

TRENDS AND PATTERNS OF FOREIGN DIRECT INVESTMENT IN INDIA: A MACRO LEVEL ANALYSIS

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ABSTRACT

Foreign Direct Investment (FDI) plays a very important role in the development of the nation. It is very much vital in the case of underdeveloped and developing countries. Foreign Direct Investment (FDI) has assumed a lot of significance for the emerging economies. India has also learnt a lesson from the experienced of the other Asian economies. During the last decade, there has been a remarkable change in the composition of sources of FDI inflows in India. Due change in FDI regime, many countries have started investing heavily in India. It serves as a link between investment and saving. Many developing countries like India are facing the deficit of savings and capital formation. This problem can be solved with the help of Foreign Direct Investment. It plays an important role in the long-term development of a country not only as a source of capital but also for enhancing competitiveness of the domestic economy through transfer of technology, strengthening infrastructure, raising productivity and generating new employment opportunities. India needs a massive investment to achieve the goals of vision 20-20.

This paper is a general analysis of the trends and patterns (state-wise, sector-wise, country-wise) distribution of FDI Inflows the post liberalization era. The purpose of this paper is to provide an examination of foreign direct investment in various sectors and government policy regarding foreign investment and this paper also tries to investigate the changing scenario and also analyses the inflows of FDI in India, country wise, sector wise and state wise inflow of foreign direct investment in India.

INTRODUCTION

FDI is now regarded as an important driver of growth. Literature on economic growth showed that there are a number of channels through which FDI permanently affects economic growth. FDI will contribute to the process of determining India's position of the next superpower in the east. There is clearly an intense global competition for FDI. India emerged as the most attractive destination for FDI. The same is reflected through the Review of various studies available on FDI. D.N1 (2001) has discussed the factors that account for China's high productivity and competitiveness in the world market. He concluded that factors included the land market, export production, educated labour force, and the higher identification of labourers in a large number of enterprises. Nagaraj2(2000) has studied the growth of India's economy since the reforms began in 1991. His study reveals that in India there has been a reduction in poverty levels, but there has not been a reduction in unemployment levels, income distribution has changed, and political power has drifted from the centre to the states. FDI flows will remain disappointing through 2011 according to the 2010, A.T. Kearney, Foreign Direct Investment Confidence Index4. China remains the top-ranked destination by foreign investors, a title it has held since, 2002. The United States retakes second place from India, which had surpassed it in 2005. India, Brazil and Germany complete the top five favored investment destinations. It is evident from the increased size of FDI flow from Rs 23,295 crores in 2000-2001 to Rs. 6,30,336 crores in 2010-2011. Hence, it is attempted to analyze the trends and pattern of FDI flows into India. The present study is analyses Trends and patterns of foreign direct investment in India in a Macro Level.

METHODOLOGICAL APPROACH OF STUDY

The present study is based on the secondary data. The secondary data pertaining to CSR funding has been collected from the annual reports of the Reserve Bank of India and reputed journals.

Objectives of Study

The present study aims at examining the Trends and patterns of foreign direct investment in India - A Macro Level Analysis. For this purpose following objectives have been outlined

- To examines the Trends and patterns of foreign direct investment in India.

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TRENDS PATTERN OF FDI FLOWS IN INDIA

In India, the private foreign capital has allowed in two main forms i.e., the foreign direct investment and portfolio investment. The improvement in FDI flows since 2000's has reflected through initiatives taken to create an enabling environment for FDI and inclusion of technologies and management practices in India. India attracted FDI equity inflows of US\$ 2,014 million in December 2010. The cumulative amount of FDI equity inflows from April 2000 to December 2010 stood at US\$ 186.79 billion, according to the data released by the Department of Industrial Policy and Promotion.

Today the transnational corporations and other investors are more attracted to deploy their tangible and intangible assets in the developing countries with a view to increase their competitiveness and profitability, and the developing countries consider the increased FDI inflow as necessary for strengthening their resource base, technological capability, access to external capability, access to external markets and thus, improve the overall economic performance. India is one of the developing countries, which have introduced liberalization policy from July 1991 and as its past relaxed the FDI regulatory framework on a selective basis. Such a positive and 'open-door' policy of India toward foreign investment.

Table-1: India's Foreign Direct Investment Inflows as Percentage of GDP. (Rs. In Crores)

| Year | Amount of FDI Inflows | YOY Growth | % of GDP |
|-----------|-----------------------|------------|-----------|
| 2000 | 01 12645 0.60 | | 2000 |
| 2001 | 02 19361 53.11 0.85 | | 2001 |
| 2002 | 03 14848 | 23.31 0.60 | 2002 |
| 2003 | 04 11945 | 19.55 0.43 | 2003 |
| 2004 | 05 17138 43.47 0.54 | | 2004 |
| 2005 | 06 24584 43.45 0.69 | | 2005 |
| 2006 | 07 70630 187.30 1.37 | | 2006 |
| 2007 | 08 98642 39.66 2.09 | | 2007 |
| 2008 | 09 123025 24.72 2.31 | | 2008 |
| 2009 | 10 123378 0.29 1.98 | | 2009 |
| 2010 | 11 (up to Dec.) 73177 | 40.69 | 2010 |
| CGR 28.08 | | | CGR 28.08 |
| CV 1.32 | — | | CV 1.32 |

Sources: Southern Economist, December 15, 2010

The above table-1 explains the trends pattern of FDI flows in India. It may be observed from the table that the maximum growth rate recorded in the year 2006-07 with 186.96 percent growth over the previous year amounting Rs. 70,630 crore. Several factors appear to have contributed to this phenomenon including 100 percent FDI allowed in many industrial sectors and an automatic approval was accorded. As a result, the highest growth rate of FDI inflow was registered during the year 2006-07 in India. This is the most favored year in respect of FDI inflow. It is observed from the table that though there is a fluctuation in the FDI trends the percentage of FDI in GDP has been tremendously increasing over a period of decade i.e., 2000-01 to 2009-10 the reason behind it that only the indigenous market was opened to the world. It is also found that during the periods i.e., 2002-03 and 2003-04 negative growth rate in FDI was observed representing -23.31 and -19.55 per cent respectively.

