenbaum D, Ditto PH. The motivated use of moral principles. *Judgm Decis Mak.* 2009;4(6):479–91.
4. Pronin E. Perception and misperception of bias in human judgment. Vol. 11, *Trends in Cognitive Sciences.* 2007. p. 37–43.
5. Simmons JP, Nelson LD, Simonsohn U. False-positive psychology: Undisclosed flexibility in data collection and analysis allows presenting anything as significant. *Psychol Sci.* 2011;22(11):1359–66.
6. Crawford JT. The ideologically objectionable premise model: Predicting biased political judgments on the left and right. *J Exp Soc Psychol.* 2012;48(1):138–51.
7. Abramowitz SI, Gomes B, Abramowitz C V. Publish or Politic: Referee Bias in Manuscript Review. *J Appl Soc Psychol.* 1975;5(3):187–200.
8. Eitan O, Viganola D, Inbar Y, Dreber A, Johannesson M, Pfeiffer T, et al. Is research in social psychology politically biased? Systematic empirical tests and a forecasting survey to address the controversy. *J Exp Soc Psychol.* 2018;79:188–99.
9. Tversky A, Kahneman D. The framing of decisions and the psychology of choice. In: *Experiments in Environmental Economics.* 2018. p. 173–8.
10. Simmons JP, Nelson LD, Simonsohn U. False-positive psychology: Undisclosed flexibility in data collection and analysis allows presenting anything as significant. In: *Methodological issues and strategies in clinical research (4th ed).* 2015. p. 547–55.

A REVIEW PAPER ON PESTICIDES

Dr Ashok Kumar*

*Sanskriti University,
Mathura, Uttar Pradesh, INDIA
Email [id: dean.soa@sanskriti.edu.in](mailto:dean.soa@sanskriti.edu.in)

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ABSTRACT

Insecticides used by farmers to prevent pests from decreasing the development and output of agricultural crops are known as agro-based pesticides. In order to produce more food on less land, farmers must be protected against pests, disease, and weeds, as well as have increased output per hectare. Pesticides are discussed in this article, as well as their benefits and drawbacks. The most often-used pesticide categories include insecticides, fungicides, fumigants, and rodenticides. Pesticides that function as modifiers are referred to as pesticides. Some pesticides are organism-specific, meaning they only kill certain pests. Pesticides, consequently, play an important role in decreasing disease and improving agricultural output all over the globe. As a result, it is essential to talk about the agricultural growth process, historical views, pesticide types and applications, as well as their behavior, contamination, and negative environmental effects. Pesticide overuse has the ability to wipe out biodiversity. Therefore, many birds, marine animals, and other species are endangered because of harmful chemicals. Farmers will be able to increase their production as well as their income by using these pesticides in the future, and they will be able to produce more food in less area.

KEYWORDS: Agriculture, Environment, Farmer, Food Quality, Pesticides.

INTRODUCTION

Humans use pesticides to protect their crops and improve the quality of their food. Insecticides are toxic chemical compounds, combinations of chemicals, or biotic agents that are released into the atmosphere to prevent, control, or eliminate the population of insects, weeds, rodents, fungi, or other pests(1). Pesticides are used to attract, entice, kill, or mitigate pesticides. They are not just employed in agricultural regions; they are also used in homes to control cockroaches, mosquitoes, rats, fleas, ticks, and other pests with sprays, poisons, and powders. As a result, pesticides are commonly discovered in our food, contributing to their presence in the air.

Chemical fertilizers are applied to soils to correct for mineral shortages and to provide extra chemicals required for the optimal growth of high-yielding cultivars(2). The use of plant growth regulators in agricultural operations, as well as research into plant tissue culture, has changed the pattern of plant development dramatically. Insects mostly destroy agricultural crops. A broad variety of plant diseases are caused by fungus and bacteria. Insect pests and plant diseases are thought to be responsible for up to 30% of yearly agricultural losses. If just half of the losses due to bugs are prevented, our country's food issue might be substantially eased. Pesticides are

chemical compounds used to kill pests such as insects, rodents, fungus, and invasive plants (weeds).

Pesticides are primarily employed for the protection of crops, the preservation of food, and the avoidance of vector-borne illnesses. They are also utilized in a variety of industries, including agriculture, forestry, aquaculture, food processing, transportation, and storage, as well as the processing, transportation, and storage of wood and other biological products. Pesticides are harmful to people's health and the environment.

Poisoning is estimated to be 13 times more common in poor countries than in developed countries, which consume 85 percent of the world's pesticide output. The majority of pesticide-related poisoning in underdeveloped countries may be ascribed to a lack of training in their usage, a lack of legal oversight, and a lack of attention in providing body protection during their administration. Even while all pesticides are transported in some manner via air, soil, and water, they have distinct distribution and persistence patterns in the environment.

Any organism that causes financial loss or affects the physical well-being of people is considered a pest. Pesticides are generally recognized to play a major role in agricultural development, since they may reduce agricultural losses while also increasing food quality and affordability. The urgent need to increase food production and fight insect-borne diseases(3). Plaguicides are pesticides that are intentionally put into the environment to kill, prevent, discourage, control, and eliminate insects, weeds, rodents, fungus, or other hazardous pesticides in farming, household, or industrial contexts, or to reduce insect populations. Pesticide serves as regulator or modifiers that work by destroying the pest. In the agricultural industry, insecticides are used to boost quality produce by reducing pests and pest-related diseases. Pesticide overuse and abuse have resulted in significant health issues, financial losses, and environmental issues. Cancer, birth defects, reproductive issues, liver, kidney, and neurological problems are only a few of the pesticide-related health issues. Insecticides, fungicides, fumigants, and rodenticides are the four most frequent pesticide categories. Pesticides have provided tremendous benefits in forestry, public health, the home sector, and, of course, agriculture.

Pesticides Types:

Several types of pesticides are shown in Figure 1.

Type of Pesticide	Target Pest
Fungicides	Fungi
Insecticides	Insects
Herbicides	Plants (weeds)
Nematicides	Nematodes
Rodenticides	Rodents
Acaricides/Miticides	Spiders, mites

Figure 1: Illustrates the types of pesticides(4)

1.1.1 Fungicides:

Fungicides, also known as antimycotics, are toxic substances used to kill or inhibit the growth of fungi. Fungicides are insecticides that kill or inhibit the growth of fungi and their spores. They can be used to manage fungi that cause plant harm, such as rust, mildews, and blights. They might also be used to keep mould and mildew at bay in other places(5). Fungicides work in a variety of ways, but the bulk of them damage fungal cell membranes or stop them from generating energy. Examples of antibiotics include cyproconazole, tebuconazole, triadimefon, Bordeaux combination, copper-oxychloride, tricyclazole, and others.

1.1.2 Herbicides:

It is a chemical substance used to kill or restrict the development of undesirable plants such as weeds and invasive species in residential and agricultural areas. To eliminate waste ground, nonselective herbicides are employed, which means they destroy any plant material that comes into contact with them. Chemical herbicides offer a number of benefits over mechanical weed control, including simplicity of application, which may reduce labor costs.

1.1.3 Nematicides:

Nematicide is a chemical used to kill plant parasitic nematodes. The most prevalent have been broad-spectrum toxicants with high volatility or other properties that encourage soil mobility. To eradicate the nematodes that wreak havoc on tobacco yields in agriculture(6). The Meloidegyne nematode infects the roots of tobacco plants, drastically reducing production. *Purpureocillium lilacinum* infests meloidegyne incognitia as a biological control agent. A strain of *P.lilacinum* has been discovered to produce proteases and chitinase, which may dissolve the shell of nematode eggs, allowing for the usage of nematophgi to limit infection connections.

1.1.4 Insecticides:

Pesticides are chemicals that are applied to one or more insect species to kill, damage, repel, or minimize their effects. Insecticides kill insects in a variety of methods. Some of them interfere with the insects' nervous systems, while others damage, repel, or control their exoskeletons in different ways. They may be packed in a variety of ways, including sprays, polishes, gels, and apples, to name a few. Each pesticide may provide a distinct danger to non-target insects, humans, animals, and the environment because of these characteristics.

1.1.5 DDT:

DDT is a pesticide that is widely used to keep insects at bay (diphenyl-dichloroethane). It was also used to keep insects out of crops, livestock, institutions, homes, and gardens. Due to the development of adaptive resistance, DDT is no longer effective in mosquito control.

1.1.6 Carbamates:

Carbonic acid derivatives with a – OCON = group in the molecule are known as carbamates. Three carbamates that are commonly used include carbofuran, propoxur, and aldicarb (Temik). Carbamate derivatives are also used in herbicides (phenyl carbamates, thiocarbamates) and fungicides (Di thiocarbamates). Carbamates are a kind of carbamate that is good against nematodes and snails. Carbamates have a one-of-a-kind action mechanism.

1.1 Benefits of Pesticides:

The primary and secondary benefits listed in Table 1 are not the same. The primordial benefits are recognised as a byproduct of immediate, less visible, or longer-term consequences of primary benefits, such as the protection of human, animal, and agricultural health, as well as the protection of recreational turf(7).

TABLE 1: ILLUSTRATES THE MAIN AND SECONDARY BENEFITS OF PESTICIDES

Primary benefits	Secondary benefits
1. Controlling pests and plant disease vectors:	Community benefits:
Improved crop/livestock quality	Nutrition and health improved
Reduced fuel use for weeding	Food safety/security
Reduced soil disturbance	Life expectancy increased
Invasive species controlled	Reduced maintenance costs
2. Controlling disease vectors and nuisance organisms:	National benefits:
Human lives saved	National agricultural economy
Human disturbance reduced	Increased export revenues
Animal suffering reduced	Reduced soil erosion/moisture loss
Increased livestock quality	
3. Prevent or control of organisms that harm other human activities and structures:	Global benefits:
Tree/bush/leaf hazards prevented	Tree/bush/leaf hazards prevented
Recreational turf protected	Recreational turf protected
Wooden structures protected	Wooden structures protected

1.2 Hazards Of Pesticides:

1.2.1 Effect of pesticide on health:

Humans are extremely sensitive to pesticide impacts due to their fundamental nature, haphazard use, or abuse. Although most people are affected by pesticide-tainted food, pesticides enter the human body by ingestion, inhalation, and skin penetration(8). Acute and chronic effects of the pesticide include skin irritation, headaches, pruritus, diarrhoea, stomach pain, nausea, vomiting, blindness, and others, as illustrated in Figure 2.

