
ISSN (Online) : 2279-0667
Published by:-
www.tarj.in
TRANS Asian Journal of Marketing
&
Management Research (TAJMMR)

**TAJMMR** ISSN (online) : 2279-0667

Editor-in-Chief : Dr. Karun Kant Uppal

| | | |
|---|---|---|
| Impact Factor | : | SJIF 2020 = 7.209 |
| Frequency | : | Monthly |
| Country | : | India |
| Language | : | English |
| Start Year | : | 2012 |

Published by : www.tarj.in

Indexed/ Listed at : Ulrich's Periodicals Directory, ProQuest, U.S.A.

E-mail ID: tarjjournals@gmail.com

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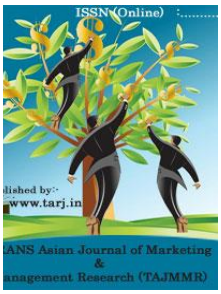
ISSN: 2279-0667 Vol 9, Issue 7-8, July-August 2020, Impact Factor: SJIF 2020 = 7.209




**TRANS Asian Journal of Marketing Management Research (TAJMMR)**

**(Double Blind Refereed & Reviewed International Journal)**

ISSN: 2279-0667 Vol 9, Issue 7-8, July-August 2020, Impact Factor: SJIF 2020 = 7.209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(Double Blind Refereed & Reviewed International Journal)

TRANS Asian Research Journals

DOI: 10.5958/2279-0667.2020.00032.2

# APPLICATION OF SIMULATION IN OPTIMIZING ONLINE SALES CHECK OUT OPERATION IN RESTAURANT USING TORA

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## ABSTRACT

*One of the expected gains by studying queuing systems is to review the efficiency of the models in terms of utilization and waiting length, hence increasing the number of queues so customers will not have to wait longer when servers are too busy. In other words, trying to estimate the waiting time and length of queue(s) is the aim of this research paper. We may use queuing simulation to obtain a sample performance result and we are more interested in obtaining estimated solutions for multiple queuing models. The restaurant Swiggy app details like customer arrival and service are directly collected from the eatery for a duration of 3 months. For the analysis point of view the queuing factors are found via Tora (Toolkit for Oracle) Software and Queuing simulation for the next month is also done. Empirical data of arrival and service times during the checkout process was recorded through observation technique to analyse the performance measures of the single-channel single-queue system at the checkout counter. Monte Carlo Simulation technique was used to analyse the operating characteristics of queues, efficiency and server utilization. These factors play a chief role in understanding customer satisfaction during the checkout process and help the management to evaluate service efficiency at the checkout points. This study enables to do research on the efficiency and effectiveness of using Online App in eateries thus avoiding direct customer waiting time in queues of restaurants.*

**KEYWORDS:** *Simulation, Queuing Theory, Interval Arrive Time, Single Server Single Queue System*

## INTRODUCTION

Indian hospitality industry now depicts as a key driver of growth among the service sector. In this hotel sector has been the subject of important development and growth. It is one of the major sectors of the travel and tourism domain that has contributed 10.4% to the global GDP. The hotel sector has developed over time from its very inception in different places in the world. Introduction to the hotel industry is a module that thrives largely due to the growth in tourism and travel.

Several parameters are responsible in grading a restaurant whether it deserves up to the desired level or not. These parameters include food quality, cleanliness, restaurant layout, spacious designing and setting. When managed carefully, these parameters, attract plenty of customers. Human behaviour plays an important role in such situation. Not all customers wait in a busy queue. Waiting lines are common phenomenon in restaurants especially during lunch and dinner time. Restaurants would avoid losing their customers due to a long wait on the line. Waiting in queues can be analysed via Queuing theory. It is the study of queue or waiting lines. Queuing theory is also known as the theory of overcrowding; it is the branch of operational research that explores the relationship between the demand on a service system and the delays suffered by the users of that system. Hence, queuing theory is suitable to be applied in a restaurant setting since it has an associated queue or waiting line where customers who cannot be served immediately have to queue (wait) for service.

With online delivery apps becoming a parlance among consumers today, it has become quintessential for restaurants as well as to create more sales via attracting more number of customers towards their outlets. Through app based service they reduce the waiting time in the queue with respect to direct and online customers. In this study the Swiggy app details has been used for analysis purpose. Swiggy offers an on-demand food delivery platform designed to provide food from neighbourhood restaurants to the customers.

Queuing model is thus used to simulate a model of restaurant operation to reduce cycle time in busy fast food restaurants and increase efficiency and service management in busy restaurants. Simulation enables to measure the performance criterion of the restaurant to understand the situation better as well to simulate any improvement in decision making. This model enables to find traffic in online and direct queue at the cash counter. This shows a need of quantitative model for the restaurant management to understand the situation better.

## LITERATURE REVIEW

Queuing theory is the mathematical study of the congestion and delays of waiting in line. Queuing theory (or "queueing theory") examines every component of waiting in line to be served, including the arrival process, service process, number of servers, number of system places, and the number of customers which might be people, data packets, cars, etc. Queuing theory is the study of congestion and waiting in line. The theory can help with creating an efficient and cost-effective workflow, allowing the user to improve traffic flow. Queuing

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theory assesses two key aspects like customer arrival at the facility and service requirements. Often used as an operations management tool, queuing theory can address staffing, scheduling, and customer service shortfalls.

The origin of queuing theory can be traced back to the early 1900s, found in a study of the Copenhagen telephone exchange by Agner Krarup Erlang, a Danish engineer, statistician and, mathematician. His work led to the Erlang theory of efficient networks and the field of telephone network analysis.

Queues are common view in hotels and other service based outlets. Queuing theory has been used in this study. This research seeks to determine the average time customers spend on the queue and the actual time of service delivery. The Chi-square test has been used to ascertain the arrival and service pattern. The conclusion is to increase the number of servers and to reduce the time customers spend on the queue and also reduce cost incurred by waiting to enhance excellence.

Researchers has proposed an on-site waiting queuing model and has taken the data from a restaurant to verify waiting model. The study focuses on the performance of utilization, queue length of waiting time, and the probabilities of potential customers to balk. The simulation result helps to improve quality of services of the restaurant by considering the relationship between restaurant capacity for customers, the queuing length and the probabilities of potential customers to balk. Study concludes to develop a booking APP, which allows customers to reserve the required restaurant space through their smartphone in advance so that the customers can abridge the waiting time in lines.

Queuing system in a restaurant with a view to determine its operating characteristics and to improve customers satisfaction for that data was obtained from a fast food restaurant and data collected was tested to show if it follows a Poisson and exponential distribution of arrival and service rate using Chi square goodness of fit. The arrival rate at the restaurant was about 40 customers per hour, while the service rate was about 22 customers per hour per server.

The waiting lines and service systems are indispensable in this era. Every restaurant would like to avoid losing their desired customers due to a long wait in the queue. This study aims to show the single channel queuing model M/M/1, and single channel waiting line model M/M/1 using Little's theorem. Also the study analyze the average waiting time in the queue before getting service and probability of impatient customers to ignore the system.

The concept of Simplex algorithm which is an aspect of linear programming to allocate raw materials to competing variables (big loaf, giant loaf and small loaf) in bakery for the purpose of profit maximization. From the analysis, it was observed that small loaf, followed by big loaf contribute objectively to the profit. Hence, more of small loafs and big loafs are needed to be produced and sold in order to maximize the profit. Through LPP the study is carried out to emphasize and understand the proposition with which materials to be used and make profit out of it.

Oladejo M.O in 2015 conducted a study at Ostrich Bakery a fast food restaurant which is considered based on the Existing Structure of its queuing model and the Proposed Structure of

that queuing model. The Poisson Distribution and the Exponential Distribution will be encountered in the queuing model. The channels of the queuing model that operate in the bakery was analysed. The study measures the performance of queuing system using n-servers in parallel and linking rest servers in series.

The queuing theory satisfies the stochastic model in practical and real time scenario. The study measures utilization rate, waiting time, queue length and the probability of potential customers to balk based on the data that has been studied using Little's formulae. This is one way of increasing the quality of service in the Restaurant by anticipating if there are many customers in the queue and checks if the restaurant can set a target profit that should be achieved on daily basis.

Restaurant owners mainly focuses on factors like customers queuing time, taste, cleanliness, the restaurant layout and settings .Queuing theory is suitable to be applied in a restaurant setting since it has an associated queue or waiting line where customers who cannot be served immediately have to wait for service. Researchers have previously used queuing theory to reduce cycle time in a busy fast food restaurant as well as to increase throughput and efficiency.

A queueing analysis has been conducted to examine multi-stage production line performance to facilitate more realistic resource planning. It is to improve the performance of multiproduct multistage production lines. This work aims to help managers in improving the efficiency and effectiveness. The relevant data for study was collected and the chi-square goodness test was applied to determine the arriving and leaving distributions data of processing parts using waiting line model.

**Hypothesis**

$H_0$: Waiting line management in a restaurant does not improve the customer satisfaction.
$H_1$: Waiting line management in a restaurant does improve the customer satisfaction.

**RESEARCH METHODOLOGY**

The study focuses on the application of queuing theory in online app based sales checkout operation in fast food restaurants. So that to improve the queue management in eatery. The data is collected from a restaurant to examine the waiting line of customers done via online ordering.

Service enterprises go through problems such as poor service pattern, basic facilities, delivery timings, incorrect mannerism of service personnel etc. All this factors affect the association with customers and overall service performance. The study aims to analyze how to optimize online app based sales check out operation in restaurant with respect to customers ordering online which in turn helps business manager to improve on the efficiency and effectiveness of their business. The process used to collect information and data for the purpose of making the analysis and required evaluation for the decision-making process is described in this section. The methodology includes collection of data already stored in the systems of the restaurant.

The Research design used in this research is quantitative in nature. The research is undertaken to find whether the waiting line management do affect the customer satisfaction level in a restaurant. Quantitative research approach is used for data analysis of the secondary data collected. The quantitative research concentrates on the secondary data sources of information.

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The data is collected from the restaurant records to gain some insights on the actual research problem. The research is then concentrated to analyse the waiting line model for the eatery. Through the data analysis using Tora software it is intended to identify whether waiting time reduction do influence and improve the level of satisfaction of the customers. The target group consists of customers ordering food online form Thalasseri restaurant. The tools for data collection includes the observation and records of the restaurant**.**

## RESULT AND DISCUSSION

**TABLE 1 : RESTAURANT APP DETAILS FOR THE MONTH OF AUGUST**

| Date | Total Orders Received | Total Orders Served |
|---|---|---|
| 01-08-2019 | 135 | 128 |
| 02-08-2019 | 127 | 115 |
| 03-08-2019 | 141 | 128 |
| 04-08-2019 | 165 | 157 |
| 05-08-2019 | 174 | 165 |
| 06-08-2019 | 183 | 167 |
| 07-08-2019 | 144 | 134 |
| 08-08-2019 | 177 | 170 |
| 09-08-2019 | 180 | 176 |
| 10-08-2019 | 152 | 136 |
| 11-08-2019 | 189 | 183 |
| 12-08-2019 | 176 | 165 |
| 13-08-2019 | 189 | 184 |
| 14-08-2019 | 154 | 141 |
| 15-08-2019 | 147 | 130 |
| 16-08-2019 | 179 | 175 |
| 17-08-2019 | 192 | 183 |
| 18-08-2019 | 203 | 190 |
| 19-08-2019 | 194 | 189 |
| 20-08-2019 | 211 | 200 |
| 21-08-2019 | 183 | 180 |
| 22-08-2019 | 159 | 149 |
| 23-08-2019 | 170 | 165 |
| 24-08-2019 | 173 | 164 |
| 25-08-2019 | 194 | 177 |
| 26-08-2019 | 217 | 211 |
| 27-08-2019 | 233 | 220 |
| 28-08-2019 | 188 | 177 |
| 29-08-2019 | 174 | 172 |
| 30-08-2019 | 169 | 164 |
| 31-08-2019 | 187 | 169 |

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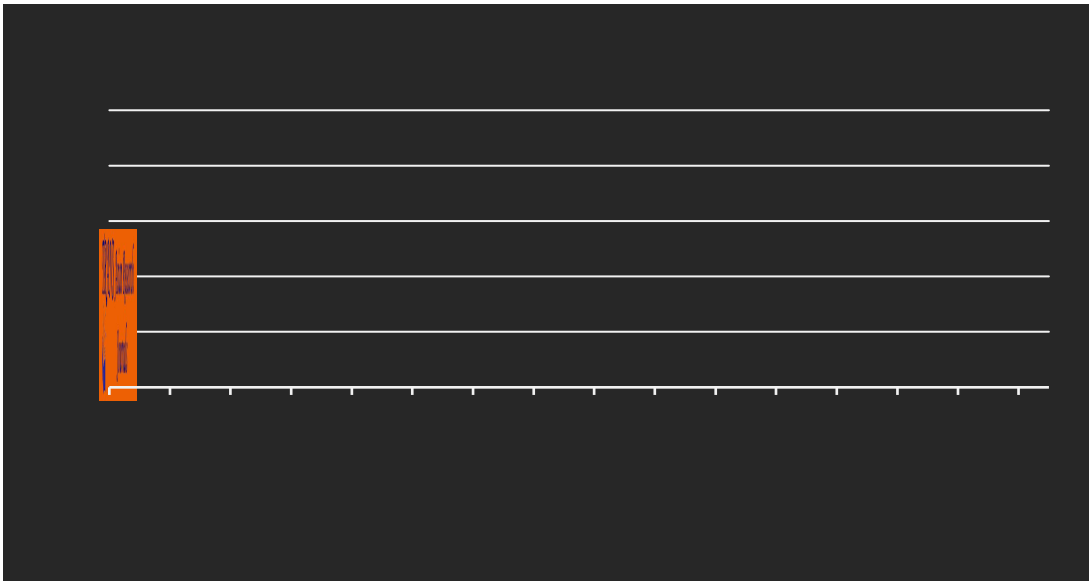
Fig 1 Chart for data of august month



**Interpretation**: From the above chart the observations implies that the customer flow is more on end of the month and service rate is always greater than the arrival rate as the system is M/M/1 model. More customers are served and arrived on the end of month on 26$^{th}$ and 27$^{th}$ August.