TREND LINE FOR FOREIGN DIRECT INVESTMENT

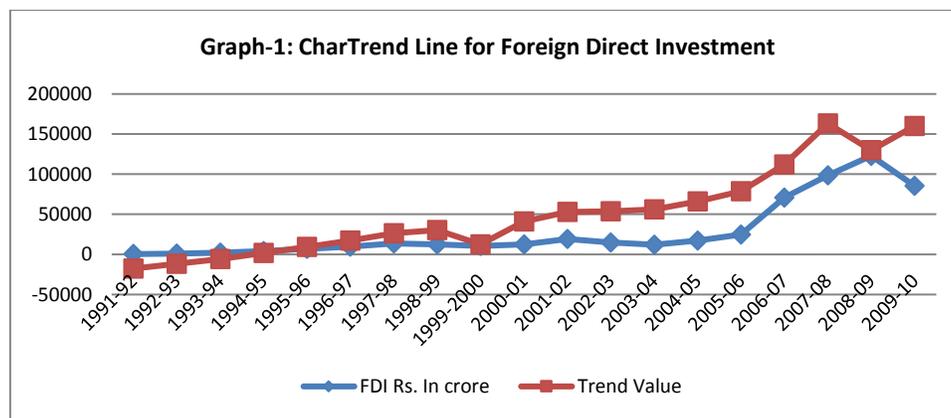
The resurgence in investment flows and technology transfer through FDI to the developing world indicate that developing countries today receive twice as much as the value of world. FDI flows was in mid-eighties. This was possible due to the liberalization of FDI policy by the host countries. Today the transnational corporations and other investors are more attracted to deploy their tangible and intangible assets in the developing countries with a view to increase their competitiveness and profitability, and the developing countries consider the increased FDI inflow as necessary for strengthening their resource base, technological capability, access to external capability, access to external markets and thus, improve the overall economic performance.

Table-2: Trend Line for Foreign Direct Investment

| Year Actual Value | FDI Rs. In crore | Trend Value |
|-------------------|------------------|-------------|
| 1991-92 | 408 | -18075.67 |
| 1992-93 | 1094 | -12915.88 |
| 1993-94 | 2018 | -7756.09 |
| 1994-95 | 4312 | -2596.3 |

| | | |
|-----------|--------|----------|
| 1995-96 | 6916 | 2563.49 |
| 1996-97 | 9654 | 7723.28 |
| 1997-98 | 13548 | 12883.07 |
| 1998-99 | 12343 | 18042.86 |
| 1999-2000 | 10311 | 2302.65 |
| 2000-01 | 12645 | 28362.44 |
| 2001-02 | 19361 | 33522.23 |
| 2002-03 | 14932 | 38682.02 |
| 2003-04 | 12117 | 43841.81 |
| 2004-05 | 17138 | 49001.6 |
| 2005-06 | 24623 | 54161.39 |
| 2006-07 | 70630 | 41321.6 |
| 2007-08 | 98644 | 64480.97 |
| 2008-09 | 122919 | 6940.76 |
| 2009-10 | 85273 | 74800.55 |

Sources: RBI Bulletin, 2010



Sources: Authors Compilation

In order to understand Trend of FDI, can be calculated from the Least Squared Method, the actual value of FDI inflows and Trend value of FDI inflows are furnished in the above table-2 and graph-1.

SUMMARY AND CONCLUSION

Foreign Direct Investment (FDI) has assumed a lot of significance for the emerging economies. India has also learnt a lesson from the experienced of the other Asian economies. During the last decade, there has been a remarkable change in the composition of sources of FDI inflows in India. Due change in FDI regime, many countries have started investing heavily in India. This paper investigates the changing scenario and also analyses the inflows of FDI in India,

It emerges from the foregone analysis that overall inflow of foreign direct investment in India witnessed increasing trends during the study period. The key sectors attracting FDI to the Mumbai-Maharashtra region are energy, transportation services, telecommunications and electrical equipment. Delhi attracts FDI inflows in sectors like telecommunications, transportation, electrical equipment and services. The states of Uttar Pradesh and Haryana have also performed really well in recent years due to its abundance of natural resources; Uttar Pradesh attracts FDI in chemical, pharmaceuticals and minerals whereas Haryana attracts FDI in the electrical equipment, transportation and food processing sectors. Tamil Nadu has done well in sectors related to automotive and auto components. Still there are certain areas, which are untouched by the government, as well as companies, which needs immediate attention in these issues. This study helps for further research in this issue.

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ROLE OF INFORMATION AND COMMUNICATION TECHNOLOGY IN THE SUPPLY CHAIN OF HYPER MARKETS IN BOTSWANA

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ABSTRACT

The paper analyses the use of Information and Communication Technology (ICT) utilization in supply chain integration piloted in real life business network consisting of three hypermarkets operating in the food sector business in Botswana. The study presents how ICT has been integrated in order to sustain an effective and efficient food industry. The information visibility of the new ICT system indicates a great potential for a more performing supply chain network, thus enhancing productivity level of the local economy. The paper also acknowledges several challenges faced by the three companies in implementing information and communication technology.

KEYWORDS

Information, Communication Technologies, Supply Chain, Integration, Hyper Markets/Stores etc.

INTRODUCTION

Supply chain is of great significance in modern economies. Its objective is to get the right materials, at the right place and at the right time by reducing total operating costs and working within budget constraints (Gianpaolo, 2004). This concept is faced by almost every profit making supply chain organization in the world. Since the fast growing competitive markets, make it vital to manage supply chain systems more and more efficiently. In this regard, the research study is based on three Gaborone based hyper markets (Choppies, Super Spar and Pick N' Pay), aims to understand the state of the technology adopted by these companies, in order to simultaneously reduce operational costs and improve service delivery in supply chain systems. The choice of integrating information and communication technology in a firm's daily operations must appreciate the cost associated with the technology itself, but that should not outweigh the need for these firms to properly plan their entire supply chain systems. Realising the benefits of information and communication technology may enable the firms to have consistent and readily available latest information to help and satisfy the customers.

STATEMENT OF PROBLEM

The exchange or handling of goods and information is central in the process of supply chain management. As such, failure to use modern information and communication technology in supply chain management can attribute to inefficiency in supply chains. Reducing or even closing this gap has always been the part of improvement in the supply chain itself. As such contemporary supply chains demand detailed and latest information about the interrelated fundamental business processes that provide products and services customers and other stakeholders. This is a consequence of increasing the need for transparency: what? When? Where? Which condition? (Gerhausor, Hupp, Efstratiou, & Heppner, 2009). The real power of information and communication technology becomes increasingly evident as ordinary processes, augmented with computing, communications, sensing and interaction are increasingly integrated into everyday activities and environment (Gerhauser, Pflaum, Schmidt, & Wichert, 2008).

OBJECTIVES OF STUDY

- To identify current information and communication technologies supporting supply chain organizations.
- To investigate the fundamental factors that are used to measure efficiency of information and communication technology in supply chain management.
- To establish the use of information and communication technology in supply chain towards organizational benefits.

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SCOPE OF STUDY

The study examines the impact of information and communication technology utilization in the supply chain of three hypermarkets situated in Gaborone, primarily in the food sector business. These enterprises comprise of Choppies, Super Spar and Pick-n-Pay hypermarkets. Although various food sector stores are available, the above were chosen based on their close relationship in size and volume of operations.

LITERATURE REVIEW

Studies indicate that the customer is the principle of today's businesses and as such, a supply chain considers a series of value-adding activities that leads to satisfied customers (Robert, 2010). The end consumers at the retail level of business are only the starting point of this value adding chain. More to this retail stores, there exist a series of manufacturers and distributors, transportation and logistics businesses, warehouses and freight forwarders, all parties trying to avail the right goods and services to consumers, at the right time, place, price, quantity and quality-the main objective of supply chains. In these settings, business-oriented systems such as enterprise resource planning (ERP) systems, executive information systems and decision support systems, are of essence in achieving cost efficiencies and organizational effectiveness through intra-organizational process integration (Kumar, 2000).