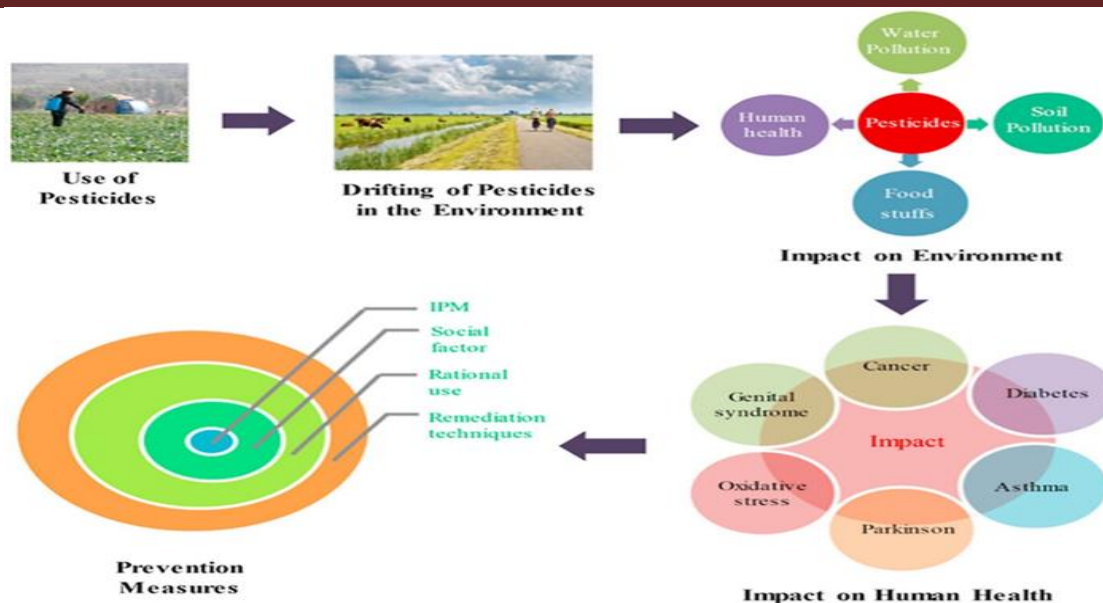


Figure 2: Illustrates the Complete Process of the Pesticides which affects human health(9).

1.2.2 Effect Of Pesticide over an Environment:

The majority of farmers and field workers are illiterate, and therefore used pesticides without adequate screening or knowledge, resulting in a variety of hazardous effects on the environment. They used a lot of insecticide after harming the crop because of the inconsistent screening. Finally, they remain in the ecosystem for a long time and pollute the environment, particularly the soil. The widespread use of pesticides also kills beneficial microorganisms, reducing soil's self-fertility. It is critical to have a practical grasp of pesticides' physical and chemical characteristics, as their solubility determines surface runoff movement and soil absorption capacity.

Pesticide resistance develops as a result of natural selection in numerous situations, posing a threat to non-target organisms and resulting in the mortality of such organisms. Pesticides that remain for a long period pose a threat to aquatic and terrestrial biodiversity. Pesticides are introduced into the aquatic ecosystem, where they operate as a toxic agent, posing a threat to aquatic plants and animals. Pesticides can contaminate soil, water, grass, and other vegetation. Birds, fish, beneficial insects, and non-target plants, among other things, can not only destroy insects and weeds, but also induce chemical toxicity. Insecticides are the most toxic class of pesticides in general; however non-target species may also be at risk. Figure 3 shows the impact of pesticides on environment.

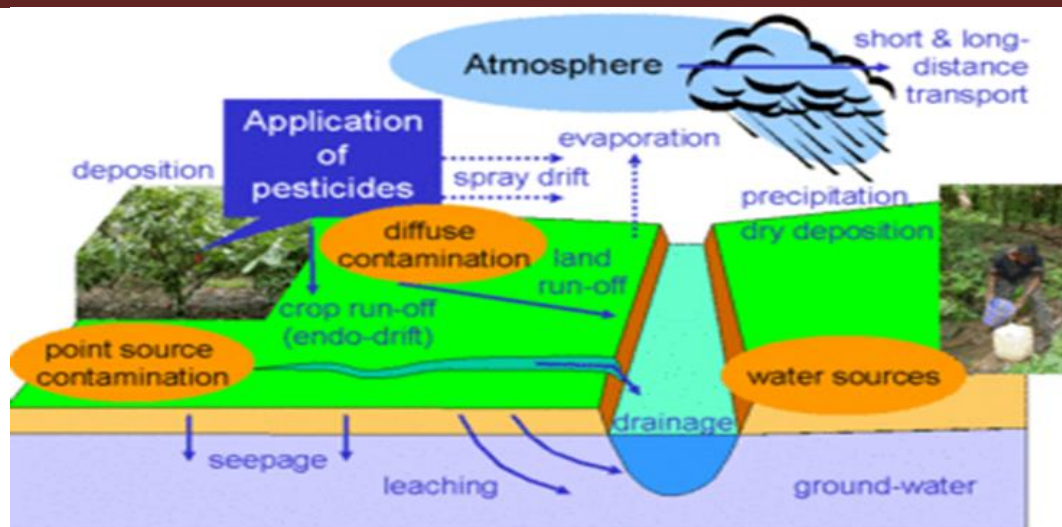


Figure 3: The above figure shows the impact of pesticides on environment which are harmful for crop and human beings(10)

3. DISCUSSION

Many pesticide kinds from different sources are covered in this page. Increased agricultural productivity, plant protection, and food preservation are just a few of the uses for these pesticides. Pesticides applied intelligently may ensure product quantity and quality, save money, and decrease labor expenses, while pesticides used irresponsibly can damage human health and the environment. Pesticides are categorized according to the pests they kill, their chemical composition, their route of entry, mode of action, and how or when they work to help kill certain pests, and their wide use is restricted. Pesticide categorization based on source of origin helps in the replacement of chemical pesticides with bio-pesticides since chemical pesticides are more harmful than bio-pesticides.

4. CONCLUSION

Pesticides offer a number of advantages, as shown by the previous research, including increasing crop yield on agricultural land (with less area), aiding plant development, and decreasing insect pests that negatively affect crop productivity. Although this improves economics and fulfills criteria, it has a detrimental effect on abiotic and biotic components due to increased pesticide exposure. The value of soil is decreasing, which has an effect on water quality, making it dangerous to aquatic animals and people, as well as pesticides, which have an environmental impact. Organic and inorganic pesticides that are environmentally friendly must be changed via research that helps the environment and is essential to all people. Pesticides have been shown to be helpful in a number of fields, including public health and agriculture. Pesticides kill mosquitoes, ticks, rats, and mice in homes, workplaces, shopping malls, and streets. Pesticide abuse results in soil contamination, water pollution, air pollution, and food contamination, among other things. Climate change has also resulted in the use of pesticides. Because of climate change, the amount and variety of pesticides may rise. Climate change has an effect on crop growth, climatic conditions, insect pest migration and dispersion, changes in pest abundance, pest quantity and vector dissemination, weed evolution, and disease stimulation. Pesticide contamination, as well as its negative consequences for non-target species and the environment,

must be controlled. In order to better understand pesticide usage and management in the future, these studies should focus on occupational and environmental exposures, as well as pesticide health risk assessments. To prevent pesticide contamination, bio pesticides (Organic) should be developed alongside chemical pesticides. Organic insecticides have less harmful impacts on the environment and human health than conventional pesticides.

REFERENCES:

1. Hakeem KR, Akhtar MS, Abdullah SNA. Plant, soil and microbes: Volume 1: Implications in crop science. Plant, Soil Microbes Vol 1 Implic Crop Sci. 2016;(December):1–366.
2. Pandya Y. Pesticides and Their Applications in Agriculture. Asian J Appl Sci Technol. 2018;2(2):894–900.
3. Gyawali K. Pesticide Uses and its Effects on Public Health and Environment. J Heal Promot. 2018;6(June):28–36.
4. Types-of-pesticides-grouped-by-the-pests-they-control.
5. NIPHM PMD. Pesticide Classification on Use, Chemical Nature, Formulation, Toxicity and Action. Natl Inst Post Harvest Manag. 2009;1–123.
6. Akashe MM, Pawade U V, Nikam A V. Classification of Pesticides: a Review. Int J Res Ayurveda Pharm. 2018;9(4):144–50.
7. Maksymiv I. Pesticides: Benefits and Hazards. J Vasyl Stefanyk Precarpathian Natl Univ. 2015;2(1):70–6.
8. Kim KH, Kabir E, Jahan SA. Exposure to pesticides and the associated human health effects. Sci Total Environ. 2017;575:525–35.
9. Process of pesticides affects human health.
10. Impact of pesticides on environment.

RICE PRODUCTION IN WATER-DEFICIENT REGIONS

Durgesh Nandan*

*Sanskriti University,
Mathura, Uttar Pradesh, INDIA
Email Id- durgesh.ag@sanskriti.edu.in

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ABSTRACT

Rice output in Asia must grow to feed the people constantly. Although the water scarcity in Asia's rice production is yet fully assessed, there are evidence that decreasing water quality and water availability threatens the sustainability of the irrigated rice system. Drought is one of the main constraints of high yields in rain-fed rice. In Asia, food safety and environmental health must investigate methods to cultivate more rice with less water. This study analyses the entire strategy of the International Rice Research Institute (IRRI) to raising rice yields and decreasing water demand for rice cultivation, which encompasses genetics, breeding and integrated management of resources. Irrigation methods such as saturated soil cultivation and alternate wetting and desiccating will substantially decrease wasteful discharges while still improving the productivity of water. Another new technique for improving water productivity are being explored without compromising output. The C4 photosynthetic pathway is incorporated into rice to enhance yield per unit of water transpired, use genetic biotechnology to promote droughtresistance and create "aerobic rice" to obtain excellent, safe yields in unflooded soil.

KEYWORDS: Drought, Fertilizer, Irrigation, Rice Output, Water Productivity.

1. INTRODUCTION

Worldwide water shortages have worsened in recent years. Asian nations are under enormous pressure to reduce water use, since 90% of the total fresh water is diverted. Rice is considered a simple goal of water management since it grows on more than 30% of irrigated land and accounts for 50% of irrigation water. When conserved water is transferred to highly competitive regions it will help society and the environment by reducing the use of water in rice production. 10 percent reduction in irrigated rice volume would free about 150 000 million pounds of water in irrigated rice, or approximately 25 percent of the world's fresh water utilized for non-agricultural usage. On the other hand, rice is extremely sensitive to water stress. Attempts to limit the use of water in rice cultivation may result in poorer yields and further jeopardize Asia's food safety. Reduced water use for rice would lead to the shift from submergence to aeration in the soil aeration. Our goal is to develop new, socially acceptable, commercially viable and environmental-friendly rice-based systems which will enable the production of rice to be maintained or expanded when water availability decreases. This article analyses the present status of the water resources in rice-growing areas, as well as the benefits and disadvantages of producing more rice with less water(1).

The rice field may vary from continuously anaerobic to partly or even completely aerobic due to the advent of water-saving irrigation technology. This will make significant gains in water protection, organic soil turnover, fertilizer dynamics, carbon sequestration, soils and weed biodiversity and greenhouse gas pollution. Any such changes may be seen as helpful, for example, water reuse or decreased methane emissions, some of which may be regarded as negatives, such nitrous oxide surface release or soil reduction. The aim is to achieve effective integrated management of natural resources, enabling rice to grow economically with improved soil aeration while maintaining rice production, environmental services and sustainability(2).

1.1 Water Resources:

Rice may be grown in irrigated or rain-fed environments. Rain fed rice provides for about 45% of the world's rice supply. Drought was one of the main limitations in yield improvements presently amounting to an average of 2.3 t ha⁻¹ with 50% of rain-fed lowlands and all rain-fed highlands exposed to drought. Severe and moderate droughts occur regularly in mostly rain fed rice regions such as Northeastern Thailand, Laos, Central Myanmar, East and Northeast India(3).

About 75 percent of the rice supply comes from 79 million hectares of irrigated lowlands. The cultivation of rice depends mainly on precipitation for wet season plants with extra irrigation in the northern and central Chinese subtropical areas, Pakistan and north-west India. Irrigated rice is prevalent throughout the dry season in South China, South-East and East India as well as in South-East Asia. There is a lack of a thorough assessment of irrigation water availability in the irrigated rice area. Wet-season irrigated rice regions in northern China, Pakistan and Northern and Central India may experience a "physical water shortfall" by 2025 according to the water scarcity maps of the International Water Management Institute. Moreover, more than 2 million hectares of irrigated rice produced in central India in the dry season will be physically scarce. The 'economic watershed' area covers the bulk of South and South-East Asia's roughly 22 million acre of dry season irrigated rice fields. However, since IWMI estimations of water scarcity are based on the yearly water balance, an overestimation of water supply may occur during the dry season. Water is still limited throughout the dry season, since a lack of rain makes irrigation problematic. In dry season, 'physical water shortage' may affect rice regions in the 'economic water scarcity' region(4).