**TABLE 2 : RESTAURANT APP DETAILS FOR THE MONTH OF SEPTEMBER**

| Date | Total Orders Received | Total Orders Served |
|---|---|---|
| 01-09-2019 | 191 | 180 |
| 02-09-2019 | 167 | 161 |
| 03-09-2019 | 172 | 162 |
| 04-09-2019 | 179 | 170 |
| 05-09-2019 | 185 | 172 |
| 06-09-2019 | 193 | 185 |
| 07-09-2019 | 219 | 207 |
| 08-09-2019 | 203 | 196 |
| 09-09-2019 | 177 | 171 |
| 10-09-2019 | 181 | 170 |
| 11-09-2019 | 194 | 179 |
| 12-09-2019 | 148 | 139 |
| 13-09-2019 | 214 | 200 |
| 14-09-2019 | 231 | 228 |
| 15-09-2019 | 237 | 229 |
| 16-09-2019 | 185 | 266 |
| 17-09-2019 | 197 | 187 |
| 18-09-2019 | 166 | 164 |

| | | |
|---|---|---|
| 19-09-2019 | 173 | 166 |
| 20-09-2019 | 195 | 182 |
| 21-09-2019 | 222 | 203 |
| 22-09-2019 | 213 | 198 |
| 23-09-2019 | 179 | 175 |
| 24-09-2019 | 187 | 176 |
| 25-09-2019 | 181 | 161 |
| 26-09-2019 | 193 | 180 |
| 27-09-2019 | 208 | 201 |
| 28-09-2019 | 219 | 201 |
| 29-09-2019 | 245 | 239 |
| 30-09-2019 | 179 | 168 |

Fig 2 Chart for data of September month



**Interpretation**: From the above graph the observations implies that the customer flow is more on middle and end of the month and service rate is always greater than the arrival rate as the system is M/M/1 model. More customers arrived on $15^{th}$ , $17^{th}$ and $29^{th}$ of the month.

**TABLE 3 : RESTAURANT APP DETAILS FOR THE MONTH OF OCTOBER**

| Date | Total Orders Received | Total Orders Served |
|---|---|---|
| 01-10-2019 | 98 | 96 |
| 02-10-2019 | 105 | 99 |
| 03-10-2019 | 97 | 93 |
| 04-10-2019 | 113 | 101 |
| 05-10-2019 | 124 | 116 |
| 06-10-2019 | 103 | 99 |
| 07-10-2019 | 131 | 120 |

| | | |
|---|---|---|
| 08-10-2019 | 123 | 111 |
| 09-10-2019 | 95 | 93 |
| 10-10-2019 | 107 | 103 |
| 11-10-2019 | 101 | 96 |
| 12-10-2019 | 88 | 86 |
| 13-10-2019 | 134 | 121 |
| 14-10-2019 | 133 | 118 |
| 15-10-2019 | 132 | 108 |
| 16-10-2019 | 99 | 96 |
| 17-10-2019 | 128 | 114 |
| 18-10-2019 | 114 | 109 |
| 19-10-2019 | 92 | 93 |
| 20-10-2019 | 140 | 124 |
| 21-10-2019 | 109 | 100 |
| 22-10-2019 | 124 | 111 |
| 23-10-2019 | 147 | 133 |
| 24-10-2019 | 107 | 102 |
| 25-10-2019 | 123 | 119 |
| 26-10-2019 | 132 | 118 |
| 27-10-2019 | 145 | 127 |
| 28-10-2019 | 102 | 95 |
| 29-10-2019 | 116 | 106 |
| 30-10-2019 | 123 | 120 |

Fig 3 Chart for data of October month

**Interpretation**: From the above graph the observations implies that the customer flow is high and constant throughout the month and service rate is always greater than the arrival rate as the system is M/M/1 model. Sales is more between $23^{rd}$ – $27^{th}$ and constantly high from $13^{th}$ – $17^{th}$ of October

The parameters and corresponding characteristics in Queuing Model M/M/1, assuming system is in steady-state condition, are calculated as below:

c number of servers = 1

Arrival rate = 130 customers per day for single server

Serving rate = 152 customers per server per day

$\rho = \lambda/(c\mu) = 130 / 152 = 0.8552$

$\gamma = \lambda/\mu = 0.8552$ ( = $\rho$ in case of c = 1 )

Overall system utilization = $\rho$ = 85.52 %

The probability that all servers are idle (Po) = 0.1448 or 14.48 %

Average number of customers in the queue , Lq = 14 customers per hour

Average waiting time in a queue per server is , Wq =8.5 hours per server = 33 min

The performance of the sales checkout service is comparatively good. We can see that the probability for servers to be busy is 0.8552 , i.e. 85.52 %. The average number of customers waiting in a queue is Lq = 14 customers per server. The waiting time in a queue per server is Wq = 8.5 hours per server i.e. 33 minutes of delay in delivery, in a busy server. When number of customers are more implies the queue is busy and hence customers never be satisfied by the service.

Here the waiting time is more in the waiting line that affect the customer satisfaction level, hence waiting line management do affect the customer satisfaction level.

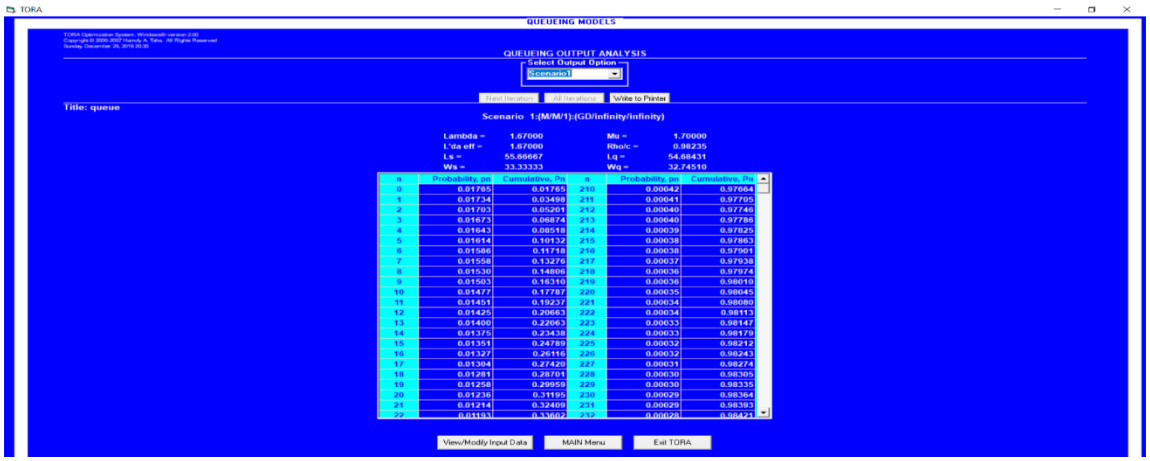



Fig 4.6 Data analysis in Tora software

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Average number of customers in the queue , Lq = 14 customers per hour

Average waiting time in a queue per server is , Wq = 8.5 hours per server = 33 min(approx..)

**Queuing Simulation**

Simulation is the replication of a real world process or system over time. Simulation involves the generation of artificial events or processes for the system and collects the observations to draw any implication about the factual system. A discrete-event simulation simulates only events that change the state of a system. Monte Carlo simulation uses the mathematical models to generate random variables for the artificial events and collect observations. Simulation technique is done so as to identify data for next 1 month of Swiggy app details based on queuing factors like inter arrival time, service time and waiting time of customers in the online queue of ordering data. Queuing simulation is an effective way to estimate the future data for analysis and further interpretation and conclude whether the customers are satisfied with the online delivery service.

**TABLE 4.4: CUSTOMER ARRIVAL TIME PROBABILITY DISTRIBUTION**

| Arrival Time | Frequency (in day) | Cumulative Frequency | Cumulative Probability | Random Number Interval |
|---|---|---|---|---|
| 1 | 135 | 135 | 0.0256 | 0-3 |
| 2 | 127 | 262 | 0.0497 | 4-6 |
| 3 | 141 | 403 | 0.0764 | 7-9 |
| 4 | 165 | 568 | 0.1077 | 10-13 |
| 5 | 174 | 742 | 0.1407 | 14-16 |
| 6 | 183 | 925 | 0.1755 | 17-19 |
| 7 | 144 | 1069 | 0.2028 | 20-22 |
| 8 | 177 | 1246 | 0.2363 | 23-26 |
| 9 | 180 | 1426 | 0.2705 | 27-28 |
| 10 | 152 | 1578 | 0.2993 | 29-32 |
| 11 | 189 | 1767 | 0.3352 | 33-35 |
| 12 | 176 | 1943 | 0.3686 | 36-39 |
| 13 | 189 | 2132 | 0.4044 | 40-42 |

| | | | | |
|---|---|---|---|---|
| 14 | 154 | 2286 | 0.4336 | 43-45 |
| 15 | 147 | 2433 | 0.4615 | 46-48 |
| 16 | 179 | 2612 | 0.4954 | 49-52 |
| 17 | 192 | 2804 | 0.5319 | 53-56 |
| 18 | 203 | 3007 | 0.5704 | 57-59 |
| 19 | 194 | 3201 | 0.6072 | 60-63 |
| 20 | 211 | 3412 | 0.6472 | 64-67 |
| 21 | 183 | 3595 | 0.6819 | 68-70 |
| 22 | 159 | 3754 | 0.7121 | 71-73 |
| 23 | 170 | 3924 | 0.7443 | 74-76 |
| 24 | 173 | 4097 | 0.7771 | 77-80 |
| 25 | 194 | 4291 | 0.8139 | 81-84 |
| 26 | 217 | 4508 | 0.8551 | 85-88 |
| 27 | 233 | 4741 | 0.8993 | 89-92 |
| 28 | 188 | 4929 | 0.9349 | 93-95 |
| 29 | 174 | 5103 | 0.9679 | 96-98 |
| 30 | 169 | 5272 | 1.0000 | 98-100 |

**TABLE 4.5 : CUSTOMER SERVICE TIME PROBABILITY DISTRIBUTION**

| Service Time | Frequency (in day) | Cumulative Frequency | Cumulative Probability | Random Number Interval |
|---|---|---|---|---|
| 1 | 128 | 128 | 0.0256 | 0-3 |
| 2 | 115 | 243 | 0.0486 | 4-6 |
| 3 | 128 | 371 | 0.0743 | 7-9 |
| 4 | 157 | 528 | 0.1057 | 10-12 |
| 5 | 165 | 693 | 0.1387 | 13-16 |
| 6 | 167 | 860 | 0.1722 | 17-19 |
| 7 | 134 | 994 | 0.1990 | 19-22 |
| 8 | 170 | 1164 | 0.2330 | 23-25 |
| 9 | 176 | 1340 | 0.2683 | 26-28 |
| 10 | 136 | 1476 | 0.2955 | 29-32 |
| 11 | 183 | 1659 | 0.3321 | 33-35 |
| 12 | 165 | 1824 | 0.3652 | 36-39 |
| 13 | 184 | 2008 | 0.4020 | 40-42 |
| 14 | 141 | 2149 | 0.4302 | 43-44 |
| 15 | 130 | 2279 | 0.4563 | 45-48 |
| 16 | 175 | 2454 | 0.4913 | 49-51 |
| 17 | 183 | 2637 | 0.5279 | 52-55 |
| 18 | 190 | 2827 | 0.5660 | 56-59 |

| | | | | |
|---|---|---|---|---|
| 19 | 189 | 3016 | 0.6038 | 60-63 |
| 20 | 200 | 3216 | 0.6438 | 64-66 |
| 21 | 180 | 3396 | 0.6799 | 67-69 |
| 22 | 149 | 3545 | 0.7097 | 70-73 |
| 23 | 165 | 3710 | 0.7427 | 74-76 |
| 24 | 164 | 3874 | 0.7756 | 77-80 |
| 25 | 177 | 4051 | 0.8110 | 81-84 |
| 26 | 211 | 4262 | 0.8533 | 85-88 |
| 27 | 220 | 4482 | 0.8973 | 89-92 |
| 28 | 177 | 4659 | 0.9327 | 93-95 |
| 29 | 172 | 4831 | 0.9672 | 96-98 |
| 30 | 164 | 4995 | 1.0000 | 99-100 |