Other technological extensions include bar codes, Electronic Data Interchange (EDI), Radio frequency Identification system (RFID), E-mail and Global positioning system (GPS). Supply chain management technologies greatly help in reduce the time spent in shipping, receiving, tracking and compiling order data, which will save both money and time. Radio Frequency Identification is a piece of technology used in products for tracking the inventory easily. RFID's improve the efficiency of supply chain by detecting the order anomalies and enables employees to correct the mistakes immediately and business owners have the maximum control over their products. RFID is the megatrend in logistics.

The speed of the information delivered by RFID is 10 times greater than bar codes. The availability of these systems makes it possible to obtain a clear view of the whole chain hence making it easier to manage and restructure it effectively to meet customer demands. Supply chain management is dynamic and demand driven (Kumar, 2000). Therefore, information and communication technology is needed to facilitate speed in response to unpredictable market changes in supply chain.

Long gone are the days of uncertain forecasting, which signaled false demands of goods and services throughout the supply chain (bullwhip effect), thanks to the ICT utilization in the modern industries. The common factors of all these concepts are that they are more or less focused on producing more value to the customer ,and that they aim at dynamic designs that can be continuously developed and adjusted to changes ,and responding to changes fast (Bovet, 2000). In other words, information sharing and transparency aided by the use of information and communication technology yields faster response to customer needs which builds trust and loyalty. If there are any delays or problems within the chain, such can be detected earlier and the situation ratified quicker hence shorter lead times.

As already indicated by some of the authors, information and communication technology (ICT) plays an important role in transforming customer oriented processes, not only in large but also in small-medium enterprises. In that regard, it is evident that team players in supply chain are well aware of it and its economic benefits. Lack of funding is the reason why some of these supply chain businesses have no or limited technology systems in place (Kushwaha, 2011). This means their ability to exploit information and communication technology available is reduced but otherwise most supply chain firms would be putting it to maximum use. The author insists that to counter the implementation challenges of information and communication technology, supply chain firms should establish appropriate ICT goals through identifying critical ICT needs and allocating financial resources for the same and working in partnership with 3PLs will also help keep these costs down With all these in place, information and communication technology adoption by the companies would be possible.

Supply chain firms need not rely on enterprise resource planning (ERP) only for managing their operation (Koh, S. L., and Sad, S. M., 2006). This is due to its rigid system design and incapability to deal with uncertainty (Koh, A. S., 2004). As such, other technologies such as Radio Frequency Identification, inventory and network optimization tools, sensors and automatic identification, cloud computing and storage, robotics and automation, predictive analysis, wearable and mobile technology, 3D printing, driverless vehicles and drones, wireless technology and electronic data interchange can be used to help improve order, part and product traceability in supply chain (Koh, A. S. 2006). The author recommends these technologies as they have been widely used to transfer information between suppliers and customers in supply chain, the reason being that they are not extremely expensive, so developing firms might as well adopt them to withstand the pressures of today's ever changing.

Tools measuring change and improvement of organizational operations need to be established to promote efficiency. The balance scorecard and the SCOR models have been widely used in measuring the supply chain performance. In this sense, the SCOR model offers a distinctive framework that links business processes and management technologies in an integrated structure to

support communication between partners in the supply chain, improve the effectiveness of management, and supply chain improvement activities (Diaz, 2009).

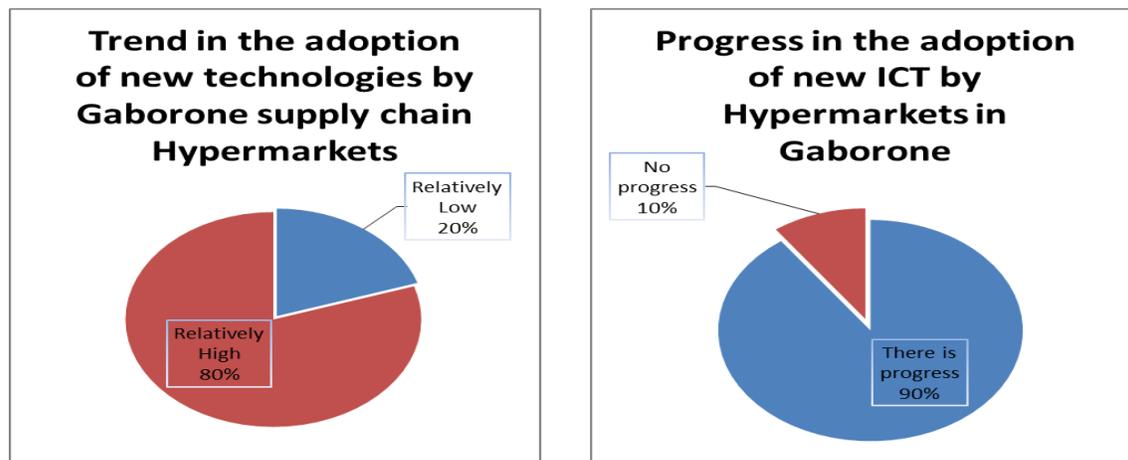
METHODOLOGY

The study is based on survey method by using of a questionnaire. The survey questionnaire was developed in collaboration with the three hypermarkets ensure the questionnaire was suitable for them i.e. testing the questionnaire for comprehension and appropriate language. Both primary and secondary sources of data were used in this research to reach a conclusion on the importance of such technologies on supply chain in organizations.

Primary data was collected for the study from 40 respondents. 50% were from Choppies hypermarkets, 25% were from Pick N Pay and the remaining 25% from Super Spar. The majority of the respondents were females at 52.5%, centered on the age of 30-34. According to Agnrud (2015), the Director of Communications in the Swedish Association of Communication Professionals, this may be because men do not often want to be involved in professional associations or respond to surveys in the way that women do, so the actual figure could be smaller. This could be the reason why majority of the respondents were females from the three hypermarkets under study.

TRENDS IN USE OF TECHNOLOGY

Figure-1: Trends and Progression in the Adoption of New ICT Technologies in HyperMarkets



Sources: Authors Compilation

The figure-1 shows the trend and how the adoption of the new technologies in the local supply chain service market appears to be in the recent years. Eighty percent (80%) of the respondents highlighted that the adoption of the new technologies in the local supply chain service market is relatively high while only twenty percent (20%) showed otherwise. This is complemented by the ninety percent (90%) mark of the significant adoption of these technologies by the three hypermarkets in Gaborone to enhance their daily operations. Perceived benefits are considered as one of the factors that could affect ICT adoption in these firms (Noor, 2009).

ICT METHODS CURRENTLY USED BY HYPERMARKETS (CHOPPIES, SUPER SPAR AND PICK N PAY)

The survey revealed that a low level of usage of Global Positioning System (GPS), Enterprise Resource planning and Radio Frequency Identification (RFID) among all the three companies. This may be because of the expensive integration of the enterprise resource planning system. However, Electronic Data Interchange (EDI) is moderately used by the hypermarkets as informed by 38 respondents (95%) and all companies use telephone, fax, and barcodes and email largely. Though the adoption of RFID, ERP and GPS technologies is low in all the studied firms, the respondents confirmed that supply chain stores in their operations are slowly integrating them.