Data have revealed that rice production regions are currently dominated by water scarcity. The overuse of groundwater in China and South Asia in recent decades has caused considerable problems. Groundwater tables decreased by an average of 1–3 m per year in Punjab, Haryana, Rajasthan, Maharashtra, Karnataka and Northern Gujarat and rough Southern Rock in India by around 1 m per year. This has led to increased pumping costs, saline penetration, contamination from fluoride, land decrease and sinkholes. These major groundwater depletion zones are impacted by the rice wheat producing regions of northern India as well as the rice-growing areas of Tamil Nadu, Pakistan and China. In the Ganges Delta of Bangladesh, overdrawing soil water permits wells to dry up in rice-producing regions during the dry season, while regeneration of water levels during the rainy season. The emergence of toxic arsenic in this area is a specific issue associated with decreased groundwater levels(5).

Strong upstream water use along many of Asia's major rivers is exacerbating water shortages downstream. Since 1972, the China Yellow River has been almost dry last year, covering 4600 kilometers over some of Asia's richest farmland. The final 600 kilometers went dry in 1997 for

more than four months because of the high demand for their water. The government of China has prohibited the cultivation of flooded rice in Beijing. The Ganges and Indus Rivers have little or no discharge to the sea in the dry season in South Asia. It is not so dramatic, but more important, that intense rivalry among States and other industries for rice producing regions creates water shortages in South India's Cauvery and in Chao Phraya in Thailand(6).

In addition, irrigated rice growing faces competition from other sectors. The Chinese irrigated rice field decreased by four million hectares during the 1970s and 1990s. Although the decline in irrigated rice cannot be stated simply because of a lack of water, there are indications that the decline in the area is related to the reduction in water carried into irrigated rice. The 160,000 hectares of irrigation system in Zhanghe for example was dominating until the 1980s when water was irrigated. Then Zhanghe River water has been utilized progressively to meet increasing urban and industrial demand for water and generation of hydroelectricity. The allotment of agricultural water in the late 1990s fell to about 20 percent. The irrigated rice area fell by about 20 percent in the 1990s compared to the 1980s. As a consequence, rice yield was also restricted. There are similar examples of increased competition throughout Asia. Water from the Angat River in the Bulacan Province of the Philippines is progressively being redirected to Manila, decreasing downstream agricultural water supplies. The poor water quality worsened by industrial waste threatens the availability of water in other regions. Upstream sediments and mining pollutants have poisoned water on the Agno River in the Pangasinan Province(7).

2. LITERATURE REVIEW

Researchers explain how the rice production in Sub-Saharan Africa may be maximized by increasing the grain yield per kg of the applicable N (alternatively AAE the N), from fertilizer input. The i.e. AAE N values we summed up indicate wide geographical variances within small regions as well as a certain gap between the top scholars' studies and smallholder farms. Experimental results show that soil components such as P, S, Zn, Si and Fe, both irrigated and plumed, may be more different spatially from one another AE to the next. In rainfed agricultural systems, too, there are differences in small scale topography that influence take »take AE N« via dynamic changes in hydrology and variations in soil organic carbon and clay content. Recent agrarian advances have opened the way to integrating the micro-topographical and land associated factors into the field-specific fertilizer management, while more study is needed into the connection between soil characteristics and fertilizer input responses. These resources include utilizing low-cost UAV systems for micro-topography collection, a high-resolution soil nutrient characteristics database, the rise of fertilizer mixing facilities around SSA, and immersive decision support tools on the ground using mobile phones. Small dosage nursery fertilization is another way of increasing the oscillations between AE and N under difficult field settings in Sub-Saharan Africa(8).

Researchers examined Chinese farmers' difficulties in rice production. Chinese rice output has more than quadrupled in the last 5 decades, mostly owing to higher grain yields and larger seed lands. This growth has led to the development of high yield crops and improved agricultural management techniques, including nitrogen fertilizer and irrigation. However, rice has stalled in China during the past 10 years. By 2030 China's growing population will need to produce 20% more rice in order to provide for domestic requirements if per capita rice consumption continues at its present level. This is a difficult job, given that numerous changes and issues in China's rice production system limit the country's capacity to sustainably increase total rice output. Reduced

arable area, increasing lack of water, global climate change, manpower problems and increased market demand for high-quality rice are all significant issues. The main problems with rice production in China include tight genetic history, misuse of fertilizers and pesticides, irrigation infrastructure failure, overexploitation of crops and a weak extension system. Effective research methods can enable China to improve rice production in spite of these hurdles. These include the development of new varieties of rice with a high production potential, the improvement of tolerance for major diseases and insects and abiotic stress, including heat and drought, and the implementation of integrated crop management. We believe that China will achieve a long-term rise in rice output with the adoption of new technology and rice science(9).

Researchers have evaluated the International Rice Research Institute methods by utilizing genetics, breeding and integrated management of rice production resources to enhance rice production and decrease rice needs. Irrigation, including saturated soil cultivation and alternate weathering and drying, is substantially reducing wasteful water exhaust and improving water yield. However, the majority of current lowland rice cultivars lead to a reduction in yield. Additional techniques are being investigated for increasing water productivity without sacrificing yield. The photosynthetic mechanism of C4 is incorporated into rice in order to stimulate the production of water per unit, use molecular biotechnology to enhance tolerance to drought and create "aerobic rice" in order to obtain excellent and safe results for non-surfacing soils. As a consequence of the adoption of water-saving techniques, the rice field may shift from being continuously anaerobic to being partly or even entirely aerobic. The changes will impact water management, organic soil turnover, nitrogen dynamics, carbon sequestration, soil fertility, weed biodiversity, and greenhouse gas pollution. Although some of these changes are helpful, such as water management and reduced generation of methane, others are harmful, such as nitrous soil oxide emission or a decrease in organic soil matter. The goal will be to implement effective integrated methods to managing natural resources that enables profitable rice farming with enhanced soil aeration while maintaining rice-based ecosystem efficiency, environmental benefits and long-term sustainability. Rice production in Asia must increase to feed an increasing population. While a thorough water shortage assessment is currently lacking in Asian rice production, indications suggest that the decreasing water quality and a decreased water supply risk maintaining the irrigated rice system. Drought is a significant constraint on the production of rainfed rice. Exploration of methods to grow more rice with less water is essential for food safety and environmental preservation in Asia(10).

3. DISCUSSION

In Asia lowland rice is typically transplanted onto puddled lowland paddy fields directly. Sweeping, ploughing and puddling are the planning stages for paddy field. Pudding is used mostly for combating weeds, however, it also helps to absorb water, reduce soil permeability and level and transplant fields. Soaking is a one-off procedure that enables water to become saturated and to create a pounding water layer on the top floor. There are frequently "free cycles" between tillage operations and transplantation in large-scale irrigation systems which may increase the land planning time of up to 12 months. The cultivation grows from the moment of transplantation until the time of harvest. During this time, fields are typically flooded with 5-10 cm of water. The last river runs 10 days before harvest.

Water is required in flooded settings in order to meet the surrounding and depletion surroundings (seepage (S) and percolation (P)) (evaporation(E) and transpiration (T)). The water head on the

field and the water resistance in the soil determine the flow rates of S and P. S and P frequently often merged as one word, i.e. SP, since in the field they are hard to differentiate. Since soil fractures do not completely close while the soil is soaked, SP may exceed 25 mm a day during the preparation of the soil. The typical SP values vary from 1-5 mm per day in hard clay soils to between 25-30 mm per day in sandy and sandy loam soils throughout the crop growing season. During land planning, only E takes place, whereas both E and T occur during crop development. Since the difference between E and T is difficult to detect during the development of crops, evapotranspiration is sometimes called (ET). In Asia, rice ET rates are typically between 4 and 7 mm daily.

3.1 Water Productivity:

Water productivity is referred to as the quantity of grain yield generated per unit of water. Water productivity may be characterized as grain yield per water unit evapotranspired (alternatively) or grain yield per unit of total water input (alternatively, the WP alle IP), depending on how the water flow is formed. • The total value in the field for the WP network varies between 0.4 and 1.6 g osteoporosis (field) under typical lowland circumstances, while in the (field) value for the WP network (support) values range from 0.20 to 1.1 g osteoporosis (-1). ÚltimaWP para ET shows the vast variety in rice yields and ET produced by changes in growing circumstances. Rice levels are just marginally smaller than other food crops such as wheat, such as C3. Rice levels are only slightly smaller. On the other hand, the rice possesses which is about half that of wheat. The low Rice is mainly owing to the significant unproductive outflows already mentioned (SP and E). In addition to the yield and size of field water outflows, the size and limit of the area in which water productivity is evaluated have a major effect on its relevance. This is because the outflow "losses" produced by S, P and drainage at one location in the research area may be duplicated. Water productivity data at different sizes may be used to evaluate if upstream water discharges are reused downstream. So far we have discovered just a few reliable water efficiency statistics at different dimensions in irrigation systems (Table 1). The findings indicate that water productivities are significantly different at levels higher than the field level and are within the range of field water productivity.

TABLE 1: PRODUCTIVITY OF WATER AS PER IRRIGATION, EVAPOTRANSPIRATION AND TOTAL WATER CONSUMPTION AT VARIOUS LEVELS.

Area (ha)	WP_{ET}	(WP_{IP})	WPI	Location
30–50	0.5–0.6	0.25–0.27	1–1.5	Muda irrigation system, Kendal, Malaysia
287–606	1–1.7	-	0.4–1	Zhanghe irrigation system Hunan, China
Over 10^5	-	0.5–1.3	1–2.5	-

3.2 Water Productivity Enhancement Techniques:

The increased water efficiency on the field level may be accomplished by (i) increasing water efficiency per unit of accumulated ET; (ii) decreasing unproductive water out-flows and depletions (SP, E); or (iii) improving rainfall usage. The latter method is economically and environmentally relevant since water to be irrigated may be augmented or completely substituted by rainwater.

3.3 Agronomic Practices and Development of Germplasm:

The creation of germplasm has helped to increase water efficiency in rice cultivation. Compared to traditional species, the novel 'IRRI species' have an increased water productivity by increasing yield and at the same time decreasing crop lengths by approximately three times (and therefore outflows of ET, S, and P). This is because, from 1966 to the beginning of the 1980s, the increase in production was followed by a decrease in the growing time, whereas cultivars which were introduced shortly after the mid-1980s were so longer than those issued after 1980. Water productivity will increase with greater establishment of tropical Japanese and hybrid rice.

Growers have been the most successful in using drought relief in low-fertility rain-fed environments that are prone to drought. Drought exposure is minimized by lowering crop duration or by minimizing the probability of water-deficit cycles coinciding with sensitive crop stages. Drought resistance breeding has advanced more slowly, and the difficulties frequently due to genetic diversity and environmental interaction of the trait. Drought-resistant cultivars were created and distributed in both highland and low-lying rainfed regions. Salt resistant cultivars of rice such as Ir51500 AC11-1 let us cultivate rice in areas where saline problems prohibit conventional lowlands from growing.