**TABLE 4.6 : CUSTOMER WAITING TIME PROBABILITY DISTRIBUTION**

| Waiting Time | Frequency | Cumulative Frequency | Cumulative Probability | Random No Interval |
|---|---|---|---|---|
| 1 | 7 | 7 | 0.0253 | 0-3 |
| 2 | 12 | 19 | 0.0686 | 4-10 |
| 3 | 13 | 32 | 0.1155 | 11-13 |
| 4 | 8 | 40 | 0.1444 | 14-16 |
| 5 | 9 | 49 | 0.1769 | 17-22 |
| 6 | 16 | 65 | 0.2347 | 23-26 |
| 7 | 10 | 75 | 0.2708 | 27-28 |
| 8 | 7 | 82 | 0.2960 | 29-30 |
| 9 | 4 | 86 | 0.3105 | 31-35 |
| 10 | 16 | 102 | 0.3682 | 36-37 |
| 11 | 6 | 108 | 0.3899 | 38-41 |
| 12 | 11 | 119 | 0.4296 | 42-43 |
| 13 | 5 | 124 | 0.4477 | 44-48 |
| 14 | 13 | 137 | 0.4946 | 49-54 |
| 15 | 17 | 154 | 0.5560 | 55-56 |
| 16 | 4 | 158 | 0.5704 | 57-59 |
| 17 | 9 | 167 | 0.6029 | 60-63 |
| 18 | 13 | 180 | 0.6498 | 64-65 |
| 19 | 5 | 185 | 0.6679 | 66-67 |
| 20 | 11 | 196 | 0.7076 | 68-71 |
| 21 | 3 | 199 | 0.7184 | 71-74 |
| 22 | 10 | 209 | 0.7545 | 75-76 |
| 23 | 5 | 214 | 0.7726 | 77-79 |

| | | | | |
|---|---|---|---|---|
| 24 | 9 | 223 | 0.8051 | 80-85 |
| 25 | 17 | 240 | 0.8664 | 86-87 |
| 26 | 6 | 246 | 0.8881 | 88-92 |
| 27 | 13 | 259 | 0.9350 | 93-94 |
| 28 | 11 | 270 | 0.9747 | 95-97 |
| 29 | 2 | 272 | 0.9819 | 98-99 |
| 30 | 5 | 277 | 1.0000 | 99-100 |

**TABLE 4.7: DETAILED SIMULATION OF QUEUEING PROCESS FOR THE NEXT MONTH (NOVEMBER)**

| Trial | Random Number Interval | Inter Arrival Time (In Day) | Random Number(Service Time ) | Service Time | Random Number (Waiting Time) | Customer Waiting Time |
|---|---|---|---|---|---|---|
| 1 | 95 | 28 | 19 | 6 | 16 | 4 |
| 2 | 75 | 23 | 4 | 2 | 2 | 1 |
| 3 | 70 | 22 | 18 | 6 | 2 | 1 |
| 4 | 68 | 21 | 9 | 3 | 17 | 5 |
| 5 | 21 | 7 | 13 | 4 | 18 | 5 |
| 6 | 83 | 25 | 8 | 3 | 20 | 5 |
| 7 | 58 | 18 | 15 | 5 | 17 | 5 |
| 8 | 75 | 23 | 13 | 4 | 12 | 3 |
| 9 | 100 | 30 | 13 | 4 | 6 | 2 |
| 10 | 32 | 10 | 16 | 5 | 19 | 5 |
| 11 | 11 | 4 | 17 | 6 | 10 | 2 |
| 12 | 96 | 29 | 12 | 4 | 9 | 2 |
| 13 | 96 | 29 | 12 | 4 | 6 | 2 |
| 14 | 75 | 23 | 5 | 5 | 11 | 3 |
| 15 | 15 | 5 | 11 | 4 | 18 | 5 |
| 16 | 77 | 24 | 12 | 4 | 20 | 5 |
| 17 | 42 | 13 | 14 | 4 | 18 | 5 |
| 18 | 13 | 5 | 91 | 27 | 56 | 16 |
| 19 | 31 | 10 | 76 | 23 | 58 | 17 |
| 20 | 50 | 16 | 61 | 19 | 59 | 17 |
| 21 | 67 | 21 | 53 | 17 | 75 | 23 |
| 22 | 97 | 29 | 73 | 22 | 87 | 26 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 23 | 90 | 27 | 44 | 14 | 83 | 25 |
| 24 | 50 | 16 | 36 | 12 | 57 | 17 |
| 25 | 10 | 4 | 48 | 15 | 32 | 9 |
| 26 | 16 | 5 | 60 | 19 | 30 | 9 |
| 27 | 64 | 20 | 52 | 16 | 31 | 9 |
| 28 | 73 | 22 | 17 | 6 | 51 | 15 |
| 29 | 16 | 5 | 39 | 12 | 41 | 13 |
| 30 | 14 | 5 | 56 | 17 | 21 | 5 |

## CONCLUSION

The study develops a queuing model for single server with single queue at the sales checkout point. Monte Carlo simulation technique is performed and the operating characteristics have been computed to understand the performance of queuing system at the checkout point and to understand the level of customer satisfaction towards online ordering of food items. It is clearly seen that the average arrival rate is less than the average service rate. So the system is stable and the queue does not generate significantly. It is seen that the service time of three months in cumulative mode calculation is varied from the simulated value in the upcoming month, hence the waiting time of customers solved for a three month data evaluation is similar to that of simulated value for the next month. By simulation the average time customers wait in the queue is about 33 minutes. The mean waiting time of customers in the system i.e. at queue and in service, is about 10 minutes, reflecting higher customer satisfaction at the checkout counters. The utilization of first analysis data is 85.52% which indicates that it is busy most of the time. The empirical analysis of queuing system of Thalasseri Restaurant is that they may not be very efficient in terms of resources utilization. Queues form and customers wait even though servers may be idle much of the time.

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ISSN: 2279-0667 Vol 9, Issue 7-8, July-August 2020, Impact Factor: SJIF 2020 = 7.209


TRANS Asian Journal of Marketing Management Research (TAJMMR)

(Double Blind Refereed & Reviewed International Journal)

TRANS Asian Research Journals

DOI: 10.5958/2279-0667.2020.00030.9

# CHANGING OF SURFACE PROPERTIES OF SILICON PLATES UNDER MECHANICAL INFLUENCE OF ULTRASONIC FREQUENCY

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## ABSTRACT

*The work relates to alternative energy technologies, in particular, solar energy. The study discusses the results of changing the optical parameters of silicon wafers after the impact of ultrasonic frequency machining on their surface. Monocrystalline silicon plates of p-type conductivity, used as a base material for the manufacture of solar cells with a flat p-n transition, were chosen as the object for experiments. Mechanical processing of the ultrasonic frequency of the surface of silicon wafers was performed using a special device. Measurements of the surface roughness and the coefficient of light reflection from the surface, depending on the wavelength of incident light, were performed before and after the ultrasonic frequency machining. Based on the obtained LSM images and the surface roughness assessment, as well as the measurement of the light reflection coefficient, the authors proposed a texturing mechanism. Based on the experimental results obtained on the change in the lifetime of photogenerated charge carriers and the spectral dependence of the light reflection coefficient, as well as the physical justification of the processes of light absorption in plates subjected to surface machining of ultrasonic frequency, a new method for improving the efficiency of silicon solar cells has been developed and recommended for practice.*

ISSN: 2279-0667 Vol 9, Issue 7-8, July-August 2020, Impact Factor: SJIF 2020 = 7.209

**KEYWORDS:** *Silicon, LSM Images, Surface Roughness, Light Reflection Coefficient, Texturing, Solar Cells, Lifetime Of Charge Carriers.*

## INTRODUCTION

Among renewable energy sources, solar photovoltaic energy sources are the most promising environmentally friendly energy sources for general energy needs.Solar photovoltaic energy sources consist of solar cells built on the basis of crystalline silicon.There are three main factors that determine the efficiency of a solar cell [1].Among them, the optical efficiency of silicon solar cells is the most important of these factors that make up their energy efficiency.It is known that more than 85% of solar elements used in various sectors of the economy are made on the basis of crystalline or polycrystalline silicon[2, 3].

Various physical methods are used to improve the optical properties of the silicon surface, i.e. to reduce the reflection of incident light from the surface.The simplest way to reduce the reflection of incident light is to apply a coating against the return of light (CARL) made of various dielectric and metal-oxide materials.If a texture is formed on the surface of the silicon and then CARL is applied, a significant increase in the efficiency of the solar cell is achieved [4]. This article discusses a new method of texturing a silicon surface and discusses the results of experimental studies.

## PART OF THE EXPERIMENT

Monocrystalline silicon wafers with *p*-type conductivity and a solar plate based on them were selected for the experiments.The process of mechanical treatment of the surface of the silicon waf at ultrasonic frequency was carried out using a special device (Fig. 1).This device consists of the following parts:1-basic mechanical impact block, 8-air compressor and 9-ultrasonic frequency generator.Main mechanical impact block (1) air pressure control system (2), vibrator (3),working cylinders for transmission of mechanical vibrations (4 and 5), spherical micro-probe made of solid metal (6) and pressure transfer channel to the vibrator (7) with provided.

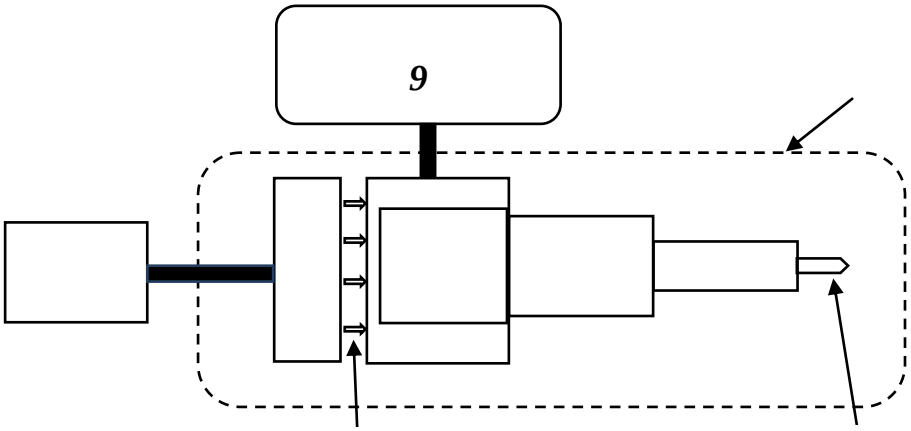


*Figure1. Simplified block diagram of ısonic frequency machining devic the surface of silicon wafers.*

ISSN: 2279-0667 Vol 9, Issue 7-8, July-August 2020, Impact Factor: SJIF 2020 = 7.209

The surface roughness (relief) of the silicon wafer was measured before and after ultrasonic machining, depending on the wavelength of the light incident on it.In addition, the residence time values of the charge carriers on the plate before and after ultrasonic frequency machining were also measured. The results of the study are presented in Figures 2 and 3.

