

AJMR

ISSN (Online) : 2278 - 4853

Asian Journal of Multidimensional Research



Published by :
www.tarj.in

AJMR

ISSN (online) : 2278-4853

Editor-in-Chief : Dr. Esha Jain

Impact Factor : SJIF 2021 = 7.699

Frequency : Monthly

Country : India

Language : English

Start Year : 2012

Published by : www.tarj.in

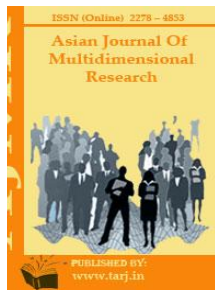
Indexed/ Listed at : Ulrich's Periodicals
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VISION

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A TREATISE ON CYBER DEFENSE AND DIFFERENT ASPECTS

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ABSTRACT

This paper deals with the loopholes in cyber space and various forms of generic cyber attacks such as spreading of malwares, malicious autobots and others. After the introductory part, we have instilled the role of statistical and differential approach to handle the problems in cyber space. The investigation is built on recent studies in mathematical malware models which originated in the mathematical biological epidemic models introduced in the 1920's and was first used to study of spreading of computer viruses in 1990s. All these models made the homogeneous assumption that each element (i.e. computer or any other mobile device) in the population has equal infection effect on the other elements in the population, and the assumption that the infected elements recover because of reactive defense (e.g. anti-malware tools).

KEYWORDS: *Cyber attacks, model, security.*

INTRODUCTION

Cyber attack techniques are continually evolving and making use of statistical knowledge over time. To get hold of the attackers and protect critical information systems in our ever more connected world, defense mechanisms must also become more sophisticated. Often understanding attack techniques more clearly is the first step toward increasing security. This paper will provide a detailed explanation of several types of attacks (such as virus, worm, Trojan horse, Bots etc.) and suggest how these attacks may be countered.

DIFFERENT TYPES OF GENERIC CYBER ATTACKS

VIRUS, WORM AND TROJANS: These are malicious programs that can damage the mobile devices or computers. Often these three terms are taken as same but actually Trojans and worms are distinctly different from each other whereas Virus is the generic term.

Trojan horse or Troans is a type of program that performs a strong and useful function that compromises host's system's security. These programs can be installed on a computer when the user leaves the system unattended. At a first glance, it might appear to be a useful program but actually the encrypted functionality will damage the system once run. An attacker must trick the user into running a Trojan program by making it appear attractive and simultaneously disguising its true nature. Some of them are merely designed to steal data or crash systems whilst some allow attackers steal data or even remotely control the host device. The latter attacker method is generally known as backdoor. It is an electronic hole in software left open intentionally. These types of programs are also known as 'Backdoor Trojans'. These are used by criminals to get remote access of a host device. One more type of Trojans is called 'Logic Bomb' which is basically a Trojan with a timing model in the embedded code. It starts a destructive mechanism after a certain point of time from installation.

Worm is a single destructive program on a single system often planted by someone who has direct access to the system. A worm has the ability to replicate itself from machine to machine and harm other systems within the network.

BOTNETS: These are killer web apps generally used by certain people including well organized cyber crime rings around the globe, using stolen bandwidth to make money from nefarious Internet activities.

PHISHING AND SPOOFING: These are online attack used by perpetrators in committing fraud through social engineering schemes via instant messaging, emails, online advertisements etc to lure users to malicious websites similar to legitimate websites for gaining confidential information such as passwords, financial account details etc.

MALICIOUS INSIDERS: In a recent survey of international corporate executives, insider threats were their prime security concern. This is the employee, contractor or sub-contractor with access to system, data, files who may be disgruntled or feel "obligated" to steal valuable intellectual property. Their motivations could vary from politics to abhorrence to pure greed.

DENIAL OF SERVICE: It's less likely to happen but not the least though with respect to the other ways of cyber attacks. The goal is to disrupt some legitimate activities like browsing, transferring money from bank account or even docking ships communicating with naval ports. It's achieved by sending messages to the target that interfere with its operation, and make it hang, crash or reboot or do useless work.

MATHEMATICAL MODELING

In one sentence modeling is - "Study of a system before actually it is build and implemented." Sometimes it is not feasible to implement a system or real world problem in the actual environment due to the huge cost and large time. So it is better to build a prototype or model and study the behavior of the system. A model is not only a substitute of the actual system, it also the simplification of the system.

Some Examples of Different Models

PHYSICAL MODEL: These are based on some analogy of Mechanical, Electrical, or Electric and Hydraulic Systems and mostly used in study of Control theory.

MATHEMATICAL MODEL: Systems which can be represented in the form of mathematical equations and then compared with the experimental results to check it's validity.

PHYSICAL STATIC MODEL: These physical models do not change their behavior as time changes like- water-tank model.

PHYSICAL DYNAMIC MODEL: These physical models change their behavior as time changes like- spring suspension system or equivalent electric system.

MATHEMATICAL STATIC MODEL: These mathematical models give a mathematical equation when the system is in equilibrium state like- demand supply system.

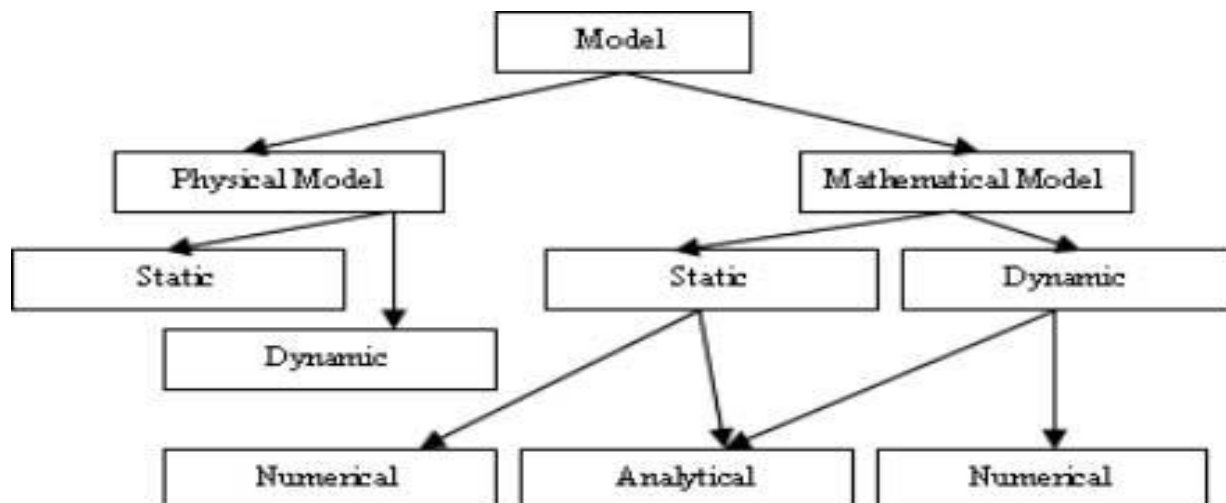
MATHEMATICAL DYNAMIC MODEL: In these mathematical models allow the change of system attributes as the function of time like- oscillatory motion.

MATHEMATICAL STATIC ANALYTICAL MODEL: These are small static mathematical model which can be solved by traditional math.

MATHEMATICAL STATIC NUMERICAL MODEL: These are complex static mathematical model which can be solved by simulation.

MATHEMATICAL DYNAMIC ANALYTICAL MODEL: These are small dynamic mathematical model which can be solved by traditional math.

MATHEMATICAL DYNAMIC NUMERICAL MODEL: These are complex dynamic mathematical model which can be solved by simulation.



Statistical background and certain mathematical definitions

The attacks on the computer are totally stochastic. We do not know the actual time of next attack on the computer. But on the basis of probability concepts in simulation we can find the probability of the attack at an instance of time.

If stochastic variable (Time of attack) can take I different values, x_i ($i = 1, 2, \dots, I$), and the probability of the value x_i being taken is $P(x_i)$, the set of numbers $P(x_i)$ is said to be a probability mass function. Since the variable must take one of the values, it follows that

$$\sum_{i=1}^I P(X_i) = 1$$

Probability mass function can be defined as $P(x_i) = n_i / N$

where N = total number of attacks and n_i number of attacks from a specified source.

A cumulative distributed function can also be found which gives the probability of stochastic attacks being less than or equal to a given value. Different measures of probability functions can be used for the study of the stochastic system such as mean, mode, median, Standard deviation, etc. Models characteristic equations can be of two types – Linear and non-Linear. Non-linear system can be represented by Partial Differential Equations (PDE). Consider that malicious object has propagation property P , depends upon various other factors like- $A, B, C \dots$ etc. It can be represented as $P = f(A, B, C \dots)$.

The velocity can be represented as

$$\partial P / \partial t = \partial f(A, B, C \dots) / \partial t.$$

and the acceleration rate can be represented as

$$\partial^2 P / \partial t^2 = \partial^2 f(A, B, C, \dots) / \partial t^2.$$

Once the simulated results obtained by the use of certain approximation techniques mentioned below can be used for complementing the data generated by simulation as well as validation:

TAYLOR SERIES EXPANSION: Any function that has derivatives can be expanded by Taylor's Formula, The value of the independent variable, x , in a region near $x = a$, a function $f(x)$ can be approximated by the polynomial

$$F(x) = f(a) + f'(a)(x-a) + (f''(a)/2!)(x-a)^2 + \dots + (f^{(n)}(a)/n!)(x-a)^n.$$

FINITE DIFFERENCE APPROXIMATION METHODS: This method transforms a partial differential equation over small intervals.

This is of two types:

FORWARD DIFFERENCE APPROXIMATION: It calculates the function gradient at various points by the formula:

$$f'(x_i) = (f(x_{i+1}) - f(x_i)) / \Delta x$$

BACKWARD DIFFERENCE APPROXIMATION: It also calculates the function gradient at various points by the formula:

$$f'(x_i) = (f(x_i) - f(x_{i-1})) / \Delta x$$

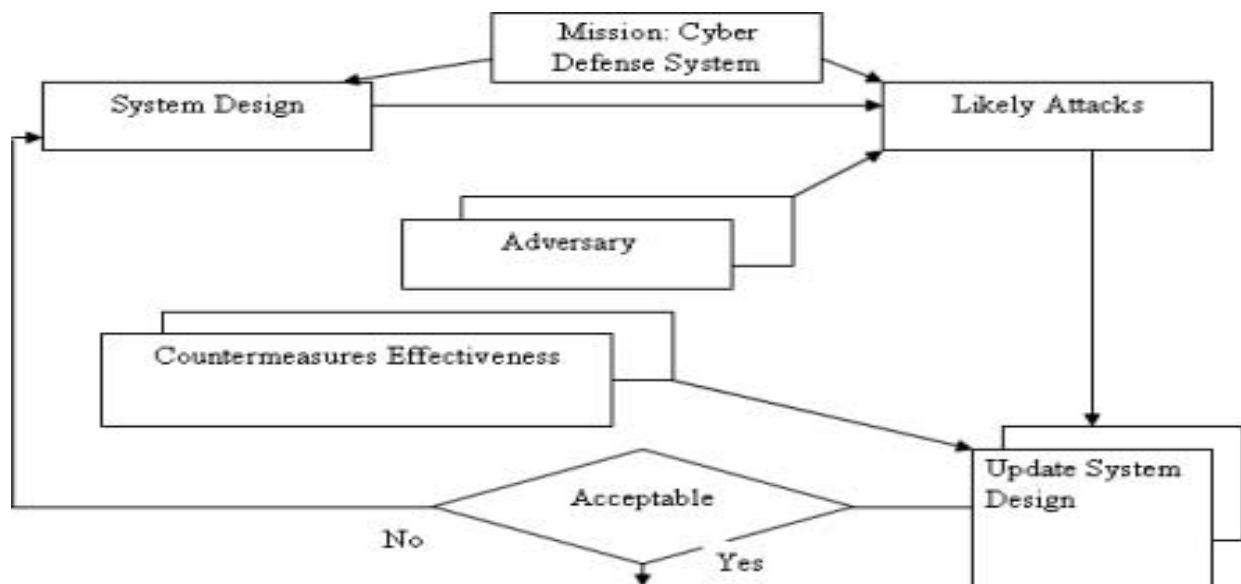
HIGHER ORDER DERIVATIVES: These can be calculated to describe the various important points in the distribution by the following formula:

$$f^{(n)} = (f^{(n-1)})'$$

Some regression tests such as Polynomial regression tests can also be used to validate the model. It finds that the values can be fitted into a polynomial or not. Once the characteristic equation is derived then results can be empirically/analytically validated on the basis of available standard mathematical hypothesis. The first thing for mathematical model validation is the dimensional homogeneity, which requires that each term has the same net dimensions. Secondly, the models can be validated by checking qualitative and limit behavior. Except these some other things can also be considered, depending convergency rate of the error, accuracy and precision of the method being used and so on.

These data can be compared easily and help us to understand the behavior of malicious objects.

Now, for modeling a cyber defense system one should know about the different components needed. Here is a good division of cyber defense components:



ACTIVE CYBER DEFENSE MODEL

A cyber system consists of networked computers/nodes of finite populations. A computer has two states: compromised and secure (i.e., vulnerable but not compromised). We may say that a compromised computer is “occupied” by an adversary/attacker, and a secure computer is “occupied” by the defender. The adversary can compromise a computer by exploiting its (e.g., zero-day or unpatched) vulnerabilities. Attacks are malware-like, meaning that compromised computers can attack vulnerable computers in an epidemic-spreading fashion. With active cyber defense, the defender can spread “good worm”-like mechanisms in networks (just as the malicious worms spread) to identify and “clean up” the compromised computers. The interaction between cyber attack and active cyber defense creates an attack–defense interaction structure, a graph topology that represents how the compromised nodes attack the secure nodes and how the secure nodes use active cyber defense to clean up the compromised nodes. We say that a defender (attacker) is strategic if it initially occupies the large-degree nodes in the graph with higher probabilities. The attack–defense

interaction leads to the evolution of the cyber security state of the entire cyber system. We illustrate the state evolution in Figure 1, where a filled circle means “secure” and an open circle means compromised.” As shown in Figure 1, the state evolution can exhibit rich phenomena (e.g., the existence of multiple kinds of equilibria). At a high level, the research objective is to characterize how the evolution is governed by the initial state, graph topology, parameters, and attacker/defender strategies. The characterization will allow us to answer some basic questions such as under which conditions the cyber security state evolves toward an all-secure equilibrium.

THE NATIVE MARKOV PROCESS MODEL

Formally, cyber attack–defense takes place over a finite network/graph structure $G = (V, E)$, where $V = \{1, 2, \dots, n\}$ is the set of nodes/computers and E is the set of edges/arcs with $(u, u) \notin E$ (i.e., there are no self-loops in the setting of the problem). At any point in time, a node $v \in V$ is in one of two states: secure, meaning that it is secure (i.e., vulnerable but not compromised by the attacker); or compromised, meaning that it is compromised by the attacker. Node v 's state changes because of some u , where $(u, v) \in E$. Note that $(u, u) \notin E$, because a secure node will not clean itself up, and a compromised node will not attack itself.

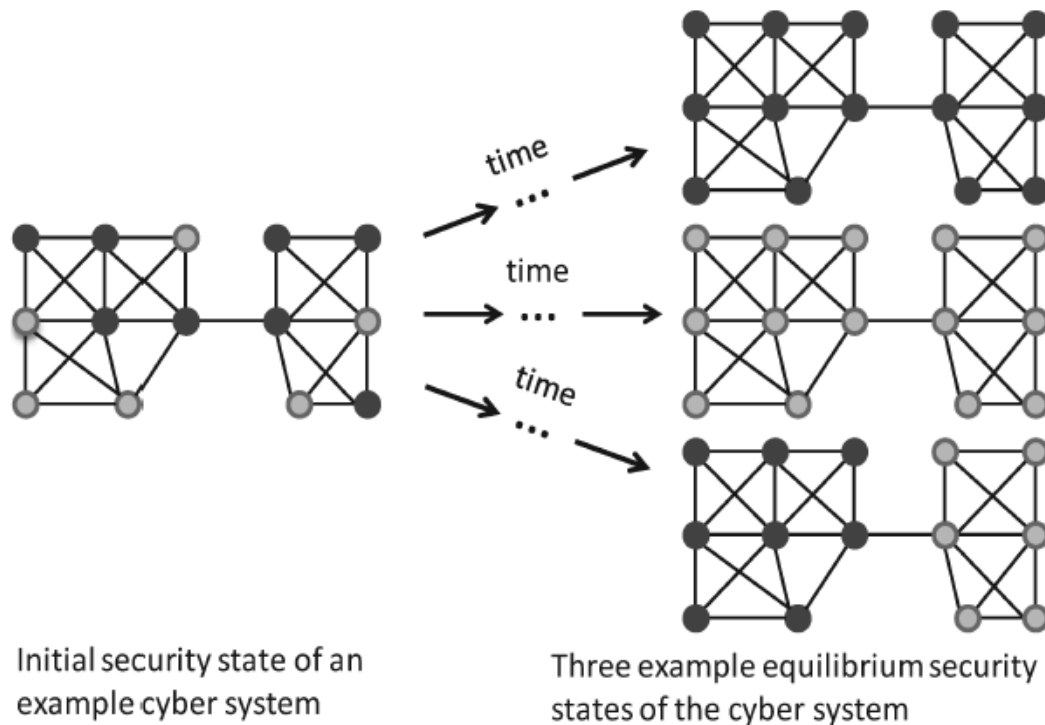


Illustration of cyber security state evolution under active cyber defense, where the same initial state may evolve, under different conditions, toward one of the three example equilibrium states—all nodes are secure (filled circles); all nodes are compromised (open circles); some nodes are secure. The core research issue is to characterize how the initial state, network topology, parameters, and attacker/defender strategies can govern the evolution.

Since our study applies to both undirected and directed graphs, we focus on undirected graphs while mentioning the differences between the two types as the need arises. We do not make any significant restrictions on G , because in real life, G can have any topology.

The state of node $v \in V$ at time t is a random variable $\xi_v(t) \in \{0, 1\}$:

$\xi_v(t) = 1$, $v \in V$ is secure at time t ,

$\xi_v(t) = 0$, $v \in V$ is compromised at time t .

Correspondingly, we define

$$B_v(t) = P(\xi_v(t) = 1) \text{ and } R_v(t) = P(\xi_v(t) = 0).$$

Denote by $\tilde{\theta}_{v,br}(t)$ the rate at which v 's state changes from secure to compromised at time t , which is a random variable because it depends on the states of v 's neighbors. Similarly, denote by $\tilde{\theta}_{v,rb}(t)$ the random rate at which v 's state changes from compromised to secure at time t .

The state evolution of $v \in V$ is naturally described as a Markov process (dubbed “Markov process model” or “Markov model” for reference purposes) with the following transition probabilities:

$$P(\xi_v(t + \Delta t) = 1 \mid \xi_v(t)) = \begin{cases} \Delta t \cdot \tilde{\theta}_{v,rb}(t) + o(\Delta t), & \xi_v(t) = 0, \\ 1 - \Delta t \cdot \tilde{\theta}_{v,br}(t) + o(\Delta t), & \xi_v(t) = 1, \end{cases} \quad \text{----- (1)}$$

and

$$P(\xi_v(t + \Delta t) = 0 \mid \xi_v(t)) = \begin{cases} \Delta t \cdot \tilde{\theta}_{v,br}(t) + o(\Delta t), & \xi_v(t) = 1, \\ 1 - \Delta t \cdot \tilde{\theta}_{v,rb}(t) + o(\Delta t), & \xi_v(t) = 0, \end{cases} \quad \text{----- (2)}$$

as $\Delta t \rightarrow 0$. Denote by $N_v = \{u \in V : (u, v) \in E\}$ the set of neighbors of node $v \in V$. Since the random rates $\tilde{\theta}_{v,rb}(t)$ and $\tilde{\theta}_{v,br}(t)$ are naturally determined by the random states of node v 's neighbors, we use deterministic but possibly nonlinear functions $\text{frb}(\cdot) : \mathbb{R} \rightarrow [0, 1]$ and $\text{fbr}(\cdot) : \mathbb{R} \rightarrow [0, 1]$ to define respectively the random rates $\tilde{\theta}_{v,rb}(t)$ and $\tilde{\theta}_{v,br}(t)$, as follows:

$$\begin{aligned} \tilde{\theta}_{v,rb}(t) &= \text{frb} \left(\frac{1}{\deg(v)} \sum_{u \in N_v} \xi_u(t) \right), \\ \tilde{\theta}_{v,br}(t) &= \text{fbr} \left(\frac{1}{\deg(v)} \sum_{u \in N_v} (1 - \xi_u(t)) \right). \end{aligned}$$

We call $\text{frb}(\cdot)$ and $\text{fbr}(\cdot)$ the combat-power functions, because they abstract the attacker's and defender's combat capabilities.

At this point, we do not know how to tackle the above native Markov process model. One may note that the above combat-power functions are reminiscent of the so-called voter model [12], whereby a node changes its opinion (or state) to the opinion of one random neighbor according to a fixed-rate Poisson process. This allows the model to be transformed into a dual process that works backward in time and becomes a random walk [12], which makes it tractable.

In contrast, in this model, a node changes its state according to a rate that is not fixed but instead depends nonlinearly on the states of its neighbors. This nonlinearity prevents us from transforming our native Markov process model into a random walk model, meaning that the technique used in Markov model cannot solve the problem we encounter. This nonlinearity-induced difficulty suggests to us that we should simplify/approximate the native Markov process model as a tractable dynamical system model.