Improved agricultural technologies, such as the control of site-specific fertilizers, efficient weed management and adequate land levelling, would increase rice production significantly without compromising ET, possibly enhancing water efficiency.

3.4 Rainfall Use More Efficiently:

Dried rice innovation has a tremendous potential to conserve irrigation resources via increased rainfall successfully. Agriculturalists in transplanted and wet rice systems often wait for the distribution of canal water before land is started. Land preparation for dry seeded rice is carried out in dry or wet soil and begins with early monsoonal precipitation. Crop emergency and early growth typically occur early in the monsoon, and when canal water is available it is only watered later as required. However, all three cultivation activities have been shown to have a similar total water input and water productivity for the total water output. The advantage of dry seeding is that the farmers are allowed to produce an additional crop after harvest using leftover soil humidity or conserved irrigation water as a result of early planting. Early production and harvesting of dry rice in stringent rain-fed systems enable rice plants to prevent dryness in the late season, improve productivity and dependability.

RESULTS AND DISCUSSION

Saturated soil cultivation (SSC) requires efficient field water management and repeated, labor demanding rounds of irrigation. In Australia, the test is conducted on raised beds in order to encourage SSC activities. The beds (120 cm wide) were soaked with water (30 cm width and 15 cm depth). Water savings were 34 percent compared to flooded rice while yield losses were 16-34 percent. SSC has been found in southern New South Wales, Australia to reduce both

irrigation-water input and return by little over 10%, while maintaining irrigation-water productivity. In this environment, the yield reduction owing to cold damage is likely for existing SSC species. The test results show that further study is necessary to determine the components of the water balance and that the disparities in total water use are to blame. In Malaysia, dry-sowed rice significantly increased irrigation water production over wet seed and transplanted rice inside the Muda irrigation system (Table 2).

TABLE 2: MEAN $\pm$ SE OF WATER PRODUCTIVITY AND GRAIN YIELD.

Parameter	WS ISU	DS ISU	TP ISU
Yield	4.50 $\pm$ 0.23 ^{a,b}	4.14 $\pm$ 0.17 ^b	4.79 $\pm$ 0.23 ^a
WP(I)	0.62 $\pm$ 0.30 ^b	1.48 $\pm$ 0.26 ^a	1.00 $\pm$ 0.30 ^b
WP(I+R)	0.26 $\pm$ 0.02 ^a	0.27 $\pm$ 0.02 ^a	0.25 $\pm$ 0.02 ^a
WP(ET+E)	0.42 $\pm$ 0.02 ^a	0.38 $\pm$ 0.02 ^a	0.39 $\pm$ 0.02 ^a
WP(ET)	0.53 $\pm$ 0.04 ^b	0.48 $\pm$ 0.03 ^b	0.61 $\pm$ 0.04 ^a

The benefits of growing rice over raised beds with SSC may be used in a rice wheat system to post-rice plants such as wheat. The structure of the soil and water logging due to spring irrigation and winter rains always restrict crop production following rice. A structure of beds may assist drain a post-rice crop.

Lowland rice ecosystems with irrigation have a particular characteristic: soil submergence. Lowlands, which produce two or three rice harvests each year on submerged soils, are extremely sustainable, as shown by their continued nutrient supply, soil carbon levels and rice production pattern. On the other side, prolonged soil submergence promotes the anaerobic breakdown of organic matter, which produces methane, which is an important greenhouse gas. Methane emissions, such as those utilized in AWD, may be decreased by brief soil aeration. Long-term aeration of the soil, such as in aerobic rice, will further decrease methane emissions. In contrast, soil aeration will boost the emissions of greenhouse gas nitrous oxides. The potential of the soil redox, an indication of soil oxidation, is strongly associated with the release of methane and nitrous oxides. The proposal is that all methane and nitrous oxide emissions may be minimized by maintaining the redox potential between -100 and $+200$ mV. An important area of study is to assess if water-saving technologies can reach such an intermediate ground redox potential.

The condition of soil organic matter and the potential supply of nutrients would be affected by increased aeration of AWD soils and aerobic rice. It may also make conservation of agricultural residues more difficult. The more aggressive weed flora linked with water-saving technologies may need more pesticide dependency and endanger the environment. How much water and how much soil is required for productivity and services of rice ecosystems may be important problems for water-saving technology.

4. CONCLUSION

Rice growth is expected for decades in permanently flooded fields, however the rising water scarcity will influence rice growing in the future. Researchers examine water-saving irrigation methods, such as alternate weathering and drying, explored in the early 1970s (AWD). The key

components for implementing these innovations appear to be in order. However, the adoption of these advances was slow, with the exception of China. The goal is to identify the environmental and socio-economic variables that allow farmers to exploit them. Our research is far from complete in this field. However, we can identify important variables that affect the desire of farmers to use water-saving technology.

Water is seldom traded on Asian markets, as are fertilizers and pesticides, and governmental irrigation water payments are frequently minimal or inexistent. Because of this, farmers are discouraged from utilizing water as a valuable resource. Farmers have little incentive to adopt water-saving technologies since water conservation cannot reduce agricultural expenses or increase income. If water becomes a real commercial benefit, farmers are more inclined to adopt water-saving technologies. According to data farmers in Asia, such technology is already used to cope with high water expenses. In certain parts of China, different kinds of AWDs and reduced floodwater depths were widely implemented, where farmers get paid for the water they utilize. In north-central India, farmers who use pumps to water their crops are using some kind of AWD to save pumping money. Farmers have also been shown to be able to undertake water conservation measures in Australia to allow farmers to sell their water rights to others.

REFERENCES:

1. Tsujimoto Y, Muranaka S, Saito K, Asai H. Limited Si-nutrient status of rice plants in relation to plant-available Si of soils, nitrogen fertilizer application, and rice-growing environments across Sub-Saharan Africa. *F Crop Res.* 2014;
2. Khan A, Hamayun M, Kang SM, Kim YH, Jung HY, Lee JH, et al. Endophytic fungal association via gibberellins and indole acetic acid can improve plant growth under abiotic stress: An example of *Paecilomyces formosus* LHL10. *BMC Microbiol.* 2012;
3. Roychoudhury A, Paul A. Absciscic acid-inducible genes during salinity and drought stress. *Adv Med Biol.* 2012;
4. Adamson P, Bird J. The mekong: A drought-prone tropical environment? *Int J Water Resour Dev.* 2010;
5. YanMei P, Chao C, ZhenFeng M. Impacts of future climate change on climatic resources and production potential during growth period of rice in Sichuan Province. *J Northwest A & F Univ - Nat Sci Ed.* 2015;
6. Singh KM, Singh RKP, Jha AK, Kumar A, Kumar A, Meena MS. Feed and Fodder Value Chains in Bihar: Some Empirical Evidences. *SSRN Electron J.* 2013;
7. Giribabu M. FOOD AND NUTRITIONAL SECURITY IN NORTH EAST INDIA-SOME CONTEMPORARY ISSUES. *Int J Dev Res.* 2013;
8. Lathvilayvong P, Schiller JM, Phommasack T. Soil limitations for rainfed lowland rice in Lao PDR. *Breed Strateg Rainfed Lowl Rice Drought-prone Environ.* 1996;
9. Tsujimoto Y, Yamamoto Y, Hayashi K, Zakaria AI, Inusah Y, Hatta T, et al. Topographic

distribution of the soil total carbon content and sulfur deficiency for rice cultivation in a floodplain ecosystem of the Northern region of Ghana. F Crop Res. 2013;

- 10.** Fageria NK, Baligar VC, Moreira A, Portes TA. Dry bean genotypes evaluation for growth, yield components and phosphorus use efficiency. J Plant Nutr. 2010;

PRICE RISK MANAGEMENT OF TURMERIC COMMODITY FUTURES (NCDEX) AND SPOT MARKET

Ravi Prakash Siddavatam*; S. Appa Rao**

* Senior Faculty,
GP Education, SRM University AP, Amaravati, Vijayawada,
Andhra Pradesh, India;

Email id: raviprakashsiddavatam@gmail.com

** Principal,
Avanthi PG College, Dilshuk Nagar, Hyderabad,
Telangana, India;
Email id: dr.s.apparao@gmail.com

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ABSTRACT

The present study is time series analysis on daily closing prices for six year of turmeric futures (NCDEX) and spot market prices in Nizamabad. Price discovery and price risk management are important goals/ aim of this paper. The future and spot prices of turmeric commodity for six years are studied by using Unit Root test, Johansen Co-integration test, Granger Causality test, VECM, Wald test, Variance Decomposition test & Impulse Response Graphs by using Eviews software Version 10. Futures are unbiased predictor of spot and this is the hypothesis that has been tested by using above econometric tools. Both market prices are well integrated and have relation in short and long terms. It emphasis on continuation of turmeric futures for better price risk management of traders in India.

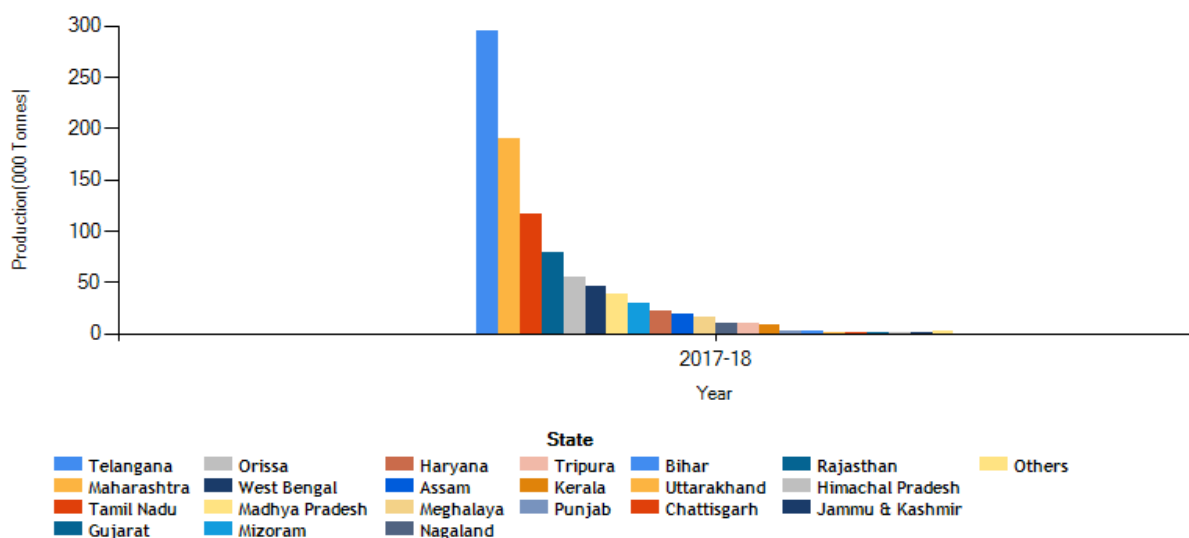
KEYWORDS: *Futures, Spot, Price Discovery, Price Risk, Co Integration, VECM, Stationarity, Lag.*

INTRODUCTION

Turmeric is an important spice grown in India since ancient times. It is referred as Indian saffron and commonly called as Haldi. Turmeric scientifically known as ‘Curcuma longa’ and it belongs to the family of ‘Zingiberaceae’. Turmeric is used as condiment, dye, drug and cosmetic in addition to its use in religious ceremonies. India is a leading producer and exporter of turmeric in the world. The chain of events of turmeric production are: Harvesting → Cooking → Curing → Drying → Polishing → storing → Shipment.