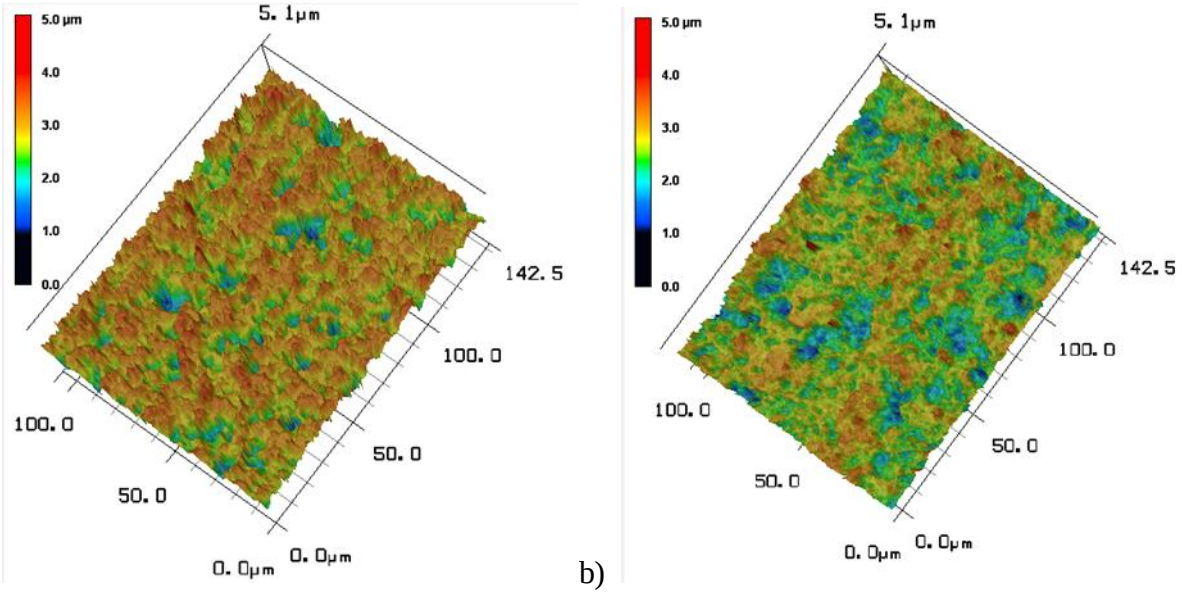


*Figure2. Three-dimensional LSM images of the silicon wafer surface before (a) and after (b) the ultrasonic frequency machining process.*

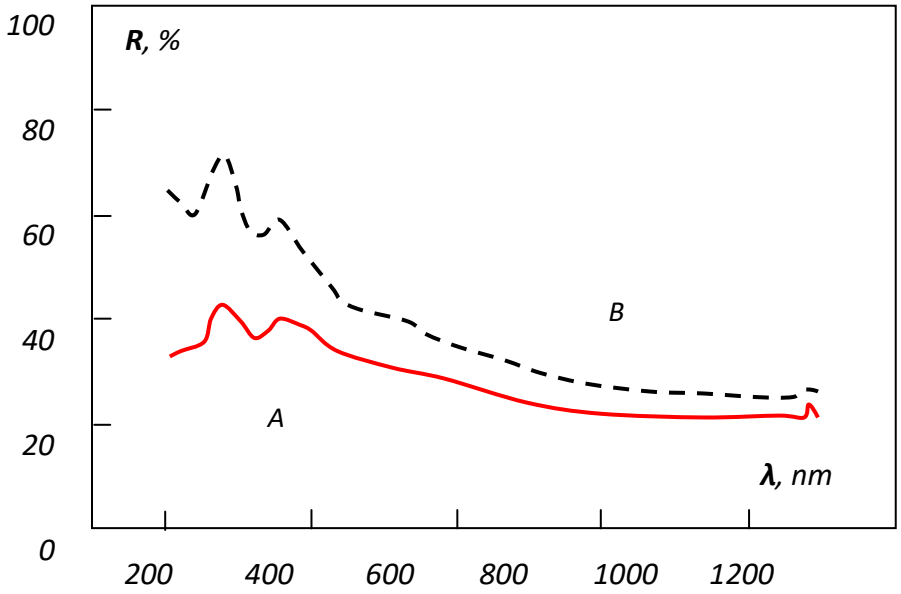


*Figure3. Spectral dependence of the light reflectance coefficient of the surface of silicon wafers before (V) and after (A) ultrasonic frequency machining*

ISSN: 2279-0667 Vol 9, Issue 7-8, July-August 2020, Impact Factor: SJIF 2020 = 7.209

Surface relief changes were studied using compact confocal laser scanning microscopes of the SJ-210, Mitutoyo (Japan) and VK-X100 3-D LSM (Japan) types.As can be seen from Figure 2, the ultrasonic frequency mechanical treatment of the surface resulted in an increase in its overall irregularities.Measurements showed that the quantitative increase in the surface roughness of the crystalline silicon wafers after processing was ≈ 7-9%.It should be noted that the design of a special device for ultrasonic frequency mechanical processing has not yet been sufficiently optimized.Different geometric shapes and strength values can be given to the plate working end of this device. As a result, circular, spiral or wavy machining trajectories can be formed on the surface of the plate.

Measurements of the optical properties of the silicon wards studied before and after processing were performed by a visible and ultraviolet spectrometer device.The results of measuring the spectral dependence of the reflection coefficient on the silicon surface show significant changes in the short-wavelength range of the spectrum when machined.As can be seen from the graph (Fig. 3), the reflection coefficient decreases by almost (26 - 28)% in the area of light wavelength 0.2 - 0.4 μm; In the area of 0.5 - 0.8 μm, it decreases by (10 - 6)%.These data indicate that a texture is formed in the surface structure after appropriate mechanical treatment. By applying additional CARL to such a surface, the return part of the incident light flux is minimized.

a) b)

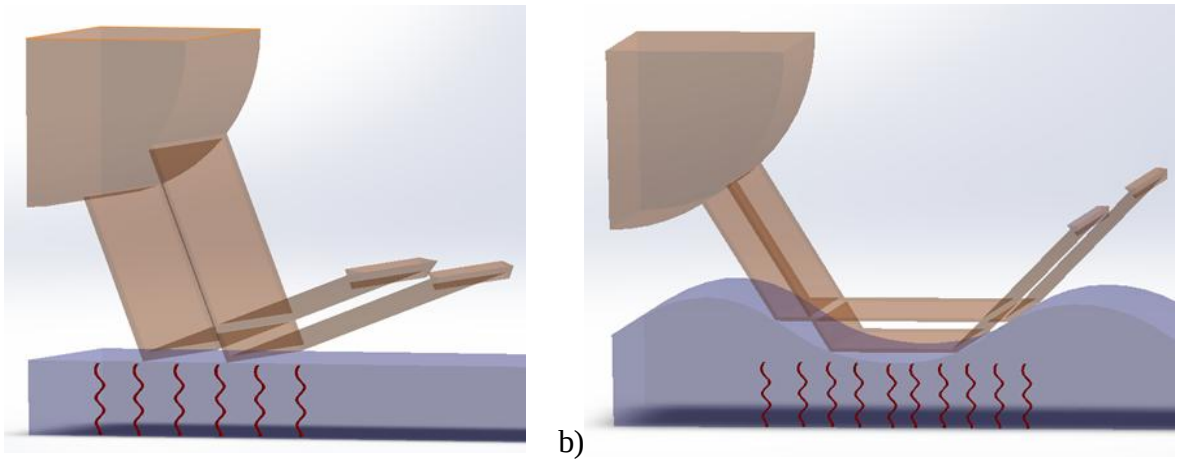

*Figure 4. A simplified schematic representation of the processes of absorption and return of light rays before (a) and after (b) ultrasonic frequency machining on a silicon surface.*

Common methods of texturing the surface of semiconductor wafers include chemical anisotropic, plasma and photolithography, and serial liquid absorption methods[5].

The laser texturing method further reduces the surface irradiance coefficient compared to the conventional anisotropic absorption method.The total surface return is 3% after texture, 5.5% after acidic erosion, and 13.4% after alkaline erosion.

One of the most effective ways to reduce surface losses is to create microreliefs that increase light absorption on the surface [6].The highest results were obtained when the inverted pyramid-shaped textures were formed on the surface.

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In order to texture the silicon surface in the proposed technological method, the surface is mechanically treated with ultrasonic frequency through a spherical working probe of a special device shown in Figure 1.The result is a texture in the form of spherical cylindrical deep channels on the surface. Narrow flat surfaces remain between the channels parallel to the surface (Fig. 4).When light falls on a flat surface, about 30% of the light returns from the surface (Fig. 4, *I*). A comparison of the process of motion and refraction of light in Fig. 4 shows that the texture created by the proposed technological method is effective.

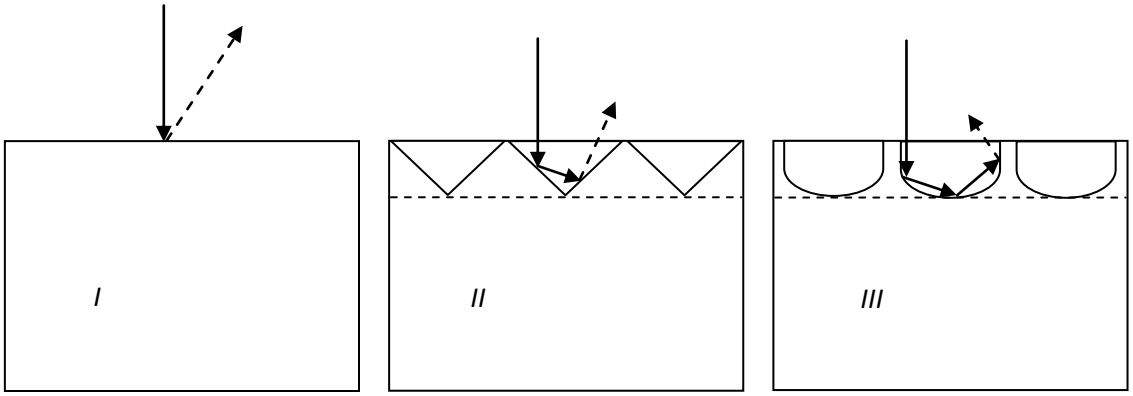


*Figure5. Reflection and refraction of light on a textured silicon surface in the form of flat (I), inverted pyramid (II) and parallel cylindrical channels (III).*

**THEORETICAL PART**

Based on the surface treatment conditions, it is possible to propose a model of the process of light return from a flat and textured surface of silicon as shown in Figure 4.Double refraction of light beam on a textured surface (Fig. 4,b) results in greater absorption of light in a semiconductor silicon volume than in a smooth surface before processing (Fig. 4,a).Furthermore, as shown in [1, 3], the surface texture reduces the depth at which the total current enters the crystal. As a result, more light absorption near the spatial charge area of the *p*-*n*-transition increases the likelihood of photogenic unbalanced charge carriers accumulating before they are lost as a result of recombination. The volumetric lifetime of unbalanced charge carriers is one of the most important criteria determining the quality of a $\tau_v$ semiconductor material and its level of suitability for the manufacture of semiconductor devices. Depending on the chemical composition of the crystal and the processing temperature, its value varies over a wide range in the plates. The lifetime ts of surface charge carriers depends not only on the properties of the material, but also on its dimensions, the condition of the surface, the production technology. The measured lifetime of surface charge carriers using modern chemical treatment methods on the polished surface of the sample can be taken as the lifetime of the charge carriers in the semiconductor volume.. However, ultrasonic frequency machining of the surface of the silicon plate can lead to a change in the life of the charge carriers $\tau_s$ and, consequently, $\tau_{eff}$, while maintaining the initial physical parameters of the plate. Therefore, considering the mechanism of measuring $\tau_{eff}$, it is expedient to study the mechanism of change of the lifetime of non-basic charge carriers in a silicon wafer by mechanical action.

ISSN: 2279-0667 Vol 9, Issue 7-8, July-August 2020, Impact Factor: SJIF 2020 = 7.209

## RESULTS AND DISCUSSION

In addition to the optical properties of a semiconductor material and its surface, it is also important to know the kinetic parameters of the charge carriers that determine the electro physical properties of the material.

The results of measuring the lifetime of pre- and post-machining charge carriers for different silicon wafers are shown in Table 1.It can be seen that the ultrasonic frequency mechanical treatment of the silicon surface leads to a significant change in the lifetime of the photo generative charge carriers. For plates with a thickness of 275 μm, the increase in the life of the charge carriers is almost 54%.Based on these data, it should be noted that surface treatment leads to a change in the lifetime of the charge carriers in the entire sample. To draw a more convincing conclusion, the life of the charge carriers was measured when the plates were illuminated from the back (column 4 of the table), in which case the increase in the life of the charge carriers was almost 15%.Naturally, this change in the lifetime of the charge carriers is due to the large thickness of the plates. If thin plates are selected, a uniform increase in the lifetime of the charge carriers across the size of the Si plates can be expected.

**TABLE 1RESULTS OF MEASURING THE LIFETIME OF THE CHARGE CARRIERS IN THE SILICON WAFER BEFORE AND AFTER PROCESSING**

| Thickness of Si plate (μm) | Lifetime of unbalanced charge carriers (mks) | | |
|---|---|---|---|
| | Beforeprocessing | Afterprocessing | Onthebacksurface |
| 200 | 0.88 | 0.96 | 0.94 |
| 203 | 0.7 | 0.68 | 0.71 |
| 270 | 1.79 | 1.25 | 1.92 |
| 275 | 5.7 | 8.76 | 6.55 |

Given the results of experiments observed by the authors and their suggestions on how to increase the efficiency of the solar cell, it is possible to refer to some new scientific works in the latest scientific literature on the development traditions of photovoltaics.