DYNAMICAL SYSTEM MODEL (MODIFICATION OVER MARKOV'S MODEL)

Now we show how to simplify the native Markov process model into a tractable dynamical system model via the mean-field approximation. From (2.1), we have, for $v \in V$,

$$B_v(t+\Delta t) = \Delta t \cdot \tilde{\theta}_{v,rb}(t) \cdot R_v(t) + (1 - \Delta t \cdot \tilde{\theta}_{v,rb}(t))B_v(t) + o(\Delta t),$$

which can be rewritten as

$$B_v(t+\Delta t) - B_v(t)\Delta t = \tilde{\theta}_{v,rb}(t) \cdot R_v(t) - \tilde{\theta}_{v,rb}(t) \cdot B_v(t) + o(\Delta t).$$

Similarly, from (2), we can derive for all $v \in V$,

$$R_v(t+\Delta t) - R_v(t)\Delta t = \tilde{\theta}_{v,br}(t) \cdot B_v(t) - \tilde{\theta}_{v,br}(t) \cdot R_v(t) + o(\Delta t).$$

By letting $\Delta t \rightarrow 0$, we have for all $v \in V$,

$$\begin{aligned} \frac{d}{dt} B_v(t) &= \tilde{\theta}_{v,rb}(t) \cdot R_v(t) - \tilde{\theta}_{v,rb}(t) \cdot B_v(t), \\ \frac{d}{dt} R_v(t) &= \tilde{\theta}_{v,br}(t) \cdot B_v(t) - \tilde{\theta}_{v,br}(t) \cdot R_v(t). \end{aligned} \quad \text{-----(3)}$$

By the idea of mean-field approximation, we can move the expectation inside the combat-power function and replace the mean of the random rate $\tilde{\theta}_{v,rb}(t)$, denoted by $\theta_{v,rb}(t)$, with the following term:

$$f_{RB} \left(\frac{1}{\deg(v)} \sum_{u \in N_v} E[\xi_u(t)] \right) = f_{RB} \left(\frac{1}{\deg(v)} \sum_{u \in N_v} B_u(t) \right).$$

We can treat $\tilde{\theta}_{v,br}(t)$ analogously. As a result, we obtain the mean state-transition probabilities $\theta_{v,rb}(t)$ and $\theta_{v,br}(t)$ as

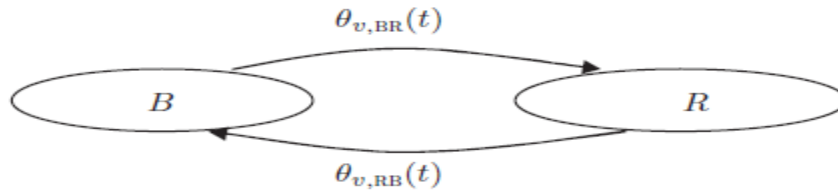
$$\theta_{v,rb}(t) = f_{RB} \left(\frac{1}{\deg(v)} \sum_{u \in N_v} B_u(t) \right) \text{ and } \theta_{v,br}(t) = f_{BR} \left(\frac{1}{\deg(v)} \sum_{u \in N_v} R_u(t) \right).$$

Therefore, (3) becomes the following dynamical system model for all $v \in V$:

$$\begin{aligned} \frac{d}{dt} B_v(t) &= \theta_{v,rb}(t) \cdot R_v(t) - \theta_{v,rb}(t) \cdot B_v(t), \\ \frac{d}{dt} R_v(t) &= \theta_{v,br}(t) \cdot B_v(t) - \theta_{v,br}(t) \cdot R_v(t). \end{aligned} \quad \text{-----(4)}$$

Note that the dynamical system model for all $v \in V$ encodes the graph topology via parameters $\theta_{v,br}(t)$ and $\theta_{v,rb}(t)$, which encode the information about node v 's neighborhood (including the

states of node v 's neighbors). The corresponding state-transition diagram for a node $v \in V$ is depicted in Figure elow:



State-transition diagram of a single node $v \in V$ (B: secure; R: compromised).

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INCLUSIVE BANKING & INCLUSIVE GROWTH

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ABSTRACT

Development is not simply a measure of aggregate of economic activity but is an assessment of the inclusiveness of economic growth with emphasis not only on the distribution of economic gains but also on the security, vulnerability, empowerment, and sense of full participation that people may enjoy in social life". The recently released World Bank's India Development policy report (DPR) 2009 advocates inclusive growth as the only sure means for correcting deeply regional imbalances and consolidating recent economic gains. The objective of this paper is two-fold

- 1) *To highlight the nexus between inclusive growth and financial inclusion ; and*
- 2) *To address the issues related to financial inclusion.*

A recent World Bank (2004) study indicates that over 60 percent have no access to credit from a formal source. The magnitude of the dependence of the rural poor on informal sources of credit can also be verified from the findings of the All India Debt and Investment Survey, 1992 which showed that the share of the non-institutional agencies (informal sector) in the outstanding cash dues of the rural households continued to be quite high at 36% even though the dependence of the rural households on such informal sources had reduced marginally from 38.8% to 36% over the previous decade (1981-1991)

If the financial sector is to contribute more to inclusive economic growth, it must reach out to more people. In this context policy approaches like microfinance are more promising as shown by international and national experiences.

INTRODUCTION

A World Bank study assessing access to financial institutions found that amongst rural households in Andhra Pradesh and Uttar Pradesh, 59% lack access to deposit account and 78% lack access to credit. Considering that the majority of the 360 million poor households (urban and rural) lack access to formal financial services, the number of customers to be reached, and the variety and quantum of services to be provided are really large. In UK, around 8 per cent of the population lacks

access to a bank account of any kind as compared to around 20 percent in USA and 3 percent in Australia. However, this ratio at 41% is quite high for India.

FINANCIAL INCLUSION

Dr. C. Rangarajan committee defined financial inclusion as “the process of ensuring access to financial services and timely and adequate credit where needed by vulnerable groups such as weaker sections and low income groups at an affordable cost”

Empirical evidence shows that all those who had access to financial services while participating in micro-finance programs were able to derive appreciable benefits both at individual and household level as under.

1. In Bangladesh, household expenditure and assets of clients of Bangladesh Rural Advancement Committee increased by 28% & 112% respectively. The income of members of Grameen Bank in Bangladesh was 43% higher than that of others who were not members of Grameen Bank.
2. In El Salvador, the weekly income of clients assisted by FINCA increased on an average by 145%
3. In Ghana, 80% of clients of Freedom from Hunger had secondary sources of income compared to 50% income of those who were not clients.
4. In Lombok, Indonesia, the average income of borrowers of Bank Rakyat Indonesia increased by 100% & 90% of households graduated out of poverty.

In order to address the issues of Financial Inclusion, the Government of India, constituted a “committee on Financial Inclusion” under the chairmanship of Dr. C. Rangarajan.

MAJOR RECOMMENDATIONS OF DR. C. RANGARAJAN COMMITTEE

- Launching of National Rural Financial Plan in mission mode with clear cut target to provide access to comprehensive financial services, including credit to at least 50% (say 55.77 million) of the financially excluded rural cultivator/ non cultivator households, by 2012 through rural / semi urban branches of commercial and rural banks. The remaining households have to be covered by 2015, for the purpose, a national Mission on financial Inclusion is proposed to be constituted comprising representatives from all stake holders to aim at achieving financial inclusion within a specific time frame.
- Constitution of two funds with NABARD – the Financial Inclusion Promotion and Development Fund (FIPF) and the Financial Inclusion Technology Fund (FITF) with an initial corpus of Rs 500 crores each to be contributed by GOI/RBI/NABARD. The FIPF will focus on Intervention like “Farmer Service Centres” “Promoting Rural Entrepreneurship” self Help Groups and their Federations” “Developing Human Resources of Banks” “Promotion of Resource Centres” and “Capacity building of Business Facilitator and Correspondents” while the FITF will focus on funding of low cost technology solutions. (This recommendation has already been accepted by Govt. of India).

- Depending on outreach of micro finance programmes through financing of SHG/ JLG's and setting up of a risk mitigation mechanism for lending to small/ marginal farmers/share croppers/ tenant farmers through JLG's.
- Use of PAC's as Business Facilitators and Correspondents.
- Micro Finance – Non Banking Finance Companies (MF – NBFC's) could be permitted to provide thrift, credit, micro insurance, remittance and other financial services up to specified amount to the poor in rural, semi-urban and urban areas. Such MF-NBFCs may also be recognized as Business Correspondents of banks for providing only savings and remittance services and also act as Micro-Insurance agents.
- Opening of specialized Micro- Finance branches/cells in potential urban centers for exclusively catering to the Micro Finance and SHG-bank linkage requirements of the urban poor. An enabling provision is made in the NABARD Act 1981 permitting NABARD to provide Micro Finance Service to the urban Poor.

ISSUES

- 1) Two issues are involved regarding access to financial services, one is it is time-consuming enrollment process and other is need for innovation in financial services. In order to cover large number of people, the acceleration of the pace of enrolment in a systematic way through massive social mobilization in collaboration with the local bodies and influential people is need of the hour, Masses are to be mobilized to form groups with the help of NGOs, MFI, NBFC VA farmer clubs and SHGs to cater to their banking needs by developing new need based products.
- 2) An entirely new system has to be established regarding making available the timely micro credit. This issue can be addressed by having a bank's small size cash safe at a cluster of small villages under the control of Business Correspondent (BCI) with a difference rate of interest in purveying credit. In addition, overdraft/micro credit facilities has to be granted which require a paradigm shift in the mind set of the Banker.
- 3) The financial literacy and credit counseling is need of the hour to bring illiterate, poverty stricken and gullible people under the banking fold. The electronic/press media can play a catalytic role in bringing awareness about financial Inclusion.
- 4) As the Micro transactions are costlier the information and Communication Technology (ICT) based solutions can help in reducing transaction cost. Since the Financial Inclusion Process is undertaken nationwide the cost of ICT based solutions should drastically brought down. Wrapping delay in the availability of ICT based solutions at the ground level, the technology coverage can be made possible in time supported by technical/skilled man power, the process of financial inclusion can be made speed and smoother.
- 5) For successfully implementing the Financial Inclusion Project at the national level, separate wings have to be established at various government/banks levels. NABARD should focus on conducting Ex Ante/Ex-post Evaluation Studies/Quick Monitoring and Impact Studies in different parts of the country to draw lessons for the implementer and provide the base for the Policy maker for exercising various Policy options.

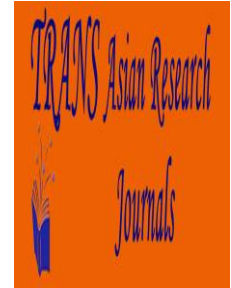
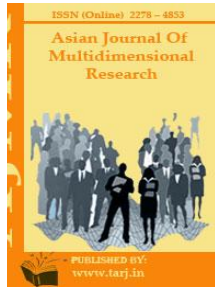
- 6) Focused attention is needed for implementation of financial inclusion in tribal, desert, hilly and remote areas which are comparatively more vulnerable and disadvantageous in all walks of life.
- 7) Without Fiscal Inclusion, financial inclusion has little meaning. It is obvious understanding that the Central/State Governments will have to do much more than banks through fiscal inclusion i.e. touching life of each and individual through its development activities like roads, water, electricity, healthcare, housing, sanitation, schools, etc. Thus in order to reap the fruits of financial inclusion, fiscal inclusion is a simultaneous necessity.

CONCLUSION

To address the issue of such financial exclusion in a holistic manner, it is essential to ensure a range of financial services such as opening of banking account, for making and receiving payments, money transfer facilities, saving products suited to the pattern of cash flow of a poor house hold, small loans, overdrafts for productive, personal and other purposes and micro insurance. Poor and Vulnerable Groups find no place in Indian Society over a period of time. It is time to rise to the occasion to do banking business with untouches. It is hoped to travel extra miles to reach the last mile person through Financial Inclusion and Fiscal Inclusion.

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ENTERPRISE RISK MANAGEMENT IN IMPROVING SUSTAINABILITY OF BANKING BUSINESS IN INDIA

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ABSTRACT

The globalised and liberalised business environment in the present era has witnessed several catastrophes ranging from frauds and scandals to global financial crisis. This has brought to light that, risk management, has utmost significance in the economic, finance and banking sectors. The governments, policy makers, businesses and stakeholders have to be conscientious in dealing with various types of risk and prescribe ways to mitigate such risks. The current paper attempts to identify the typology of risks associated across functional areas in the banking sector and presents the most important findings on the same as well as suggests ways to mitigate risks in the identified areas.

KEYWORDS: Financial Risk, Human Resource Risk, Marketing Risk, Mitigating Risk, Banking.

Acknowledgment: We are grateful to our Director Dr.S.S.Mohanty, (SFIMAR) for critical review of our paper and for the suggestions which he has made for improving quality of this paper .

INTRODUCTION

The Banking Sector in India has undergone a metamorphosis in its operations, product-service profile and delivery methodologies. The element of risk should be unearthed to enable sustainability in the transactions of the banks and the banking system. The Basel Accord deemed the necessity for a sound risk management in the banking landscape. The Banking Sector Reforms of the Narasimhan Committee (1998) paved the way for the banks to address the issues of Capital Adequacy and Asset Quality that considered the risk weighted assets of the bank and deficiency in the quality of the assets of the bank. The apex authority, Reserve Bank of India has stipulated guidelines for the

identification of risk, and ways to mitigate risk since the domino effect of the global financial crisis had far reaching repercussions on the financial and banking system across the globe in the world including India.

The system of risk management currently in practice does not specify a defined framework for banks in different functional areas of finance, human resource, marketing, operations and information technology. There should be a thorough scrutiny of the banks' practices and their approach to identification, management and mitigation risk. The introduction of risk management in the banking sector globally is not of recent origin, but was practiced since 1800 where attempts were made to recognize risk and implementing risk functions in the banking organizations.

NEED FOR THE STUDY

The Basel Committee has accorded the Capital Adequacy component as a measure of long term solvency of the banks (Basel Committee on Banking Supervision, 2014). The banks should anticipate its capital requirements in the future to mitigate the diverse risks it is exposed to.

The thumb rule of finance, 'maximization of risk to earn maximum profit' has made the banks move from a risk cautious approach to a risk exploratory approach in its operations. The increase in the trends of non interest income, off balance sheet activities combined with the third party products signal that banks are taking on risk related activities and not shunning risk in the regulated and technological savvy environment (Kohler, 2013; Uppal and Kaur, 2007).

Asset quality is one of the major concerns for a bank's viability and sustainability in the long run. The level of Non-Performing Assets (NPAs) in the banking industry has been increasing on an alarming level. This has questioned the credibility of the overall banking system with respect to risk management policies and practices. There should be complete monitoring of the portfolio of the assets of the banks amidst recession, inflation, fluctuations in exchange rates and stock markets (FDIC RMS Manual of Examination Policies, 2005).

In India, increasing trends have been evidenced towards increasing profitability by introducing new products and services at the cost of devising appropriate tools for managing risks associated with them, identification of risk, managing risk and mitigating risk are of prime importance to the banking sector Risk taking has been the first and foremost characteristic of organization culture as a common perception held by the organizations members (Robbins, 2005). The element of risk should be addressed across all functional areas in an organization and not restricted to finance function alone. There has been a transition from the traditional risk management function to the enterprise risk management (Verena and Othmar, 2012).

STATEMENT OF THE PROBLEM

Enterprise Risk Management entails identification of risk from various sources, management of risks in a systematic way across different functional areas and to be proactive in nature that will not affect the value of the organization (Simona-Iulia, 2014). Dhar (2013) too is of the opinion that Enterprise Risk Management should come from every aspect of the bank. Enterprise Risk Management lies in the identification of risk in each and every functional area of banking, implementation of risk management approaches at the initial level and not just adopting best practices stipulated by the Basel Accord or audits to mitigate risk. Risk Management should be studied in all the functional

areas of banking operations – Finance, Human Resource, Marketing, Information Technology and Operations as it is of utmost importance to the bankers, policy makers and researchers.

OBJECTIVES OF THE STUDY

The objectives of the study are threefold

- To identify the types of risks in the functional areas of banking – Finance, Marketing, Human Resource, Information Technology and Operations.
- To assess the procedure of risk management and ways of mitigating risk adopted by the banks under survey.
- To propose suggestive measures based on the study.

To meet the above objectives following Unstructured Interview of bank officials in form of questionnaire as a pilot study was conducted.

- 1) Does functional risk management exists in your bank? If yes, then in which area?
- 2) What are the risk management processes adopted by your bank in the above mentioned functional areas?
- 3) What type of risks the above functional areas are exposed to?
- 4) Is functional risk management done in your bank or outsourced?
- 5) When was the functional risk management implemented in your bank?
- 6) After the implementation of the above mentioned functional risk management in your bank, what percent of the risk is mitigated in above area?
- 7) Apart from RBI guidelines, which are the other types of risk management adopted by your bank?
- 8) Are you aware about other banks involvement in Risk Management?
- 9) How do you mitigate the risks in your bank?
- 10) Does internal control system exist in your bank?
- 11) If yes, does it help your bank in risk management?
- 12) Did you come across any uncontrollable risk factors?

SCOPE OF THE STUDY

The present study extends to the identification of the risks in the diverse functional areas of the banking sector – Finance, Human Resource, Marketing, Information Technology and Operations and management of the risks by the banks within the limits of the Mumbai Metropolitan Region (MMR).

RESEARCH METHODOLOGY AND DATA EXTRACTION

The research design is exploratory in nature. The primary data was collected through an Unstructured Questionnaire that was utilized to elicit responses from the risk managers of the sample banks at the regional corporate offices within the Mumbai Metropolitan Region. The secondary data was collected from the publications and reports of the Banks and the Reserve Bank of India.

The banks selected for the purpose of the study were on the basis of the Convenience Sampling Technique, a non probability method of sampling technique. A sample of three banks was included in the study. The banks considered were commercial banks comprising public sector and private sector banks.

REVIEW OF LITERATURE

Fraser et al (2008) highlighted excellent opportunities for academics to closely collaborate with practitioners to conduct research in the area of enterprise risk management. They stated that enterprise risk management is implemented by organizations in the advanced stages and not at the initial stages of risk management.

Abrams et al (2007) cited that enterprises are beginning to integrate compliance and risk management into a comprehensive enterprise risk management function and thus proactively address all sorts of risk, including operational risk and the risk of noncompliance.

Goyal and Agarwal (2010) investigated the importance of risk management process in detail as suggested by the Basel Accord II and highlighted the challenges and opportunities of the implementation of Basel-II in the Banking System of India. They commented that the Basel II requirements to manage risk would have an impact on the banking business, processes and its employees.

Murthy and Pathi (2013) assessed the risk management practices of State Bank of India (SBI) and associates for the period of six years from 2007-08 to 2012-13. They focused on the credit risk of the banks and stated that lending to the priority sector of Agriculture was affected due to their credit policy.

Dhar (2013) conducted a quantitative and qualitative analysis of the Enterprise Risk Management in the Banking Sector. He stated that risk management in the banks were due to compliance with Basel Norms and not strategy driven. His results showed that the banks had identified three important risks – credit risk, market risk and operational risk.

Arunkumar and Korteshwar (2006) stressed that Credit risk management was important for the long term financial success of banks in India. They concluded that diversification of the portfolio of asset reduced the credit risk of banks and their Non Performing Assets.

The literature review on Enterprise Risk Management shows that banks mostly emphasize on risks in the finance function, and not on the human resource risks, marketing risk and the information technology and operations risk.

RISKS IN THE BANKING SECTOR

Risk may be defined as ‘possibility of loss’, which may be financial loss or loss to the image or reputation. Banks like any other commercial organization also intend to take risk, which is inherent in any business. Higher the risk taken, higher the gain would be. But higher risks may also result into higher losses. Banks need to follow prudent policies to identify, measure and price risk, and maintain appropriate capital to take care of any eventuality.

In view of growing complexity of banks,, business and the dynamic operating environment, risk management has become very significant, especially in the financial sector. Though risk at the apex

level may be visualized as the probability of a bank's financial health and performance being impaired due to one or more contingent factors, the parameters indicating the banks' health may vary from net interest margin to market value of equity as the factors causing them to vary are also numerous. For instance, there could be default in repayment of loans by borrowers, change in value of assets or disruption of operation due to reason like technological failure. While the first two factors can be classified as credit risk and market risk, respectively, generally banks have all other risks excluding the credit risk and market risk clubbed together under operational risk.

The major risks in banking business or 'banking risks', as commonly referred, are listed below:

- Liquidity Risk
- Interest Rate Risk
- Market Risk
- Credit or Default Risk
- Operational Risk

1. LIQUIDITY RISK

The liquidity risk of banks arises from funding of long-term assets by short-term liabilities, thereby making the liabilities subject to rollover or refinancing risk (Kumar et al., 2005). It can be also defined as the possibility that an institution may be unable to meet its maturing commitments or may do so only by borrowing funds at prohibitive costs or by disposing assets at rock bottom prices. The liquidity risk in banks manifest in different dimensions –

- A. FUNDING RISK:** Funding Liquidity Risk is defined as the inability to obtain funds to meet cash flow obligations. For banks, funding liquidity risk is crucial. This arises from the need to replace net outflows due to unanticipated withdrawal/ non-renewal of deposits (wholesale and retail).
- B. TIME RISK:** Time risk arises from the need to compensate for non-receipt of expected inflows of funds i.e., performing assets turning into non-performing assets.
- C. CALL RISK:** Call risk arises due to crystallization of contingent liabilities. It may also arise when a bank may not be able to undertake profitable business opportunities when it arises.

2. INTEREST RATE RISK

Interest Rate Risk arises when the Net Interest Margin or the Market Value of Equity (MVE) of an institution is affected due to changes in the interest rates. In other words, the risk of an adverse impact on Net Interest Income (NII) due to variations of interest rate may be called Interest Rate Risk (Sharma, 2003). It is the exposure of a Bank's financial condition to adverse movements in interest rates. IRR can be viewed in two ways – its impact is on the earnings of the bank or its impact on the economic value of the bank's assets, liabilities and Off-Balance Sheet (OBS) positions.

3. MARKET RISK

The risk of adverse deviations of the mark-to-market value of the trading portfolio, due to market movements, during a certain period is termed as Market Risk. This risk results from adverse

movements in the price levels or volatility in the market prices of interest rate instruments, equities, commodities, and currencies. It is also referred to as Price Risk. In the financial market, bond prices and yields are inversely related. The price risk is closely associated with the trading book, which is created for making profit out of short-term movements in interest rates.

A) FOREX RISK: Forex risk is the risk that a bank may suffer losses as a result of adverse exchange rate movements during a period in which it has an open position either spot or forward, or a combination of the two, in any individual foreign currency.

B) MARKET LIQUIDITY RISK: Market liquidity risk arises when a bank is unable to conclude a large transaction in a particular instrument near the current market price.

4. DEFAULT OR CREDIT RISK

Credit risk is more simply defined as the potential of a bank borrower or counterparty to fail to meet its obligations in accordance with the agreed terms. In other words, credit risk can be defined as the risk that the interest or principal or both will not be paid as promised and is estimated by observing the proportion of assets that are below standard. Credit risk is borne by all lenders and can lead to serious problems, if excessive. There are two variants of credit risk which are discussed below

A) COUNTERPARTY RISK: This is a variant of Credit risk and is related to non-performance of the trading partners due to counterparty's refusal and or inability to perform. The counterparty risk is generally viewed as a transient financial risk associated with trading rather than standard credit risk.

B) COUNTRY RISK: This is also a type of credit risk where non-performance of a borrower or counterparty arises due to constraints or restrictions imposed by a country. Here, the reason of non-performance is external factors on which the borrower or the counterparty has no control.

5. OPERATIONAL RISK

Basel Committee for Banking Supervision has defined operational risk as 'the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events'. Thus, operational loss has mainly three exposure classes namely people, processes and systems. Managing operational risk has become important for banks due to the following reasons

- i. Higher level of automation in rendering banking and financial services
- ii. Increase in global financial inter-linkages

OTHER RISKS

Apart from the above mentioned risks, following are the other risks confronted by Banks in the course of their business operations

(A) STRATEGIC RISK: Strategic Risk is the risk arising from adverse business decisions, improper implementation of decisions or lack of responsiveness to industry changes. This risk is a function of the compatibility of an organization's strategic goals, the business strategies developed to achieve those goals, the resources deployed against these goals and the quality of implementation.

(B) REPUTATION RISK: Reputation Risk is the risk arising from negative public opinion. This risk may expose the institution to litigation, financial loss or decline in customer base.