Turmeric production in India is about 80% of total production in the world. Telangana, Maharashtra, Tamil Nadu, Gujarat, Orissa, West Bengal, Madhya Pradesh are some of the important states cultivating turmeric. Turmeric cultivation in India is a good business.

Figure:1: State-wise turmeric production Graph



Indian Production of Turmeric

TABLE 1: STATE WISE TURMERIC PRODUCTION DURING 2017-18

S.NO	State	Production (000 Tones)	Share (%)
1	Telangana	294.56	31.12
2	Maharashtra	190.09	20.08
3	Tamilnadu	116.00	12.25
4	Gujarat	78.91	8.34
5	Orissa	54.50	5.76
6	West Bengal	45.50	4.81
7	Madhya Pradesh	39.05	4.13
8	Mizoram	29.82	3.15
9	Haryana	22.00	2.32
10	Assam	19.17	2.03
11	Meghalaya	16.50	1.74
12	Nagaland	10.19	1.08
13	Tripura	10.08	1.06
14	Kerala	8.82	0.93
15	Punjab	3.19	0.34
16	Bihar	2.83	0.30
17	Uttarakhand	1.74	0.18
18	Chattisgarh	0.96	0.10
19	Rajasthan	0.47	0.05
20	Himachal Pradesh	0.12	0.01

21	Jammu & Kashmir	0.01	0.00
22	Others	2.14	0.23
	Total	946.65	

Source: National Horticulture Board (NHB).

[https://agriexchange.apeda.gov.in/India_Production/India_Productions.\(Ref.16\)](https://agriexchange.apeda.gov.in/India_Production/India_Productions.(Ref.16))

Turmeric Futures Trading In NCDEX:

Turmeric futures are traded in NCDEX since 2004. Turmeric commodity is one of the highly traded commodity in agriculture segment of NCDEX and it has regular berth in 'Nkrish' index (earlier known as Dhaanya index) of NCDEX. Turmeric weight in Nkrishi index is 3%.

Nizamabad of Telangana state is the biggest Spot market for Turmeric. The price arrived by pooling method in this spot market is taken as convergence price for settlement of turmeric futures contract at the maturity of the futures contract.

The important terms and conditions of Turmeric Futures contract in NCDEX are given in Table:2

Table 2: Futures Contract Specification of Turmeric	
Ticker symbol	TMCFGRNZM
Basis of price of the contract	Unpolished turmeric fingers Nizamabad quality.
Unit of trading	5 Metric Tons
Delivery unit	5 Metric Tons
Maximum Order Size	250 Metric Tons
Quotation/base value	₹ Per Quintal
Tick size of trading system	₹. 2/-
Delivery Centre of commodity	Nizamabad
Delivery Logic follows for contract	Compulsory delivery
Initial Margin	4%

REVIEW OF LITERATURE

Iyer and Pillai (2010) have examined whether futures market play a dominant role in the process discovery process. They used Threshold vector auto regression for six commodities. They found that commodity futures prices play sheet anchor role in the price discovery process. They observed that for copper, gold and silver, the rate of convergence is almost instantaneous during the settlement week of contract. Futures acts as an effective hedging tool. The convergence worsens during the expiration week for Chickpeas, nickel and rubber indicating the non-usability of futures contract for hedging. [1]

Kushankur Dey, Debasis Maitra, & Shiladiya Roy (2010) in their study "Market Efficiency and Volatility on Indian Pepper Futures Markets". They tried to model volatility spill over in Indian Pepper futures and spot markets employing Johansen's co-integration test, VECM, Granger Causality and Variance Decomposition test. They had drawn inference from the study that unidirectional causality has been observed in case of pepper futures market. The adjustment of

innovation or shocks in future market is relatively faster than that of spot markets. For volatility modelling, they have employed models with their specifications, namely EGARCH (2,2), EGARCH (3,3), MGARCH (diagonal VES & BEKK) for spot and futures prices series of Pepper. The study concluded that unidirectional spillover had been observed under EGARCH (2,2) model and results obtained through EGARCH (3,3) model were not impressive. News impact curve shows the steeper movement on the logarithmic conditional variance of futures and spot return series, which was due positive shocks rather than that of negative shocks. Conditional correlation seems to be dynamic in nature and the correlation between pepper spot and futures has been observed the temporal changes. [2]

VJayagurunathan, P.S.Velmurugan, P.Palanichamy,(2010) in their Research article “An empirical analysis of price discovery in gold spot -futures market: Evidence from Multi commodity Exchange of India Ltd” used co-integration, VECM to examine the price discovery in gold. They observed that spot market is informally more efficient than the underlying future market. Spot market leads the future market for price discovery. The leading role of future market weakens around the firm specific announcement. Futures market is not in immature stage, which has been started from 2003. Still many traders and investors are confused about their new market. Derivatives are complex. New traders and investors are still facing difficulty to entry in the futures market. Hence, spot market leads futures market. [3]

Jabir Ali, Kriti Bardhan Gupta, (2011) studied the long term relationship between futures and spot prices of Agri-Commodities like Soy bean, Castor seeds, chickpea, Pepper, Maize, Black Lentil, Maize and found that there is co-integration between Futures and Spot prices of these commodities trade. There was short term relationship between them and the futures market had ability to predict the spot prices for chickpea, castor seeds, soybean and sugar. There was Bidirectional relation in the short run among the Maize, Black Lentil and pepper. [4]

Srinivasan (2012) examined the price discovery process and volatility spillover of Indian futures-spot commodity market through Johansen co-integration test, VECM, and bi-Variate EARCH model. He observed that the commodity spot markets of MCX Comdex, MCX AGRI, MCX ENERGY and MCX METAL serve as effective price discovery vehicle. Further, the volatility spillover from spot to futures market are dominant in case all MCX commodities. [5]

Kushankur Dey, Debasis Maitra (2012) conducted studies on Pepper commodity to examine price discovery process by using econometric tools like Granger Causality, Co-integration, Error correction model. They observed unidirectional causality from Futures to Spot in paper trade. [6]

Nazlioglu et al (2012) examined whether volatility in oil prices has any explanatory impact on the volatility in agricultural commodity prices. The study investigated volatility spillover between oil and selected agri commodities (Wheat, Corn, Soybean and Sugar) that are key agricultural products for biofuel and for food in the world. They observed that risk transmission between oil and agricultural commodity markets in the pre-crisis period, but the oil market volatility spills on the agricultural market in the post post-crisis period (exemption of Sugar). The study reveals that local measures to suppress price uncertainty in agricultural markets may not be effective in short run. [7]

Prashant Atma, Venu Gopala Rao (2013) conducted a study on Commodity derivatives in India: A Study of COMDEX. They used the Vector Error Correction Model & Granger causality test

and concluded that the average future prices are greater than the average spot prices due the fact that the Comdex is a combination of both perishable and non-perishable commodities. The futures showed leadership in the markets. [8]

Dr. S. Nirmala, & K. Deepthy (2016), in their article “Price discovery in commodity markets: a study of precious Metals market in Multi Commodity Exchange” analyzed the price discovery of Gold and Silver market of MCX during 2014 to 2016 by using co-integration vector, VECM. They observed that Gold has unidirectional causality relationship from futures to spot market in long run, whereas there is a bidirectional relationship in short run. In case of Silver, there is a bidirectional causal relationship between spot and futures in long run, and unidirectional relationship from futures to spot in short run. [9]

Tanushree Sharma (2016) conducted a study on “the impact of Future trading on Volatility in Agriculture Commodity: A Case of Pepper”. She studied the pepper prices from 2004 to 2013 from NCDEX by ARCH & GARCH model. The results shows that residual the volatility in spot showed positive and significant relationship with unexpected open interest. Volatility in spot price is explained by open interest and trade volume. When there is sudden change unexpected open interest, it leads to a rise in volatility of physical market prices and is destabilizing. [10]

Arora and Chander (2016) in their studies made an endeavor to assess the futures trading impact on India market regarding Agricultural Commodities. The daily prices of Spot and Futures markets for a period of 5 years from 2011 to 2015 for Castor seeds, chana, Kapas and Turmeric, were integrated in to various econometric models to study the price efficiency in cash market and the effects of unpredictability spillover in agricultural commodities market in India with the help of Johansen co-integration test, VECM and Bivariate model of EGARCH (1,1) on NCDEX. The study observed that futures market of NCDEX is more proficient in terms of price efficiency and the information dissemination as compared to the spot market. Further, the study observed that the spillover information occurs from futures to spot market. Thus the futures market entails potential to explain underlying price in the cash market. [11]

Arora and Chander (2017) further, in another study made an effort to assess the futures trading impact on Indian market regarding agricultural commodities (Castor seeds, Mustard seed, crude palm oil and refined soy oil) for the period 2013-16. The empirical study findings reconfirmed that futures market of agricultural commodities is more proficient in terms of price efficiency and information disseminations as compared to the spot market. [12]

Dhandayuthapani and Pavitra (2017) examined the relationship of spot and futures prices in Crude oil and natural gas using ADF Test, PP test & Johansen co-integration test. The results implied the existence of relationship between spot and futures prices of commodity trade at Multi commodity exchange. [13]

Shilpa Lodha (2017) in their “A co-integration and Causation study of Gold prices, Crude oil prices and Exchange rate” used the tools ADF test, Johansen co-integration test and VAR model. It has been concluded in the study that a bidirectional causality exists between crude oil and exchange rate, whereas unidirectional Granger causality was found from crude oil to gold. Causation from crude oil to exchange rate and gold implies changes in the gold price may be monitored by movement in the oil price. The causation has been attributed to the logic to the logic that high oil prices is bad for the economy, which adversely affects growth and hence pushes down the stock prices. Investors look for gold as one of the alternative assets, due to the

inflation and negative impact on economy, there is negative impact on the exchange rate also. [14]

Karamjeet Kaur (2019) conducted a study on “Causality Relationship between spot and Futures Markets: Evidence from India.” She has used Unit Root test, co-integration Test, Granger causality test to find out causal relationship between spot and futures market of Bombay Stock Exchange. The result indicates that the existence of long-run stable relationship between spot index and futures contract index of Indian stock market. Granger causality test result suggested that the direction of causality is unidirectional running from spot prices lead to futures prices. The futures market does not play a role of price discovery vehicle for stock market. [15]

Objectives of the Study:

1. To find out whether any co-integration relation is happening between i). Daily Futures closing prices at NCDEX and ii). Daily Spot prices at its respective delivery center during the period December 2012 to December 2018 for Turmeric commodity.
2. To find out the lead-lag relationship between futures prices and spot prices of turmeric commodity in NKrishi Index of NCDEX.
3. To find how price discovery is happening in commodity markets during the period December 2012 to December 2018 in which market reflects the price information first.
4. To find how the variance decomposition is happening between the two markets prices.

RESEARCH METHODOLOGY

EViews Version-10 is used for the analysis. Author is licensed user of EViews software.

The data used in the study is Time Series data between 21/12/2012 to 20/12/2018.

There are only two variables in the data.

1. Daily closing price of Futures market of NCDEX.
2. Daily closing prices of Spot market of Deliver center.

The price series of eight selected agriculture products are studied.

Trend: Long-run characteristics in economic and financial data are usually associated with non-stationary in time series are called **trends**.

Cycles: Short term fluctuations are stationary times series are called **Cycles**.

Economic and financial times series can be viewed as combination of both trends and cycles. A shock to stationary time series would have an effect which would gradually disappear, leaving no permanent impact on the time series in the distant future. A shock to non-stationary time series would permanently change the path of the time series or would permanently move the activity to a different level. It would be either higher or a lower level.