MOTIVATION OF INVESTING IN NEW TECHNOLOGY

It was reported that entrepreneurial culture and economic and business matters have a significant influence in the adoption of the new information and communication technology(ICT).55% of the respondents from Pick N Pay and Super Spar each pointed out

that economic and business matters motivate their investment decisions towards ICT, while Choppies was only represented by 45% in that matter. The other 50% motivation of ICT investment to the former firms (Pick N Pay and Super Spar) is due to entrepreneurial culture. The reason behind these figures may be that all motivators are aimed at cutting down costs to be competitive hence all receiving significant recognition and eventually influencing the adoption ICT in daily operations.

IMPORTANCE OF ICT OPPORTUNITY ROLES IN HYPERMARKETS

As per the experience of hypermarkets, the important opportunity role associated with ICT usage is attributed to the following three very important elements:

- Competitive advantage,
- Cost efficiency, and
- Information transparency.

The respondents reported that the most important opportunity role associated with ICT usage is **competitive advantage**, which is rated as very important, followed by **cost efficiency** rated as quite important and lastly **information transparency** as important. ICT capabilities can assure the rapid customisation of products and maintain competitive lead-times hence its bases is on creating value for customers as many value added activities are directly or indirectly dependent on ICT applications (Evangelista, 2006). Having a competitive edge means providing value at a lower cost and fast pace, as such, the effective use of ICT provides the potential to consecutively reduce costs and improve information transparency, yielding a better customer service to the companies.

EFFECTIVENESS OF CURRENT METHODS OF ICT USED BY THE THREE HYPERMARKETS

The process and the use of ICT methods is left to the consideration of hypermarkets while being cautioned by Competition, cost efficiency, image of the organisation and customer aspirations to name a few. The following factors are discussed and put before the respondents to get the feel of effectiveness of new methods of ICT in hypermarkets:

- Focus on customer service delivery,
- Elimination / error reduction,
- Improvement of quality system,
- Improvement of customer integration.

These results suggest that Choppies, Super Spar and Pick N Pay are enjoying significant benefits of providing improved customer services through ICT, which is reflected by 87.5%. 75% of the respondents felt that there has been a significant elimination of errors since the new technology is adopted. Other areas where significant differences exist are: improvement of quality system at 50% and improvement of customer integration with 40%. This clearly shows that companies should not underestimate the potential value of ICT in improving trade through cutting lead times and enhancing customization of products and services they provide.

IMPORTANCE OF PERFORMANCE MEASUREMENT IN SUPPLY CHAIN

Effective performance measurement of ICT helps a great deal in reducing costs and improving customer service, which is the objective of almost every profit making business. Based on the entire sample, 95% performance is attributed for identifying bottlenecks, wastage, problems and improvement opportunities, followed by 85% performance is attributed for tracking progress, 58% performance is for identifying customer needs and then 43% performance is for facilitating a better understanding of the processes and a more open and transparent communication in the organisation. This suggests that technology measurement is now well reasonably established within the three hypermarkets under study.

Table-1: Measurement of the Efficiency of New Technologies Adopted

| Method | Frequency | Percentage | Valid Percentage | Cumulative Percentage |
|--------------------|-----------|------------|------------------|-----------------------|
| SCOR-Method | 1 | 2.5 | 2.5 | 2.5 |
| Balanced scorecard | 39 | 97.5 | 97.5 | 100.0 |
| Total | 40 | 100.0 | 100.0 | |

Sources: Authors Compilation

From the table above, it is evident that 98% of the respondents use the balance scorecard method in measuring the efficiency of the new technologies in the hypermarkets. Only one respondent chose the SCOR-method, which may have been a mistake due to misunderstanding the question. The balance scorecard method tries to balance or align the company's operations to the



organizational strategy in place and all the three hypermarkets use balance scorecard method in measuring how efficient their adopted information and communication technology.

FACTORS INHIBITING THE ADOPTION OF ICT BY THREE HYPERMARKETS

Various factors inhibit the adoption of ICT by the three hypermarkets. The most salient factors are; high investment and implementation costs, lack of technological skills, difficulties in customer SCM system integration, unclear return on investment, high running costs and updating personnel skills, etc. It was reported that there are no significant differences between these three firms. The most important reasons for non- investment in ICT are related to financial factors. The amount of investment and the implementation costs will have 85% importance, followed by lack of technological skills with 75%. These are most inhibiting factors towards Further, 68% importance was given difficulties in customer SCM system integration. Other factors such as the need to update personnel skills of employees relate to human resource do not represent any problems and unclear return on investment and high running costs do not have a significant negative influence in adopting ICT.

MEASURES NEEDED FOR INTEGRATING ICT IN SUPPLY CHAIN

From the reports of the three hypermarkets, there are some important factors that play a role in the integration of ICT in supply chain; financial support, educated and skilled staff, access to vocational education, improved information sharing, better infrastructure, closer cooperation between stakeholders, etc.

It is reported that all the three hypermarkets significantly need more funding and financial support with 90% importance, followed by more educated and skilled staff with 100% importance. Better infrastructure e.g. telecommunications and roads, emerges to be the next important factor that support the three firms' effort in integrating ICT in supply chain and finally the improved information sharing are key for the successful supply chain management

THE DISCUSSION IN RELATION TO THE OBJECTIVES AND OUTCOME OF THE STUDY

The knowledge of and attitudes towards new and improved information and communication technologies in supply chain organizations

The eighty percent of the respondents emphasised that the adoption of the new technologies in the local supply chain service market is relatively high. They have basic knowledge about the new adopted information and communication technology in their respective hypermarkets. This may be due to positive attitudes they hold in being open to learning new things due to the perceived benefits ICT may yield (Noor, 2009). The twenty percent reveal that not all employees are keen about knowing the benefits of using ICT. Lack of technological skills to operate such technologies may be attributed to their negative attitudes towards the adoption of these technologies.

Current information and communication technologies supporting supply chain organizations

Within the three hypermarkets, there is a low usage of Global Positioning System (GPS), Electronic data interchange and Radio Frequency Identification (RFID). However, enterprise resource planning is to some extent used by the hypermarkets as highlighted by most respondents. Reasons of slow adoption of some of these technologies may be attributed to high costs in integrating them in their operations. All companies use telephone, fax, barcodes and email largely. This is because they are cheaper to acquire and facilitate the day-to-day communication services to deliver satisfactory goods and services to the customers.

Benefits in utilizing information and communication technology

The results suggest that Choppies, Super Spar and Pick N Pay are enjoying significant benefits of providing improved customer services through ICT, which is reflected by the 87.5% of the respondents in the study. 75% of the respondents felt that there has been a significant elimination of errors since adopting the new technologies. Other areas where significant differences exist since the adoption of ICT are improvement of quality system at 50% and improvement of customer integration with 40%. This clearly shows that companies should not underestimate the potential value of ICT in improving trade and enhancing customization of products and services they provide.