The local mechanical stress applied to the surface can deform the silicon, partially reducing the distance between the atoms.As a result, deformation can affect the current flowing through the r-p-junction due to changes in surface charge state density, bandwidth, charge carrier life, or diffusion length.A precisely targeted and comprehensive study is required to determine the effect of local mechanical stress on the volumetric charge transfer process of a solar cell.

## CONCLUSION

Thus, the experimental results obtained, the physical model of the stimulation of the light absorption process by ultrasonic frequency mechanical treatment of the plate surface and the measurement results on the positive change in the lifetime of photogenerated charge carriers allow to recommend a new method to increase the efficiency of silicon solar cells.

The development of optimal technical and technological tastes of ultrasonic frequency machining on the surface of silicon plates will be the basis for recommending this new method to the process of industrial production of traditional silicon-based solar cells, or as a method of increasing the efficiency of solar cells.

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ISSN: 2279-0667 Vol 9, Issue 7-8, July-August 2020, Impact Factor: SJIF 2020 = 7.209


TRANS Asian Journal of Marketing Management Research (TAJMMR)

(Double Blind Refereed & Reviewed International Journal)

TRANS Asian Research Journals

DOI: 10.5958/2279-0667.2020.00033.4

# A STUDY ON IDENTIFYING OPINION OF CUSTOMERS REGARDING THE SWITCHING COST OF FINANCIAL SERVICE COMPANIES IN PUNE AND NAGPUR

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## ABSTRACT

*Marketing can contribute to higher cash flow levels by achieving a price premium, creating preference with competitive pricing, cross-selling and up-selling of complementary products and services, achieving lower sales and service costs, and extending resources through co-branding and co-marketing alliances. Marketing can lower risk and volatility of cash flows (and hence improve the firm's cost of capital) in a number of ways. Loyalty-enhancing strategies can increase switching costs and increase customer retention, enhancing the lifetime value (LTV) of the customer. Sales volume can be increased by offering service-based products and consumables in addition to the core product offering. Costs can be lowered by coordinating supply chain activities to ensure greater information sharing, more effective ordering and replenishment, and fewer inventories. This study therefore will focus on providing more detailed understanding about opinion of customers on switching cost of financial service companies in selected areas of Pune and Nagpur. Marketing can lower risk and volatility of cash flows (and hence improve the firm's cost of capital) in a number of ways. Loyalty-enhancing strategies can increase switching costs and increase customer retention, enhancing the lifetime value (LTV) of the customer (Reichheld and Sasser, 1990a).*

**KEYWORDS:** *Customer Satisfaction, Financial Services And Switching Cost*

ISSN: 2279-0667 Vol 9, Issue 7-8, July-August 2020, Impact Factor: SJIF 2020 = 7.209

## INTRODUCTION:

### Financial Services Marketing

Sankaran M (1999) studied the measures that would help domestic players in financial services sector to improve their competitive efficiency, and thereby to reduce the transaction costs. The study found that the specific set of sources of sustainable competitive advantage relevant for financial service industry are :

- Product and process innovations,
- Brand equity,
- Positive influences of 'Communication Goods',
- Corporate culture,
- Experience effects,
- Scale effects, and
- Information technology.

Trevor Watkins (1989) while studying the current state of the financial services industry worldwide identified four major trends:

(1) The trend towards financial conglomeration;

(2) Globalization

(3) Information technology in bank marketing; and New approaches to financial services marketing.

These trends, it was concluded, will affect the marketing of banks and other financial services in the 1990. Marisa Maio Mackay (2001) examined whether differences exist between service and product markets, which warrant different marketing practices by applying ten existing consumer based measures of brand equity to a financial services market.

The results found that most measures were convergent and correlated highly with market share in the predicted direction, where market share was used as an indicator of brand equity. Brand recall and familiarity, however, were found to be the best estimators of brand equity in the financial services market.

(Source: shodhganga.inflibnet.ac.in)

Marketing can lower risk and volatility of cash flows (and hence improve the firm's cost of capital) in a number of ways. Loyalty-enhancing strategies can increase switching costs and increase customer retention, enhancing the lifetime value (LTV) of the customer (Reichheld and Sasser, 1990a). Sales volume can be increased by offering service-based products and consumables in addition to the core product offering (i.e. cross-selling or brand extensions and up-selling). Costs can be lowered by coordinating supply chain activities to ensure greater information sharing, more effective ordering and replenishment, and less inventory (Berger et al. 2002; Hogan et al. 2002). Marketing thus offers a significant contribution to the generation of the firm's cash flows.

The value-creating processes may be further understood in the context of a series of four marketing

ISSN: 2279-0667 Vol 9, Issue 7-8, July-August 2020, Impact Factor: SJIF 2020 = 7.209

tasks. These are value analysis (understanding value issues for the served market(s) in the context of wider society, including customer needs and competitor activity); value provision (offer development); value communication and value delivery or implementation (Bradley 1998).

**Research methodology used in this study**

Researchers have used exploratory research design in the study. A structured questionnaire will be used, and a five point balanced Likert Scale will be used for finding out the major strategies used by the financial service companies in selected areas of Pune and Nagpur region. Since it was difficult for the researcher to capture each and every area of these two cities.

**Pune city:**

Pune city and the twin city Pimpri-Chinchwad are the major cities in the district. Pune city is administered by the Pune Municipal Corporation while Pimpri – Chinch wad is administered by the Pimpri-Chinchwad Municipal Corporation. There are three cantonment areas in the district.

- Pune Cantonment
- Khadki Cantonment
- Dehu Road Cantonment

There are also smaller towns in the district with Nagarpalikas or Municipal Councils. Most of these are the headquarters of or the main town in their respective Taluka.

These are:

- Alandi
- Baramati (also taluka headquarters)
- Bhigwan
- Bhor (also taluka headquarters)
- Chakan
- Daund (also taluka headquarters)
- Indapur
- Jejuri
- Junnar (also taluka headquarters)
- Rajgurunagar (also taluka headquarters)
- Lonavla – Khandala
- Narayangaon
- Nasrapur
- Pirangut
- Saswad (also taluka headquarters)
- Shirur (also taluka headquarters)
- TalegaonDabhade
- Wadgaon
- Walchandnagar
- Uruli Kanchan
- Mulshi

ISSN: 2279-0667 Vol 9, Issue 7-8, July-August 2020, Impact Factor: SJIF 2020 = 7.209

The relentless growth of Pune metropolitan area has led to development of many new townships close to the city such as Magarpatta and Amanora and bigger development at a distance from the city in the mountains such as Lavasa.

(Source:https://en.wikipedia.org/wiki/Pune_district)

**Nagpur city:**

The division of the Nagpur city according to zones is as follows:

- North Nagpur – Koradi Rad, KT Nagar, Sadar, HazariPahad, Godhni, Gorewada and ZingabaiTakli
- South Nagpur – Besa, hanuman nagar, Manewada, Sakkardara, Somalwada, Trimurti nagar, Pratapnagar, Narendra nagar, Chinchbhavan
- East Nagpur - Nandanwan, Pardi, Surya nagar, Wardhamannagar
- West Nagpur – Bajaj nagar, Laxminagar, Dharampeth, Ravi nagar, Shivajinagar, Amravati road, Jaitala, Swavalambinagar, Hingna road
- Central Nagpur – CA Road, Civil lines, Dhantoli, Mahal, Ramdaspeth, Sitabuildi.

**Selected areas for study as per convinence:**

**Pune city:**

Alandi, Jejuri, Narayangaon, Wadgaon, Uruli Kanchan, Mulshi, Lavasa.

**Nagpur city:**

Sadar, Trimurti nagar, Pratapnagar, Narendra nagar, Nandanwan, Bajaj nagar, Laxminagar, Dharampeth, Civil lines, Dhantoli, ,Ramdaspeth, Sitabuildi.

**Universe of the study:**

**The universe of this study consists of all the financial service companies in Pune and Nagpur region.**

Financial services are those services which helps people in management of their finance related problems in a well-organized manner and therefore eliminating the worry of people regarding their money. Given below are the various types of financial services which one can expect getting from financial institutions. For this study only banking, insurance and Mutual funds are taken into consideration.

1. **Banking** – Under this an individual can deposit his or her money and can get return in the form of interest and also borrowers can get loan by paying interest to bank periodically.
2. **Insurance** – By using this one can get peace of mind as one can buy insurance policies like life insurance, fire, marine, health and general insurance which ensures that person in the event of any mishap can get his or her money back from insurance company.
3. **Mutual Funds** – These funds track asset class and generate returns accordingly so a debt fund will track returns of debt and money market, an equity mutual fund would give returns according to performance of stock market and so on.

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**(Source:http://www.letslearnfinance.com/types-of-financial-services.html)**

**Sample element:**

Middle level- Branch Manager

First level – Agents who are the personal financial advisors for people dealing in Stock broking, Mutual funds, Insurance and other financial services

Third level- Customers

**Sample size:**

| | Branch Manager of Banks | Advisors | 10 Contacts /customers of these agents each |
|---|---|---|---|
| Nagpur | 20 | 20 | 100 |
| Pune | 20 | 20 | 100 |
| **Total** | **40** | **40** | **200** |

**Selection of Sample element:**

**A) Branch Managers:**

The managers from four leading banks were considered.

B) **Advisors:**

The references of the advisors have been generated randomly from the customers entering in the banks. In totality 4 advisors from each city were selected i.e. 2*4 = 8 in all.

C) **Customers:**

Randomly the customers were selected from the banks as well as their references.

**Total cities** **=2**

| | | |
|---|---|---|
| **Branch Managers** | = 20*2 | =40 |
| **Advisors** | =20*2 | =40 |
| **Customers** | =100*2 | =200 |

**Total Number of respondents = 280 (40+40+200)**
**Actual Data Collection:**

The questionnaire was distributed to nearly 180 respondents and the properly filled 142 questionnaire. In all 38 questionnaire were rejected since they were either incomplete or not properly filled up.

**List of top 10 financial services companies in India**

Find below a comprehensive list of top financial services companies in India.

- SBI Capital Markets Limited
- Bajaj Capital Limited
- DSP Merrill Lynch Limited
- Birla Global Finance Limited

- Housing Development Finance Corporation
- PNB Housing Finance Limited
- ICICI Group
- LIC Finance Limited
- L & T Finance Limited
- Karvy Group

(Source: https://business.mapsofindia.com/finance/top-10-financial-services-companies-in-india.html)

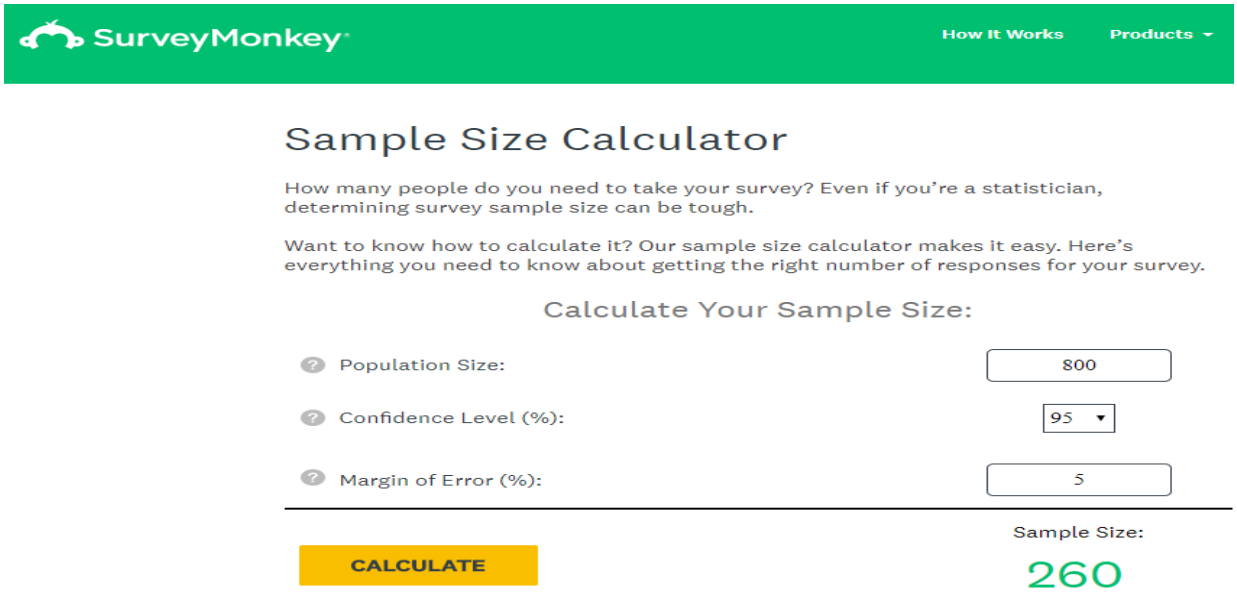
**Sampling technique:** Cluster Random Sampling

In this technique, the total population is divided into these groups (or clusters) and a simple random sample of the groups is selected. Then the required information is collected from a simple random sample of the elements within each selected group.