Data Analysis & Interpretation Of Turmeric Futures And Spot Prices

Turmeric Futures contract are issued by NCDEX is for the period of 7 months. It starts on 21st of the launching month and ends on 20th settlement month. Usually, the near month expiry futures contracts highly liquid and hence, the futures price of nearest expiring month are taken for the

econometric analysis purpose. The corresponding spot market closing prices are obtained from the NCDEX website for the study. 1240 data samples pertaining 57 months Futures expiry contracts and its corresponding daily spot data used for the study. Delivery center for Turmeric commodity is Nizamabad. Delivery logic is compulsory delivery. The Turmeric futures details are given below:

Table 3 : Details of Futures and Spot price data of Turmeric				
Type of Trade	Ticker Symbol	Period for testing	No of settlement months	Number of observations
Futures	TMCFGRNZM	22.02.2013 to 20.12.2018	57	1240
Spot	---	22.02.2013 to 20.12.2018	---	1240

1. Unit Root Test:

ADF Test and PP test have been conducted to test the stationarity of the variables (Futures & Spot). Eviews automatically takes the lag suitable for the data.

Table 4: Hypothesis details		
Null Hypothesis	H_0	Data is not stationary or got unit root
Alternate Hypothesis	H_1	Data is stationary

1.1 Unit Root Test with Probability Values:

Table 5 shows the value of Test Statistic and its p-values of the variables (Futures and Spot prices) at level data & first difference data for ADF Test and PP test separately. It is mentioned in three phases. 1. Constant, 2. Constant & Linear trend & 3. None.

A) Level Data: This has been observed that all p-value are more than 0.05 (>5%) for level data, which indicates that the variables fail to reject null hypothesis (accepted the null hypothesis). Hence, this can be concluded that variables (Futures & Spot) are non-stationary at level (Raw data).

B) First Difference Data: Further, the data has been converted to first difference. ADF Test & PP Test are repeated with three phases. Table 5 results under first difference shows that the p-values are less than 0.05 (<5%) in all three phases of ADF test and PP test. This indicates that the null hypothesis has been rejected and alternate hypothesis has been accepted. Hence, this can be concluded that both the variables (futures and spot price) are stationary at 1st difference as per Probability values.

Table 5: Result of Unit Root Test with p-values of Turmeric Commodity		
Type of Test	ADF Test	Phillips Perron Test

Phase type / Data type	None	With Intercept	With trend & intercept	None	With intercept	with trend & intercept
I. Variable: Spot Closing price of Turmeric commodity						
A. Level data:						
T-Statistic (Probability)	0.088082 (0.7105)	-2.058651 (0.2618)	-1.988284 (0.6066)	-14.65423 (0.00000)	-14.65398 (0.00000)	-14.66082 (0.00000)
Conclusion	Non-Stationary	Non-Stationary	Non-Stationary	Non-Stationary	Non-Stationary	Non-Stationary
B. First difference data:						
T-Statistic (Probability)	-0.183922 (0.6199)	-2.118564 (0.2374)	-2.376305 (0.3918)	-48.09338 (0.0001)	-48.07645 (0.0001)	-48.06188 (0.0000)
Conclusion	Stationary	Stationary	Stationary	Stationary	Stationary	Stationary
II. Variable: Futures Closing prices of Turmeric commodity						
A. Level Data						
T-statistic (Probability)	-0.469356 (0.5123)	-2.168939 (0.2180)	-2.266032 (0.4518)	-0.470253 (0.5119)	-2.210759 (0.2026)	-2.334617 (0.4142)
Conclusion	Non-stationary	Non-stationary	Non-stationary	Non-stationary	Non-stationary	Non-stationary
B. First difference data:						
T-statistic (Probability)	-35.80785 (0.0000)	-35.79355 (0.0000)	-35.78173 (0.0000)	-35.80154 (0.0000)	-35.78748 (0.0000)	-35.77585 (0.0000)
Conclusion	Stationary	Stationary	Stationary	Stationary	Stationary	Stationary

1.2 Test of value of Coefficient ADF Equation & PP Equation:

The coefficient of variables of Futures and Spot of ADF and PP equation is given Table 6. As per guidelines of Eviews, the value of the coefficient should be negative. This has been observed that Coefficient is negative in all cases. The shows that the unit root test is a good fit as per guidelines of Eviews.

1.3 Examining test statistic with Critic Values:

The ADF test and PP test reports are examined for test statistic value with critical values at 1%, 5% & 10%. The absolute value of test statistic is less than critical values, which indicates that the null hypothesis is failed to reject (Null hypothesis accepted), i.e. the variable are non-stationary at level (Table 7).

Further, the tests repeated after converting the data in first difference. The absolute value of test statistic is more than the critical value in all cases, which indicates the null hypothesis is rejected, and the alternate hypothesis is accepted. Hence, this test statistic method concludes that the variables (Futures prices and Spot prices) are stationary at first difference.

From the above tests it can be concluded that the variables are non-stationary at level (raw data) and stationary at first difference. The data of the variables are fit for further econometric analysis.

Table 6 Results of Test static, Critical Values & Coefficient of Spot variable

Test Type	ADF unit test Statistic			Phillips Perron Test		
Phase type / Data type	None	With Intercept	With trend & intercept	None	With intercept	with trend & intercept
LEVEL DATA						
A. Coefficient	-5.62E-05	-0.008339	-0.009077	-0.000236	-0.011764	-0.014614
B.						
Trace Statistic	-0.088082	-2.058651	-1.988284	-0.183922	-2.118564	-2.376305
Critical Value						
1%	-2.566839	-3.435440	-3.965506	-2.566830	-3.435415	-3.965470
5%	-1.941080	-2.863676	-3.413460	-1.941079	-2.863664	-3.413442
10%	-1.616527	-2.567957	-3.128772	-1.616527	-2.567951	-3.128762
Conclusion	Non-Stationary	Non-Stationary	Non-Stationary	Non-Stationary	Non-Stationary	Non-Stationary
2 First difference data:						
A. Coefficient	-14.65423	-1.395341	-1.396668	-1.273796	-1.273804	-1.273815
B.						
Trace Statistic	-14.65423	-14.65398	-14.66082	-48.09338	-48.07645	-48.06188
Critical Value at						
1%	-2.566839	-3.435440	-3.965506	-2.566831	-3.435419	-3.965476
5%	-1.941080	-2.863676	-3.413460	-1.941079	-2.863666	-3.413445
10%	-1.616527	-2.567957	-3.128772	-1.616527	-2.567952	-3.128763
Conclusion	Stationary	Stationary	Stationary	Stationary	Stationary	Stationary

Table 7. Result of Test static, Critical Values & Coefficient of Futures variable for Daily Futures Closing price of Turmeric

Test Type	ADF test	Phillips Perron Test

Phase type / Data type	None	With Intercep t	With trend & intercep t	None	With intercep t	with trend & intercept
1. LEVEL DATA						
A. Coefficient	- 0.00025 9	- 0.007710	- 0.00877 0	- 0.00025 9	- 0.00771 0	-0.008770
<u>B.</u>						
Trace Statistic	- 0.46935 6	- 2.168939	- 2.26603 2	- 0.47025 3	- 2.21075 9	-2.334617
Critical Value 1%	- 2.56683 0	- 3.435415	- 3.96547 0	- 2.56683 0	- 3.43541 5	-3.965470
5%	- 1.94107 9	- 2.863664	- 3.41344 2	- 1.94107 9	- 2.86366 4	-3.413442
10%	- 1.61652 7	- 2.567951	- 3.12876 2	- 1.61652 7	- 2.56795 1	-3.128762
Conclusion	Non- Stationa ry	Non- Stationar y	Non- Stationar y	Non- Stationa ry	Non- Stationa ry	Non- Stationary
2 First difference data:						
A. Coefficient	- 1.01656 6	- 1.01657 4	- 1.01662 5	- 1.01656 6	- 1.01657 4	-1.016625
<u>B.</u>						
Trace Statistic	- 35.8078 5	- 35.79355	- 35.7817 3	- 35.8015 4	- 35.7874 8	-35.77585
Critical Vale at 1%	- 2.56683 1	- 3.435419	- 3.96547 6	- 2.56683 1	- 3.43541 9	-3.965476
5%	- 1.94107 9	- 2.863666	- 3.41344 5	- 1.94107 9	- 2.86366 6	-3.413445
10%	- 1.61652 7	- 2.567952	- 3.12876 3	- 1.61652 7	- 2.56795 2	-3.128763

Conclusion	Stationary	Stationary	Stationary	Stationary	Stationary	Stationary

2. Lag Selection Criterion:

Four out of five tests suggest lag of 7. Lag selection tests i.e. LR, FPE, AIC and HQ jointly suggest lag of 7 where the lowest value indicated by star (*) in the Table 8. Lag 7 will be used for the purpose of testing Cointegration, VECM, and Causality test. Etc.

Table 8: Lag selection Criterion						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-19038.13	NA	9.81e+10	30.98475	30.99307	30.98788
1	-15682.28	6695.327	4.19e+08	25.53015	25.55511	25.53954
2	-15618.44	127.1531	3.81e+08	25.43277	25.47438	25.44843
3	-15594.82	46.96242	3.69e+08	25.40085	25.45911*	25.42277
4	-15583.77	21.94341	3.64e+08	25.38938	25.46427	25.41756
5	-15576.26	14.89355	3.62e+08	25.38366	25.47520	25.41810
6	-15560.18	31.81611	3.55e+08	25.36400	25.47219	25.40471
7	-15539.64	40.58029*	3.46e+08*	25.33708*	25.46192	25.38405*
8	-15539.06	1.133774	3.48e+08	25.34266	25.48413	25.39589
9	-15537.64	2.796067	3.49e+08	25.34686	25.50498	25.40635
10	-15534.55	6.086132	3.50e+08	25.34833	25.52309	25.41408
11	-15532.41	4.192167	3.51e+08	25.35136	25.54277	25.42338

* Indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

3. Johansen's Co-Integration Test:

For examining Johansen's Cointegration test, it is mandatory that variables (Futures and Spot price data) are non-stationary at level and stationary at 1st differentiation. This has been confirmed from the Unit Root Test.

Table 9 shows the Johansen Cointegration test results for Trace test and Max Eigen Value test separately.

A). Trace test (Table 9, Part A) result shows that the p-value is less than 0.05. (<5%) for zero Cointegration equations. Thus, the null hypothesis is rejected. Further, the test has been conducted for at most 1 Cointegrating equations. The result shows that the p-value is less than 0.05 (<5%) for atmost 1 Cointegration equation. The null hypothesis has been rejected. Therefore, this has been concluded that there is neither none nor one, but there are 2 Cointegrating equation between the variables.

B). Max Eigen value test also shows that p-value is less than 0.05 (<5%) for zero cointegrating equation and hence, the null hypothesis has been rejected.

P-value for 'atmost one' Cointegrating equation is less than 0.05 (<5%). Hence, the null hypothesis has been again rejected. Therefore, this can be concluded that there are 2 Cointegrating equation is available between the variables.