Important factors that are used to measure efficiency of information and communication technology in supply chain management.

Effective performance measurement of ICT helps a great deal in reducing costs and improving customer service, which is the basic objective of all profit making businesses. Based on the entire sample, it surfaces that the measurement of the new adopted



technologies has greatly helped in identifying bottlenecks, waste, problems and improvement opportunities by 95%, followed by tracking progress at 85%, Knowing how effective the technology is helps identify customer needs by 58% and facilitates a better understanding of the processes and a more open and transparent communication by 43%. The 98% response of using a balanced scorecard model proves that technology measurement is now well reasonably established within the three studied hypermarkets. The balance scorecard method tries to balance or align the company's operations to the organizational strategy in place. Only one respondent chose the SCOR-method, which may have been a mistake due to misunderstanding the question.

The use of information and communication technology in supply chain towards organizational benefits

There is an increasing role of ICT that attributes to the development of competitive position of the three hypermarkets. Although these companies may not be considered leaders in the adoption of this technological innovation, over the last few years, but these companies have made significant progress in the adoption of new technologies. However, today food sector businesses are able to provide efficient services to customers. The adoption of new ICT has opened up opportunities to play an important role by supply chain, contributing to competitive advantage, information transparency and cost efficiency.

CONCLUSION AND RECOMMENDATIONS

Taking into account the importance and value of information and communication technologies in supply chain management, it is possible to have an improved customer service, cost reduction, an efficient information sharing and transparent chain. It was evident that information and communication technology contributed substantially for the success of the three organizations. The majority of respondents who showed that information supports this and communication technology is of great value to their organizations.

It was also found that information and communication technology has the potential to create effective procedures and systems within the workplace. Information and communication technology can be effectively implemented in Botswana if Information and technology managers and their employees will realize the usefulness of ICT and adopt effective procedures and techniques of information and communication technology. This can also help in creating an overall effective working process in the organizations.

The study reveals that use of exceptional and sophisticated information and communication technologies is not taking place in the three hypermarkets because they are expensive to implement and maintain. Surprisingly, the adoption trend of these technologies shows a significant increase in each of the three companies. Given the value adding nature of these technologies, the positive trend is likely to continue as positive as it is. The factors inhibiting ICT adoption do not significantly vary between the three hypermarkets but the most important inhibiting factor is primarily financial. Further, Human resource implications and ICT skills also have an important role in inhibiting ICT investment. These factors act interdependently as financial constraints usually attribute to less training hence low technological skills in these companies. As the trend of ICT adoption is increasing, its effective adoption has the potential to significantly enhance the competitive capabilities in the local hypermarkets.

It is suggested that more investment should be made towards advanced ICT systems such as Enterprise Resource Planning, which integrates all other systems to support the daily operations of supply chains efficiently. This may greatly leverage the 'hypermarkets' information system assets to market demands.

Education and training should be offered more to users of the ICT in the companies. After all, it is the most essential component for any improvement in the company. For the successful adoption of the new technologies to yield good results, the organisations need the requisite skilled human resource, as technologies alone cannot help to improve the organizational competitiveness.

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THE ROLE OF ENTREPRENEUR IN ECONOMIC DEVELOPMENT: A MACRO LEVEL PERSPECTIVE

Dr. Honnappa S.⁵

ABSTRACT

Development of the economy in any form is an outcome of human activity. The economic development of a country much depends on the rate of industrialization. Industrialization and entrepreneurship are directly related. It is the entrepreneurship, which link the sociocultural milieu with rate of economic and industrial development. Unless the skills and resources provided by the nature are not fully transformed into efficient production units, the man's labour will remain largely unproductive and keeps his level of consumption low. These considerations focus the attention on the importance of entrepreneurship in the development of any nation. Entrepreneurship and small business are related but not synonymous concepts. On the one hand, entrepreneurship is a type of behavior that concentrates on opportunities rather than resources (Stevenson and Gumpert, 1991). This type of behavior can happen in both small and large businesses but also elsewhere. On the other hand, small businesses can be a vehicle for both Schumpeterian entrepreneurs introducing new products and processes that change the industry and for people who simply run and own a business for a living (Wennekers and Thurik, 1999). Entrepreneurship is a source of innovation and change, and as such spurs improvements in productivity and economic competitiveness. The present paper provides a theoretical framework of the relationship between rate of entrepreneurship and economic development in macro level perspectives.

KEYWORDS

Entrepreneurship, Production Units, Self-Reliance, Innovation, Economic Development etc.

INTRODUCTION

Entrepreneurship is closely associated with knowledge and flexibility, two factors that have gained new significance as a source of competitiveness in an increasingly globalized world economy. The shift in industry structure towards less concentration and more decentralization that OECD countries experienced between the mid-1970s and the early 1990s is only one indicator of this development. With technological change and the intensified global competition brought about by globalization and economic liberalization, the assumption that fostering entrepreneurship means fostering a country's competitiveness today appears more valid than ever. It is striking that the current debate discusses the importance of entrepreneurship mainly with regard to developed countries and that the question of how to foster entrepreneurship seems to be primarily a concern of policy makers in OECD countries. As a key element in securing the competitiveness of developed countries, entrepreneurship is even more central to developing countries trying to attain competitiveness in international markets.

The economic development of a country much depends on the rate of industrialization. Industrialization and entrepreneurship are directly related. It is the entrepreneurship, which link the sociocultural milieu with rate of economic and industrial development. Kingsky Davis appropriately states that, "Vicious circle cannot be broken by agricultural reform alone. It can be broken only by the dues exmachina of industrialization." India is a second largest populated country in the world. Surplus manpower is a great liability to a nation it can become an asset once those with potential are selectively encouraged for self-employment. The entrepreneurship should be spread from a few dominant entrepreneurs to a large number of industrially potential people of varied social strata. The non-business communities and cases should be encouraged through efforts such as training, counseling, appropriate environment and support.

1.1. What is an 'Entrepreneur?'

An entrepreneur is an individual who, rather than working as an employee, runs a small business and assumes all the risks and rewards of a given business venture, idea, or good or service offered for sale. The entrepreneur is commonly seen as a business leader and innovator of new ideas and business processes.

Entrepreneurs play a key role in any economy. These people have the skills and initiative necessary to take good new ideas to market and to make the right decisions that lead to profitability. The reward for taking the risk is the potential economic profits the entrepreneur could earn.

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Schumpeter discovered that they:

- Greatly value self-reliance,
- Strive for distinction through excellence,
- Are highly optimistic (otherwise nothing would be undertaken), and
- Always favor challenges of medium risk (neither too easy, nor ruinous).

1.2. Types of Entrepreneurs

In every form of economic activity as well as in other social and cultural activities. They are found amongst artisans, labourers, artists, importers, exporters, engineers, supervisors, bankers, industrialists etc. They are also found among farmers, fisherman, and tribals and so on. According to gender, entrepreneurs are divided into two categories as men entrepreneurs and women entrepreneurs.