**Statistical tools and techniques:**The data collected from consumer survey and industry survey will be tabulated category wise and following statistical tools will be used. ANOVA, Cranach's Alpha, correlation, frequency distribution etc.

**Sample Size:**

If we include respondents from banks and advisors it may consists of 800 so the total population is considered as 800




(Source: https://www.surveymonkey.com/mp/sample-size-calculator/)

**According to Morgan's table:**

**Required Sample Size†**

| Population Size | Confidence = 95% Margin of Error | | | | Confidence = 99% Margin of Error | | | |
|---|---|---|---|---|---|---|---|---|
| | 5.0% | 3.5% | 2.5% | 1.0% | 5.0% | 3.5% | 2.5% | 1.0% |
| 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| 20 | 19 | 20 | 20 | 20 | 19 | 20 | 20 | 20 |
| 30 | 28 | 29 | 29 | 30 | 29 | 29 | 30 | 30 |
| 50 | 44 | 47 | 48 | 50 | 47 | 48 | 49 | 50 |
| 75 | 63 | 69 | 72 | 74 | 67 | 71 | 73 | 75 |
| 100 | 80 | 89 | 94 | 99 | 87 | 93 | 96 | 99 |
| 150 | 108 | 126 | 137 | 148 | 122 | 135 | 142 | 149 |
| 200 | 132 | 160 | 177 | 196 | 154 | 174 | 186 | 198 |
| 250 | 152 | 190 | 215 | 244 | 182 | 211 | 229 | 246 |
| 300 | 169 | 217 | 251 | 291 | 207 | 246 | 270 | 295 |
| 400 | 196 | 265 | 318 | 384 | 250 | 309 | 348 | 391 |
| 500 | 217 | 306 | 377 | 475 | 285 | 365 | 421 | 485 |
| 600 | 234 | 340 | 432 | 565 | 315 | 416 | 490 | 579 |
| 700 | 248 | 370 | 481 | 653 | 341 | 462 | 554 | 672 |
| 800 | 260 | 396 | 526 | 739 | 363 | 503 | 615 | 763 |
| 1,000 | 278 | 440 | 606 | 906 | 399 | 575 | 727 | 943 |
| 1,200 | 291 | 474 | 674 | 1067 | 427 | 636 | 827 | 1119 |
| 1,500 | 306 | 515 | 759 | 1297 | 460 | 712 | 959 | 1376 |
| 2,000 | 322 | 563 | 869 | 1655 | 498 | 808 | 1141 | 1785 |
| 2,500 | 333 | 597 | 952 | 1984 | 524 | 879 | 1288 | 2173 |
| 3,500 | 346 | 641 | 1068 | 2565 | 558 | 977 | 1510 | 2890 |
| 5,000 | 357 | 678 | 1176 | 3288 | 586 | 1066 | 1734 | 3842 |
| 7,500 | 365 | 710 | 1275 | 4211 | 610 | 1147 | 1960 | 5165 |
| 10,000 | 370 | 727 | 1332 | 4899 | 622 | 1193 | 2098 | 6239 |
| 25,000 | 378 | 760 | 1448 | 6939 | 646 | 1285 | 2399 | 9972 |
| 50,000 | 381 | 772 | 1491 | 8056 | 655 | 1318 | 2520 | 12455 |
| 75,000 | 382 | 776 | 1506 | 8514 | 658 | 1330 | 2563 | 13583 |
| 100,000 | 383 | 778 | 1513 | 8762 | 659 | 1336 | 2585 | 14227 |
| 250,000 | 384 | 782 | 1527 | 9248 | 662 | 1347 | 2626 | 15555 |

According to Morgen's table for the population of 800 and above we should have a sample size of 260 at 95% confidence interval with 5% of margin of error.

**Data Analysis**

Since this is a quantitative research, statistical tools were the main instruments used for analyzing the data collected during primary research. Special statistical software, SPSS was used to organize and interpret the data.

**Test of hypothesis:**

**$H_{01}$: There is no relationship between the level of perceived switching costs, and the level of customer retention.**

This hypothesis is tested with the help of paired-samples t-test.

The dependent t-test (called the paired-samples t-test in SPSS Statistics) compares the means between two related groups on the same continuous, dependent variable.

(https://statistics.laerd.com/spss-tutorials/dependent-t-test-using-spss-statistics.php)

Dependent variable switching cost **can be measured from the responses gathered on the following statements on 5 point Likert scale (Strongly agree, agree, undecided, disagree, and strongly disagree)**

In general switching to a new financial service company would be a hassle for me, It would cost me a lot of money to switch from my financial service company to another, It would not take me more time to switch from my financial service company to another, It would not make me more effort to switch from my financial service company to another, I feel Internet Banking is more advanced in my financial service company since it uses modern technology, I am satisfied with

ISSN: 2279-0667 Vol 9, Issue 7-8, July-August 2020, Impact Factor: SJIF 2020 = 7.209

the available accessibility in my financial service company for Internet Banking products, I feel the benefits are high in Internet Banking Services in the present financial service company set up, In general service qualities are more standard in my financial service company, I feel the availability of advance security features are more in present financial service company environment, It is not risky to change from my financial service company to another since it may provide me good Internet Banking service

Dependent variable customer retention **can be measured from the responses gathered on the following statements on 5 point Likert scale (Strongly agree, agree, undecided, disagree, and strongly disagree)**

Financial service companies apply more technology to meet customer needs, I feel speedy access helps to retain more customers, Financial Service Company's availability of services how is the customer growth, My service charges are very low when dealing with Internet Banking applications, The Financial service companies always introduce competitive products to customers, Financial service company's value added features may gain more customers, The Financial services company provides up to date service, I always trust my Financial service company when it comes to personal information, Financial service company always gives priority to security issues, The Financial service company always trusts their customers on transactions

**Paired Sample Statistics Table**

The first table, titled **Paired Samples Statistics**, is where SPSS Statistics has generated descriptive statistics for your variables.

| **Paired Samples Statistics** | | | | | |
|---|---|---|---|---|---|
| | | Mean | N | Std. Deviation | Std. Error Mean |
| Pair 1 | Switching cost | 4.26 | 280 | 2.772 | .103 |
| | Customer Retention | 4.64 | 280 | 2.539 | .095 |

**Paired Samples Test Table**

The **Paired Samples Test** table is where the results of the dependent t-test are presented. The information refers to the **differences** between the two variables (the subtitle reads "Paired Differences"). As such, the columns of the table labelled "**Mean**", "**Std. Deviation**", "**Std. Error Mean**" and "**95% Confidence Interval of the Difference**" refer to the mean difference between the two variables and the standard deviation, standard error and 95% confidence interval of this mean difference, respectively. The last three columns express the results of the dependent t-test, namely the *t*-value ("**t**"), the degrees of freedom ("**df**") and the significance level ("**Sig. (2-tailed)**").

| **Paired Samples Test** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Paired Differences | | | | | t | df | Sig. (2-tailed) |
| | | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | | | | |
| | | | | | Lower | Upper | | | |
| Pair 1 | Switching cost - Customer Retention | -.381 | 3.706 | .138 | -.652 | -.110 | -2.757 | 279 | .006 |

**Reporting the Output of the Dependent T-Test**

You might report the statistics in the following format: *t*(degrees of freedom) = *t*-value, *p* = significance level. In our case this would be: *t*(279) = -2.757, *p* < 0.0005. Due to the means of the two variables and the direction of the *t*-value, we can conclude that there was a statistically relationship between the level of perceived switching costs, and the level of customer retention.

Hence we can reject the null hypothesis and accept the alternate hypothesis $H_{A1}$: The higher the level of perceived switching costs, the higher the level of customer retention.

**CONCLUSION:**

In order to build an organizational capability, managers are required to contemplate which benefits can be carried to customers through three customer value extents through the firm's assets and how this can be assisted by developing joint customer education and decision-making procedures. The importance here is on procedures that are advantageous to complete, customer-related decision-making. This is a vital input to evidence because it is now known that it is significant for firms to establish their people and resource savings to ease these vital customer value-related knowledge and decision-making procedures. In other words, the firm's association and its competence to device its customer value delivery strategy may depend in part on how well the firm is able to make and bring aids that accomplish customers' significances in a use condition.

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TAJMMR

ISSN: 2279-0667 Vol 9, Issue 7-8, July-August 2020, Impact Factor: SJIF 2020 = 7.209


TRANS Asian Journal of Marketing Management Research (TAJMMR)

(Double Blind Refereed & Reviewed International Journal)

TRANS Asian Research Journals

DOI: 10.5958/2279-0667.2020.00031.0

# FEATURES OF CREATING THE IMAGE OF THE TERRITORY IN INCREASING THE INVESTMENT POWER OF NAVOI REGION

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## ABSTRACT

*The article explores the scientific and theoretical aspects of creating the image of the region in increasing the investment attractiveness of the regions. Approaches to assessing the investment image of the region are systematized. Based on the results of the analysis of investment policy of Navoi region, an organizational mechanism has been proposed to create a positive investment image. Scientific proposals and practical recommendations for the formation of the investment image of Navoi region and the use of marketing technologies in it have been developed.*

**KEYWORDS:** *Marketing, Territory, Image, Marketing Strategy, Investment Attractiveness, Infrastructure, Industrial Potential, Industrial Potential, Promotion.*

## INTRODUCTION

Investment is one of the most important factors in the socio-economic development of the country. Their scale, composition, and effectiveness determine the state, prospects, and competitiveness of the national economy in essence.

In the world practice, in the conditions of innovative development of market participants, the investment image remains the most important source of sustainable development of regional economies. The investment attractiveness of the region is the basis for the formation of the investment image, which is characterized by the following objective factors: the investment climate, infrastructure and investment potential of the region. Subjective factors influencing the formation of the investment image include: socio-economic development of the region, its regulatory tools and investment risks, participation of the business environment in socially important events, charitable sponsorship, intellectual and scientific potential. Investment

attractiveness and image together reflect the comprehensive (quantitative and qualitative) assessment of the region.

The formation of the investment image of the region is also important for government agencies, businesses, investors and the public. However, the existing inconsistencies in the solution of organizational, economic, legal, information and communication problems between the authorities and regional administrations hinder the formation of a positive investment image of the region, investment, labor and other internal and external influences to create a competitive advantage. Requires the study of the scientific and theoretical aspect of solving a problem, such as the creation of a unique image in different regions.

An analysis of foreign and domestic research sources in the field of regional marketing shows that issues related to the concept of shaping the investment image of the region have not been sufficiently studied at present. There are also no comprehensive methodological approaches that allow the investor to obtain sufficient information about the investment status of the region.

Research in Uzbekistan also does not study the concept of creating an investment image and its concepts as a key component of regional marketing. Navoi region is one of the most developed "attracting investors" in the country. In this regard, Navoi region with its huge economic potential is important in the country. The relevance of this study is determined by the possibility of increasing the attractiveness of investors by creating an investment image in Navoi region.

**LITERATURE REVIEW**

The scientific and theoretical aspects of creating a "regional image" in regional marketing theories are based on a number of factors, including: MV Yakovlev [1], Vajenina I.S. [2], Vizgalov D. [3], Barnes JG [4], Belyakov S.A. [5], Vajenina I.S. [6].

In the theory of regional marketing by AP Pankrukhin considers the image of the country as a reflection of the investment status of the region, that is, "donor" or "recipient" [7]. E.Z. Yashina suggests that the "image of the region" should be considered as a tool of strategic importance in the socio-economic development of the region, with an emphasis on the positive view of the object by the subject [8].

The image of the area is understood to be the recognition of the area by the public. A purposefully formed image is seen as a force for working with the public. A generalized classification of technologies for shaping the image of the region using different marketing technologies was developed by Kalieva and A.P. Systematized by pancreas. [9]Research by P.R. Katarina suggests a 4-category model of creating and promoting a country's image. [10] But? In this study, the image creation was studied in terms of increasing the prestige of goods and services for the country in international markets, and insufficient attention was paid to the areas aimed at attracting investors. S.M. Shevchuk, V.V. A study by Dobrianska et al. [11] explored different features of regional image formation in Ukraine and Poland and identified differences in investment attractiveness. From these studies, the image of the region was seen as a means of gaining a competitive advantage. Theories of regional image dependence on resource creation and export opportunities have been studied in studies by scholars such as Qin Suna and Paswan

Audhesh [12]. This prohibition is based on the fact that marketing is the most important factor in creating the image of the region.