DATA COLLECTION & ANALYSIS

BANK OF INDIA**TABLE 1: KEY RATIOS (QUANTITATIVE) OF BANK OF INDIA (AMOUNT IN MILLIONS)**

Items	2008-09	2009-10	2010-11	2011-12	2012-13
No. of offices	3118	3304	3586	4088	4373
No. of employees	40155	39676	39788	41537	42348
Business per employee	83.30	101.10	128.40	136.00	158.20
Profit per employee	0.75	0.44	0.62	0.64	0.64
Capital and Reserves & Surplus	134949	142300	172907	209618	239182
Deposits	1897085	2297619	2988858	3182160	3818396
Investments	526072	670802	858724	867536	946134
Advances	1429094	1684907	2130962	2488333	2893675
Interest income	163474	178780	217517	284807	319089
Other income	30519	26166	26418	33212	37660
Interest expended	108485	121220	139410	201672	228849
Operating expenses	30940	36678	50682	49407	53315
Net Interest Margin	2.72	2.30	2.49	2.26	2.16
Cost of Funds (CoF)	5.69	4.97	4.53	5.69	5.66
Return on advances adjusted to CoF	4.09	3.45	3.59	3.07	2.94
Wages as % to total expenses	13.90	14.54	18.28	12.22	11.09
Return on Equity	24.97	12.56	15.79	14.00	12.25
Return on Assets	1.49	0.70	0.82	0.72	0.65
CRAR	13.01	12.94	12.17	11.95	11.02
Net NPA ratio	0.44	1.31	0.91	1.47	2.06

Source: A Profile of Banks in India, RBI

Bank of India has achieved consistency in the ratios of Net Interest Margin. The ratios of profitability – Return on Equity, Return on Assets have declined. The productivity ratios of Business per Employee have increased. The Net NPA ratio has increased too.

REPORT ON BANK OF INDIA – HUMAN RESOURCE RISK (QUALITATIVE)**HR RISKS IDENTIFIED AT BANK OF INDIA**

1. Employability of Human Resources

2. Training and development of human resource
3. Employee motivation and satisfaction
4. Employee Commitment
5. Employee Productivity
6. Hiring and Laying off Employees
7. Balance of work life and personal life
8. Expatriation and Repatriation.
9. Cross Cultural Training

WAYS TO MITIGATE HR RISK BY BANK OF INDIA

1. Calibrated Recruitment programme
2. Continuous skills Upgradation programme
3. Structural Policies of performance measurement, promotion policy, transfer policy, talent management, communication, etc.

ANALYSIS ON MITIGATION OF RISK BY BANK OF INDIA

Bank of India has an attuned Recruitment programme that reflects the banking sector demands, customer requirements to select the best potential candidate available from the population resources. They have in place training and development programmes that emphasizes the continuous skills upgradation to make the employees more informed, mobile and demanding so that they perform better. The top management has designed structural policies to sustain the commitment, improve the productivity, motivation and satisfaction of the employees and maintain the balance of work life and personal life. They have inculcated cross cultural training programmes not only for international assignments but also for rural banking activities.

ING VYSYA

TABLE 2: KEY RATIOS (QUANTITATIVE) OF ING VYSYA(AMOUNT IN MILLIONS)

Items	2008-09	2009-10	2010-11	2011-12	2012-13
No. of offices	474	497	527	547	562
No. of employees	6086	6113	6909	9642	9381
Business per employee	60.64	62.38	67.48	55.98	64.43
Profit per employee	0.30	0.39	0.45	0.46	0.63
Capital and Reserves & Surplus	17029	23309	26243	39798	46268
Deposits	248895	258653	301942	351954	413340
Investments	104955	104729	110583	127155	182782

Advances	167564	185072	236021	287214	317720
Interest income	22399	22329	26941	38568	48616
Other income	5477	6202	6550	6698	7269
Interest expended	15903	14031	16875	26485	33230
Operating expenses	7725	8081	10260	11102	12728
Net Interest Margin	2.26	2.52	2.76	2.81	3.02
Cost of Funds (CoF)	5.84	4.10	4.40	6.38	6.70
Return on advances adjusted to CoF	5.29	5.59	5.26	4.58	5.04
Wages as % to total expenses	16.60	19.39	22.32	17.32	16.33
Return on Equity	11.66	12.01	12.86	13.82	14.24
Return on Assets	0.70	0.80	0.89	1.09	1.26
CRAR	11.65	14.91	12.94	14.00	13.24
Net NPA ratio	1.20	1.20	0.39	0.18	0.03

Source: A Profile of Banks in India, RBI

The ratio of Net Interest Margin for ING Vysya Bank has increased. The ratios of profitability – Return on Equity, Return on Assets has increased. The productivity ratios of Business per Employee and Profit per Employee have also increased. The Net NPA ratio has decreased too.

REPORT ON ING VYSYA (QUALITATIVE)

FINANCIAL RISKS IDENTIFIED AT ING VYSYA

1. Foreign Exchange Currency Risk
2. Interest Rate Risk
3. Counter Party Risk
4. Liquidity Risk
5. Cashflow Risk

WAYS OF MITIGATING FINANCIAL RISK

1. Process of Asset Liability Management
2. Computation of Value at Risk
3. Computation of Dates to Survival
4. Dynamic Liquidity
5. Money to Trading
- 6.

ANALYSIS OF MITIGATING FINANCIAL RISK AT ING VYSYA

ING VYSYA Bank follows the Asset Liability Management Process as the most pertinent method of mitigating financial risk in a way defined by the Apex Bank of the Indian Banking System, the Reserve Bank of India. The asset liability management committee meetings are held regularly to determine the severity in the deficiency and surplus of the maturity gap of cash flows. They also conduct a discriminatory study of the default customers with respect to non performing assets. Their system computes the value of Value at Risk on a daily basis at 95% confidence level. The survival dates are computed on a monthly basis to assess the inflows and outflows of cash. They have a procedure of trading in the markets with swaps and options to mitigate risk.

REPORT ON HDFC

TABLE 3: KEY RATIOS (QUANTITATIVE) OF HDFC (AMOUNT IN MILLIONS)

Items	2008-09	2009-10	2010-11	2011-12	2012-13
No. of offices	1422	1736	1999	2553	3046
No. of employees	52687	51888	55752	66076	69401
Business per employee	44.60	59.00	65.30	65.40	75.00
Profit per employee	0.42	0.60	0.74	0.80	1.00
Capital and Reserves & Surplus	146518	215225	253793	299247	362141
Deposits	1428116	1674044	2085864	2467064	2962470
Investments	588175	586076	709294	974829	1116136
Advances	988830	1258306	1599827	1954200	2397206
Interest income	163323	161727	199282	278742	350649
Other income	32906	39831	43352	57836	68526
Interest expended	89111	77863	93851	149896	192538
Operating expenses	55328	59398	71529	92776	112361
Net Interest Margin	4.69	4.13	4.22	4.19	4.28
Cost of Funds (CoF)	6.92	4.66	4.64	6.06	6.41
Return on advances adjusted to CoF	8.04	6.11	5.91	5.83	5.92
Wages as % to total expenses	15.50	16.68	17.15	14.01	13.01
Return on Equity	17.17	16.30	16.74	18.69	20.34
Return on Assets	1.28	1.53	1.58	1.77	1.90
CRAR	15.69	17.44	16.22	16.52	16.80
Net NPA ratio	0.63	0.31	0.19	0.18	0.20

Source: A Profile of Banks in India, RBI

The ratio of Net Interest Margin for HDFC Bank has declined. The ratios of profitability – Return on Equity, Return on Assets has increased. The productivity ratios of Business per Employee and Profit per Employee have also increased. The Net NPA ratio has decreased too.

REPORT ON HDFC (QUALITATIVE)

HDFC deals with all types of functional risk such as Finance, Marketing, H.R, operation and I.T

HDFC FINANCIAL RISK IS EXPOSED TO

- Credit risk which includes risk associated with borrowers
- Portfolio risk behind every high-ended portfolio handled by the bank
- Interest rate risk which has immediate effect of changes in interest rates and can impacts the Net Interest Income (NII) as well as on the bank's net worth in the long term since the economic value of a bank's assets, liabilities and balance sheet positions get affected due to variation in market interest rates.
- Liquidity risk as it involves risk to meet all financial commitments and to capitalize on opportunities for business expansion. This includes ability to meet deposit withdrawals either on demand or at contractual maturity, to repay borrowings as they mature and to make new loans and investments as opportunities arise. Liquidity is managed on a daily basis by the Treasury Group.

HDFC MARKETING RISK

- Promotional risk, especially with regards to advertising and promotional material
- Risks associated with customer service and technical support which involves un-estimated costs to the organization
- Risk to brand reputation which could be contributed by deficiency in any of the other functional areas
- Perceived risks by customers with respect to product offerings (mutual funds, loans, etc.)
- Risk associated with improper selection of channels for communication
- Channel conflicts
- Risks arising from non-uniformity in communicating the brand message to the customers through various channels

HDFC OPERATIONAL RISK

- Transaction verification
- authorization systems
- internal audit process
- identity verification

- ATM transaction verification

HDFC IT RISK

- Authentication risk
- Internet banking risk
- Hacking of bank's website

HDFC has various teams to tackle all the above functional risks. HDFC have never outsourced any of their functional areas, as their policies and regulations are highly confidential. HDFC believes that its entire management staff are required to get involved in the reduction of risk for the bank. Circulars which are to be generated in order to meet the risk parameters and thresholds are formulated by the top management.

HDFC has implemented functional risk management from day one since the bank started its operations. Changes in the policies and regulations are done every 3 months and new circulars are issued depending on changing market scenarios.

ANALYSIS FOR RISK MITIGATION

Every bank is exposed to risk, though people trust more on public sector banks because of safety and assurance as they are backed by Government of India.

HDFC being a private sector bank, takes utmost care to mitigate 92 -95% of risk associated with the bank. RBI guidelines for the banks are general guidelines such as recent KYC (Know your customer) in which every bank has to get up-to-date dated customers' information. These regulations are helpful to banks like HDFC but there are other risks which RBI doesn't takes into consideration .HDFC has its own set of policies and regulations in order to safeguard the bank from risk.

IN ORDER TO MITIGATE THE FINANCIAL RISK

Maker-checker central principle is implied wherein maker and checker means that for each transaction, there must be at least two individuals necessary for its completion. While one individual may create a transaction, the other individual should be involved in confirmation/authorization of the same.

Audits are been done for corporate branches twice a year and small branches once a year. Audits are done on strict basis where Mystery shopping is done by RBI people in branches and corporate offices.

Concurrent audits are conducted every 1 month in corporate branches to keep check on cash balances, KYC policy, loans and advances checking, deposits, forex, income leakage, housekeeping and computers.

If any suspicious activities in transactions are noticed, they are reported to FIU (Financial Intelligence Unit) headquarter in Delhi. Banks are required to file suspicious transactions' reports to avoid money laundering.

IN ORDER TO MITIGATE HR RISK

- Identification of the employees are made compulsory

- Verification of the documents are done for top end to lower staff of the bank

IN ORDER TO MITIGATE IT RISK

- Software like SAS (Statistical Analysis System) are used to keep data confidential
- Internet banking users are provided with user name and password for transaction
- Authentication passwords are made compulsory for each transaction through websites.

ANALYSIS OF QUESTIONNAIRE

SCALED BASED ON 1 TO 5 WHERE 5 IS HIGHEST AND 1 IS LOWEST

Parameter	BOI	ING VYASA	HDFC	Weighted Average
Existence of functional risk management exists in bank	4	4	4	4
Whether risk management processes adopted by bank in the mentioned functional area	4	3	4	3.67
Functional risk management done in bank itself or outsourced	3	3	3	3
Implementation of functional risk management	3	3	3	3
Percent of Risk Mitigated after Implementation	3	3	3	
Apart from RBI guidelines, which are the other types of risk management adopted by bank	2	2	2	2
Awareness about other banks Process in Risk Management	2	2	2	2
Process of mitigation of the risks in bank	3	3	3	3
Existence of internal control system exist in bank	3	3	4	3.67
Existence of any uncontrollable risk factors	2	2	2	2
Total	29	28	30	29

All the three banks in the sample have paid utmost importance to the risk management in the diverse functional areas and have undertaken steps adhering to the RBI guidelines to mitigate the risk. This underlies the fact that banks in India are risk conscientious and aware of its impact on the performance and stability of the banking system in India.

The banks have not implemented any other steps apart from the RBI Guidelines to mitigate the risk in their banking operations and systems. They are not aware of the uncontrollable risk factors existing that affect the performance and stability of the banking system.

SUGGESTIONS

- Marketing Risks could be mitigated by periodic and regular marketing audits to review the performance of the bank as a brand in the market, market share, customer base, product offerings, positioning, customer feedback studies and overall enhancing of customer service. Banks also need to be more engaging with customers within their premises and not just treat them as consumers of their products and services. This will go a long way in building customer loyalty and mitigating unwarranted risks in future.
- Banks must have small machine called thumb print which is used by them to access computers & information. Before this system bank staff used to have login id & password, if someone having or knowing other staffs' login id & password then that person can easily access confidential information. In order to avert that risk bank introduced thumb print machine.
- With the increase in number of job options available nowadays, the HR function of an organization must take care that they hire those people who believe in long-term commitment to the organization. The HR then must take up the challenge of retaining them by developing retention techniques like Holiday plans, fun-at-work etc. HR also faces the challenge of creating a balanced organization that originates from mergers and acquisitions. HR needs to assimilate those policies that are mutually agreeable to the companies being merged as well as profitable for the new organization.
- Globalization poses HR with challenges such as expatriation and repatriation. HR needs to train employees that leave their nation for fulfilling a foreign assignment. It also needs to provide such employees with adequate moral support and assure them of job security on their return.
- With multinational organizations on the rise, HR needs to focus on issues such as cross-cultural training so that problems that can arise because of differences in international professional values can be diminished.

LIMITATIONS OF THE STUDY

- Time constraint
- Confidentiality of the information

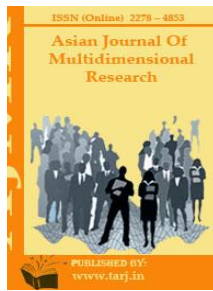
CONCLUSION

Risk management underscores the fact that the survival of an organization depends heavily on its capabilities to anticipate and prepare for any occurrence rather than just wait for an event to occur and then react. The objective of risk management is not to prohibit or prevent risk taking activity, but to ensure that the risks are consciously taken with full knowledge, clear purpose and understanding so that it can be measured and mitigated.

Based on the survey, it is analyzed that financial, operational, and IT-related risks are largely mitigated by banks as per the norms laid down by RBI. However, marketing risks and HR-related risks need to be clearly identified, defined and mitigated by banks. The above suggestions are hence restricted to these two uncovered risks.

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THE PRADHAN MANTRI JAN DHAN YOJANA (PMDJY) - A FORWARD JOURNEY TOWARDS FINANCIAL INCLUSION

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ABSTRACT

Financial inclusion is very vital towards economic development and well structured financial system of a country. PMDJY is an ambitious financial scheme which will provide a host of benefits including a bank account, insurance and a debit card to non-bank account holders in India. Financial literacy has been accorded top priority to create the financial awareness about this yojana. Only 58 % of Indians have access to banking services. So, the PMJDY's target is to open 7.5 crore bank accounts by January, 2015. Under this programme, people will be able to open zero-balance accounts with any bank. By paying the financial benefits directly into bank accounts, the scheme would reduce waste and check corruption that inflate India's \$43 billion subsidy bill, equivalent to more than 2 % of its GDP for handouts of grain, fuel and fertilizer. By taking these factors, the Central Government under the leadership of Mr. Narendra Modi, Prime Minister, India has launched this mass empowerment banking scheme: "[Pradhan Mantri Jan Dhan Yojana](#)" on August 28, 2014 to include every Indian into the Indian banking system. Along with banking account, the person will also get other benefits such as Kisan Credit Card, health insurance and other benefits. The PMDJY provides for a free zero-balance bank account with a debit card, Rs. 1 lakh accidental insurance policy and Rs. 30,000 free medical insurance cover for those who enroll before January, 26, 2015. Depending on the performance of the accounts in the first six months, banks will later extend Rs. 5,000 overdraft facility, thereby turning the debit card into a kind of credit card. This research paper will discuss in detail the scope, benefits and developments of the PMDJY towards financial inclusion of common masses as well as towards nation building.

KEYWORDS: PMDJY, Financial Inclusion, Kisan Credit Card, Health Insurance, Debit Card, GDP.

INTRODUCTION

PROLOGUE

On the eve of Independence Day, Narendra Modi, the Prime Minister of India, in his first has announced that his government would ensure that all the citizens of India have access to bank accounts and debit cards. In keeping with this ambition, on August, 28, 2014, his government has formally launched the Pradhan Mantri Jan Dhan Yojana (PMJDY) which would end the financial untouchability of the poor masses in India. PMJDY is an ambitious scheme that will provide a host of benefits including a bank account, insurance and a debit card for all. The project has been modeled to fulfill the financial inclusion by providing economic benefits for all sections of India. PMJDY is national mission for financial inclusion to ensure access to financial services i.e. banking/savings and deposit accounts, remittance, credit, insurance, pension in an affordable and suitable manner. The aim of this scheme is highlighted by its slogan “*Mera Khata – Bhagya Vidhaata*”. In the long run, the scheme will also allow the poor sections to avail themselves of subsidies and overdraft facilities through their bank accounts, which are intended to eliminate money-lenders, commission agents and corruption. In India, about 42 percent of the population lacks access to a formal financial institution; they depend on local money lenders for loans which are often given at excessive interest rates and unfair terms. Without access to a basic bank account, facilities such as insurance cover and debit cards remain a far cry to this section of the population. The PMJDY has been launched to change this scenario. In the long term, this scheme will also provide the backdrop for a cashless economy – another focal point of the Prime Minister’s I-Day address (Digital India). Considering these factors, Narendra Modi, the Prime Minister of India has launched this mass empowerment banking scheme: “PMJDY” on August 28, 2014 to include every household in India into the banking system. Along with banking account, the person will also get other benefits such as kisan credit card, health insurance and other benefits.

OBJECTIVE OF THE STUDY

The main objective of the present study is to discuss in detail the benefits, scope PMJDY towards the common masses for the purpose financial inclusion in India. Apart from the main objective, other objectives are the followings:

- a. To know the summary progress of financial inclusion by all banks including regional rural banks (RRBS)
- b. To know the opening new bank accounts under **PMJDY**
- c. To compare between the earlier approach (Swabhimaan) and new approach (PMJDY)

FINANCIAL INCLUSION: CURRENT STATUS - INDIA

Instead of various measures by govt. of India for financial inclusion, poverty and exclusion continue to dominate socio-economic and political discourse in India after independence. Indian economy has shown impressive growth after liberalization process, impact is yet to filter to all sections of the society. India is still home of 1/3 of world's poor. Out of 24.67 crore households in the country, 14.48 crore (58.7%) households have access to banking services according to census 2011. Of the 16.78 crore rural households, 9.14 crore (54.46%) are availing banking services. Of the 7.89 crore urban households, 5.34 crore (67.68%) households are availing banking services (shown in the

Table-1). The present banking network of the country (as on 31.03.2014) comprises of a bank branch network of 1, 15,082 and an ATM network of 1, 60,055. Of these, 43,962 branches (38.2%) and 23,334 ATMs (14.58%) are in rural areas. Moreover, there are more than 1.4 lakh Business Correspondents (BCs) of Public Sector Banks and Regional Rural Banks in the rural areas. BCs are representatives of bank to provide basic banking services i.e. opening of bank accounts, cash deposits, cash withdrawals, transfer of funds, balance enquiries, mini statements, etc. After 2005-2006, RBI has advised banks to align their policies with the objective of financial Inclusion. Further, in order to ensure greater financial inclusion and increasing the outreach of the banking sector, it has been decided to use the services of NGOs/SHGs, MFIs and other Civil Society Organizations as intermediaries in providing financial and banking services through use of “Business Facilitator and Business Correspondent Model”.

TABLE-1 AVAILABILITY OF BANKING SERVICES (IN %)					
Rural		Urban		Total	
Census 2001	Census 2011	Census 2001	Census 2011	Census 2001	Census 2011
30.1	54.4	49.5	67.8	35.5	58.7
Source: Table IV.7, RBI Annual Report,2013-14					

TABLE-2 FINANCIAL INCLUSION-SUMMARY PROGRESS OF ALL BANKS INCLUDING REGIONAL RURAL BANKS (RRBs)					
Particulars	Year Ended 2010	Year Ended 2011	Year Ended 2012	Year Ended 2013	Year Ended 2014
Banking Outlets in Villages					
a)Branches	33,378	34,811	37,471	40,837	46,126
b)Villages covered by BCs'	34,174	80,802	1,41,136	2,21,341	3,37,678
c)Other modes	142	595	3,146	6,276	-
d)Total	67,674	1,16,208	1,81,753	2,68,454	3,83,804
Urban locations through BCs	447	3,771	5891	27,143	60,730
Basic Saving Bank Deposit A/c-Branches					
a)No. in millions	60.19	73.13	81.20	100.80	126.00
b)amount in billions	44.33	57.89	109.87	164.69	273.30
Basic Saving Bank Deposit A/c-CBs					
a)No. in millions	13.27	31.63	57.30	81.27	116.90

b) Amount in billions	10.69	18.23	10.54	18.22	39.00
OD facility Availied in BSBDA's account					
a) No.in millions	0.18	0.61	2.71	3.92	5.90
b) Amount in billions	0.10	0.26	1.08	1.55	16.00
KCCS(No. in Millio)	24.31	27.11	30.24	33.79	39.90

Source: Table IV.7, RBI Annual Report,2013-14

Source RBI. "Rural" areas are defined as those centres which have population of less than 10,000.

USSD- Unstructured Supplementary Service Data proposed to be launched by NPCI 2 One BC can cover more than one village.

PMDJY KNOWN AS A WELFARE BANKING SCHEME

In the first phase, banks were nationalized in 1969 after weaving a lot of dreams before the country. It is told that nationalization of banks would benefit the poor. But, it is regretted to say that in reality, even after 68 years of independence, not even 68 per cent of the population is covered by the banking system. The PMDJY provides for a free zero-balance bank account with a debit card, Rs. 1 lakh accidental insurance policy and Rs. 30,000 free medical insurance cover for those who enroll before January 26, 2015. Depending on the performance of the accounts in the first six months, banks will later extend Rs. 5,000 overdraft facility, thereby turning the debit card into a kind of credit card. The debit card is being issued by RuPay of the National Payments Corporation of India. Modi said a mammoth initiative like this would go a long way in granting global acceptance to the RuPay brand, in line with international retail credit giants like Visa and others. "Banks queue up at the houses of the rich to extend loans at cheaper rates. Nothing's wrong with that. It's business. But they do not extend the same courtesy to the poor. So, the poor take loans from rich money-lenders at five times the market rate. Many poor farmers fail to repay because the loan is so expensive and then some of them commit suicide when all is lost. This is a vicious cycle. This programme is the first step towards breaking that cycle," Modi said. Over 77,000 camps were held across India to open bank accounts. The scheme was simultaneously launched at multiple places by concerned State Chief Ministers, several Union Ministers in India. Never in the history of Indian banks or even insurance companies have 1.5 crore people been insured or accounts opened in one single day. It is a history and record. By 2018, it is likely that all account holders under the PMJDY scheme will have access to an Aadhaar-linked bank account with overdraft facility up to Rs. 5,000. By allowing direct money transfer into bank accounts, the scheme is likely to cut down on corruption. The Prime Minister also said that by providing debit cards that can be swiped the scheme shall reduce the dependence on credit cards, thereby promoting savings. PMJDY focuses on coverage of households as against the earlier plan which focused on coverage of villages. It focuses on coverage of rural as well as urban areas. Earlier plan targeted only villages above 2000 population while under PMJDY

whole country is to be covered by extending banking facilities in each Sub-Service area consisting of 1000–1500 households such that facility is available to all within a reasonable distance, say about 5 KM.

MISSION OF PMJDY

Mission of PMJDY envisages provision of affordable financial services to all citizens within a reasonable distance. It comprises of the following six pillars.