- **Men Entrepreneurs:** Enterprise owned and managed by men. He must possess quality of a capacity to assume risk and self-confidence, technical knowledge, alertness to know opportunities, willing to accept change and ability to initiate, ability to Marshall Resources, ability to organise and administer.
- **Women Entrepreneurs:** Women entrepreneurs are the women or a group of women who initiate, organize and operate business enterprise. The Government of India can notes women entrepreneur as “an enterprise owned and controlled by women having minimum financial investment of 51 percent of capital and giving at least 51 percent of the employment generated in the enterprise to women”.

METHODOLOGICAL APPROACH OF THE STUDY

The present study is based on the theoretical approach. The secondary information pertaining to Entrepreneur has been collected from the annual reports of the ASI and reputed journals.

Objectives of the Study

The present study aims at examining the The Role of Entrepreneur in Economic Development- A Macro Level Analysis For this purpose following objective has been outlined:

- To examine the Role of Entrepreneur in Economic Development in India.

The Role of Entrepreneurs in Economic Development

The entrepreneur therefore plays a key role among the factors of production and has enormous potential to galvanise the other components such as land, labours and capital towards generating increased output, income and employment. The state would be more and more confined itself to public utilities and withdraw from the competitive and commercial activities. The Government will play the role of enabler and facilitator providing infrastructural facilities appropriate to section, region and production line. Who can take advantage of those facilities? The answer is clear only those who have potentiality and propensity. In India, the term entrepreneurship appears to connote much restricted meaning. It covers only a limited sphere of enterprising endeavour i.e. establishment and running of factories and industrial enterprises alone. It has also been viewed as a phenomenon occurring around an individual and benefiting only an individual. India, with a developing economy even after nearly five decades of planning still has a long way to go to catch up with the leading developed economies of the world. The goal may be distant but surely, the time required to reach it can be cutdown by accelerating the pace of development. The industrial revolution boosted entrepreneurship in the developed economies. It was not the same with underdeveloped countries like India, as they were under the colonial rule at that time. Immediately after the liberation, the country found itself in poverty and chaos.

The inadequate availability of entrepreneurial talent adversely affected the development of modern small manufacturing and processing enterprises for while large industries can be setup with expatriate, capital, small industries need to have a domestic entrepreneurial base. In the Indian context, an entrepreneur may not necessarily be an “innovator”, but an “imitator” who would copy organisation, 11 technology products of innovators from other developed regions. Young underscore the importance of society in shaping the entrepreneurial personality and consider that ingredients in the emergence of entrepreneurs are cultural values, role expectations, and social tensions and inter group relations in society.

Entrepreneurship has played a vital role both in the take-off stages of the European economy and during the First Industrial Revolution. Entrepreneurial formation also played a crucial role during the Second Industrial Revolution. However, the growth in

scale economies and the managerial revolution that took place in the decades preceding 1970 were forces that not only pushed the rate of business ownership downward, but also suppressed entry of new businesses and other entrepreneurial ventures. In spite of these forces, the economic success of this interim period can however be traced back to individual entrepreneurs of an earlier period. Finally, the present era is sometimes designated as that of the knowledge economy or the third industrial revolution. From the empirical evidence of increasing new business formation and total business ownership in recent decades, and from econometric analysis of these data, it can be concluded that entrepreneurial formation seems to be regaining the economic relevance of previous industrial revolutions.

India and other developing nations viewed this is an effective instruction to combat their many problems. Schumpeterian entrepreneur are necessary in underdeveloped countries for rapid economic development. Entrepreneurs are to be innovators who must change the production function and bring about rapid development. For this purpose, India also made planned efforts to develop entrepreneurship to promote national production, balanced regional development, and dispersal of economic power and provide better employment opportunities.

SUMMARY AND CONCLUSION

The present paper attempts to outline the relationship between entrepreneurship and economic development using a macro perspective: the aim of the present contribution is to identify the consequences of entrepreneurship in economic development. It reviews some recent research on the relationship between entrepreneurship and small business on the one hand and economic growth on the other. It provides a tentative framework linking entrepreneurship and growth at different levels of aggregation. Entrepreneurship has played a vital role both in the take-off stages of the European economy and during the First Industrial Revolutions.

Entrepreneurial formation also played a crucial role during the Second Industrial Revolution. However, the growth in scale economies and the managerial revolution that took place in the decades preceding 1970 were forces that not only pushed the rate of business ownership downward, but also suppressed entry of new businesses and other entrepreneurial ventures. In spite of these forces, the economic success of this interim period can however be traced back to individual entrepreneurs of an earlier period. Finally, the present era is sometimes designated as that of the knowledge economy or the third industrial revolution.

From the empirical evidence of increasing new business formation and total business ownership in recent decades, and from econometric analysis of these data, it can be concluded that entrepreneurial formation seems to be regaining the economic relevance of previous industrial revolutions. Finally conclude that framework of the consequences of entrepreneurship seems to be applicable, although apparently the explanatory power of the various determinants and the weight of the various consequences differ between historical periods. There are certain areas, which are untouched by the government, as well as companies, which needs immediate attention in these issues. This study helps for further research in this issue. However, much needs to be done to explain the links between entrepreneurship and economic growth.

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A STUDY ON EFFECTIVENESS OF DIGITAL MARKETING ON CONSUMER BEHAVIOR

P. Lalitha Praveena⁶

ABSTRACT

“Digital Marketing is an umbrella term for the marketing of products or services using digital technologies, mainly on the Internet, but also including mobile phones, display advertising, and any other digital medium”. It has a wide spread application across sectors; however, in the current context with proliferation digital and social media have gained enormous popularity and are integral parts of the decision-making. Statistics reveal that we currently have over 350 million internet users in the country and about 80 % of the population is active through their smart phone devices. Based on user base and revenues for most global internet companies India is one of the largest markets. Taking consumers as sample the paper aims to study how digitalization can influence decision making among a certain Target group. The paper also aims to an attempt to reveal the factors influencing the online consumer's behavior.

KEYWORDS

Decision, consumer buying behavior, Digital Marketing, Digital Media etc.

INTRODUCTION

Digital marketing is one type of marketing being widely used to promote products or services and to reach consumers using digital channels. Digital marketing extends beyond internet marketing including channels that do not require the use of Internet. It includes mobile phones (both SMS and MMS), social media marketing, display advertising, search engine marketing and many other forms of digital media.

Through digital media, consumers can access information any time and any place where they want. With the presence of digital media, consumers do not just rely on what the company says about their brand but also they can follow what the media, friends, associations, peers, etc., are saying as well. Digital marketing is a broad term that refers to various promotional techniques deployed to reach customers via digital technologies. Digital marketing embodies an extensive selection of service, product and brand marketing tactics, which mainly use Internet as a core promotional medium in addition to mobile and traditional TV and radio. Canon iMage Gateway helps consumers share their digital photos with friends online. L'Oréal's brand Lancôme uses email newsletters to keep in touch with customers and hence tries to strengthen customer brand loyalty (Merisavo et al., 2004). Magazine publishers can activate and drive their customers into Internet with e-mails and SMS messages to improve re-subscription rate (Merisavo et al., 2004).