The importance of marketing in attracting foreign investment and the scientific and theoretical basis for creating a regional image have been studied by Wells, Louis T. This study discusses the role and place of regional marketing agencies in attracting foreign investment, the scientific and theoretical aspects of their management. [13] The connections between marketing technologies and the life cycle of the regions in the formation of the image of the region are studied in the research of M. Bacherikova. The study developed a marketing concept for creating an investment image of the region based on the analysis of about 350 scientific articles published on the image of the region in 2014-2016. [14] Scientific, methodological and practical aspects of the formation of the image of the region, aimed at ensuring investment attractiveness, are widely studied in the research of Yu.I. Firsov [15]. This study identifies the role of regional authorities and governance structures in the image-making process.

In general, the investment image of the region is a set of opinions about the investment climate and potential of the region among investors, which facilitates the arrival of new investors, increases the volume of investments of existing investors, prevents the outflow of existing investors. Analysis of foreign and domestic research sources in the field of regional marketing shows that the field of defining the essence of the concept of investment image as a key component of regional marketing is almost not studied. These situations require the development of theoretical foundations and practical recommendations for the formation and evaluation of the investment image of the region.

## RESEARCH METHODOLOGY

It allows to highlight the main elements of the three-tier system in creating an image aimed at increasing the investment attractiveness of the region.

The first level is the state of the investment market, the formation of supply and demand for it, the availability of its subjects and facilities, financial, labor and production resources, as well as the formation of the investment image of the region.

The second level is determined by the investment attractiveness of the region, which consists of the investment environment, investment potential, investment sources, priorities and risks. Investment attractiveness is characterized in terms of socio-economic, infrastructural and geographical factors, which are determined by the specific image of the territory and the specific form of economic development. In this regard, the attractiveness of the region in the field of investment is closely linked with the ongoing investment policy, ie the first level of its system.

The main element of the third level is to identify the organizational, economic, political and socio-economic conditions that affect the creation of the investment image of the region. The assessment and acceptance of the area by the investor to make investments is an important factor in investment development.

Based on the above, the qualitative image of the region is assessed at the initial stage of the development of the image of the region, after which the quantitative indicators are analyzed, which are described as follows:

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1. Level of infrastructure of the region;
2. Indicators of economic development of the region;
3. Competitiveness of the region in terms of growth and production;
4. The structure of industrial production;
5. The level of utilization of the industrial potential of the region;

The state of investment attractiveness of the region is determined by the following indicators: the state of investment attractiveness of the region (assessment indicators); preferences, conditions and requirements of investors; the mechanism of interaction between the state, business and the public. In the scientific literature, regional image evaluation models from a consumer perspective are common. Including, M. Fishbein [16] suggests that in assessing the image of a region, the relationship to an object should be determined by the sum of the differences between consumer perceptions relative to the estimated values of the attributes of that object. M. Fishbein's multi-factor model has advantages and disadvantages. The advantage of Fishbein's multifactor model is its simplicity, while the disadvantage is that it can only be used to compare consumer attitudes toward multiple objects. R.D. Blackwell proposes a multi-attribute "Ideal Point" model in defining a regional image. Its main advantage is the ability to use a single object to assess its compatibility with the ideal image, and the main disadvantages of the model are the difficulty of adapting it for use for different groups of consumers.

It is advisable to assess the image of the area, taking into account the specific factors for residents and non-residents. The first research in this regard Á. Conducted by Herrero [17], he developed regional image assessment indicators for non-residents. The main indicators are investor loyalty to the region; quality felt in the region; regional awareness; used the image of the whole country.

In view of the above, it is expedient to define the "investment image" on the basis of a complex system of indicators, which includes factors related to a particular image of the region, such as investment attractiveness (system of indicators), preferences, requirements for investors and conditions.

## ANALYSIS AND RESULTS

The results of the investment policy implemented in Navoi region in 2010-2018 allowed to increase its volume by 11.5 times (6.7 times the national rate) and 10.3 times per capita (6.4 times the national rate) (Figure 1). .

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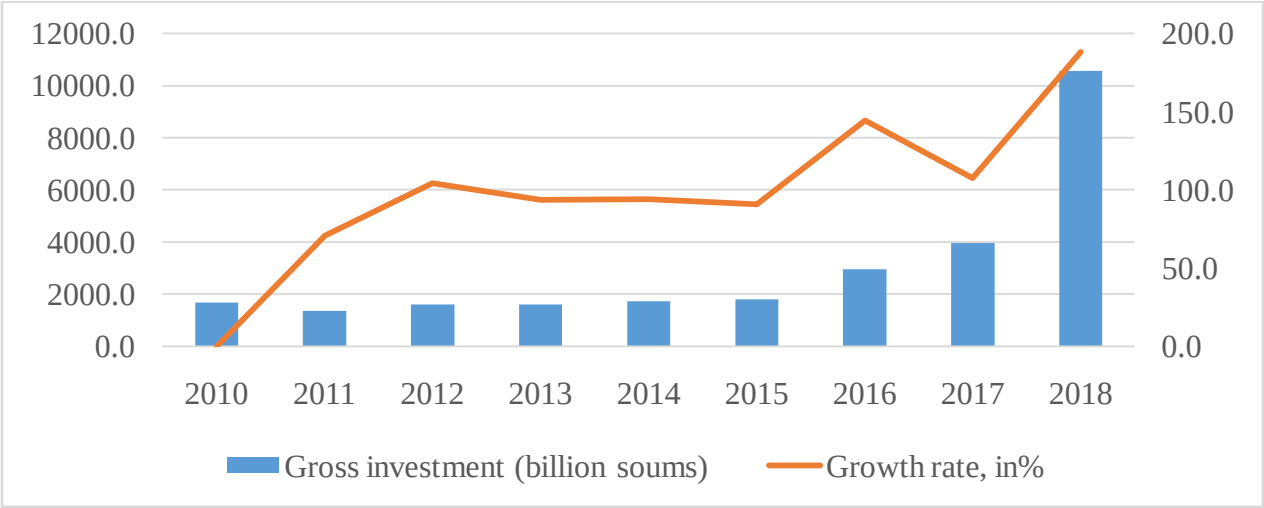


**Figure 1. Growth of investments in fixed assets in Navoi region, in percent**

Despite the rapid growth of gross investment in the region, the growth of industrial potential and loans in the region from 2012 to 2018 showed a downward trend, while in 2019, about 38.8% of the 17,775.3 billion soums attracted foreign investment. (Figure 2)

f the total volume of investments in fixed assets in the region in 2019, 16 164.7 billion soumsor 90.9% to the manufacturing sector, 1,610.6 billion soums or 9.1% were directed to non-manufacturing sectors.


**Figure 2. Share of foreign investments in fixed capital investments,%**

A complete view of the formation of the investment image of the region in question are the areas of image enhancement, ie: social, economic, political process, strategies that contribute to a positive impression of the target audience, ie the investor on the region [18].Based on this situation, the attractive features of the region for the investor are reflected in the following: economic, legal, financial condition of the region, infrastructure, quality of relations with partners and management.

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The marketing potential of the region is an important indicator in the formation of the image of the region. These characteristics include the official characteristics of the region, the brand of the region, the brand's reputation, and so on. The results of targeted programs to develop a strategy for the formation of investment image in Navoi region is a strategic direction of attracting foreign investors. Its implementation requires the formation of regional marketing strategies. The marketing potential of Navoi region does not adequately meet the requirements of active investment and management of investment activities. In order to prevent or neutralize the negative impact on the socio-economic development of the region, it is necessary to accelerate the work on creating a system of management of marketing potential of the region on the basis of the formation of a set of leading indicators. This requires a more accurate forecast of the dynamics of indicators that characterize the results of marketing processes. The transition from a regional system to process-oriented marketing management includes: identifying processes, documenting them, and identifying sequences and interactions.

The concentration of the impact of the image of the region on the growth of investment potential of the regions should be considered as an important component of the regional marketing complex. Their efforts should be aimed not only at creating an image for investors in regulating the strategic development of the regions, but also at improving the quality of life of the population of the region. The main process of its implementation is:

**1.** Analysis and assessment of material and intangible resources and investment potential of the regions

**2.** Identify and select regional development strategies

**3.** Development of regional marketing strategies and strategies identify the area

**4.** Develop a regional branding strategy

**5.** Development and approval of plans and budgets for the development of populated areas, activation of business efficiency and investment component, increasing the tourist attractiveness of the regions, effective and targeted work of government agencies.

A mechanism that allows to assess the completeness and scale of the actions required to create a positive investment image of the region is recommended according to Figure 3. There are two main directions: geographical and thematic image creation. The proposed system of creating a regional image is called a regional image platform.

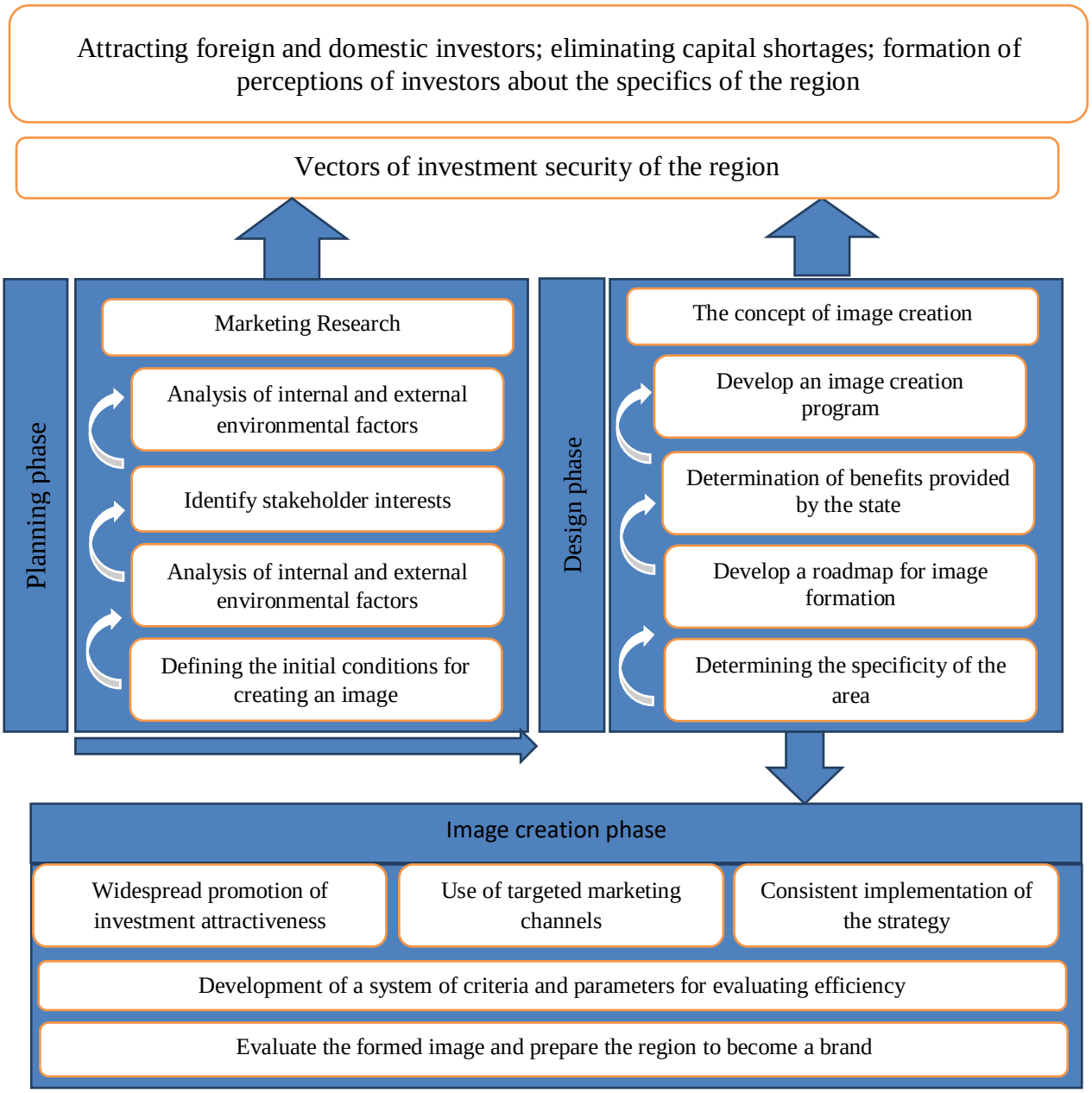


**Figure 3. Organizational mechanism that allows you to create a positive investment image of Navoi region**

In the first stage of investment image formation, marketing research is conducted. Based on the results of marketing research and the collected data, it is planned to identify problems in the formation of the investment image of the region. It should be borne in mind that the study of competitors may change the ongoing project to shape the image of the region.