- I. UNIVERSAL ACCESS TO BANKING FACILITY:** Mapping of each district into Sub Service Area (SSA) catering to 1000-1500 households in a manner that every habitation has access to banking services within a reasonable distance say 5 km by 14th August, 2015. Coverage of parts of J&K, Himachal Pradesh, Uttarakhand, North East and the Left Wing Extremism affected districts which have telecom connectivity and infrastructure constraints would spill over to the Phase-II of the program (15th August, 2015 to 15th August, 2018)
- II. PROVIDING BASIC BANKING ACCOUNTS WITH OVERDRAFT FACILITY AND RUPAY DEBIT CARD TO ALL HOUSEHOLDS:** The effort would be to first cover all uncovered households with banking facilities by August, 2015, by opening basic bank accounts. Account holder would be provided a RuPay Debit Card. Facility of an overdraft to every basic banking account holder would be considered after satisfactory operation/credit history of six months.
- III. FINANCIAL LITERACY PROGRAMME:** Financial literacy would be an integral part of the mission in order to let the beneficiaries make best use of the financial services being made available to them.
- IV. CREATION OF CREDIT GUARANTEE FUND:** Creation of a Credit Guarantee Fund would be to cover the defaults in overdraft accounts.
- V. MICRO-INSURANCE:** To provide micro- insurance to all willing and eligible persons by 14th August, 2018, and then on an ongoing basis.
- VI. UNORGANIZED SECTOR PENSION SCHEMES LIKE SWAVALAMBAN:** By 14th August, 2018 and then on an ongoing basis.

Under the mission, the first three pillars would be given thrust in the first year. a comprehensive financial inclusion based is proposed to be achieved under the six pillars through PMJDY.

OBJECTIVE OF PMJDY

THE MAIN OBJECTIVES OF PMJDY ARE THE FOLLOWINGS

- I. The PMJDY has been conceived as a national mission on financial inclusion with the objective of covering all households in the country with banking facilities and having a bank account for each household.
- II. The scheme, pushed by the government in a mission mode, seeks to provide two accounts to 7.5 crore identified households by August 2018.

- III. PMJDY lies at the core of Prime Minister Narendra Modi-led government's development philosophy of "Sab Ka Sath Sab Ka Vikas".

FEATURES OF PMJDY

THE MAIN FEATURES OF PMJDY HAVE BEEN HIGHLIGHTED GIVEN BELOW

- I. The first phase of the mission, which started on 28 August 2014, would end in Aug.2015.
- II. The second phase will start from 2015 till 2018, covering aspects such as micro insurance and pension schemes like 'Swavalamban'.
- III. Rs. 5,000 overdraft facility for Aadhar-linked accounts
- IV. RuPay Debit Card with inbuilt Rs. 1 lakh accident insurance coverage.
- V. The National Payments Corporation of India (NCPI) has tied up with HDFC Ergo to provide the 1 Lakh initial cover while the additional 1 lakh cover would be provided by the four state owned general insurers New India Assurance, National Insurance, United India Insurance and Oriental Insurance Company.
- VI. Minimum monthly remuneration of Rs. 5,000 to business correspondents who will provide the last link between the account holders and the bank.

MAIN HIGHLIGHTS OF PMJDY

The main highlights of this scheme are mentioned given below.

1. **PMJDY** scheme has been launched on August 28, 2014.
2. Universal access to banking facilities for all households in India through a bank branch or a fixed point Business Correspondent (BC) within a reasonable distance
3. To cover all households with at least one basic banking accounts with RuPay Debit Card having inbuilt accident insurance cover of Rs.1 lakh.
4. An overdraft facility upto Rs. 5000 will also be permitted to Adhaar enabled accounts after satisfactory operation in the account for 6 months.
5. Financial literacy programme aims to take financial literacy upto village level.
6. The mission envisages expansion of direct benefit transfer under various government schemes through bank accounts of the beneficiaries of.
7. The issuance of Kisan Credit Card (KCC) as RuPay Kisan Card is also proposed to be covered under this plan.
8. The major shift in this programme is that households are being targeted instead of villages as targeted earlier. Moreover both rural and urban areas are being covered this time as against only rural areas targeted earlier.
9. The present plan also pursues the digital financial inclusion with special emphasis on monitoring by a mission headed by the Finance Minister, Govt. of India.

**TABLE-3 BANK ACCOUNTS OPENING UNDER PMJDY
ON 4.11.2014)****(AS**

S.No.	Bank	No of Accounts (In Lacs)			No. of Rupay Debit Cards in Lacs)	Balance in Accounts (in Lacs)	No. of Accounts With Zero Balance (in Lacs)
		Rural	Urban	Total			
1	Public Sector Bank	305.48	258.73	564.2	352.25	437753.42	425.06
2	Regional Rural Bank	98.41	17.33	115.74	11.81	59318.03	91.38
3	Private Sector Bank	9.41	9.78	19.19	5.03	32338.70	13.10
Total		413.30	285.84	699.13	369.09	529410.15	529.50

Source: Press Information Bureau (PIB), Govt. of India. 25 August 2014

The bank officials have a target of enrolling 7.5 crore new accounts by January 26, 2015, which would be achieved just 2 months from its launching. Govt. of India is now considering doubling this target to 15 crore new accounts. **PMJDY** has already got the huge popularity and attention in India. Almost **4 crore RuPay debit cards have been delivered** to these new bank account holders. Account holders are also getting an accidental insurance of Rs. 1 lakh with every account, along with an overdraft facility of Rs. 5000, which can prove to be a financial miracle for small business men and traders as well as to agriculture sector. The banks have observed an interesting phenomenon is that the balance accumulation has increased to Rs. 750 as an average. The people are slowly warming up to the idea of depositing their money into banks. Beforehand, it has been observed that such no-frills accounts with zero minimum balance tend to remain dormant with no transaction or addition whatsoever. In fact, before the launch of this national wide program, most banks which offered such as no-frills bank account for economically backward families used to have an average deposit in between Rs. 250-500. Through PMJDY, this figure has increased to Rs. 750, which is again an achievement for the bank officials and the Govt. of India.

TABLE-4 COMPARISON BETWEEN THE EARLIER APPROACH (SWABHIMAAN) AND NEW APPROACH (PMJDY)

S.No.	Earlier Approach (Swabhimaan)	New Approach (PMJDY)
1	Villages with population greater than 2000 covered; thus limited geographical coverage	Focus on household; Sub Service Area (SSA) for coverage of the whole country.
2	Only rural	Both rural and urban
3	Bank Mitra (Business Correspondent) was visiting on fixed days only	Fixed point Bank Mitra in each SSA comprising of 1000-1500 households (3 to

		4 villages on an average) to visit other villages in the SSA on fixed days
4	Offline accounts opening - Technology lock-in with the vendor	Only online accounts in CBS of the Bank
5	Focus on account opening and large number of accounts remained dormant	Account opening to be integrated with DBT, credit, insurance and pension
6	Inter-operability of accounts was not there	Inter-operability through RuPay Debit Card, AEPS, etc.
7	No use of mobile banking	Mobile wallet and USSD based mobile banking to be utilized
8	Cumbersome KYC formalities	Simplified KYC/e-KYC in place as per RBI guidelines
9	No guidelines on the remuneration of the Bank Mitra. Banks went generally with Corporate BCs who used to be least expensive to them	Minimum remuneration of the Bank Mitra to be Rs. 5000/- (Fixed + Variable)
10	A recent RBI survey finds that 47 % of Bank Mitra are untraceable	Viability and sustainability of Bank Mitra is identified as a critical component
11	Monitoring left to banks	Financial inclusion campaign in mission mode with structured monitoring mechanism at Centre, State and District level
12	Financial literacy had no focus	The rural branches of banks to have a dedicated financial literacy cell
13	No active involvement of States / Districts	State level & District level monitoring committees to be set up
14	No brand visibility of the programme & Bank Mitra	Brand visibility for the programme & Bank Mitra proposed
15	Providing credit facilities was not encouraged	OD limit after satisfactory operations / credit history of 6 months
16	No grievance redressal mechanism	Grievance redressal at SLBC level in respective states
Source: Department of Financial Services, Ministry of Finance, Govt. of India www.financialservices.gov.in		

CONCLUDING REMARKS

The financial inclusion is vital to poverty reduction and financial awareness among mass people. The PMJDY has been launched as a national mission towards the financial inclusion for covering all households in India with banking facilities and having a bank account for each household. The scheme is aimed at providing bank accounts, insurance coverage and a debit card to all the citizens of the country. It is said that since banking services are in the nature of public product, the availability of banking and payment services to the entire population without discrimination is the prime objective of financial inclusion in public policy. With a bank account, every household gains access to banking and credit facilities. This will enable them to come out of the grip of private money lenders. In India, about 42 % of the population lacks access to a formal financial institution such as a bank and is not part of the country's banking system. Without access to a basic bank account, facilities such as insurance cover and debit cards remain a far cry to this section of the population. The PMJDY is set to change this scenario. In the long term, this scheme will also provide the backdrop for a cashless economy. The new scheme has tried to address all the possible deficiencies of earlier scheme and its monitoring would be done at state and district levels. There is more than a fair chance that they will be proved wrong. The goal is hard to achieve. It is costly and unviable. It will create huge stresses in the banking system. Some experts feel that the overdraft facility of Rs.5000 may be doubling by accountholders. As it is difficult to spread bank branches across all unbanked areas, bank correspondents (BCs) will be deployed on a large scale to help execute the plan. The PMJDY scheme's connectivity and delivery of services would be crucial to BCs. Some IT aspects should be used to prevent the accountholders from operating the account from locations other than with a BC. A standardized financial literacy material has also been prepared in vernacular languages to create awareness about this scheme. The government has to popularize this scheme through banks and public sector banks and they have the major roles in this regard. There must have the close coordination among the government, the States and the bankers for successful of this scheme. For the NDA government, there will be a large number of positive political and economic spin-offs from the successful implementation of this scheme. Apart from making available basic banking facilities to every household, it is designed to provide social security through insurance schemes, and in select cases, pension schemes. Investments in branches and the servicing of millions of small accounts pushed up operational costs in nationalized banks. The banks should take the bold steps to check bad loans and maintain their net worth under this scheme. Duplication is bound to happen. Most public sector banks don't have the systems to check this especially in interior India. The insurance cover offer could be misused by opening multiple accounts under the scheme. To avoid duplication of claim settlement, the banks may need the customers to carry their Aadhaar card and comply with biometric requirements. It may be the financial burden to the National Payments Corporation of India (NPCI). A standardized financial literacy material has also been prepared in vernacular languages to create awareness about this scheme. PMJDY requires meticulous planning of NDA government for its successful implementation with the developmental philosophy of financial inclusion. Last but not the least, the success of the mission will definitely depend upon the delivery system of the financial institutions and creating awareness and wide participation of the people.

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DOES HUMAN CAPITAL DEVELOPMENT ENHANCE AGRICULTURAL PRODUCTIVITY; EVIDENCE FROM RURAL HIMACHAL PRADESH

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ABSTRACT

In present paper an attempt has been made to examine, does human capital development helps in increasing agricultural productivity in Himachal Pradesh with the help of production function. The present analysis indicates that the impact of the farmer's education on farm production is positive and significant. Education alone accounts for 28 per cent of the variation in per hectare agricultural productivity. Infact the relationship is relatively stronger with secondary level and weak but positive with higher level of education. This underlines the importance of sustained human capital up to a minimum of secondary level.

KEYWORDS: *Agricultural Productivity, Human Capital, Maize and Production Function.*

INTRODUCTION

Rural development strategies that 'overrated land and underrated human beings have not been succeeded considerably (Schultz, 1981). It is realized that fundamental problem of agricultural growth is of human capital. Variations in the productivity of crops has been traditionally explained using factors like size of holdings, quality of land, yield increasing inputs (seeds, fertilizers, and pesticides), area under irrigation, use of human labour and bullock labour, weather condition etc. Human capital has not been considered as important factor for explaining the variation in productivity of crops. The role of farmer's education became an important issue after the seminal work of Schultz (1964). Schultz suggested that skilled human capital increases the productivity of crops and provides higher pay-off to farmers in a changing modernizing environment than in a traditional agriculture. Similarly, Mellor (1976) also argued that investment in human capital in rural

area is important to improve agricultural productivity. Hence, the need for human capital arises for rural development in general and agricultural development in particular.

Following Schultz's publication, several studies (Singh, 2000; Kurosaki and Khan, 2004 and Huang and Luh, 2009) have been carried-out using farmer's education as one of the explanatory variables in determining the productivity of crops in different parts of the world. However, the results of these studies are not uniform. While the majority of studies carried out using field level survey data have shown a significant positive relationship between education and productivity of crops (Singh, 1974; Duraisamy, 1992; Huang and Luh, 2009 and Mohapatra, 2009). Some studies have found no direct relationship between education and yield of crops (Kalirajan and Shand, 1985 and Narayanamoorthy, 1990). Some of the studies have also come out with mixed results regarding the role of farmer's education on agricultural productivity (Tilak, 1993).

It has also been acknowledge since the time immemorial that development of rural people is an important factor influencing the productivity and economic growth as a whole. Agriculture of today is significantly different from that in the period of green revolution. At that time, major thrust of agricultural teaching and research was on enhancing production through raising yields per hectare. That concern still remains vital but in addition, understanding of management of natural resources, economics, agricultural marketing and management has been more crucial (Csaki, 1999). They are more prompt in the adoption of new farm practices and technologies and the illiterate farmers usually replicate their adoption behavior. However, productivity gains to the illiterate farmers may be attributed to the spread of new technologies rather than its effective use, whereas education among farmers reduces technical and allocative inefficiencies and shift their production frontier outward (Narayanamoorthy, 2000).

Although there has been a gradual decline in the share of illiterate farmers in the Indian agriculture, first between 1983 and 1993-94 (from 69 per cent to 61 per cent) and then between 1993-94 and 1999-2000 (from 61 per cent to 57 per cent), agriculture still consists of a large pool of illiterate workforce (Singh and Sharma, 2004). Human capital base of agriculture workforce is very low in rural areas. Education level of farmers engaged in agriculture and allied activities as shown in Chadha (2004) indicates that about 3/5 farm workers in rural areas are illiterate; about 23 per cent workers in rural area could attain education up to primary level; and the percentage of workers achieving education at the secondary and above levels is less than 9 per cent in rural areas.

Agricultural development is undoubtedly basic to not only rural development, but also to the development of the economy as a whole. Rural development may be defined as a process of sustained growth of the rural economy and improvement of well-being of the rural population. The ultimate goal of rural development is to have a balanced social and economic development with emphasis on equitable distribution as well as the creation of benefits for the rural poor. In Himachal Pradesh 89.96 per cent population is residing in rural areas (Census, 2011). The majority of people in rural areas are engaged primarily in subsistence agriculture for their survival. The core problems of growing inequality, rapid population growth, massive illiteracy and rising unemployment, find their origin in the stagnation and often retrogression of economic life in rural areas. According to the Census report (2011) there are 988,139 illiterate persons in Himachal Pradesh (above 7 years), most of them are residing in rural area and indulged in agricultural activities. They are not even in the position to prepare and maintain their account of income and expenditure. In this paper an attempt

has been made to explore the relationship between human capital and agricultural productivity in the Seraj development block of Mandi district in Himachal Pradesh with the help of micro level data.

CONCEPTUAL FRAMEWORK: IMPACT OF HUMAN CAPITAL ON AGRICULTURAL PRODUCTIVITY

Variation in the productivity of crops has been traditionally explained using factors like size of holdings, quality of land, yield increasing inputs (seeds, fertilizers and pesticides), area under irrigation, use of human and bullock labour, weather condition etc. Human resources were not considered as important factor for explaining the variation in the productivity of crops. The mechanism through which human capital enhances the productivity of farmers is of various kinds. It is generally envisaged through innovative, allocative, worker and externality impacts (Singh, 2000). The 'innovative effect' emanates from the possible usefulness of schooling in relation to receiving decoding and using the new information through improved communication skills, superior contacts and sharpened judgmental faculties. Education enhances the farmer's capacity to maximize the perceived profit function by allocating the resources in a more effective cost efficient manner by choosing which and how much of each output to produce and in what proportion to use the inputs – allocative effect (Mook, 1981 and Tilak, 1993). The central theme of the allocative effect lies in evaluating and adopting the more profitable new technologies.

The innovative effect was defined as the acquisition and decoding of economically useful information, while the allocative effect refers to the use of this information to change the patterns of resource allocation (Chaudhari, 1974 and Khaldi, 1975). The former is useful only when combined with the later. Since the allocative effect presupposes innovative effect, in practice there does not seem to be any need to distinguish between the two. However following Welch (1970), the subsequent literature has not deemed it necessary to maintain the distinction between the innovative and allocative effects and has rightly used the term allocative effect to denote both of them.

Under perfect competition, given prices of inputs and outputs and technology, there is no scope for allocative efficiency. However, in a dynamic modernizing agriculture with changing technology, farmers face imperfect information and make allocative errors, in the sense of not being able to equate the marginal value product (MVP) of inputs to their respective opportunity costs (Duraismy, 1991). The presence of disequilibria arising out of such changes in technology may create incentives for farmers to learn and adjust their resources towards attaining an optimum level. The allocative hypothesis proposes that education enhances the productive skills of persons by making them to adjust quickly to disequilibria. This kind of increase in information acquisition is likely to constitute a major source of higher allocative and productive efficiency among more educated farmers.

The 'worker effect' of education refers to the 'technical efficiency'- a more educated farmer's ability to produce more output from a given bundle of inputs (Duraismy, 1991). This effect arises because education may improve the quality of labor component. It includes the ability to perform agricultural operations more efficiently in the economic sense. It is translating the allocative efficiency in to production efficiency. The increased capability to process and apply the information is seen through lowering the marginal costs and raising the marginal benefits with the given set of inputs.

Mutual interdependence in economic activity can be either through the market where costs and benefits accrue to the participants in strict and direct proportion to the scale of their economic transactions; it can also be a form of mutual inter-dependence which does not work through normal market channels. In economic literature this has come to be known as and 'externality' (Chaudhari, 1979). In the agriculture sector, among a large body of farmers, the externality would manifest itself in many ways. Chaudhri (1979) has given three traits of externalities viz. externality in production process, in market transactions and in social behavior. Farmers with superior production techniques and entrepreneurial ability would see the appropriate timing of agricultural operations, opportunities of adding to their income by introducing grading, efficient handling which would enable them to realize a higher price for their output. These techniques of proven success can also be easily copied by other farmers in the vicinity unless they suffer from some resource constraints. But measurement of externality is difficult and intricate problem in applied econometrics.

Although many factors contributes towards an increase in agricultural productivity, yet the impact of human capital, area of land, irrigation, use of improved seeds and fertilizers, credit facilities and farm mechanization on agricultural productivity are more pronounced (Das, 1997).

DETERMINANTS OF AGRICULTURAL PRODUCTIVITY

The determinants of agricultural productivity can be grouped under three categories.

1 NATURAL FACTORS

Agricultural productivity is primarily determined by natural factors like weather condition, quantum of rainfall and type of soil. The prevailing weather condition largely determines the success or failure of farming. Weather decides the time of sowing transplanting, time of fertilizer application and the time of harvesting. It is because of weather condition that gestation period of wheat ranges from 6 to 10 months in India. Appropriate and timely decisions in this regard have to be taken to make farming successful and most productive. The topography and agro-climatic zones also determines the productivity and selection of seeds as well. Soil serves as a store house of nutrients, minerals and water for crops. The principal components of soil are mineral material, organic matter and water, the proportion of which vary and which together form a system for plant growth. Hence the selection of crops and the productivity thereof depends upon the types of the soil.

2 TECHNICAL FACTORS

Technical factors comprise of water management, use of improved seeds, fertilizer, plant protection and use of modern agricultural tools and machineries. Water being a key factor for agricultural production needs proper management. A sound infrastructure of irrigation and drainage can overcome the constraints posed by physical environment such as floods and soil erosion. The efficient exploitation of water resources also determines the productivity of crops. Use of improved seeds, suitable to the local condition like climate, soil, water availability accompanied by appropriate doses of fertilizer, enhances the productivity (Narayanamoorthy, 2000). It is now recognized that mechanization of farm operations not only reduces drudgery but also contributes to increase productivity. The use of improved tools and implements like seed-cum-fertilizer drills, sprayers, tillers, threshers, modern ploughs and gardening tools and equipments results in increased production, reduction of cost, saving of time and increase in appropriate quantity can push up the productivity manifold (Singh, 2000). Seed treatment, followed by timely and adequate application of

insecticides and pesticides protect the plant from the attack of diseases, pests and insects and thereby increases the productivity.

3 INSTITUTIONAL FACTORS

Institutional factors include land reforms, marketing and storage facilities credit facilities, human capital, research and extension and transfer of technology. Proper marketing of agricultural produce, adequate storage facilities and standardization of product ensures fair prices of the product. Land reform measures involve decisions on the redistribution of land ownership, conditions of tenancy, regulation of rent and consolidation of holding etc. The average size of holding has now reached such a level as to make the farm size uneconomical unit under the traditional farming technology. Land reform measures aims at installing the cultivations with incentives to make productive improvement in agriculture. Supply of adequate and in-time seeds, fertilizers and credit also have significant effect on agricultural production and productivity. Better use of available technology and adequate research and extension services add to the production function of a farmer (Mohapatra, 2009). Human capital, not only helps in dissemination of useful and practical information relating to agriculture, but also makes the farmer receptive to new ideas and skills (Singh and Sharma, 2002).

Human capital development enables the farmers to improve efficiency of farming is obvious for it would enable them to be more scientific in the application of various new inputs. And its ranking among as many as 10 variables affecting the total factor productivity from 1966-67 to 1989-90 for India was third, next only to government expenditure on agricultural research, and crop production programmes and the inequality of land distribution (Desai and Nawboudiri, 1997). There are many farm level production function studies with education of the farmer as one of the explanatory variables. These studies show that the level of farm production is significantly higher on farms where the decision-maker is literate than where the decision-maker is illiterate. This was reported for Haryana where it was also found that the impact of the level of education on farm production is relatively strong with secondary education and weak, though positive with both primary and middle level of education (Singh, 1974). Realizing the importance of human capital in accelerating the more carefully evaluated adoption of new technologies by the farmers and thereby improving the agricultural productivity and ultimately earnings, adequacy of knowledge, type of information, adequacy of knowledge, role of NGO's and farmer's willingness to pay to acquire more information assumes special significance.

OBJECTIVES OF THE STUDY

1. To assess the impact of human capital on agricultural productivity and agricultural practices.
2. To identify the level of human capital appropriate for agricultural practices.

DATA AND METHODOLOGY

In order to get the necessary information on the levels of human capita and agricultural productivity a primary survey has been conducted in the crop year 2012-13 in Seraj development block of Mandi District in Himachal Pradesh. To examine the relationship between human capital and agricultural productivity a double log production function of Cobb-Douglas type has been employed. The basic form of the model is specified by;

$$\ln Q = \alpha + \beta_1 \ln S + \beta_2 \ln L + \beta_3 \ln I + \beta_4 \ln F + \beta_5 \ln C + u$$

Where,

Q = Agricultural productivity of maize per hectare in Kg.

S = Education of the farmer, measured by the years of schooling completed

L = Amount of land measured in hectare

I = Irrigation, measured in terms of irrigated area as percentage to net cropped area

F = Fertilizer consumption, measured in money value

C = Credit facilities measured in money value

α = Intercept term

β = Respective regression coefficient/ estimated average effect of a unit change

u = Random variable

EMPIRICAL ANALYSIS AND RESULTS

DETAILED BREAK-UP OF THE SAMPLE

A total number of 130 households from 26 villages have been surveyed, taken from three strata of human capital development viz. elementary, secondary and higher level. Farmers having elementary level of education constitute 42.31 per cent of the total sample size, farmers having secondary and higher level of education constitute 32.31 and 25.38 per cent respectively.