C) Furthermore, Eviews report it self indicates that there exist 2 cointegrating equations

Table 9. Johansen's Cointegration Test						
Cointegration between Daily Spot prices and Daily futures prices of Turmeric						
Lag length selected	Cointegration test used	No. of Cointegrating equations (CES)	Eigen Value	Trace Statistic	Critical value at 5%	Probability **
1 to 7	A) Trace test	H ₀ : r =0(Nothing) *	0.032989	45.41221	15.49471	0.0000
		H ₁ : r<=1 (At most 1)	0.003310	4.084666	3.841465	0.0433
	B) Max-Eigen value test	H ₀ : r =0 (Nothing) *	0.032989	41.32754	14.26460	0.0000
		H ₁ : r<=1 (At most 1)	0.003310	4.084666	3.841465	0.0433
C) Eviews inference: Trace Test indicates 2 Cointegrating equations at the 0.05 level Max-Eigenvalue test indicates that 2 Cointegrating equations at the 0.05 level.						
In the above table one star (*) indicates: Rejection of the hypothesis at the 0.05 level						
Two Stars (**) indicates: MacKinnon-Haug-Michelis (1999) p-values .						

4. Granger Causality Test:

This test examines the lag-lead relationship between the variables at 0.05 level of significance using F test. It is a statistical proposition test for determining whether one time series is helpful in forecasting another one.

A) Granger causality test result (Table 10, Part A) shows that the p-value less than 0.05 (<5%) and the null hypothesis is rejected, which says that Spot does not granger cause Futures.

B) Granger causality test result (Table 10, Part B) shows that the p-value is less than 0.05 (<5%) and the null hypothesis is rejected, which says that Futures does granger cause Futures. (F→S).

Hence, it can be concluded that there is uni-direction of long run causal relation running from Futures to Spot for turmeric. $F \rightarrow S = \text{Futures} \rightarrow \text{Spot}$.

Table 10. Pair wise Granger Causality Test					
Lag:7					
Null Hypothesis	observ ations	F- statistics	proba bility	Inference	Direction of causality
A) TURMARIC_SPOT does not Granger Cause TURMARIC_FUTURES	1233	1.95334	0.0583	Accepted	F→S
B) TURMARIC_FUTURES does not Granger Cause TURMARIC_SPOT	1233	25.2324	2.E-32	Rejected	

5. Vector Error Correction Model (VECM):

I) Test of Long-term association:

The Cointegration criterion, if validated, facilitates the error correction model. This model has been identified that whether price discovery occurs in the market. The equilibrium relationship between the non-stationary variables is used to construct an Error Correction Model.

The lag length of 7 is applied as suggested by leg selection criterion.

A) VECM (with Futures is a dependent variable):

The VECM results (Table 11, Part A) shows that the coefficient of error correction term C(1) is negative and significant as p-value is less than 0.05 (<5%), when the Futures is dependent variable and Spot is independent variable. This can be concluded that there exists long run causality relationship from Spot prices to Futures prices in Turmeric trading during the test period.

B) VECM (with Spot is a dependent variable):

Further, VECM results (Table 11, Part B) shows that the coefficient of error correction term C(1) is negative and significant as p-value is less than 0.05 (<5%), when the Spot is dependent

variable and the Futures is independent variable. This can be concluded that there exists long run causality relationship from Futures prices to Spot prices in Turmeric trading during the test period.

From the VECM Test results, this can be concluded that there is **exists bi-directional long run** causality relationship between Futures variable and Spot variable for Turmeric during the test period.

Further, C(1) is the coefficient of Cointegrating model. It is also called error correction term or speed of adjustment towards equilibrium. The value of coefficient is high where the Futures is a dependent variable. This implies that even though there is bi-directional relation causality running between Spot and Futures prices in long run, the speed of adjustment of Spot towards equilibrium is more whenever there is any imbalance takes place.

System Equation Model:

1) VECM Equation (with Futures as dependent variable)

$$\begin{aligned} D(\text{TURMERIC\_FUTURE}) &= C(1)*(\text{TURMERIC\_FUTURE}(-1) - \\ &0.946093975403*\text{TURMERIC\_SPOT}(-1) - 275.12334528) + C(2)*D(\text{TURMERIC\_FUTURE}(-1)) \\ &+ C(3)*D(\text{TURMERIC\_FUTURE}(-2)) + C(4)*D(\text{TURMERIC\_FUTURE}(-3)) + \\ &C(5)*D(\text{TURMERIC\_FUTURE}(-4)) + C(6)*D(\text{TURMERIC\_FUTURE}(-5)) + \\ &C(7)*D(\text{TURMERIC\_FUTURE}(-6)) + C(8)*D(\text{TURMERIC\_FUTURE}(-7)) + \\ &C(9)*D(\text{TURMERIC\_SPOT}(-1)) + C(10)*D(\text{TURMERIC\_SPOT}(-2)) + \\ &C(11)*D(\text{TURMERIC\_SPOT}(-3)) + C(12)*D(\text{TURMERIC\_SPOT}(-4)) + \\ &C(13)*D(\text{TURMERIC\_SPOT}(-5)) + C(14)*D(\text{TURMERIC\_SPOT}(-6)) + \\ &C(15)*D(\text{TURMERIC\_SPOT}(-7)) + C(16) \end{aligned}$$

2) VECM Equation (with Spot as dependent variable)

$$\begin{aligned} D(\text{TURMERIC\_SPOT}) &= C(1)*(\text{TURMERIC\_SPOT}(-1) - \\ &1.05697745256*\text{TURMERIC\_FUTURE}(-1) + 290.799172633) + C(2)*D(\text{TURMERIC\_SPOT}(-1)) \\ &+ C(3)*D(\text{TURMERIC\_SPOT}(-2)) + C(4)*D(\text{TURMERIC\_SPOT}(-3)) + \\ &C(5)*D(\text{TURMERIC\_SPOT}(-4)) + C(6)*D(\text{TURMERIC\_SPOT}(-5)) + \\ &C(7)*D(\text{TURMERIC\_SPOT}(-6)) + C(8)*D(\text{TURMERIC\_SPOT}(-7)) + \\ &C(9)*D(\text{TURMERIC\_FUTURE}(-1)) + C(10)*D(\text{TURMERIC\_FUTURE}(-2)) + \\ &C(11)*D(\text{TURMERIC\_FUTURE}(-3)) + C(12)*D(\text{TURMERIC\_FUTURE}(-4)) + \\ &C(13)*D(\text{TURMERIC\_FUTURE}(-5)) + C(14)*D(\text{TURMERIC\_FUTURE}(-6)) + \\ &C(15)*D(\text{TURMERIC\_FUTURE}(-7)) + C(16) \end{aligned}$$

Table 11. VECM results of Turmeric Futures and Spot prices

Turmeric Dependent variable		Coefficient	Standard Error	t-statistic	Probability	Inference
A) Futures	C(1)	-0.046929	0.016433	-2.855872	0.0044	

B) Spot	C(1)	-0.076271	0.017076	-4.466625	0.0000	$F \leftrightarrow S$

6. Wald Test (Weak Exogenous Test): Test of short run association:

Wald test is test of short run causality between the variables. C(9) to C(16) of VECM equation are the coefficient of short run equation.

Table 12 Discretion of Hypothesis	
Null Hypothesis H_0	$C(9)=C(10)=C(11)=C(12)=C(13)=C(14)=C(15)=C(16)=0$
Alternate Hypothesis H_1	$C(9)=C(10)=C(11)=C(12)=C(13)=C(14)=C(15)=C(16) \neq 0$

The result of Wald test is given in the Table 13.

A. when the Futures is dependent variable and spot is an independent variable:

The result shows that the P-value is more than 0.05 (>5%). Hence, the null hypothesis has been accepted. i.e coefficient of variables is equal to zero. Therefore, there is no short run causality from Spot to Futures.

B. When Spot is dependent variable and Futures is an independent variable:

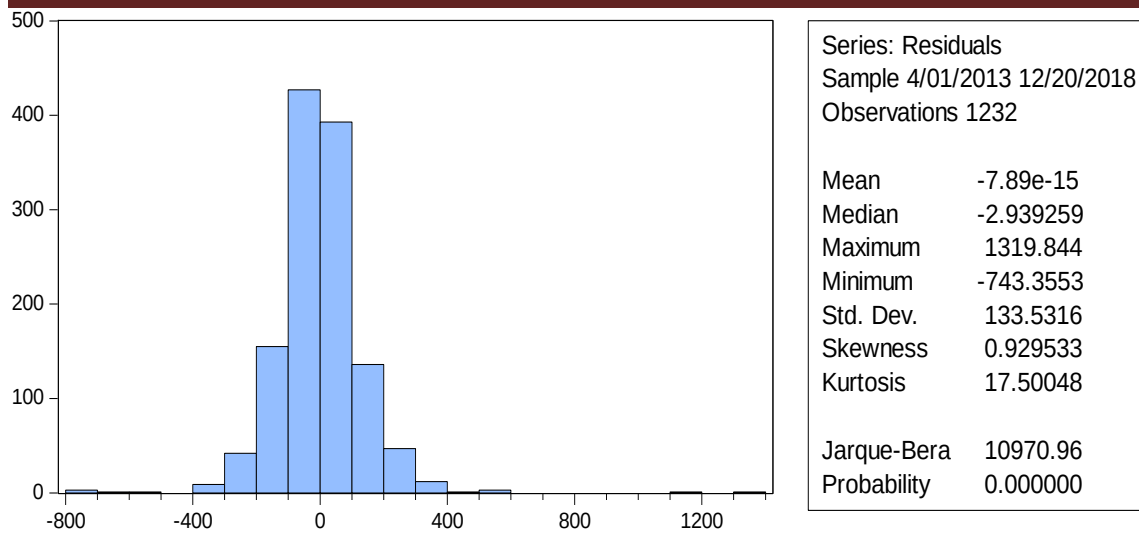
The result shows that the P-value is less than 0.05 (<5%). Hence, the null hypothesis has been rejected. i.e coefficient of variables is not equal to zero. Therefore, this can be concluded that there exists short run causality running from Futures to Spot.

Table 13. Results of Wald test (Weak Exogenous Test)					
Turmeric Dependent variable	Test statistic	Value	Df	Probability	Inference
A) Futures price	F-statistic Chi-Square	0.982499 7.859994	(8, 1216) 8	0.4479 0.4473	No short run causal relation
B) Spot Price	F-statistic Chi-Square	9.454779 75.63823	(8, 1216) 8	0.000 0.000	$F \rightarrow S$

7. Residual Diagnostic Tests:

A) Histogram Normality Test: Jarque Bera Test:

Table 14 H_0 : Normal Distribution



H_0 has been rejected as the p-value is <5%. It is not normally distributed. It is acceptable to Econometricians for further analysis.

B) Breusch-Godfrey Serial Correlation LM Test:

P-value is more than 0.05 (>5%), hence the Null Hypothesis is accepted. Therefore, there is no serial correlation in the model.

Table 15. Breusch-Godfrey Serial Correlation LM Test			
Null Hypothesis: No serial Correlation up to 7 lags			
Alternate Hypothesis: Serial correlation upto 7 lags			
F- Statistic	1.220575	Prob F(7,1209)	0.2881
Observed R-Square	8.645471	Prob. Chi-square (7)	0.2791

C) ARCH Test:

P-value is more than 0.05 (>5%), hence the Null Hypothesis is accepted. Therefore, there is no heteroskedasticity in the model.

Table 16. Heteroskedasticity Test: ARCH			
Null Hypothesis: There is no ARCH effect.			
Alternate Hypothesis: There is ARCH effect.			
F-statistics	0.149977	Prob F97,1217)	0.9940
Obs R-square	1.055833	Prob. Chi-square (7)	0.9939

8. Variance Decomposition Test:

Variance decomposition explain the percentage of forecasting error that can be explained with the help of variance in its previous behavior as well as the behavior of other series.