Indian consumers as a whole spend about 55% of the total consumption expenditure on food items. According to a survey conducted by ORG, the expenditure on non-food items has recorded large growth that the expenditure on food items. Consumers decide whether, what, when, from whom, where and how much to buy. They can avail various mediums to buy the products. However, currently we are living in the age of internet. According to a study, “About 44 percent students use Internet in India and overall 72% of young people access Internet on regular basis. Due to the vast usage of Internet, the buying patterns have been changed. It has changed the way goods are purchased and sold, resulting to the exponential growth in the number of digital shoppers. However, many differences concerning digital buying have been discovered due to the various consumers' characteristics and the types of provided products and services. Attitude toward digital shopping and goal to shop are not only affected by ease of use, usefulness, and enjoyment, but also by other factors like consumer individuality, situational factors, product distinctiveness, previous digital shopping understanding.

Traditional Marketing versus Digital Marketing

Traditional marketing is the most recognizable form of marketing. Traditional marketing is non-digital way used to promote the product or services of business entity. On the other hand, digital marketing is the marketing of products or services using digital channels to reach consumers. Some comparisons are presented below:

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Table-1

| Traditional Marketing | Digital Marketing |
|---|---|
| Traditional marketing includes print, broadcast, direct mail, and telephone. | Digital marketing includes online advertising, email marketing, social media, text messaging, affiliate marketing, search engine optimization, pay per click. |
| No interaction with the audience. | Interaction with the audience. |
| Results are easy to measure. | Results are largely easy to measure. |
| Advertising campaigns are planned over a long period. | Advertising campaigns are planned over short period. |
| Expensive and time-consuming process. | Reasonably cheap and rapid way to promote the products or services. |
| Success of traditional marketing strategies can be celebrated if the firm can reach large local audience. | Success of digital marketing strategies can be celebrated if the firm can reach some specific number of local audience. |
| One campaign prevails for a long time. | Campaigns can be easily changed with ease and innovations can be introduced within any campaign. |
| Limited reach to the customer due to limited number of customer technology. | Wider reach to the customer because of the use of various customers' technology. |
| 24/7 year-round exposure is not possible. | 24/7 year-round exposure is possible. |
| No ability to go viral. | Ability to go viral. |
| One-way conversation. | Two ways conversation. |
| Responses can only occur during work hours. | Response or feedback can occur anytime. |

Sources: Authors Compilation

VARIOUS ELEMENTS OF DIGITAL MARKETING

There are various elements by which digital marketing is formed. All forms operate through electronic devices. The most important elements of digital marketing are given below:

Online Advertising

Online advertising is a very important part of digital marketing. It is also called internet advertising through which company can deliver the message about the products or services. Internet-based advertising provides the content and ads that best matches to consumer interests. Publishers put about their products or services on their websites so that consumers or users get free information. Advertisers should place more effective and relevant ads online. Through online advertising, company well controls its budget and it has full control on time.

Email Marketing

When message about the products or services is sent through email to the existing or potential consumer, it is defined as email marketing. Direct digital marketing is used to send ads, to build brand and customer loyalty, to build customer trust and to make brand awareness. Company can promote its products and services by using this element of digital marketing easily. It is relatively low cost comparing to advertising or other forms of media exposure. Company can bring complete attention of the customer by creating attractive mix of graphics, text and links on the products and services.

Social Media

Today, social media marketing is one of the most important digital marketing channels. A computer-based tool allows people to create, exchange ideas, information and pictures about the company's product or services. According to Nielsen, internet users continue to spend more time with social media sites than any other type. Social media marketing networks include Facebook, Twitter, LinkedIn and Google+. Through Facebook, company can promote events concerning product and services, run promotions that comply with the Facebook guidelines and explore new opportunities. Through Twitter, company can increase the awareness and visibility of their brand. It is the best tool for the promotion of company's products and services. In LinkedIn, professionals write their profile and share information with others. Company can develop their profile in LinkedIn so that the professionals can view and can get more information about the company's product and services. Google+ is also social media network that is more effective than other social media like Facebook, Twitter. It is not only simple social media network but also it is an authorship tool that links web-content directly with its owner.



Text Messaging

It is a way to send information about the products and services from cellular and smart phone devices. By using phone devices, company can send information in the form of text (SMS), pictures, video or audio (MMS). Marketing through cellphone, SMS (Short Message Service) became increasingly popular in the early 2000s in Europe and some parts of Asia. One can send order confirmations, shipping alerts using text message. Using SMS for campaigns get faster and more substantial results. Under this technique, companies can send marketing messages to their customers in real-time, any time and can be confident that the message will be seen. Company can create a questionnaire and obtain valuable customer feedback essential to develop their products or services in future.

Affiliate Marketing

Affiliate marketing is a type of performance-based marketing. In this type of marketing, a company rewards affiliates for each visitor or customer they bring by marketing efforts they create on behalf of company. Industry has four core players: the merchant (also known as “retailer” or “brand”), the network, the publisher (also known as “the affiliate”) and the customer. The market has grown in such complexity resulting in the emergence of a secondary tier of players including affiliate management agencies, super-affiliates and specialized third party vendors. There are two ways to approach affiliate marketing: Company can offer an affiliate program to others or it can sign up to be another business’s affiliate. If company wants to drive an affiliate program, then, the company owner has to pay affiliates a commission fee for every lead or sale they drive to company’s website. Company’s main goal here is to find affiliates who can reach untapped markets. For example, a company with an e-zine may become a good affiliate because its subscribers are hungry for resources. Therefore, introducing one’s offer through “trusted” company can grab the attention of prospects, which might not have otherwise reached.

Search Engine Optimization (SEO)

Search engine optimization (SEO) is the process of affecting the visibility of a website or a web page in a receive from the search engine users. SEO may target different kinds of search including image search, local search, video search, academic search, news search and industry-specific vertical search engines.

Pay Per Click (PPC)

Pay-per-click marketing is a way of using search engine advertising to generate clicks to your website rather than “earning” those clicks organically. Pay per click is good for searchers and advertisers. It is the best way for company’s ads since it brings low cost and greater engagement with the products and services.

DETAILED FEATURES OF DIGITAL MARKETING

- It is based on the notion of elastic time.
- It can be accessed from anywhere.
- One can assess numerous digital shopping stores at a time.
- Assessment can be made in real time.
- There is rider of alternate of product if it is not as per the requirement of the customer.

FOUR NEW DIGITAL MARKETING MODELS

Booz & Company has identified four equally successful digital marketing models: Digital Branders, Customer Experience Designers, Demand Generators, and Product Innovators. A company’s focal point for marketing venture may have fundamentals of each, but odds are that one of these models represents the right marketing organization for a company.