CHARACTERISTICS OF THE SAMPLE

Out of the total sampled households, 116 households were headed by males and remaining 14 by females. The average agricultural productivity of maize obtained during the reference year has been computed by dividing total agricultural production of all individuals by number of persons engaged in production. Trends in respect of gap in returns of education between genders are similar to the study of Das (1997). It is observed that the average agricultural productivity of farmers in Seraj block is 1811.46 Kg. per hectare. The agricultural productivity per hectare in respect of male headed household is 1813 Kg. which is 20.53 kg. higher than that of female headed household. Similarly the average years of schooling for the total sample are 10.39 and 10.57 for male and 8.93 for females. A wide variety of variation has been found in the average years of schooling of males and females. This is because female literacy rate is lower and girls drop-out is high as compare to boys at all levels of education in Himachal Pradesh. The other important reasons for low level of average years of schooling are poverty, child labour and requirements of farm and domestic labour.

EDUCATION AND PRODUCTIVITY PROFILE OF FARMERS

Table 1 depicts the agricultural productivity of farmers having different levels of education. In respect of farmers having elementary education, agricultural productivity varies between 0 to 3,000 Kg. per hectare, though the productivity level of the majority of the farmers in this category varies from 1,500 to 2,000. Similarly the productivity level of the farmers having secondary and higher education varies between 1,000 to 4000 Kg. per hectare. As shown in figure, in respect of secondary and higher education the highest frequency lies between 1,500 and 2,000. But in case of higher education the frequency is relatively higher in class interval 2,000 to 2,500 Kg. per hectare. As per

the arguments of existing studies, the productivity should have been significantly high for highly educated group of farmer than that of the less educated group of farmers Table 1 clearly shows that higher the level of human capital development, higher is the agricultural productivity.

TABLE 1 FARMERS WITH DIFFERENT LEVELS OF PRODUCTIVITY AND EDUCATION LEVEL

Level of Agricultural Productivity (maize) in Kg./hectare	Levels of Education			Total
	Elementary	Secondary	Higher	
0-1000	2	0	0	2
1000-1500	28	9	1	38
1500-2000	17	25	12	54
2000-2500	7	5	11	23
2500-3000	1	2	6	9
3000-3500	0	0	0	0
3500-4000	0	1	3	4
Total	55	42	33	130

Source: Survey data.

ESTIMATES OF THE PARAMETERS: COBB-DOUGLAS PRODUCTION FUNCTION

Table 2 presents the measurement, symbol, mean and standard deviation of the variables included in the Cobb-Douglas production function both in absolute and logarithmic forms. Table 3 depicts the inter correlation matrix of the variables included in present study and it shows that multicollinearity among the variables is not a problem. In table 4 results of double log production function of Cobb-Douglas has been presented in detail.

TABLE 2 MEASUREMENT, MEAN, STANDARD DEVIATION AND COEFFICIENT OF VARIATION OF THE VARIABLES

Variables	Measurement	Symbol	Absolute Form		Log Form	
			Mean	S D	Mean	S D
Agricultural Productivity Per Hectare	Gross return per hectare in Kg.	Q	1811.46	526.28	3.24	0.12
Education	Years of schooling completed	S	10.39	3.88	0.98	0.17
Land	Total area used for cultivation during the year in hectare	L	1.19	0.478	0.04	0.19

Irrigation	Irrigated area as percentage to total cultivable area	I	28.82	35.25	0.88	0.86
Fertilizer	Actual amount of fertilizer used expressed in money value	F	1238.59	809.15	3.28	0.34
Credit	Actual amount taken by the farmer	C	1431.25	2391.28	1.27	1.70

Source: Calculated.

TABLE 3 CORRELATION MATRIX OF THE VARIABLES USED IN THE COBB-DOUGLAS PRODUCTION FUNCTION (LOG FORM)

Variables	Education	Land	Irrigation	Fertilizer	Credit
Education	1.0000	0.0764	0.2188	0.2162	0.8070
Land		1.0000	0.0205	0.0787	0.1752
Irrigation			1.0000	0.1090	0.0692
Fertilizer				1.0000	- 0.1449
Credit					1.0000

Source: Calculated

The production function is specified as

$$Q = [S, L, I, F, C]$$

The five alternative specifications of the aforementioned basic production function are:

- $Q = [S]$ (i)
 $Q = [S, L]$ (ii)
 $Q = [S, L, I]$ (iii)
 $Q = [S, L, I, F]$ (iv)
 $Q = [S, L, I, F, C]$ (v)

These specifications have enabled us in understanding the relative contribution made by independent variables included in the model. Both the input and output variables are introduced in log form.

TABLE 4 ESTIMATES OF THE PARAMETERS OF COBB-DOUGLAS PRODUCTION FUNCTION (N = 130)

$$\ln Q = \alpha + \beta_1 \ln L + \beta_2 \ln I + \beta_3 \ln F + \beta_4 \ln C + \beta_5 S_1 + \beta_6 S_2 + \beta_7 S_3 + u$$

Equ. No.	Constant	Education	Land	Irrigation	Fertilizer	Credit	R ²	F-Value
1	2.8958	0.3526* (7.191)					0.2877	51.71
2	2.9056	0.3398* (6.727)	0.0497* (1.051)				0.2938	26.43
3	2.9100	0.3285* (6.273)	0.0525* (1.106)	0.0085 (0.835)			0.2977	17.81
4	2.7565	0.3119* (5.956)	0.04438 (0.941)	0.0059 (0.577)	0.0526 (2.020)		0.3199	14.71
5	2.7518	0.3111* (5.907)	0.0426* (0.892)	0.0056 (0.550)	0.0538 (2.023)	0.0012 (0.251)	0.3202	11.69

Source: Calculated

Note: Figures in the parentheses are t- statistics.

Asterisks (*) signify statistical significance at 1 per cent level.

Consider first the equation (1) where schooling is the only independent variable, explains 28 per cent of the variation in agricultural yield per hectare. However when schooling and land are taken together in equation (2) the power of the model increases only to 29 per. Inclusion of irrigation do not affect the explanatory power of the model remarkably but the coefficient value of irrigation has positive and significant impact on agricultural productivity at five per cent level of significance. This may be because only a very smaller proportion (5 per cent) of the entire block is under irrigation. In relation to other states of India in Himachal Pradesh only 23 per cent of total cultivable area is under irrigation. So in relation to other studies the coefficient value associated with irrigation is very small. Inclusion of all the input variables of the specified model increases the explanatory power to 32 per cent. All the variables except irrigation and credit facilities, shows a positive and significant impact on per hectare yield. In equation (5) irrigation and credit facilities is found to be positive but not significantly related with the agricultural productivity. The respective coefficient value associated with human capital shows that, keeping other variables constant, one year increase in education level, per hectare agricultural productivity increases by 31 Kg. The remaining part of the growth of agricultural output is not explained by the factors included in the regression.

An interesting point that emerges from this statistical exercise is that the growth of agricultural output seems to be related to the growth of human capital. Another notable point is that among all variable inputs except education fertilizer has a high positive and significant impact on per hectare

agricultural productivity. It is evident from the discussion that human capital alone contributes 28 per cent of the variation in agricultural output and along with other variables it accounts for 32 per cent of the variation.

AGRICULTURAL PRODUCTIVITY ACROSS SCHOOLING LEVELS

The result of previous discussion asserts that effects of human capital on physical output are substantial, leading to improvement in productivity and economic development. Now at micro level it would be interesting to see that the level of farm production varies with increasing educational standards of the farmer or not. In order to study the relative impact of the different levels of human capital development on agricultural productivity three levels of human development (elementary, secondary and higher) has been introduced as explanatory variables along with other explanatory variables in the double log production function of Cobb-Douglas type. The production function is specified as;

$$Q = f [L, I, F, C, S_1, S_2, S_3]$$

Where,

S_1 = Elementary education

S_2 = Secondary education

S_3 = Higher education

Zero order correlation matrix of the variables used in production function is presented in Table 5, and it shows that multicollinearity among the variables is not a problem. It is evident from the table that there exists a high level of correlation between elementary education and land. From the values of the parameters of relation (Table 6) we observe that there is a positive relationship between the level of human capital and the level of farm production. The impact of human capital on farm production becomes more marked as we move from the lower to higher levels of human development, especially when farmers have education up to secondary level. The impact of fertilizer, credit and elementary education is negative but insignificant. The rate of increase in per hectare agricultural output is marginally high with secondary education as compare to higher level of education.

TABLE 5 CORRELATION MATRIX OF THE VARIABLES USED IN THE COBB-DOUGLAS PRODUCTION FUNCTION (ACROSS SCHOOLING LEVEL)

Variables	Agricultural Productivity	Land	Irrigation	Fertilizer	Credit	Elementary Education	Secondary Education	Higher Education
Agricultural Productivity	1.0000	0.2056	0.1892	0.2735	0.0469	0.0551	0.0504	0.1553
Land		1.0000	-0.0040	0.1248	0.1358	0.8240	0.0519	0.2628
Irrigation			1.0000	0.1706	0.0721	0.0732	-0.0348	0.0132
Fertilizer				1.0000	-0.1449	0.0890	0.2670	0.3149
Credit					1.0000	0.1387	-0.1719	-0.0152
Elementary Education						1.0000	0.0500	0.1547
Secondary Education							1.0000	0.0132
Higher Education								1.0000

Source: Calculated.

**TABLE 6 COBB-DOUGLAS PRODUCTION FUNCTION
(ACROSS SCHOOLING LEVEL)**

$$\ln Q = \alpha + \beta_1 \ln L + \beta_2 \ln I + \beta_3 \ln F + \beta_4 \ln C + \beta_5 S_1 + \beta_6 S_2 + \beta_7 S_3 + u$$

Explanatory Variables	Regression Coefficients
Land	0.2964* (2.329)
Irrigation	0.0043 (0.191)
Fertilizer	-0.0299 (-0.212)
Credit	-0.0039 (-0.323)

Elementary Education	-0.0626 (-0.329)
Secondary Education	0.3227* (0.649)
Higher Education	0.2239* (0.277)
Constant	2.8459
R ²	0.248
F- Value	1.18

Source: Calculated

Note: Figures in the parentheses are t- statistics.

Asterisks (*) signify statistical significance at 1 per cent level.

From the preceding analysis it is clear that secondary level of education brings a marked increase in farm production and rural development. Consequently, a breakthrough in farm production would demand that farmers acquire a minimum of secondary education. The quantum of per hectare agricultural productivity decrease as we move from secondary level of education to higher levels.

Comparing our results with that of Chaudhari (1974), Singh (1974) and Das (1997), who also examined the impact of human capital on agricultural productivity by introducing Cobb-Douglas production function of double log type. It is found that the relationship between human capital and agricultural productivity is positive and significant both in primary and secondary levels of education but got stronger in case of secondary level. The impact of primary level of education found to be positive but negligible in the promotion of agricultural productivity. Demand for fertilizer and agricultural productivity was positively and significantly related with the level of education of the farmer. All the above mentioned studies have the same results as we have in the present study but Klirajan and Shand (1985) and Narayanamorthy (2000) by using maximization technique and Cobb-Douglas production function respectively found that the role of farmer's education is very limited in the productivity of crop. Majority of studies shows that human capital significantly affects farmer's productivity and use of modern inputs such as fertilizer and machines.

CONCLUSION

The present analysis indicates that the impact of the farmer's education on farm production is positive and significant. Education alone accounts for 28 per cent of the variation in per hectare agricultural productivity. Further the impact of the level of education on farm production, direct, cannot be said to hold true for all the levels of human capital development. It is in fact relatively strong with secondary level and weak but positive with higher level of education and negative but insignificant with elementary level of education. This underlines the importance of sustained human capital up to a minimum of secondary level. The statistical exercise do support that all other variables except credit have a positive and significant impact on farm output.

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SPATIAL PATTERN OF CARRYING CAPACITY OF LAND IN SOUTHERN KUMAON REGION

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ABSTRACT

The present paper is a modest attempt to compute the carrying capacity of land in Southern Kumaon region on the basis of potential production unit and standard nutritional requirement as proposed by National Institute of Nutrition, Indian Council of Medical Research. The carrying capacity of land in Southern Kumaon region has been worked out in three temporal frameworks i.e. 1994-1995, 2007-2008 and 2015-2016. The resulted values are reasonably grouped on the basis of 'Nested mean' statistical techniques. For the presentation of voluminous data on maps ARCVIEW GIS (9.3) software has been used. An account for the determinants of the carrying capacity of land has been made in relation to physiographic condition of the region. In the end it was noticed that there is a negative relationship between altitude and carrying capacity of land in Southern Kumaon region.

KEYWORDS: *Potential Production Unit, Carrying Capacity, Bhabar, Tarai and Nested Mean.*

INTRODUCTION

The fundamental problem that faces the world today is the rapidly increasing pressure of population on physical resources, particularly on resources of land (Stamp, 1958). The age of discovery is already over and there are no new lands to be discovered. The area of the earth's land surface is fixed, inelastic, inextensible and the most valuable resource of the planet Earth. Although land reclamation represents a gigantic effort in terms of the world's land area, such additions are insignificant in comparison to total area of the planet Earth. It has been estimated that population of India will touch 1.4 billion by 2025 and 1.7 billion by 2050. On the contrary India's grocery list for

2025 is alarming: 260-264 million tonnes (mt) of foodgrain, 151-193 mt of vegetables, 84-106 mt of fruits, 10-14 mt of meats, 4-5 mt of eggs, 10-14 mt of fish and 12 mt of edible oil. (Mohammad, N., and Alam, S.Z., 2007).

India has around 17 per cent of the world population and 2.4 per cent of the total surface area of the planet Earth. The per-capita availability of land has already decreased from 0.5 hectare (ha.) in 1950-51 to 0.15 hectare in 1999-2000, which is likely to reduce to 0.08 hectare in 2025 A.D. The report on the "State of Indian Agriculture 2011-12", highlight that, the average size of operational landholdings in India has diminished progressively from 2.28 hectare (ha) in 1970-71 to 1.55 ha. in 1990-91 to 1.23 ha in 2005-06. Available data suggest that the state of food security deteriorated during the post-reform period 1990-91 to 2003-04 (Bhalla, 2008). Therefore, a scientific study of carrying capacity of land is necessary to understand the ground situation.

CONCEPT OF CARRYING CAPACITY

The term 'carry means 'to continue without stopping and the term 'capacity' denotes the maximum quantity or aggregate that can be received. The term "carrying capacity" was most likely coined by range managers, who were concerned with the use of land for grazing livestock. Bartels et al. (1993) trace it back to the 1906 Yearbook of the U.S. Department of Agriculture, and the 1991 edition of the Random House Webster's College Dictionary dates it from between 1880 and 1885 (Price, 1999). Allan 1949 defined the carrying capacity of land as "the maximum number of people that a given land will maintain in perpetuity under a given system of usage without land degradation setting in" (Mohammad, N., and Alam, S.Z., 2007). The concept of carrying capacity of land at global forum was introduced by Stamp (1958) in his presidential address to the international geographical congress at Rio de Janeiro in 1956. For measuring the carrying capacity of land, he employed two parameters viz. (1) Standard Nutrition Unit, and (2) calorific value of food crop. Stamp proposed that higher the calorific output per unit area, greater will be the carrying capacity of land.

DATA BASE AND METHODOLOGY

The discussion is mainly based on secondary data. Latest available secondary data extending from 1994-1995 to 2007-2008 have been obtained from various published records of government agencies. The food crop and the area under crop data was obtained from; Zila Sankhiyaki Patrika of Champawat, Nainital and Udham Singh Nagar district of various period. The base map of the study region (at block level) was prepared on the basis of Census of India, 2001. Uttaranchal Administrative Atlas, Directorate of Census Operations, Uttar Pradesh and Uttaranchal.

METHODOLOGY EMPLOYED

The spatial pattern of carrying capacity is worked out under following steps. Firstly, potential production unit is calculated by converting all the food crops into calorific value with the help of Indian Council of Medical Research Food Table. Similarly Standard Nutrition Unit is assessed by applying a recommended rule i.e. a person in general requires 8, 30,505 kilo calories per year. The aggregate caloric output of all the food crops is derived after making necessary adjustment for wastage, which is estimated to be about 20 per cent of total production (i.e. 9, 96,606 Kilo calories/person/year). To assess the carrying capacity of land the total caloric output is divided by the area under food crops to obtain the per hectare food crop output in kilocalories (i.e. potential

production unit). Using potential production unit and standard nutrition unit for production the carrying capacity of land in terms of person per hectare per year is arrived at for each block. All the obtained values of potential production unit were predicted for the year 2015-2016 by using 'forecast equation'. The forecast equation Calculates, or predicts, a future value by using existing values. The predicted value is a y-value for a given x-value. The known values are existing x-values and y-values, and the new value is predicted by using linear regression. Therefore on the basis of known values of potential production unit (1994-1995 and 2007-2008) of 19 blocks of the Southern Kumaon region new values were predicted for the year 2015-2016. To present the carrying capacity values according to the degree of uniformity under High, Medium, Low and very low interval the 'Nested Mean' statistical technique was used for each set of years. In the 'nested mean' The arithmetic mean divides a numerical array into two classes and the means of each of these two map classes yield four map classes with smaller interval. Thus the class intervals vary according to the degree of uniformity (in the univariate sense) of the numerical array which is classified for mapping. (Scripter, 1970). Finally, in order to get the temporal changes in the level of carrying capacity change in carrying capacity of successive period was calculated. For the presentation of voluminous data on maps ARCVIEW GIS (9.3) software along with the MS-Excel software was used on a WGS_1984 (UTM Zone 44° N) datum through 'Transverse Mercator projection'. The generalized formulas for the calculation of the entire aforesaid mentioned variable are given below:

1. Potential Production Unit (k.cal/hectare/year) =

$$\frac{\text{Calorific value of the food crops} \times \text{Area under food crops}}{\text{Area under food crops}}$$

2. Standard Nutrition Unit (consumption) = 8,30,505 kilocalories/person/year

3. Standard Nutrition Unit (production) = 9,96,606 kilocalories/person/year

4. Carrying Capacity of land (persons/hectare/year) =

$$\frac{\text{Potential Production Unit} \times \text{Standard Nutrition Unit (production)}}{\text{Standard Nutrition Unit (production)}}$$

In the Southern Kumaon region following crops are grown with varying amount; (a) cereals crops such as, rice, wheat, Barley, Jowar, Bajara, Kodo millet, Kakun (Italian Millet), Maize, Ragi (Manduwa), Sanwa Millet (Sawa); (b) Pulses such as Bengal Gram (Urad), Lentil (Masur), Black Gram (Chana), Green Pea (Matar), Green Gram (Moong), Arhar (Red Gram) Moth (Moth Beans) and ; (c) Oilseeds such as Mustard Seed, Linseed (Alsi), Til shudh, Rendi, Mongfali (Groundnut), Sunflower, Soyabean, Potato (Tuber). In the calculation of potential production units all the aforesaid mentioned crops have been taken into account.

BACKGROUND OF THE STUDY AREA

The Southern Kumaon region comprises the southern portion of Kumaon Division and lies between 28°43'N and 29°37'N Latitudes and 78°42'34''E 80°18'E Longitudes. It covers an area of 8,798 square kilometers. This region embraces Nainital, Champawat and Udham Singh Nagar district. These districts contain 19 blocks (figure 1). Total population of the region is around 16 lakhs. The region comes under the Agro-Climatic Zone-I of Western Himalayan. The agricultural year is

divided into three main seasons; Kharif (July-September) which corresponds to rainy season, Rabi (October-April) corresponds to winter and Zaid (March-June) which corresponds to summer season. The northern portion of the region is occupied by the outer ranges of the Himalayas known as Siwaliks. The general slope is from North to South i.e. altitude increases from South to North. At the foot of the hills is the tract called the Tarai. Beyond these two tracts towards the south commences the alluvial plain, which form part of the middle Ganga valley. From South to North there are Four major types of soil in the region i.e. Tarai, Bhabar, Brown and Submontane soils (fig. 4). The chief rivers of the region are Dheta, Kosi, Dabta, Baur, Kichha, Nandhour and Ladhiya (fig. 6). There are three types of vegetation i.e., tropical moist deciduous vegetation which is prevalent over 70 per cent of the region, coniferous vegetation and Himalayan Moist Temperate vegetation



FIG.1

PATTERN OF CARRYING CAPACITY IN SOUTHERN KUMAON REGION, 1995-2016

TABLE 1: CARRYING CAPACITY OF LAND 1995-2016

Block	Carrying Capacity (Persons/ hectare /year)			Index of Change		
	1994-1995	2007-2008	2015-2016*	1995-	2008-	1995-

				2008	2016	2016
Ramnagar	8.9	7.8	7.1	-1.1	-0.7	-1.8
Kotabagh	7.8	7.1	6.7	-0.7	-0.4	-1.2
Ramgarh	9.3	6.8	5.2	-2.5	-1.5	-4.0
Bhimtal	8.6	6.2	4.8	-2.4	-1.5	-3.8
Betalghat	8.8	6.7	5.4	-2.1	-1.3	-3.5
Dhari	11.3	7.9	5.9	-3.4	-2.1	-5.4
Okhal kanda	7.9	6.4	5.4	-1.6	-1.0	-2.6
Haldwani	8.0	7.1	6.6	-0.9	-0.5	-1.4
Jasipur	9.9	11.5	12.5	1.6	1.0	2.6
Kashipur	9.8	11.1	11.8	1.3	0.8	2.1
Bajpur	9.5	11.3	12.4	1.8	1.1	3.0
Gadarpur	9.9	11.3	12.2	1.4	0.9	2.2
Rudrapur	9.4	11.2	12.3	1.8	1.1	2.9
Sitarganj	9.7	11.3	12.2	1.6	1.0	2.5
Khatima	9.7	11.3	12.3	1.6	1.0	2.7
Pati	5.0	4.6	4.3	-0.4	-0.3	-0.7
Barakot	4.9	4.6	4.4	-0.3	-0.2	-0.5
Lohaghat	5.1	4.6	4.2	-0.6	-0.4	-0.9
Champawat	5.2	4.5	4.1	-0.7	-0.4	-1.1
Average	8.4	8.1	7.9			
Standard deviation	1.9	2.7	3.5			

*Projected

LEVEL OF CARRYING CAPACITY, 1994-1995

AREAS WITH HIGH CARRYING CAPACITY (MORE THAN 9.7 PERSONS PER HECTARE PER YEAR)

The nested mean class interval classifies five blocks of Tarai region and one block of mountainous region in this category (fig 3) i.e. Jasipur, Kashipur, Gadarpur, Sitarganj, Khatima block of Tarai region and Dhari block of mountainous region. This region supports more than 9.7 persons per hectare per year which is more than the average carrying capacity of the of the Southern Kumaon region i.e., 8.4 persons per hectare per year (table 1). This region is composed of fertile Tarai soil

containing high ground water potential of more than 40 liters/ sec. Physiographically this region is situated below 300 metres of an altitude. The large part of the area is well drained by rivers (fig. 6). Therefore, natural conditions are favorable for higher carrying capacity. The Dhari block of the Southern Kumaon Region is the only Exception. The higher carrying capacity is attributed to production of potatoes. This block ranks number one in potatoes production in the entire Southern Kumaon region (fig. 1). In the year 1994-1995 the total production of potato of this block was 2, 59,500 quintals i.e. 36 per cent of the total potato production, which is equivalent to 25 billion Kilocalories.