The next stage consists of activities that include project development and approval. At this stage, a project for the formation of the image of the region will be developed and a road map

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will be determined on a technical basis. Government decisions developed and adopted on the implementation of the project should include and serve as a basis for its implementation and monitoring system.

The final stage is the development of measures for socio-economic development of the region and investment attraction, analysis and evaluation of the effectiveness of the project. It also involves reviewing and identifying the causes of problematic situations, determining the impact of the investments being made on the development of the region, and taking appropriate action. To do this, the source of data needed for evaluation and analysis, the expediency of the plans, and their results are compared.

## CONCLUSIONS AND RECOMMENDATIONS

The main purpose of investment marketing is to form the necessary market information on the object of investment, to ensure competitiveness in the market on the basis of targeted use of capital to ensure economic and social efficiency.

In accordance with the international strategic directions for attracting investments in Navoi region, an investment program for 2019-2020 has been identified. The main growth points in the strategic program document include 511 investment projects worth 26.3 trillion soums. The projects implemented under this program will further enhance the image of the region. In our opinion, special attention should be paid to the "image-building strategy" in the programs adopted in the region.

The main priorities of the image strategy aimed at increasing the investment attractiveness of Navoi region are: the advantage of the region's resource potential over other regions, the recognition of Navoi as a "free economic zone", rich natural climatic conditions and others.

In these cases, it is expedient to develop and approve normative documents on the implementation of ideology, such as investment, marketing, image and innovation in the practical processes to ensure the innovative development of the region.

Based on the above, the following should be done to form the investment image of Navoi region and the effective use of marketing communications:

- Organization of the department of investment, innovation, brand, regional image on the official website of the regional administration and posting information on it;

- development and introduction of printed and electronic information materials reflecting the existing image of the region;

- Organization of special shows, programs, promotions and competitions on investment projects;

- Promotion of the image potential of the region at the national and international levels;

- Development of measures aimed at promoting the image of the region in international and regional events;

-providing information assistance to investment project initiators and business entities;

- to inform the general public through the mass media about the work being done and being carried out in the implementation of investment activities;

- Within the framework of the above tasks, the marketing strategy of Navoi region is aimed at innovative development, it is expedient to prepare a special draft resolution and submit it for approval.

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ISSN: 2279-0667 Vol 9, Issue 7-8, July-August 2020, Impact Factor: SJIF 2020 = 7.209


TRANS Asian Journal of Marketing Management Research (TAJMMR)

(Double Blind Refereed & Reviewed International Journal)

TRANS Asian Research Journals

DOI: 10.5958/2279-0667.2020.00034.6

# THE ROLE OF CORPORATE GOVERNANCE IN THE DEVELOPMENT OF ECONOMY

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## ABSTRACT

*This paper will try to review the relationship between the best practice of corporate governance and the development of economy. The literature part of the paper includes different studies from different countries and also will try to illustrate any research considering Uzbekistan as an emerging economy. It is evident that there is positive effect of corporate governance to the development of country`s economic wellbeing. To support the literature there are normative documents mentioned in the case of Uzbekistan.*

**KEYWORDS:** *Corporate Governance, Legislations, CSR (Corporate Social Responsibility), Auditing, Financial Report, Accounting Standards, Code Of Corporate Governance, Uzbekistan*

## INTRODUCTION

### 1. UNDERSTANDING OF CORPORATE GOVERNANCE

A core activity of any business for development and growth is how much they are able to attract funding from investors. As for investors, they must make sure for the soundness and health state of the businesses in order to carry on with investment. The future state of businesses also important to gain the trust and confidence of the investors. Generally, the information flow is carried out via published annual reports by companies. So do the information release of the future activities of companies. However, the world has seen a few instances where annual report promises high returns and bright future but actual business operations collapsed. In similar cases not only shareholders as investors lose their wealth but also employees lose their job, pension schemes, suppliers of goods and services get effected, and also local communities. Because company papers and reports carried out by auditors, complying with appropriate accounting

standards which help to open up true and fair view on the companies. After few drastic collapses of large organizations in the world, and some of which due to accounting fraud,interestto learn the corporate governance practices has risen more.

The collapse of the large corporations such as WolrdCom, Enron, Parmalat, HIH, Maxwell Communications not only caused big scandals but also forced governments to adopt new laws and regulations. For example, USA based Enron and WorlCom demise was caused by internal fraudulent activities and led to the largest bankruptcy in history and also led to the enactment of Sarbanex-Oxley Act 2002. Likewise, in the UK,Sir Adrian Cadbury developed Cadbury Report 1992 and OECD Principles of Corporate Governance in Europe 1999.

Defining corporate governance becomes bit tricky as subject is linked to the development of companies from various aspects such as financial aspect, behavioral aspects, normative aspects - protecting the shareholders. Shleifer and Vishny (1997) carried out research and stated that "Corporate governance deals with the ways in which suppliers of finance to corporations assure themselves of getting a return on their investment." By the definition above it can be seen that corporate governance has to deal with protection of the rights of the shareholders, creditors rights, the issues of directorship, and most importantly addressing to increase investors' confidence.

However, Sir Adrian Cadbury as a head of the Committee on the Financial Aspects of Corporate Governance in the United Kingdom gives more attention to the separation of ownership and states that "Corporate governance is the system by which companies are directed and controlled" (Cadbury Committee 1992, introduction).

OECD Principles of Corporate Governance, defines as follows and states that "Good corporate governance helps to build an environment of trust, transparency and accountability necessary for fostering long-term investment, financial stability and business integrity, thereby supporting stronger growth and more inclusive societies". It can be seen that OECD definition tries cover all the aspects of the business such as shareholders, stakeholders and also covering CSR (Corporate Social Responsibility) matters.

So, the definitions above do concern the corporations, investors, employees, shareholders and stakeholders and so there is no single explanation and definition of corporate governance. And all the definitions given regarding corporate governance is to protect and develop corporations and its surroundings and lead to development and wellbeing.

## 2. CORPORATE GOVERNANCE AND ECONOMIC GROWTH

As has been mentioned above, large organizational demises and world financial crises, all have served/serve as recognition and lead to comprehensive understanding that best corporate governance practices effect economic wellbeing. Especially, the crises might improve the immune system of the global economy as employment, consumer spending, pensions, the finances of national and local governments face difficulties and therefore well practiced corporate governance structure help to restore balance and retain more confidence in investors behavior.

StijnClaessens and BurcinYurtoglu of International Finance Corporation (IFC) of The World Bank Group have revised academic researches and studies on how corporate governance can influence economic development and wellbeing. The publication is called Focus 10 – Corporate Governance and Development – An Update and state their reasons why and how corporate governance can influence economic development.

First, corporate governance also has a great importance in the private companies as many government owned activities becoming privatized and moving towards public markets worldwide from market based private investments. And so corporate governance issues are crucial and there has been many academics works carried out in regards.

Second, IT and IS are serving as advancements and also effecting all the businesses and so the markets get great benefit. Technological advancements enable markets change and become complicated financial markets. When complicated financial systems, it becomes challenging to deliver more transparent and clear financial statements to investors. This is very important aspect of corporate governance as organizations should be clear and transparent.

Third, institutional investors, such as large pension funds, insurance companies, and mutual funds, hedge funds, and others more agents have become intermediaries (part of the system) which creates multiple steps between the investors and the final user of that investor's capital. This increases the degree of asymmetric information and agency problems and makes corporate governance at each step between the firm and its final investor even more important.

Fourth, due to rapid advancements and changes in the financial regulations locally and globally there has been Corporate Social Responsibility and stakeholders' issues more challenge to corporate governance.

Djankov et.al. 2008 in their study analyzed that financial and capital markets are more developed in countries where stronger protection of property rights are practices linking the law to protect creditors and shareholders' rights. In its turn, this leads to development in banking and capital markets. It shows that the better the creditor rights are defined, the more willing the lenders are to extend financing. This relationship holds across countries and over time, in that countries that improved their creditor rights saw an increase in financial development (Djankov et al. 2008b).

There is a positive connection between the better management practices within corporations and corporate governance, effecting overall development in the economy. Where there is better operational performance there is better resource allocation and obviously better management. In its turn best corporate governance practices can help to improve company performance by monitoring asset allocation, improving labor protection policies and so on. (Claessens et al. 2002)

At times of strong financial crises, it is found that genuine corporate governance practices also has a positive effect uncovering the financial and operational conditions of the organizations to outer world.

Study of listed companies from Korea, Malaysia, Thailand, Indonesia and PhilippinesbyMitton (2002), has shown that financial performance weas better in companies with more clear

accounting disclosure and transparency. Hence, it can be said that it is the application of genuine corporate governance practices which helped to explain the situation during financial crises to outside world.

One of the important points which is addressed by corporate governance is CSR (Corporate Social Responsibility) as mentioned above. It will help to maintain better relationship with local governments, stakeholders, labor and maintain positive social relationships.

## 3. CORPORATE GOVERNANCE IN THE CONTEXT OF UZBEKISTAN

As a rapidly developing economies, Republic of Uzbekistan also paying more attention to better practices of corporate governance. For the past decade there has been several academic studies been carried out to outline the development of corporate governance in the country. The emergence of corporate governance has begun with relative normative legislations. By law, in order to establish firm corporate governance preciouses and relations Uzbekistan has enacted law and regulations such as:

Law on Joint-Stock Companies and Protection of Shareholders‟ Rights‟ (enacted in 1996, revised in 2014);

- Law on Limited and Additional Liability Companies (enacted in 2001, last amended in 2014);
- Law on Business Partnerships (2001, last amended in 2014);
- Law on Securities Market (enacted in 2008, last amended in 2014);
- Law on Accounting (enacted in 1996, last amended in 2014);
- Law on Auditing Activity (revised in 2000, last amended in 2014);

Later in 2015, more measures have been taken and came about The Decree of the President of Uzbekistan “On measures for the introduction of modern methods of corporate governance in joint stock companies” dated April 24, and the Resolution “On additional measures to attract foreign investors in joint-stock companies” dated December 21.

These arrangements became necessarily significant step to improve corporate governance in the country.

As many studies showed above, the main purpose of the adoption of the changes and challenges are to help the local business entities to become more attractive and to create favorable conditions to foreign investment and investors. As a help the German model of corporate governance has been taking as a role model and together with German company Indecent Consulting Code of Corporate governance for Uzbekistan was approved and adopted.

During the conference on "The Code of Corporate Governance is an effective tool for the introduction of the corporate governance standards" held on February 2016 in Tashkent, international financial institutions such as the World Bank, Asian Development Bank, International Finance Corporation, the United Nations Development Programme representatives came to conclusion that the best international practices adapted for use in the Joint Stock Companies of Uzbekistan, and its successful implementation will contribute to the application and further advancement of the basic principles of corporate management in companies and

firms ensuring transparency of activity of JSC and JV, the protection of rights and legitimate interests of shareholders. (The Permanent Mission of the Republic of Uzbekistan to the United Nations, 2016)

To this day, there have been many significant changes in normative applications as well as operational activities of businesses in Uzbekistan. Development and advancement in Auditing and Accounting aspects led the organizations to adopt new International Standards of reporting and become listed in the markets. And it can be witnessed that improvements in stock markets are also significant.

## 4. CONCLUSION

Above studies demonstrated that corporate governance can show great effect on the economies. Vast coverage of the subject touches many aspects of corporations and their wellbeing, and this in turn reflects on the economy of the country. There are many studies and researches carried out internationally, but however only few exploring and studying Uzbekistan. Even though there is a lack of firm evident study illustrating changes after the adoption of laws and code of conduct for best practices of corporate governance, it can be acknowledged that there is district development in corporate governance practices and there are increased number of investors coming in the country. As a suggestion for further research, there can be studies carried out for more, deeper analysis on:

- Ownership structures and separation of control in relationships with performance
- Stakeholders role in governing the organizations
- CSR and Corporate governance practices in Uzbekistan

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ISSN: 2279-0667 Vol 9, Issue 7-8, July-August 2020, Impact Factor: SJIF 2020 = 7.209

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ISSN: 2279-0667 Vol 9, Issue 7-8, July-August 2020, Impact Factor: SJIF 2020 = 7.209

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ISSN: 2279-0667 Vol 9, Issue 7-8, July-August 2020, Impact Factor: SJIF 2020 = 7.209

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ISSN (online) : 2278-4853