Forecast Error Variance Decomposition of Turmeric:

A. Variance decomposition of Spot:

The results of variance decomposition of Spot (Table 17) shows that a shock to Spot account for 88.63 % of the fluctuation in spot (own shock) on day 1. A shock to Futures can cause only 11.37% fluctuation to Spot.

A shock to Spot can cause 39.51 % fluctuation to Spot (own shock) on period.10, whereas a shock to Futures can cause 60.49 % on spot. This can be concluded from the result that the response of own shock of spot is coming drastically over the forecasting period and the fluctuation caused by futures on spot is increasing drastically over forecasting period.

Table 17. Variance Decomposition of Spot (%)

Period/ Variable	1	2	3	4	5	6	7	8	9	10
Spot	88.63	76.74	67.77	60.24	54.73	49.39	46.67	43.70	41.43	39.51
Future	11.37	23.36	32.23	39.76	45.27	50.61	53.33	56.30	58.57	60.49

B. Variance Decomposition of Futures:

The results of variance decomposition of Futures (Table 18) shows that a shock to futures account for 100 % of fluctuation in futures (own shock) on day 1. A shock to Spot cannot cause any fluctuation to futures on day 1. Further, a shock to Futures can cause 99.47% fluctuation to futures (own shock) on period.10, whereas even a shock to Spot can cause negligible fluctuation (0.53 %) on Futures.

It can be concluded from the results that the Turmeric Futures can cause highest fluctuation on both futures (own shock) as well as on spot on long term.

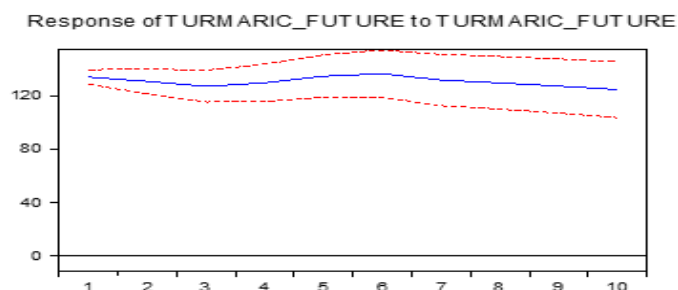
Table 18. Variance Decomposition of Futures (%)

Period/ Variable	1	2	3	4	5	6	7	8	9	10
Future	100	99.91	99.83	99.87	99.84	99.84	99.77	99.67	99.56	99.47
Spot	0.00	0.09	0.17	0.13	0.16	0.16	0.23	0.33	0.44	0.53

9. Impulse Response:

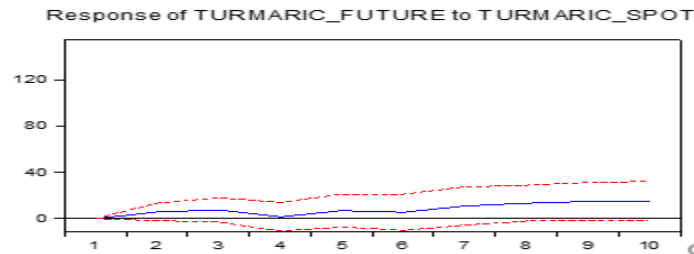
The impulse response explains the responsiveness of the endogenous variables in system to one Standard Deviation (SD) of positive shock to residuals. There are only two variables in the system. Period of response used in the rest is 10 trading days. Blue line indicates the impulse response line. Red line in the graph indicates 95% confidence interval.

Graph 1. Response of Futures to Futures:



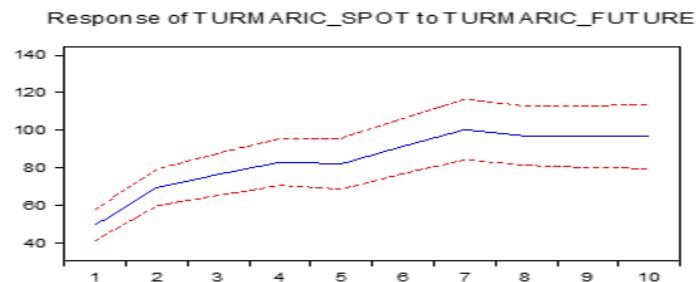
If there is one SD positive shock or innovation on Futures residuals, then there is high steady impact on Futures over the study period (own shock).

Graph 2. Response of Futures to spot:



If there is one SD positive shock to Spot residuals, then there is very small impulse response on Futures over the forecasting periods and zero impact on period 1 & 3. However, there is no negative impact.

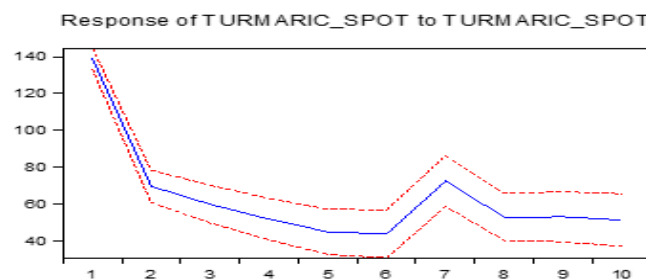
Graph 3. Response of Spot to Futures:



Response to 1 SD positive shock on Spot residuals to Futures:

The impulse response of spot to futures is steady growing till period 7, after that it stabilized at that level during the remaining period.

Graph 4. Response of Spot to Spot:



Response to 1 SD positive shock on Spot residuals to Spot (Own shock): Even though, the response is good in period 1, it starts declining over the remaining period. But again it increased on Period 7 and continue to decline after wards.

From the above, it can be concluded that the impulse response of spot for shock on Futures is high. Impulse response of futures to shock on spot is less. This indicates that the Futures dominate in the price discovery in Turmeric commodity market.

CONCLUSION

The Futures and Spot variables of Turmeric are non-stationary at level and Stationary at first difference. Thus, the Spot and Futures price data is fit for further econometric analysis, like cointegration test, VECM test, Granger Causality test etc. Lag of 7 is jointly suggested by four tests. i.e.LR test, FPE test, AIC test and HQ test. Hence, lag 7 will be used for further econometric analysis of turmeric data.

Johansen cointegration confirms that there are 2 Cointegrating long run equation. This is important from the point of view of trading participants that both the markets are properly co-integrated.

VECM confirm that there is two ways long run causation running between Futures and spot. The speed of adjustment from spot market towards equilibrium is 4.62% in long run, when there is any information/shock arises in the commodity market. Whereas the speed of adjustment from Futures market towards equilibrium is 7.62%. The speed of adjustment is more from Futures variable then that of Spot variable towards equilibrium for any imbalances/shocks that occurs in the market. Hence, there is good flow of information between Futures and Spot market. futures react faster to any impulse in the market.

Wald test confirm that there exist short run causality running from Futures to Spot as well as Spot to Futures. Wald test confirm the short run causality from both the Futures and Spot of Turmeric Commodity. Granger causality test confirms the is uni-direction of causality from Futures to Spot. (F→S). Therefore, we can conclude from the above three tests (VECM, Wald test, Granger Causality Test) that there exists long and short run causation and also leads to price discovery in the market. This information is crucial in making trade related decisions by stakeholders.

Variance decomposition and impulse response shows the factors that effects the Futures prices (like increase/decrease the trading margins, trading limits, taxes, cess etc.) will have more impact on Spot market prices. This shows that Futures are more dependable and fit for hedge price risk management and hedging. This model is more useful Turmeric Trader in both Spot and Futures markets that that impulse on Futures prices will impact in long run (8-10 days) rather than in short run (3 days). Impulse on Spot prices have negligible impact on Futures. According, the traders plan their trading strategies.

Breusch-Godfrey Serial Correlation LM Test confirms that there is no serial correlation. ARCH Test confirms that there is no hetroskedasticity. Both these tests indicate that model is good fit. Jarque Bera Test concludes that the residuals are not normally distributed, however, this results are acceptable by researchers. Overall, we can conclude that the model is good fit.

We can conclude that appropriate price discovery takes place in turmeric futures and spot markets. Turmeric Futures in NCDEX have all required characteristics to be continued in India and is fit for price risk management strategies.

REFERENCES:

1. Iyer, V. and Pillai, A., 2010, Price discovery and convergence in Indian market, Indian Growth and Development Review, 3, No.1, pp.53-61.
2. Dey Kushankur, Roy Shiladitya, (2010) Price Discovery, Market Efficiency and Volatility: Indian Pepper Futures Markets. <http://ssrn.com/abstract=1867850>.2
3. Jayagurunathan, V., Velmurugan, PS., Palanichamy, P., (2010), An Empirical Analysis of price discovery in gold spot-futures market: Evidence from Multi Commodity Exchange of India Ltd., Indian Commodity Market (Derivatives and Risk Management), Serial Publication, PP.1-32.
4. Ali Jabir, Gupta Kriti Bardhan (2011), Efficiency in Agricultural Commodity Futures Market in India: Evidence from Co-integration and Causality Tests, Agricultural Finance Review, Vol. 71, No.2, Issue:2, pp.162-178.
5. Srinivasan. P (2012), Price Discovery ad Volatility Spillover in Indian Spot–Futures Commodity Market, The IUP Journal of Behavioural Finance, 9, pp-70-85.
6. Kushankur Dey, Debases Maitra (2012), Price Discovery in Indian Commodity Futures Market: An Empirical exercise, International Journal of Trade and Global Markets, Vol.5, No.1, pp.68-87.
7. Nazlioglu Saban E, Cumhur S and Ugur (2012), Volatility Spillover between Oil and Agriculture Commodity Markets, Energy Economics, Vol, 36, No. C, pp-1-28.
8. Prashanta Athma, Venu Gopal Rao K.P (2013), Commodity Derivatives in India: A Study of MCX Comdex, International Journal of Marketing, Financial Service & Management Research, Vol.2, No. 6, PP: 26-41.
9. Dr.Nirmala.S, & Deepthy K (2016), Price Discovery in Commodity Markets: A Study of Precious Metals Market in Multi Commodity Exchange, International Journal of Multidisciplinary Research and Modern Education (IJMRE), ISSN (Online):2454-6119, (www.rmodernresearch.com), Vol II, Issue II, 2016.
10. Dr. Tanusree Sharma (2016), An Empirical analysis on Commodity Futures Market in India, International Journal of Engineering Technology, Management and Applied sciences (IJETMAS),(www.ijetmas.com), March 2015, Volume 3, Special Issue, ISSN. 2349-4476.
11. Arora Mehak and Chander Ramesh (2016), Price efficiency and Volatility in Agri Commodities Market in India: An Empirical investigation, Amity Journal of Finance, Vol.1, No2, pp.83-99.
12. Arora Mehak and Chander Ramesh (2017), Does Derivatives Trade Facilitate Price Discovery and Risk Management? The IUP Journal of Applied Finance, Vol.23, NO.4 2017, pp18-29.
13. Dr. S.P. Dhandayuthapani and R. Pavitra (2017), A Study on Energy Performance Commodity Trading in India, International Journal for Scientific Research & Development (IJSRD), Vol.5, Issue 01, 2017, ISSN (online) 2321-0613.

14. Shilpa Lodha (2017), A Cointegration and Causation Study of Gold Prices, Crude Oil Prices and Exchange rate, The IUP Journal of Financial Risk Management, Vol. 14, No.1, pp.55-66.
15. Kaur Karamjee, 2019, Causality Relationship between Spot and Futures Markets: Evidence from India, the IUP journal of Financial Risk Management, Vol. 16, No1, pp-50-57.
16. *National Horticulture Board (NHB).*
 - a. https://agriexchange.apeda.gov.in/India_Production/India_Productions.

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