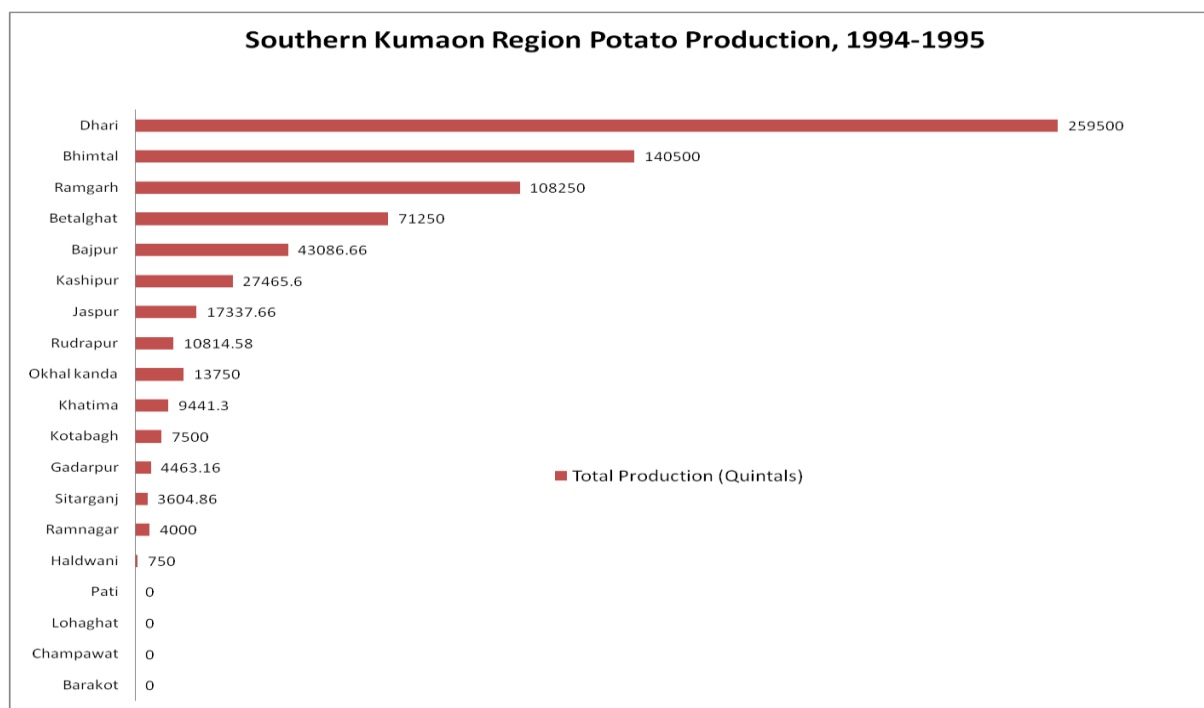


FIG.2

Data source: Zila Sankhiyaki Patrika., 1995: Janpad Nainital, Karyalaya Arth awam Sankhyaadhikari, Uttarakhand.

MEDIUM CARRYING CAPACITY AREAS (8.5 TO 9.6 PERSONS PER HECTARE PER YEAR)

The fig 3 reveals that out of 19 blocks 6 blocks come under this category. This region can support 8.5 to 9.6 persons per hectare per year which is more than the average carrying capacity of the of the Southern Kumaon region i.e., 8.4 persons per hectare per year (Table 1). There are two conspicuous regions in this category. The first region incorporates Bhimtal, Betalghat, Ramgarh blocks of Nainital district. The reason for medium carrying capacity of this belt is mainly attributed to the sizeable production of potatoes attributed to suitability of land and climate to this particular crop. It is obvious from the fig. 1 Bhimtal, Betalghat, Ramgarh (which comes in relatively cooler climatic region) together contribute 44.33 per cent of the total potatoes production of the Southern Kumaon region. According to Indian Council of Agricultural Research (2012) Potato cultivation is limited to relatively cooler areas and seasons throughout the world due to photo and thermo-sensitivity of the

crop. Farmers of this region also get remunerative price for hill potato produce. The Haldwani is a major market for hill potato. The other region embraces Ramnagar, Bajpur and Rudrapur blocks largely comes under the Tarai region having higher potential for carrying capacity.

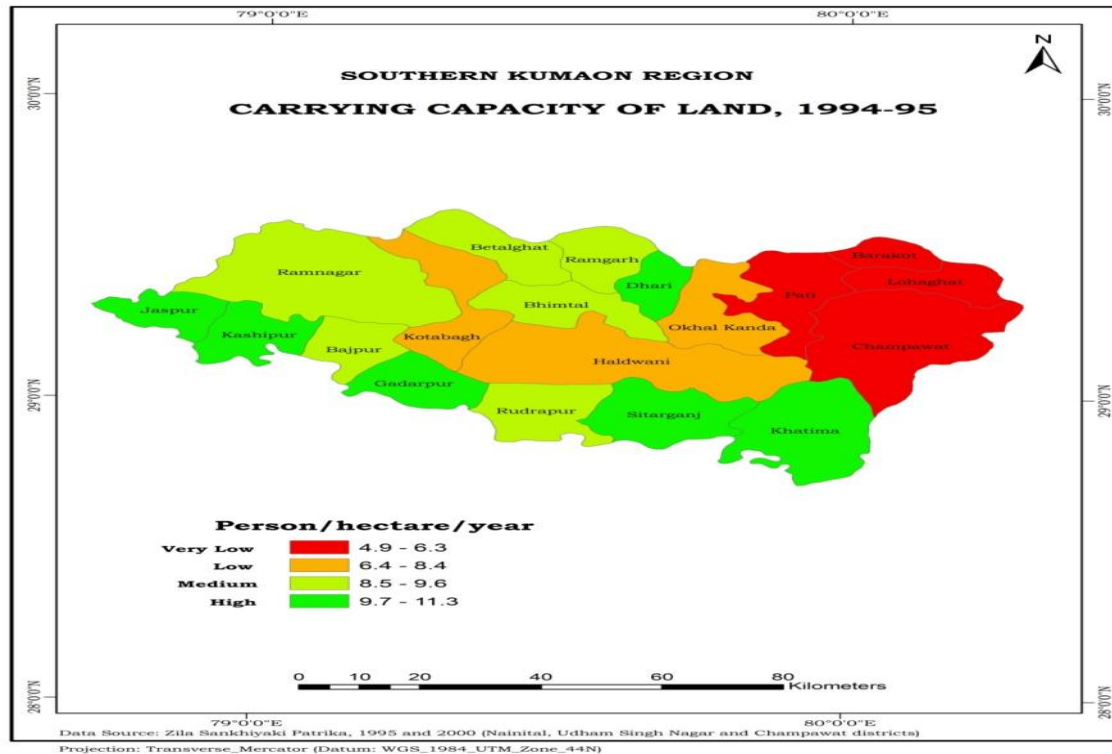


FIG. 3

LOW CARRYING CAPACITY AREA (6.4 TO 8.4 PERSONS PER HECTARE PER YEAR)

This region is clearly identified with a 'U' shaped belt in the central part of the southern Kumaon region. It includes, Haldwani, Okhal Kand and Kotabagh blocks with a carrying capacity of 8.0, 7.9 and 7.8 persons per hectare per year respectively. Overall agricultural situation of this region is poor because of presence of Bhabar and brown mountainous soil (fig. 4) which is not conducive for cultivation of crop. Similarly, Because of the high altitude the ground water potential of this region is also less than 10 liters/Sec. Therefore, it can be concluded that the physiographic determinism plays an important role in shaping the agricultural carrying capacity of the region.

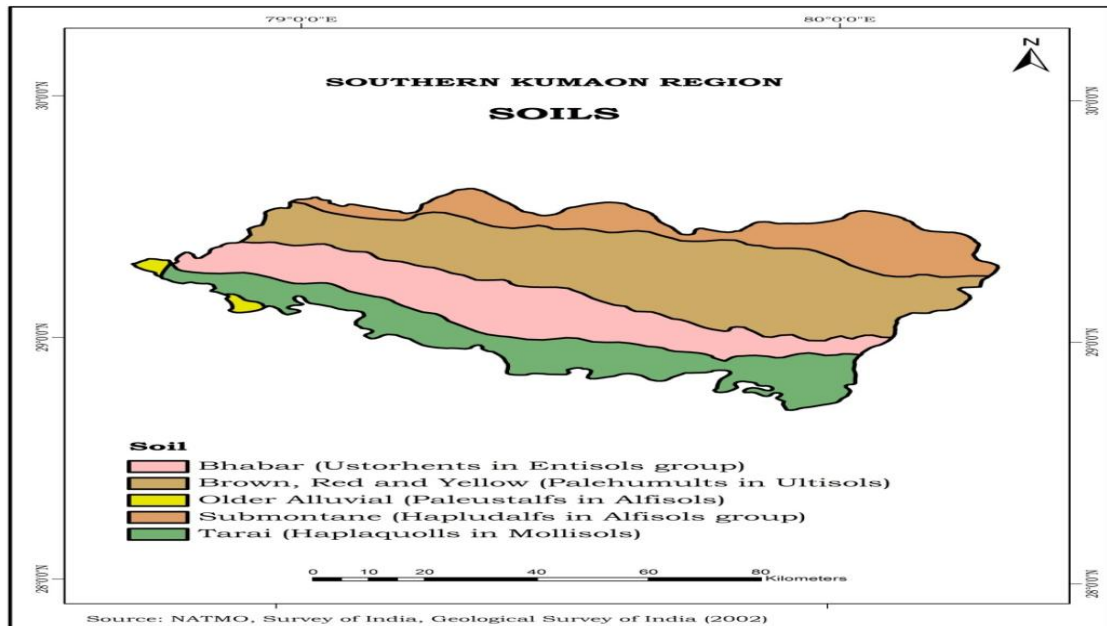


FIG. 4

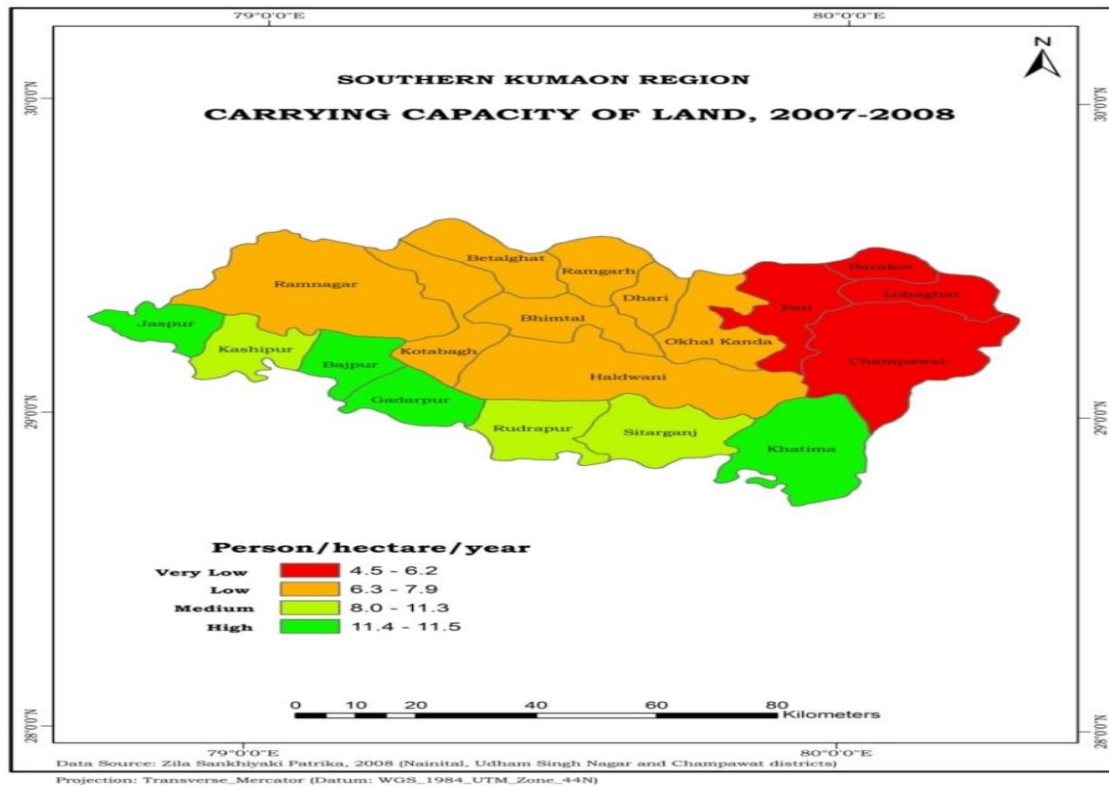
VERY LOW CARRYING CAPACITY AREA (4.9 TO 6.3 PERSONS PER HECTARE PER YEAR)

The entire North-Eastern part of the Southern Kumaon Region falls under this category. The nested mean class interval classifies four blocks of district Champawat under this category i.e. Chmpawat, Pati, Barakot and Lohaghat block. Except the Southern part of the Champawat block remaining section of this belt is situated above 1200 metres of an altitude. It signifies that in general there is negative relationship between carrying capacity and the altitude.

LEVEL OF CARRYING CAPACITY IN 2007-2008

AREAS WITH VERY HIGH CARRYING CAPACITY (11.4 TO 11.5 PERSONS PER HECTARE PER YEAR)

The nested mean class interval classifies four Tarai region blocks in this category (fig 5). From West to East in Tarai soil region (fig. 4) it embraces Jaspur, Bajpur, Gadarpur, and Khatima block. This region can support more than 11.4 persons per hectare per year which is more than the average carrying capacity of the of the entire southern Kumaon region i.e., 8.1 persons per hectare per year. It is already explained that Tarai soil is considered as a very fertile soil which is good in humus and carries excellent ground water potential (more than 40 liters/ sec). Therefore, it again highlight that there is positive relationship between carrying capacity of land and the soil fertility.

**FIG. 5****MEDIUM CARRYING CAPACITY AREAS (8.0 TO 11.3 PERSONS PER HECTARE PER YEAR) EMBRACE**

The medium level of carrying capacity is also recorded in the Tarai belt of the Southern Kumaon region which is known for its high fertility. Physiographically this belt comes below 300 metres of an altitude. Therefore, large part of the area is well drained by rivers (from West to East River Dheta, Kosi, Dabta and River Baur), and water reservoir (6). It can be concluded that medium and high level of carrying capacity is found where natural conditions are favorable for agricultural development.

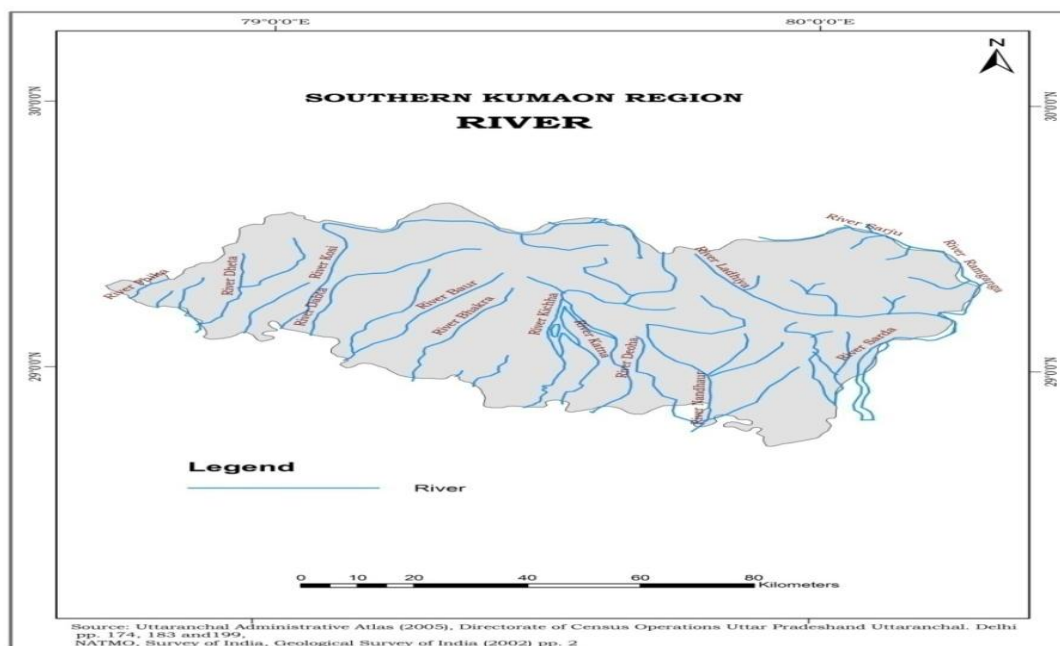


FIG. 6

LOW CARRYING CAPACITY AREA (6.3 TO 7.9 PERSONS PER HECTARE PER YEAR)

It is apparent from the fig. 5 that entire North-Western part of the study region falls under this category. It incorporates Haldwani, Kotabagh, Ramnagar, Bhimtal, Okhal Kanda, Dhari, Ramgarh and Betalghat with a carrying capacity ranging between 6.3 to 7.9 persons per hectare per year. The lower part of the region is characterized by Bhabar soil which is very poor in soil fertility it covers Southern part of Ramnagar and Haldwani block. The higher altitude encompasses Bhimtal, Okhal Kanda, Dhari, Ramgarh and Betalghat. A section of Shiwalik range comes under these blocks having an average altitude 1200 metres. Therefore, agriculturally this region is characterized by poor Brown and Submontane soil (4). At higher altitude of mountaneous region, soils do not get properly matured because of the moderate chemical weathering, moderate mass movement, strong fluvial erosion and low temperature (Singh.J and Dhillu. S. S., pp-51). Therefore poor soil fertility and higher altitude creates unfavorable condition for the agricultural activity consequently this region is characterized by low level of carrying capacity.

VERY LOW CARRYING CAPACITY AREA (4.5 TO 6.2 PERSONS PER HECTARE PER YEAR)

Again the entire North-Eastern part of the Southern Kumaon Region falls under this category. Four blocks comes in this category they include Chmpawat, Pati, Barakot and Lohaghat block all of them comes under the district under Champawat and are generally situated above 1200 metres of an altitude. According to David (1995) as mean annual temperatures decrease with increasing altitude, the growing season shortens. The combination of increase in altitude and steep slopes also make much of the region unsuitable for farming activity. Therefore this region is characterized by low Very level of carrying capacity. The overall range of carrying capacity of the region during 1995-

2007 has decreased from 4.9 to 6.5 persons per hectare per year in the year 1994-1995 to 4.5 to 6.2 persons per hectare per year in the year 2006-2007. The average size of landholding of this mountainous region is less than 1 hectare which is lowest in the entire region. Overall agricultural situation is poor because of presence of brown mountainous soil (fig. 4) which is not very conducive for cultivation of crop. Therefore, it can be concluded that the physiographic determinism plays an important role in shaping the carrying capacity of land and technological advancement has its own limitations against the improvement in carrying capacity of land.

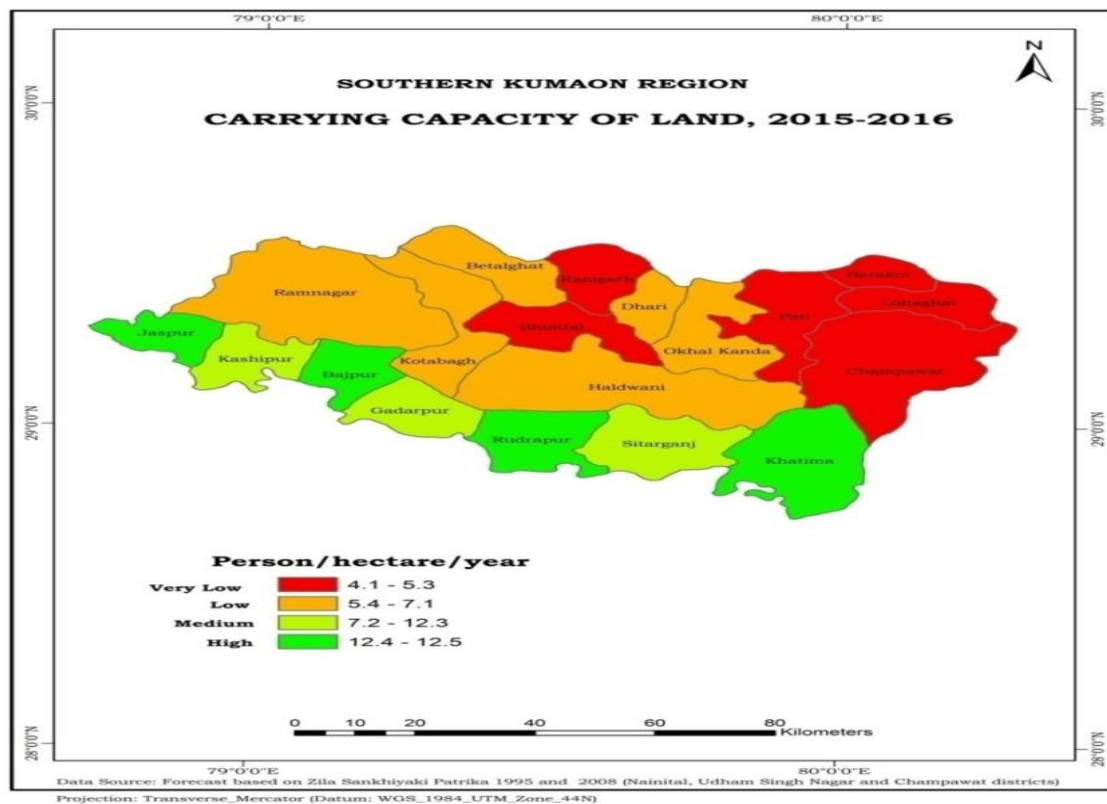
LEVEL OF CARRYING CAPACITY IN 2015-2016

AREAS WITH VERY HIGH CARRYING CAPACITY (12.4 TO 12.5 PERSONS PER HECTARE PER YEAR)

The level of carrying capacity for the year 2015-2016 has been forecasted on the basis of linear regression equation which has been discussed in the methodology section. The nested mean class interval reveals that (fig 7) again four blocks of Tarai region are likely to come under the area with very high carrying capacity. It incorporates Jaspur, Bajpur, Rudrapur, and Khatima block. This region is likely to support more than 12.4 persons per hectare per year and shows an increase of 1 person per hectare per year since 2006-2007. Overall carrying capacity of this region is likely to be higher than the average carrying capacity of the of the entire southern Kumaon region i.e., 7.9 persons per hectare per year. As explained earlier the fertile Tarai soil region having below 300 metres of an altitude with high ground water potential of more than 40 liters/sec embraces this region. Therefore this region exhibits very high level of carrying capacity.

MEDIUM CARRYING CAPACITY AREAS (7.2 TO 12.3 PERSONS PER HECTARE PER YEAR)

The Medium carrying capacity areas are again estimated to be noticed in the Tarai region. From West to east it embraces Kashipur, Gadarpur and Sitarganj blocks. It was noteworthy that Gadarpur used be the in the category of area with very high carrying capacity in the year 2007-2008 but in the year 2015-2016 period its position is likely to come down to Medium carrying capacity area. However it does not mean that its carrying capacity has decreased infact it has increased from 11.3 persons per hectare per year in the year 2017-2008 to 12.2 persons hectare per year in this year 2015-2016. This fact summarizes that carrying capacity of the Gadarpur is increasing but with the decreasing growth rate and gradually realizing its maximum limit. For example index of change in carrying capacity of Gadarpur block was 1.4 persons per hectare during 1995-2008 which has reduced to 0.9 person per hectare during 2008-2016.

**FIG. 7****LOW CARRYING CAPACITY AREA, (5.4 TO 7.1 PERSONS PER HECTARE PER YEAR)**

It incorporates Haldwani, Kotabagh, Ramnagar, , Okhal Kanda, Dhari, and Betalghat blocks of Nainital district. In the year 2007-2008 the overall carrying capacity range of this region was between 6.3 to 7.9 persons per hectare per year which is estimated to reduce between 5.4 to 7.1 persons per hectare per year. The poor soil fertility and higher altitude creates unfavorable condition for the agricultural activity consequently this region is characterized by low level of carrying capacity. It again confirms that the physiographic determinism plays an important role in shaping the carrying capacity of land and technological advancement has its own limitations against the improvement in carrying capacity of land.

VERY LOW CARRYING CAPACITY AREA, 1995 (4.1 TO 5.3 PERSONS PER HECTARE PER YEAR)

It is apparent from the fig. 7 that along with the entire North-Eastern part of the Southern Kumaon Region two more blocks are likely to fall under this category i.e. Ramgarh and Bhimtal. In the year 2007-2008 there were only four blocks in this category they included Chmpawat, Pati, Barakot and Lohaghat. All the blocks of this category are generally situated above 1000 metres of an altitude. The overall range of carrying capacity of the region decreased from 4.9 to 6.5 persons per hectare per year in the year 1994-1995 to 4.5 to 6.2 persons per hectare per year in the year 2006-2007 and likely to reduce further to 4.1 to 5.3 persons per hectare per year in the year 2015-2016.

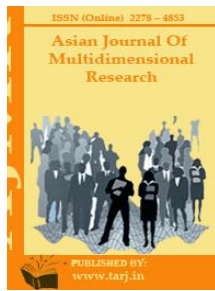
CONCLUSION

The carrying capacity of land in Southern Kumaon region in general decreases from South to North-East. The medium to high level of carrying capacity of land is noticeable in the Tarai belt extending from Jaspur in the South-West to Khatima in South-East. There is positive relationship between carrying capacity of land and the fertility of soil. On the other hand fertility of soil is inversely related with the increase in altitude which increases in Southern Kumaon region from South to North-West. For example, the tarai soil at lower altitude (below 300 metres) is clayey rich in nitrogen, moisture and organic matter on the other hand, the Bhabar soil at little higher altitude is sandy to gravelly, highly porous and aerated, and has lower moisture retaining capacity (Kapil, 2011). At much higher altitude of mountainous region, soil do not get properly matured because of the moderate chemical weathering, moderate mass movement, strong fluvial erosion and low temperature (Singh and Dhillon, 2004); which eventually decreases the carrying capacity of land. Therefore, in the Southern Kumaon region an inverse relationship between the altitude and the level of carrying capacity of land can be discerned.

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SUSTAINABLE DEVELOPMENT WITH REFERENCE TO INDIAN AGRICULTURE

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ABSTRACT

Sustainable development is a road-map, an action plan, for achieving sustainability in any activity that uses resources and where immediate and intergenerational replication is demanded. As such, sustainable development is the organising principle for sustaining finite resources necessary to provide for the needs of future generations of life on the planet. It is a process that envisions a desirable future state for human societies in which living conditions and resource-use continue to meet human needs without undermining the "integrity, stability and beauty" of natural biotic systems.

INTRODUCTION

Sustainable development is a road-map, an action plan, for achieving sustainability in any activity that uses resources and where immediate and intergenerational replication is demanded. As such, sustainable development is the organising principle for sustaining finite resources necessary to provide for the needs of future generations of life on the planet. It is a process that envisions a desirable future state for human societies in which living conditions and resource-use continue to meet human needs without undermining the "integrity, stability and beauty" of natural biotic systems. The United Nations World Commission on Environment and Development (WCED) in its 1987 report Our Common Future defines sustainable development: "Development that meets the needs of the present without compromising the ability of future generations to meet their own needs." Under the principles of the United Nations Charter the Millennium Declaration identified principles and treaties on sustainable development, including economic development, social development and environmental protection. Broadly defined, sustainable development is a systems

approach to growth and development and to manage natural, produced, and social capital for the welfare of their own and future generations. The term sustainable development as used by the United Nations incorporates both issues associated with land development and broader issues of human development such as education, public health, and standard of living.

Agriculture has been a way of life and continues to be the single most important livelihood of the masses in India. The country is the second largest economy in Asia after China, as measured in terms of its gross domestic product (GDP). India ranks among the top countries of the world with regard to production of food grains, fruits & vegetables, commercial crops, livestock and animal products. Agriculture has been acting as a driving force for our economy as it generates employment, national income, foreign exchange, food for people, feed for livestock, etc. However, since 1950-51, the focus of the successive governments on agricultural development has been declining which is evident from the declining budget allocated for agriculture and allied activities; from about 15 per cent during the first five year plan to a mere 3.7 per cent during the eleventh five year plan.

Private investment in this sector has been increasing during the same period. Sustained development can be assured through the fulfilment of basic needs of employment, food and shelter, for which agriculture plays a pivotal role.

The larger objective for the improvement of agriculture sector can be realised through rapid growth of agriculture which depends upon increasing the area of cultivation, cropping intensity and productivity. But for a country like India, increasing productivity is more important than the rest of the two. This is simply because of increasing urbanization, industrialization and the limited land size of the country.

The productivity can be increased by two ways. First, increasing output by efficient utilization of available resources. Second, increasing output by variation of input. The first method is better with respect to productivity and sustainability. But due to increasing population, this method cannot provide a permanent solution. Thus we can go for the second method which may potentially cause environmental degradation in the economy and affect its sustainability. Therefore there is need to tackle the issues related to sustainable agriculture development.

SUSTAINABLE AGRICULTURE DEVELOPMENT

The issues of sustainable development can be discussed under three broad types of farming systems viz. traditional production system, modern agriculture system and sustainable agriculture system. Further we can compare them across three dimensions, ecological, economic and social sustainability.

ECOLOGICAL SUSTAINABILITY

Most of the traditional and conventional farm practices are not ecologically sustainable. They misuse natural resources, reducing soil fertility causing soil erosion and contributing to global climatic change. But sustainable agriculture has some major advantages over traditional practices:

SOIL FERTILITY

Continuous fall in soil fertility is one of the major problems in many parts of India. Sustainable agriculture improves fertility and soil structure.

WATER

Irrigation is the biggest consumer of fresh water, and fertiliser and pesticides contaminate both surface and ground water. Sustainable agriculture increase the organic matter content of the top soil, thus raising its ability to retain and store water that falls as rain.

BIODIVERSITY

Sustainable agriculture practices involve mixed cropping, thus increasing the diversity of crops produced and raising the diversity of insects and other animals and plants in and around the fields.

HEALTH & POLLUTION

Chemicals, pesticides and fertilisers badly affect the local ecology as well as the population. Indiscriminate use of pesticides, improper storage etc. may lead to health problems. Sustainable agriculture reduces the use of hazardous chemical and control pests.

LAND USE PATTERN

Over-exploitation of land causes erosion, land slides and flooding clogs irrigation channels and reduces the arability of the land. Sustainable agriculture avoids these problems by improving productivity, conserving the soil etc.

CLIMATE

Conventional agriculture contributes to the production of green house gases in various ways like reducing the amount of carbon stored in the soil and in vegetation, through the production of Methane in irrigated field and production of artificial fertilisers etc. By adopting sustainable agriculture system, one can easily overcome this problem.

ECONOMIC SUSTAINABILITY

For agriculture to be sustainable it should be economically viable over the long term. Conventional agriculture involves more economic risk than sustainable agriculture in the long term. Sometimes governments are inclined to view export-oriented production systems as more important than supply domestic demands. This is not right. Focusing on exports alone involves hidden costs: in transport, in assuring local food security, etc. Policies should treat domestic demand and in particular food security as equally important to the visible trade balance.

It is a popular misconception that specific commodities promise high economic returns. But market production implies certain risks as markets are fickle and change quickly. Cheap foreign food may sweep into the national market, leaving Indian farmers without a market. As a World Trade Organisation signatory, the Indian government is under pressure to deregulate and open its economy to the world market so it cannot protect its farmers behind tariff walls.

The main source of employment for rural people is farming. Trends towards specialisation and mechanisation may increase narrowly measured "efficiency", but they reduce employment on the land. The welfare costs of unemployment must be taken into account when designing national agricultural support programs. Sustainable agriculture, with its emphasis on small-scale, labor-intensive activities, helps overcome these problems.

SOCIAL SUSTAINABILITY

Social sustainability in farming techniques is related to the ideas of social acceptability and justice. Development cannot be sustainable unless it reduces poverty. The government must find ways to enable the rural poor to benefit from agriculture development. Social injustice is where some section of the society is neglected from development opportunities. But having robust system of social sustainability can bridge the gap between “haves” and „have-nots”. Many new technologies fail to become applicable in agriculture sector due to lack of acceptability by the local society. Sustainable agriculture practices are useful because it is based on local social customs, traditions and norms etc. Because of being familiar the local people are more likely to accept and adopt them .Moreover, sustainable agriculture practices are based on traditional know-how and local innovation. Local people have the knowledge about their environment crops and livestock.

Traditional agriculture is more gender oriented, where woman bear the heaviest burden in terms of labor. Sustainable agriculture ensures that the burden and benefits are shared equitably between man and woman. While conventional farming focuses on a few commodities, sustainable agriculture improves food security by improving quality and nutritional value of food, and also by producing bigger range of products throughout the years. Traditional farming was also driven by the caste and wealth oriented people. The rich and higher castes benefitted more, while the poor and lower castes are left out. Sustainable agriculture attempts to ensure equal participation which recognises the voice and speech of every people.

INDIAN AGRICULTURE SECTOR

Agriculture is one of the most preeminent sectors of the Indian economy. It is the source of livelihood for almost two third of the rural population workforce in the country residing in rural areas. Indian agriculture provides employment to 65% of the labor force, accounts for about 27% of GDP, contributes 21% of total exports and raw material to several industries. The livestock sector contributes an estimated 8.4% to the country GDP and 35.85% of the agriculture output.

In India about 75% people are living in rural areas and are still dependent on agriculture, about 43% of India"s geographical area is used for agriculture activities. The estimated food grain production is about 211.17 metric tons in the country.

The total geographical area comes under the agriculture are 329 MH out of which 265MH represent varying degree of potential production. The net sown area is 143 MH out of which 56MH are net irrigated area in the country.

India is a vast country with variety of land forms, climate, geology, physiography and vegetation. India is endowed with regional diversities for its uneven economic and agriculture development on account of

- Agro-Climate Environment
- Agro-Ecological Regions
- Agro-Edaphic regions
- Natural resource Development
- Human Resource Development

- Level of Investment
- Technological Development

AGRICULTURAL PRODUCTION IN INDIA

Indian Agriculture production in most part of the country is closely related to the optimum use of available natural and human resources of the country. Therefore riding on the back of agro climatic condition and rich natural resource base, India today has become the world's largest producer of numerous commodities. The country is a leading producer of coconuts, mangoes, milk, bananas, dairy products, ginger, turmeric, cashew nut, pulses and black pepper. It is also the second largest producer of rice, wheat, sugar, cotton, fruit and vegetables.

Indian agriculture production is closely related to sufficient and wise water management practices. Most of the agriculture practices in India confined to a few monsoon months. During the monsoon season, India is usually endowed with generous rainfall; although not infrequently, this bountiful monsoon turns into terror, causing uncontrollable floods in different parts of the country and ultimately affecting agriculture production.

DEVELOPMENTS IN INDIAN AGRICULTURE

Policy makers and planners, concerned about national independence, security and political stability realised that self sufficiency in food production was an absolute pre requisite for sustainable agriculture development. The policies considered to be a mile stone in agriculture development of the country are:

GREEN REVOLUTION (1968): This revolution includes packages of programs like, Intensive Agriculture District Program (IADP) which eventually led to the Green Revolution. The National Bank for Agriculture Development (NABARD) was set up. The emphasis was on high yielding varieties along with other modern inputs like chemicals, fertilisers, pesticides and mechanisation and also on how productivity could be raised in agriculture sector without having substantial influences on increasing area under cultivation.

EVER GREEN REVOLUTION (1996): Father of India's Green revolution, Prof. M.S. Swaminathan claims to be pro- woman, pro-nature and pro-poor. The conservation of biodiversity, maintaining soil fertility, increasing the climate resistance of food crops combined with better and more education and technological innovation are the key to the ever green revolution. The main aim of this revolution is to produce more using less land, less water and less fertiliser. The recent visit of US President in New Delhi in March 2010, announced a new partnership with India in an agriculture sector for an evergreen revolution to achieve global food security.

WHITE AND YELLOW REVOLUTION: The Green Revolution generated a mood of self confidence in our agriculture capability, which led to the next phase characterised by the Technology Mission. Under this approach, the focus was on conservation, consumption, and commerce. An end-to-end approach was introduced involving attention to all links in the production-consumption chain, owing to which progress was steady and sometimes striking as in the case of milk and egg production.

BLUE REVOLUTION (WATER, FISH): It has been brought about in part by a trend towards healthier eating which has increased the consumption of Fish. Additionally the supply of wild fish is declining. This revolution could give landless labourers and women a great opportunity for employment which empowered them.

BIO-TECHNOLOGY REVOLUTION: India is well positioned to emerge as a significant player in the Global Bio-tech Arena. Agriculture biotech in India has immense growth opportunity and the country could become the fore runner in the transgenic production rise and several other genetically engineered vegetables by 2010. In agri-biotech sector India has been growing at a blinding rate of 30% since the last five years. The food processing sectors which is considered to be prime drivers of Indian economy is currently growing at 13.5%.

ECONOMIC REFORM AND INDIAN AGRICULTURE

The Indian agriculture sector has been undergoing economic reform since 1990s in a move to liberalise the economy to benefit from globalisation. India, which is one of the largest agriculture based economies, remained closed until the early 1990s. In 1991, the new economic policies stressed both external sector reforms in the exchange rate, trade and foreign investment policies and internal reform in areas such as industrial policies, price and distribution controls, and fiscal restructuring in the financial and public sector. India's economic reforms were initiated in June 1991, but it was observed that the expected increase in exports due to liberalisation did not occur. In addition, the agriculture sector's output growth decreased during 1992-1993 to 1998-1999. The reason behind this was the decline in the environmental quality of land which reduced the marginal productivity of the modern inputs. Agriculture sector is the mainstay of the Indian economy around which socio-economic privileges and deprivation revolve, and any change in its structure is likely to have a corresponding impact on the existing pattern of social equality. No strategy of economic reform can succeed without sustained and broad based agriculture development, which is critical for raising living standards, alleviating poverty, assuring food security, making substantial contribution to the national economic growth.

Since agriculture continues to be a tradable sector, this economic liberalisation and reform policy has a far reaching effect on

- Agricultural exports and imports
- Investment in new technologies
- Pattern of agricultural growth
- Agricultural income and employment
- Agricultural price
- Food security

Reduction in Commercial Bank credit to agriculture, in lieu of this reforms process and recommendations of Khusro Committee and Narasimham Committee resulted in fall in farm investment and impaired growth.

Liberalisation of agriculture and open market operations enhance competition in “resource use” and “marketing of agriculture production”, which forces the small and marginal farmers to resort to “distress sale” and seek off farm employment for supplementing income.

ISSUES & CHALLENGES

The central issue in agricultural development is the necessity to improve productivity, generate employment and provide a source of income to the poor segments of population. Studies by FAO have shown that small farms in developing countries contribute around 30-35% to the total agricultural output.

The pace of adoption of modern technology in India is slow and the farming practices are too haphazard and unscientific. Some of the basic issues for development of Indian agriculture sector are revitalisation of cooperative institutions, improving rural credits, research, human resource development, trade and export promotion, land reforms and education.

FUTURE PROSPECTS AND SOLUTION FOR INDIA

Agriculture sector is an important contributor to the Indian economy around which socio-economic privileges and deprivations revolve and any change in its structure is likely to have a corresponding impact on the existing pattern of social equity. Sustainable agricultural production depends upon the efficient use of soil, water, livestock, plant genetics, forest, climate, rainfall and topology. Indian agriculture faces resource constraints, infrastructural constraints, institutional constraints, technological constraints and policy induced limitations.

Sustainable development is the management and conservation of the natural resource base and the orientation of technological and institutional change in such a manner as to ensure the attainment and continued satisfaction of human needs for the present and future generations. Such sustainable development (in the agriculture, forestry and fisheries sector) conserves land, water, plant and animal genetic resources, is environmentally non-degrading, technically appropriate, economically viable and socially acceptable.

So, to achieve sustainable agriculture development the optimum use of natural resources, human resources, capital resources and technical resources are required.

In India the crop yield is heavily dependent on rain which is the main reason for the declining growth rate of agriculture sector. These uncertainties hit the small farmers and labourers worst which are usually leading a hand to mouth life. Therefore something must be done to support farmers and sufficient amount of water and electricity must be supplied to them as they feel insecure and continue to die of drought, flood, and fire. India is the second largest country of the world in terms of population; it should realise it is a great resource for the country. India has a huge number of idle people. There is a need to find ways to explore their talent and make the numbers contribute towards the growth. Especially in agriculture passive unemployment can be noticed.

The sustainable development in India can also be achieved by full utilisation of human resources. A large part of poor population of the country is engaged in agriculture, unless we increase their living standard, overall growth of this country is not possible. If we keep ignoring the poor, this disparity will keep on increasing between classes. Debt traps in country are forcing farmers to commit suicides. People are migrating towards city with the hope of better livelihood but it is also increasing

the slum population in cities. Therefore rural population must be given employment in their areas and a chance to prosper. India has been carrying the tag of “developing” country for quite long now; for making the move towards “developed” countries we must shed this huge dependence on agriculture sector.

CONCLUSION

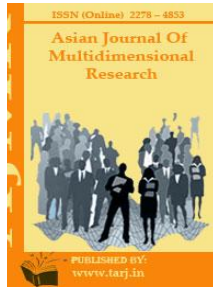
The agricultural technology needs to move from production oriented to profit oriented sustainable farming. The conditions for development of sustainable agriculture are becoming more and more favourable. New opportunities are opening the eyes of farmers, development workers, researchers and policy makers like agri related businesses, dairy farming, poultry farming, fish farming and fisheries. Now the time is to see the potential and importance of these practices not only for their economic interest but also as the basis for further intensification and ecological sustainability.

To conclude, a small-farm management to improve productivity, profitability and sustainability of the farming system will go a long way to ensure all round sustainability.

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IMPLEMENTATION OF THE MNREGA

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ABSTRACT

Bureaucratic implementation of the NREGA has bypassed the Panchayati Raj Institutions which were intended to play an important role in planning and executing this flagship programme to respond to the local needs of the people. As a result several problems ranging from corruption to poor planning and the arbitrary management of the scheme have crippled the potentially valuable measure to provide sustenance to the rural poor.

INTRODUCTION

Bureaucratic implementation of the NREGA has bypassed the Panchayati Raj Institutions which were intended to play an important role in planning and executing this flagship programme to respond to the local needs of the people. As a result several problems ranging from corruption to poor planning and the arbitrary management of the scheme have crippled the potentially valuable measure to provide sustenance to the rural poor. This was the tenor of the deliberations of some 1200 panchayat delegates who assembled in New Delhi at a National Conference on NREGA and Panchayats organised by Institute of Social Sciences (ISS), New Delhi on October 14-15, 2008. (Similar issues were raised during another conference organised by the ISS on Thirty Years of Panchayati Raj in West Bengal at Kolkata on December 12-13, 2008.)

The NREGA was passed in 2005 with twin objectives in mind. First, it ensured the legal right to work for a hundred days to poor people whoever is willing to work at a minimum wage rate, particularly in the rural areas, which in turn would reduce the flow of rural to urban migration. (Dreze et al. 2006) In addition to this, another important objective of the Act has been to strengthen the PRIs. (Aruna Roy, 2008) As result the institutional machinery at the grassroots level would be stabilised to address both short term and long term measures to eradicate poverty, facilitate rural development and promote social equity in consultation with the local people. Under the Act the Gram Panchayat has a pivotal role in the implementation of the NREGS. It is responsible for planning of works, registering those households which are entitled to get work, issuing job cards,

allocating employment, executing 50 per cent of the works, and monitoring the implementation of the scheme at the village level. All these activities are to be done in consultation with the gram sabha. In view of the complexities and sheer volume of work, the implementation of the NREGA assigns a considerable organisational responsibility at the level of the Gram Panchayat.

For example, the role of the Gram Panchayat in the registration of beneficiaries is significant. In order to authenticate the registration, the Panchayat verifies whether the applicant resides in that village and is an adult. The unit of registration is the household. After verification, the Gram Panchayat issues a Job Card to the household.

The Intermediate Panchayat will be responsible for planning at the Block level, and for monitoring and supervision. It can also be given the responsibility of executing works from among the 50 per cent that are not to be executed by the Gram Panchayat. The Programme Officer at the Block level will assist the Intermediate Panchayat in its functions.

As per the norms, the Gram Panchayat/Programme Officer should send letters to the applicants informing them where and when to report for work. A public notice has to be displayed at the Gram Panchayat office and at the Programme Officer's block office, providing information on the date, place of employment and the names of those provided employment.

The District Panchayats will be responsible for finalising the District Plans and for monitoring and supervising the Employment Guarantee Scheme in the district. District Panchayats can also execute works from among the 50 per cent that are not to be executed by Gram Panchayats. (ISS, 'NREGA—Concept Note', 2008)

To perform the assignment efficiently the panchayats representatives and functionaries need to undergo orientation training on various aspects of the Act ranging from micro planning to technical inputs. They also need coordination between all three tiers of panchayats. Further, these institutions need additional functionaries at their disposal. Vertical integration of all three tiers of panchayats is also necessary.

But it became apparent from the deliberations of the delegates that neither have the funds been devolved nor has the decision-making process from the lines departments been fully decentralised. The Gram Panchayats are still dependent upon the block level and district level officers. What is more, in the process of getting sanction from them the PRIs have to give commissions to the concerned officers. On top of it, they don't have Secretaries of their own.¹ Two to three panchayats have just one Secretary who is always overburdened. Besides, the Secretary declines to take the additional responsibility of the NREGA in some States. A junior Rozgar Sachiv, who is appointed to look after the NREGA at the panchayat level, is quite inexperienced in the matter of keeping accounts. The functionaries of the panchayats are also quite inexperienced in handling a massive amount of money while having limited skill of micro planning. These and other issues emerged from the two-day Conference.

VOICES FROM THE FIELD AND FINDINGS OF A SURVEY

The convention delegates had come from all parts of India including the North-Eastern States as well as Lakshadweep and Puduchery. They were mostly Zilla Panchayat and Block Panchayat chiefs and also those of Gram Panchayats. About 33 per cent elected women representatives were present. The delegates discussed various issues not only recounting some positive impacts of the scheme but also

highlighting the problems which they face while implementing it at the villages level. At the end of the conference they adopted a Charter of Demands which was passed unanimously. All of them agreed that the scheme should be implemented by enabling the panchayats to operate more efficiently.

EFFECT OF NREGA

Raghuvansh Prasad Singh, the Minister for Rural Development, Government of India, reeled out impressive data to show how the NREGA is creating a revolution in the countryside. He said the NREGA has already created 2900 million person days work throughout India. As many as 339 million families have benefited because of the scheme. A sum of Rs 160,000 million has already been spent on this, while 422 million accounts have been opened in the post office. He observed that the scheme is working well in Jharkhand and Orissa. Answering a query he said that the budget for the NREGA has not been reduced. But apart from highlighting the need for training he did not go into details as to what kind of problems the elected representatives were facing in implementing the scheme; these came out subsequently at the convention and those points are discussed here.

COVERAGE

First of all it is to be noted that the NREGS has not been implemented in all districts of India though legally it has been done so since April 2008. Out of a total 416 respondents 79 per cent said that the NREGS has already started in their panchayats but the rest replied in the negative. Delegates from Jammu and Kashmir, Nagaland and some districts of other States informed that the scheme is yet to start. The delegates from J&K pleaded that the scheme should be implemented as soon as possible so that women have access to employment, whereas Nagaland reported that they don't know anything about the NREGS yet. (Nagaland, incidentally, does not come under the purview of the 73rd Amendment Act. On the other hand they have the Autonomous District Council.) Obviously the initiative to start was still lacking with the implementing machinery. Vijaya Bai Tai, the awardee of nirmal gram puruskar from Maharashtra, said that her district was agriculturally prosperous and hence they were yet to start the scheme even though it had been in operation. In other words, the agricultural schedule and that of the NREGA don't match. Even many delegates from Uttar Pradesh informed that the scheme was yet to start in some parts of their region. Similarly the delegates from the Mewat region of Haryana, and Koppali in Karnataka pleaded ignorance about the scheme.

TRAINING

As for training to all the PRI members who were supposedly the main implementers of the scheme, the Minister for Rural Development recommended that training and awareness programme should be imparted to all the 34 lakh representatives in a phased manner. He even suggested that institutions like the IIT and Agricultural University should start training on the NREGS. The same view was expressed by the delegates from Madhya Pradesh, Karnataka etc. A president of a panchayat, who happened to be a male and hailed from Karnataka, observed that women presidents are more ignorant than men about the budget and social audit, vigilance committee, budget and micro planning.

According to the survey, 25 per cent of the respondents were silent about the training, whereas 34 per cent of them said that they got training only for two days which is really inadequate to learn about the complicated procedure of the scheme. About 29 per cent of them said that they attended

only one-day training. Regarding the contents of training 89 per cent of the delegates replied that they were given training relating to the panchayats and NREGS. Regarding other important issues such as Right to Information, social audit, village development, only one per cent in each category replied in affirmative! The training was mostly given by the SIRD followed by NGOs as per the survey.

Representatives from Arunachal Pradesh and Assam pointed to the weak structure of the PRI system in their States and explained how they are unable to handle the scheme. In Arunachal Pradesh, therefore, the Zilla Parishad directly selects the beneficiaries ignoring the role of the Gram Panchayat!

FUNDS AND FUNCTIONARIES

Regarding funds and functionaries, the delegates were candid about the shortage of everything. Under the scheme, the panchayat is supposed to get Rs 10 million per year but in reality only 39 per cent of the delegates informed that their panchayats get more than Rs three lakhs and then 29 per cent of them said that they get a small amount of money, namely, Rs one lakh. But the most shocking point was that rest of the delegates did not reply to this question!

On top of it the panchayats don't get adequate number of technical functionaries such as junior engineers to carry out the NREGA activities. In many places, Rozgar Sevaks have been appointed to advise them about the technical points or preparing the budget or village level planning needs. But they themselves are not adequately trained. Further, the panchayats do not have Secretaries of their own to manage the routine work. Besides, some gram panchayats don't have the own offices, let alone sitting space for the personnel meant for the NREGS. Insofar as the nature of activities is concerned, the predominance of construction work became quite clear from the survey. For example, 52 per cent of the work was in the nature of road construction, repairing of boundary wall, creation of check dam etc. followed by digging of water bodies (41 per cent) and agriculture related work (20 per cent). Thirteen per cent of the funding is spent on increasing the forest cover. A high proportion of delegates—32 per cent—did not reply to this question!

CORRUPTION

On corruption almost all the representatives expressed concern about the commission that they have to pay to get the project sanctioned. It included many levels from patwaries to other officers. A patwari took 25 to 50 rupees per job card with photographs, a pradhan from one of the panchayats in Saurashtra region reported. A Zilla Parishad member from Sitamadh, Bihar informed the gathering that even the officers took bribe to sanction the NREGS money. As per the survey, 57 per cent of the delegates felt that the block and panchayat officers have a share in the total amount of money sanctioned for the NREGS work, whereas 23 per cent were silent.

According to the delegates, the contractors also cheated the labourers on measurement at the work site, or duplicating the job cards or measuring the earth work after a lapse in order to show it as less amount than the actual weight particularly after the rains. In the process the labourers got less than the actual wage rate which was invariably lower than the minimum wage.

A common complaint of the delegates was that even though the panchayat chief was likely to handle millions of rupees, the members of the panchayats did not at all benefit. The functionaries were not

even considered to be entitled to employment opportunity offered by the scheme. Further he/she got only three to four hundred rupees per month and the ward member got Rs 30 as sitting fee.

Some Block Panchayat chiefs said that there is hardly any coordination between the three tiers of panchayats whereas the Act clearly mentioned about such coordination. In many places it was the CEO who ordered to start the work through contractor.

About political interference the delegates from West Bengal and Tripura shared the same opinion, namely, if the villagers were not from the same political party as that of the elected representatives, the contractor took six months to issue the job card.

DURATION OF THE ACTIVITIES AND MINIMUM WAGE RATE

Further, they also said that employment was created only for fifteen person days and the minimum wage rate which was paid to the labourers was not adequate in some panchayats. Subhas Pradhan, a Panchayat Samiti member of Ganjam, Orissa, reported about the discrepancy between the male and female wage rates. He explained that since the nature of work was very arduous, women being anaemic are unable to earn the full wage rate. Others also commented on the minimum wage rate pointing out various malpractices adopted in deciding the amount. The President of the Banda District Panchayat of UP was of the opinion that even though the labourers worked for fifteen days, they were paid only for a couple of days by the CEO and BDO. It took fifteen days to five months to get the amount in spite of the fact that the daily labourer lived from hand to mouth, observed the elected representatives from Uttarakhand. Regarding the duration of the work, it is surprising that about 61 per cent of the delegates who answered other questions, did not respond to this question. But one quarter of them said that the activities lasted for 20 to 30 days, followed by 18 per cent who were of the opinion that it lasted for more than three months. About 31 per cent of the respondents at the time of survey confided that labourers got more than Rs 80 followed by 15 per cent who were of the opinion that labourers got below Rs 50. At the same time a significant percentage of the respondents, 23 per cent, did not reply to the query at all. In Gujarat, interestingly, 50 per cent of the delegates said that the workers get less than Rs 50 followed by another 50 per cent who did not respond to the question!

SOME POSITIVE IMPACT

The delegates were quite aware of the impact of the Act. For example, they noted that the migration process had declined throughout India. This was stated not only by the elected representatives from Punjab but also those from Bihar. Both agreed that the migration flow has declined. However, the Up-sarpanch of Bolangir district of Orissa said that since the work begins in September and October, by that time the seasonal labourers have already been committed to contractors for dadan migration to Hyderabad or Raipur. Hence the whole impact of the availability of work is not being utilised fully.²

Many specific recommendations were made by women members from the different States for allocation of employment opportunity under the NREGS. Representatives from Bangalore suggested that labourers should get a chance to work in international airport modernising schemes. Bihar representatives felt that efforts should be made to canalise the course of the Kosi river to prevent massive floods through this work. Others opined that a provision should be there to meet the needs

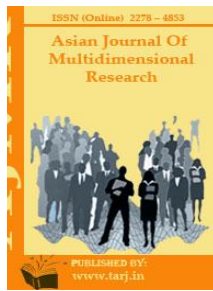
of skilled persons or physically challenged persons in the villages. So far as the division of material and labour cost is concerned, the delegates suggested to make it 50:50 instead of 60 to 40.

CONCLUSION

From the panchayat perspective it is clear from the above discussions that the NREGA has not been able to help in deepening grassroot democracy or strengthening the PRIs even though the scheme has brought about some positive impact on the beneficiaries. The members of local government lack knowledge about micro planning, social audit, vigilance committees etc. Since they don't have functionaries of their own, they depend on the line departments and hence the BDO, CEO, patwaries, and other officers get the opportunity to take extensive bribes in order to get the scheme sanctioned. In order to make the decentralised decision-making process a reality the NREGA should be implemented through the panchayats by proper devolution and without having any undue interference from the block and district officers.

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REFORMS IN INDIAN AGRICULTURE

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ABSTRACT

Since the early 1990s India has undergone substantial economic policy reforms and economic growth. Though reforms in agricultural policy have lagged those in other sectors they have nonetheless created a somewhat more open economic orientation. In this study we evaluate the protection and support versus disprotection of agriculture in India. Agrarian reform in India had been adopted to reallocate the agricultural resources among all the people directly connected with agriculture. After Independence the Government of India started the process of building equity in rural population and improvement of the employment rate and productivity. So for this reason the Government had started agrarian reform.

KEYWORDS: Agrarian Reforms, Employment, productivity.

INTRODUCTION

In the center of India's flag sits a spinning wheel a symbol used by Gandhi to protest English textile imports under colonial rule and to demonstrate the nobility of a society of small-scale agriculture and industry. For much of its independence India's economy was governed by the principal of the spinning wheel with disastrous economic and social effects. Just as the United States in industrializing had to overcome the belief in the nobility of agriculture that shaped its founding fathers India is still struggling to move beyond Gandhi-era economics and raise its standard of living. India's recent progress toward economic growth stems from reforms undertaken after the 1991 fiscal crisis which lifted India from decades of slow growth under socialist rule and offered an opportunity to improve living conditions in the immense poor country. And the recent growth has been impressive among the highest growth rates in the world. A great portion of the world's poor live in India and will depend on its future growth to overcome poverty. But the recent progress is not enough. Certainly great steps have been taken towards reform on trade, industrial policy and the financial system substantial progress has been made in reducing poverty and India has a growing and thriving middle class. However much remains to be done :the government intrudes where it need not

in everything from coal mining to discos and fails to manage the basic services that it should like decent roads a stable power distribution infrastructure and quality primary education.

Agriculture development in post independence India is marked by a historic failure of the state to resolve the agrarian question, ending the extreme concentration of land ownership and use and weakening the factors that fostered disincentives in investment and technology adoption tied workers to a social system with considerable pre-modern features and compressed purchasing power. While this failure has shaped the pattern and nature of agriculture growth in India after 1947 the implementation of economic reforms after 1991 has introduced new dimensions to the contradictions of the earlier regime. In the 1990s and 2000s some of the fundamental contradictions of the post-independence agrarian economy have persisted on the other hand some of the pillars on which the earlier regime rested have been undermined Indian banking has around 200 years of history and has undergone many transformations since independence. But Liberalization

Privatization and globalization and Information technology are currently changing the Indian banking radically. "Indian agriculture is bouncing back. It is scripting its own success story, thanks to rising private investment, which will lead to faster growth. Faster growth in agriculture tomorrow will happen because of rising private investment in agriculture today ." says Y C Deveshwar , Chairman CII's Agriculture Council and Chairman ITC. Indian agriculture still suffers from poor productivity, Falling water levels, Expensive credit, A distorted market, Many intermediaries who increase cost but do not add much value, Laws that stifle private investment Controlled prices, Poor infrastructure, produce that does not meet international standards, inappropriate research, Tax evasion by unorganized sector leading to the lack of a level playing field. All these hamper the farmers and the industry.

OBJECTIVES OF THE STUDY

- To generate an overview of various reforms in Agriculture.
- To generate an overview of the impact of reforms in agriculture.
- To know the levels of awareness of agrarian reforms in India's.
- To study the various challenges faced in the reforms.

NEED OF THE REFORMS

- Since India had been under several rulers for a long time, i.e. right from the beginning of the middle age that's why its rural economic policies kept changing. The main focus of those policies was to earn more money by exploiting the poor farmers.
- In the British period the scenario had not changed much. The British Government introduced the "Zamindari " system where the authority of land had been captured by some big and rich land owners called Zamindar. Moreover they created an intermediate class to collect tax easily.
- This class had no direct relationship with agriculture or land. Those Zamindars could acquire land from the British Government almost free of cost. So the economic security of the poor peasants lost completely. After independence the Government main focus was to remove those intermediate classes and secure a proper land management system. Since India is a large country the redistribution process was big challenge for the government.

CHALLENGES

Regional rulers or local representatives of the state were generally obliged to allocate a certain percentage of the agriculture taxes on building and managing water-storage water-harvesting and water-diverting strictures which facilitated a second crop and provided water for drinking and other purposes in the long dry season.

Only a small percentage of Indian farmers have enjoyed the luxury of natural irrigation although there are reports that in certain parts of the country the soil used to remain enough moisture well beyond the monsoon months. However it is equally true that the drying up of wells led to mass migration and sudden depopulation of old towns and villages.

In Assam Bengal and Bihar all flood prone states there is evidence of a massive network of canals that allowed both effective drainage to prevent flooding during the heavy monsoon months and also provide for fishing transportation and irrigation arteries in the dry season.

Intelligent water management thus allowed for the growth of a healthy agricultural surplus that in turn facilitated steady urbanization and the development of a variety of pre-industrial manufacturing in areas such as textiles, Jewelry wood, metal working etc.

Because of the immense importance of effective water-management the entire revenue system of the state was structured so as to take into account both the necessity of water management and the inherent dependency that existed between Indian agriculture and the availability of water. Most Indian states attempted to collect revenues in a manner that did not entirely destroy the village solidarity that was essential in proper sharing and management of common water-resources. At the same time urban tax collectors had to deal with mediating entities from the villages so that they did not tax at a rate that might lead to the destruction of water management facilities so essential for life and sustainable agriculture.

By and large taxes were imposed on villages collectively and the village elites were obliged to ensure that the burden of taxes did not destroy the complete viability of agriculture Taxes were also adjusted keeping in mind whether the land was well-irrigated or not.

REFORMS IN INDIAN AGRICULTURE

- Give states an incentive to amend the APMC act and abolish mandi taxes. This would allow competitive markets to develop farmers and processors will both gains.
- Support the organized private sector in increasing its spending on extension and technology transfer. This would give farmers the knowledge of what to grow and how to grow so that stringent quality norms are met.
- Implement the Unified Food Law and back it up with lowering the total tax burden on processed foods so that the sector picks up and consequently demand farm produces rises.
- Target foreign buyers of high –value ethnic Indian foods as opposed to commodity exports starting with the large NRI population of 20 million which can be huge market.
- Create a viable model of private partnership that allows private investors to invest in agriculture infrastructure in partnership with banks and financial institutions.

CONCLUSION

India is becoming a production base and an export hub for diverse goods from agriculture products to automobile components to high end services. Indian firms are now part of global production chains importing sub-assemblies adding value to them and re-exporting them. The reforms implemented so far have helped attain 6 plus per cent growth however should India be able to implement these remaining reforms and re-orient governmental spending away from inessential expenditures and towards high priority areas of health education and infrastructure development then it is very likely that it would attain and sustain even higher rates of economic growth.

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A STUDY ON THE DEVELOPMENT OF THE FLEXIBILITY IN VOLLEYBALL PLAYERS

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ABSTRACT

In the present study, school going volleyball teenage players were undertaken as subjects. The purposive sampling was made from sports population for giving the designed treatment. It was a training program for aiming at the improvement in their flexibility. Related exercises and drills were considered and given for six weeks training program. One session is given per day of sixty minutes. Before training, mid and after training, measurements of the flexibility element were taken with the sit and reach test. A comparison was made between control and experiment group and also with in experiment and with in control group. It was noted that there was significant difference found in comparison with experiment and control group, followed by with in experiment group. However there was no difference noticed with in control group. So a well designed systematic training is recommended for practice to improve the flexibility fitness for Volleyball players.

KEYWORDS: Volleyball, Flexibility, Sit And Reach, Experiment, Control Group, Purposive Sampling, Systematic Training Etc.

INTRODUCTION

Rapid progress has been observed in fitness program and methods for sports persons as well as sedentary people for various reasons. It is underpinning in making these new changes. That is related with advancement in knowledge and technology. The domain of fitness consists with various components of strength, flexibility, speed, endurance, power, agility etc. It makes the sports persons successful in sports competition. It is included the element of flexibility in physical fitness. It is important in preventing injury while doing one's daily activities (Johnson & Nelson, 1982). With span of time the definition of physical fitness is modifying by adding other components like weight control, freedom from obesity and mental well being. The impetus for it undoubtedly came from medical professional. A wider body of knowledge and scientific facts can play a beneficial role in sustaining one's physical and mental health (Paffenbarger & Hyde, 1988; Powell, 1988). Today,

advancement has been made in field of fitness for sedentary people. Also as it are in sports persons for improving the fitness standard. Scientific expertise is required based on research in knowledge and innovation in technology. Consequently, experts and other professional peoples have begun to give more attention to fitness regime. In India, adjustment to indigenous activities is taken to its population. So importance is given to create new knowledge and insights. Research on the structure of children's games suggests that different activities structure create opportunities to learn different game (Carpenter, 1983; Lever, 1976, 78).

Each and everyone would agree about the guidelines for the role of Individual's body structure and functions. That determines the capacities and efficiency of players. So sports drills decide and make changes in the form and functions of sports persons. However, physical fitness seems to develop efficiency to restore on physical strength and motor ability (George & Barrow 1978). Generally, we take notice that the Volleyball game is played since very early age by all male female. It is helpful to enhance the fitness. Lal Chand (1975) has revealed that Volley ball players should be gifted with heights, jumping ability, legs and arms strength with endurance, flexibility and agility. In the fitness of players, weight training significantly improves in physical fitness by having normal conditioning program alone (Compbell, 1962). As it is the flexibility component in the present study which would be measured after the exercise program given to the subjects. Flexibility is the ability of an individual to move the body and its parts through range of motion as possible. It is the core component of fitness for game of Volleyball. So it is pertinent logic of giving the certain training. It is argued in various studies that a programmed test battery is likely to improve the destined physical fitness elements. After going through literature review, it was hypothesized that the certain physical program is likely to improve the flexibility fitness of volleyball players.

METHODOLOGY

In the present work, 40 school going students were taken as subjects that were beginners for volleyball game. It was a purposive sample of sports group of 40 school going students. They were selected randomly from sample population age ranging from 12-14 years. Further they were divided into two groups i.e. experimental and control group of 20 subjects respectively in each group. They were belonged to Govt. school Kurukshetra. A treatment programmed of flexibility fitness was designed and various exercises. Drills were undertaken for six weeks and one session of 60 minutes in a day. The training was given at morning time to the experimental group for six weeks. Then test was taken fortnightly from first day before starting of training then mid and last day of fourth week. The control group remained at a normal routine. Same pattern was used for measuring the observations. The measurements/ observations were taken on the test i.e. Sit and Reach flexibility test measuring (in inches) the flexibility as described in standardized procedure.

A training program was prepared for sixty minutes to destine to improve the overall fitness of the players. It was including flexibility with other components of fitness i.e. strength, endurance, agility etc. It was especially flexibility exercises were given in form of stretching, joint movement in warming up, muscle isometric contraction specifically the exercises for particular group of muscles. Again stretching exercise was given at the time cooling down. To get more affect, specific training procedures involving static stretch and ballistic stretch methods have also been used in ensuing practice (Herbert, H. 1962 & Marckbank, 1970). It was training program in practice by increasing and decreasing the intensity. Volume of load was changed in combination of other types of

exercises for improving the flexibility. A descriptive statistical calculation was made. Specifically mean and 't' ratio for comparison with significance difference between experiment and control groups.

Results

Statistical analysis and interpretation of data was presented in descriptive method, the results have been presented in table-1 to table-3.

TABLE-1; COMPARISON OF SIT AND REACH TEST (FLEXIBILITY IN) BETWEEN EXPERIMENTAL AND CONTROL GROUPS

Exp. Vs. Cont	M1	M2	't'
1vs1	2.57	2.00	1.32
1vs11	2.57	2.00	1.32
1vs111	2.57	2.06	1.18
11vs 1	2.93	2.00	2.16
11vs11	2.93	2.00	2.21
11vs111	2.93	2.06	2.07
111vs1	4.00	2.00	4.54
111vs11	4.00	2.00	4.76
111vs111	4.00	2.00	4.61

Table-1; reveals that the mean scores and 't' scores of pre, mid and post tests of control group are 2.00, 2.00 & 2.06 with pretest of experimental group as with value of 2.57. No significant difference was found in 't' test. Further same values of control group were compared with mid test of experiment group of 2.93 value. And it was found significant difference of 't' values as 2.16, 2.21 & 2.07 respectively. Then it was followed by comparison of same control group test with post experiment group. Values of mean score i.e. 4.00 with 't' value are i.e. 4.54, 4.76 & 4.61 respectively

TABLE-2; COMPARISON OF SIT AND REACH TEST (FLEXIBILITY) WITH IN EXPERIMENTAL GROUPS

Exp. vs. Exp.	M1	M2	't'
1vs11	2.57	2.93	0.65
1vs111	2.57	4.00	2.60
11vs111	2.93	4.00	1.98

Table-2; proves that mean scores with in experiment group tests of pre, mid and post are 2.57, 2.93 and 4.00 respectively. The values of 't' are 0.65, 2.60 & 1.98 respectively. It was found at significant difference in all except between 1 test. So the improvement in flexibility was found in this group.

TABLE-3; COMPARISON OF SIT AND REACH TEST (FLEXIBILITY) WITH IN CONTROL GROUP

Cont. vs. Cont.	M1	M2	't'
1vs11	2.00	2.00	0.00
1vs111	2.00	2.06	1.00
11vs111	2.00	2.06	0.26

Table-3; proves that mean scores with in control group tests of pre, mid and post are 2.00, 2.00 and 2.06 respectively. The values of t' are 0.00, 1.00 & 0.26 respectively. It was found no significant difference in all tests. So it was noted that there is no improvement in flexibility in this group.

DISCUSSION

The findings in tables 1, 2 and 3 prove that the proposed treatment program of fitness of flexibility was very effective. It made the progress in this fitness component. The research work showed that systematic training has definite affect on exp. group. It proved in the forthcoming training program of the volleyball teenage players at early age. In table-1, it was noted that comparison between experimental and control group was found with the significant difference. It is due to training as went on gradually ahead. At the beginning stage of the tests of training both groups are found to be almost at same level. As training goes on. The better improvement was revealed at significant level with 't' value in experimental groups. There was no significant difference of value in control group in all tests. In the table-3, it was noted that results with in control group. And it was not found significant improvement in control groups. However in table-2, reveals that the experimental group was found at a significant difference. When, the training went forward with span of period. The study has been supported by other authors like Shaver (1976).

CONCLUSION

The findings in tables-1 to 3 prove the affect of systematic training was observed in the data collection. Volleyball beginners showed improvement in flexibility required in game of volleyball. It proves that well designed program of training is always recommended. The present study proves that the proposition regarding the systematic practice which gives good results. Further it is recommended that the similar training treatment program can be conducted on the school going female students. The studies can be also made on college going students. The similar studies can be conducted at state and national level and in other games also.

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