- Digital Branders are the majority frequent consumer products companies or further marketers that center on structuring and renewing brand equity and concrete consumer commitment. These companies are changing their venture from traditional linear advertising in the direction of more immersive digital multimedia way that can bond consumers to the brand in innovative conduct. They are rethinking on how they employ consumers with the main agenda of attracting new consumers to the brand and motivating loyalty through various encounters with the brand.
- Customer Experience Designers use customer statistics and perception to generate a advanced uninterrupted brand familiarity for their customers. Characteristically, these companies (such as financial-services companies, airlines, hotels, and retailers) fabricate their business models focusing on customer service. By reworking how they interrelate with customers, these companies anticipate to craft a constant exchange of ideas and construct a loyal customer base.



- Demand Generators (typically retailers) center of attention on driving online traffic and transferring a numerous sales as probable across channels to capitalize on marketing competence and produce their share of profits. All essentials of the digital marketing are customized to enhance sales and amplify reliability.
- Product Innovators use digital marketing to facilitate the organization recognizes and grows, and generates proactive digital products and services. These companies utilize digital communications with consumers to gather information that can help profile the innovation.

Consumer Buying Behaviour

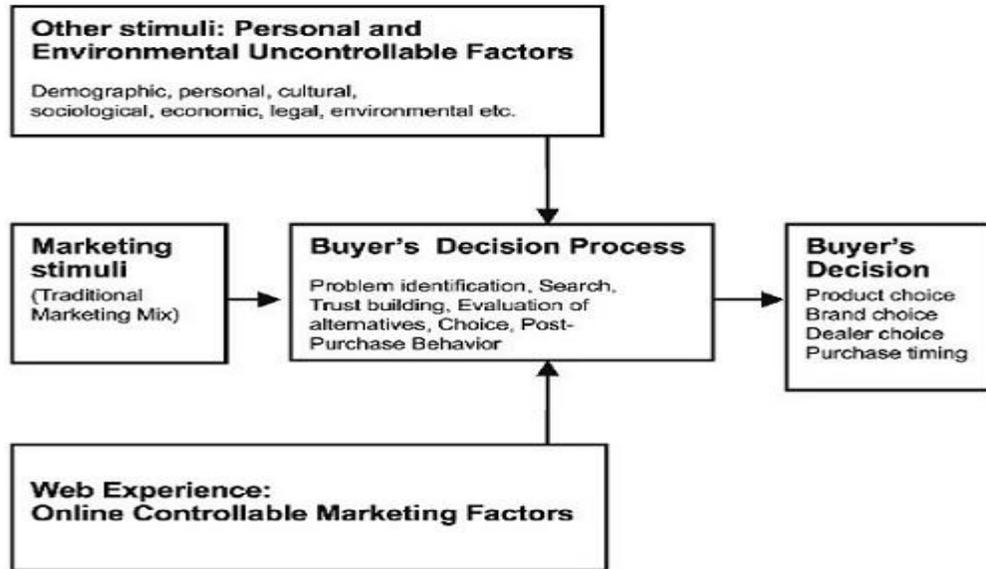
The consumers' buying behavior has been always a popular marketing topic, extensively studied and debated over the last decades while no contemporary marketing textbook is complete without a chapter dedicated to this subject. The predominant approach, explaining the fundamentals of consumer behavior, describes the consumer buying process as a learning, information processing and decision-making activity divided in several consequent steps:

Problem Identification; (2) Information Search; (3) Alternatives Evaluation; (4) Purchasing Decision; (5) Post-Purchase Behavior (Bettman, 1979; Dibb et al., 2001; Jobber, 2001; Boyd et al., 2002; Kotler, 2003; Brassington and Pettitt, 2003). A distinction is frequently made between high and low involvement purchasing, implying that in practice the actual buying activity can be less or more consistent with this model, depending on the buyer has perceived purchasing risks. High or low degree of involvement is also a question of buyer experience; products purchased for the first time, in general, require more involvement than frequently purchased products (Boyd et al., 2002). Next to identifying the steps of the buying process and the potential role of marketing in each stage, marketers are eager to comprehend how purchasing choices and decisions are made, how consumers are likely to react to innovation and how to predict the outcome of the customer vendor interaction (Davis et al., 1989; Ajzen, 1991; Legris et al., 2003). Most academics and practitioners agree that demographic, social, economic, cultural, psychological and other personal factors, largely beyond the control and influence of the marketer, have a major effect on consumer behavior and purchasing decisions (Harrell and Frazier, 1999; Czinkota et al., 2000; Czinkota and Kotabe; 2001; Dibb et al., 2001; Jobber, 2001; Boyd et al., 2002; Solomon and Stuart, 2003). Despite their incapacity to exercise any substantial influence on the above factors, marketers can have some bearing on the outcome of the buying process by engaging different marketing tools, the most prominent being the 4Ps – product, price, place and promotion – also known as the marketing mix (Borden, 1964; McCarthy, 1964). While the value and current standing of the mix as a marketing toolkit is frequently disputed (Dixon and Blois, 1983; Gro'nroos, 1994; Gummesson, 1997; Goldsmith, 1999), marketing practitioners nonetheless widely deem the 4Ps as the tools that can influence the consumer's behavior and the outcome of the buyer-seller interaction.

Online Buying Behavior

Understanding the mechanisms of virtual shopping and the behavior of the online consumer is a priority issue for practitioners competing in the fast expanding virtual marketplace. This topic is also increasingly drawing the attention of researchers. Indicative of this is the fact that more than 120 relevant academic papers were published in 2001 alone (Cheung et al., 2003). Given the continuous expansion of the Internet in terms of user numbers, transaction volumes and business penetration, this massive research endeavor is not surprising. More than 20 per cent of Internet users in several countries already buy products and services online (Taylor Nelson Sofres, 2002) while more than 50 per cent of US net users regularly buying online (Forrester Research, 2003). These developments are gradually transforming e-commerce into a mainstream business activity while at the same time, online consumers are maturing and virtual vendors realize the importance and urgency for a professional and customer-oriented approach. Yet the Internet meltdown at the end of the 1990s and plenty of more recent anecdotal and empirical evidence indicate that many online firms still do not completely understand the needs and behavior of the online consumer (Lee, 2002) while many of them "... continue to struggle with how effectively to market and sell products online" (Joines et al., 2003, p. 93). As in the case of traditional marketing in the past, most of the recent research and debate is focused on the identification and analysis of factors that one way or another can influence or even shape the online consumer's behavior; a good deal of research effort is focused on modeling the online buying and decision-making process (Miles et al., 2000; Liu and Arnett, 2000; Cockburn and McKenzie, 2001; Liao and Cheung, 2001; McKnight et al., 2002; Joines et al., 2003; O'Cass and Fenech, 2003). While many researchers do not see any fundamental differences between the traditional and online buying behavior, it is often argued that a new step has been added to the online buying process: the step of building trust or confidence (Lee, 2002; Liebermann and Stashevsky, 2002; McKnight et al., 2002; Suh and Han, 2002; Liang and Lai, 2002). An important contribution in classifying the increasingly growing number of research papers on the subject of the virtual customer's behavior is the study of Cheung et al. (2003). The findings of their comprehensive literature review are summarized in a model depicting the main categories of factors affecting the online consumer. The study identifies two groups of uncontrollable factors—consumer characteristics and environmental influences – as well as three groups of controllable ones.

Figure-1: Factors Affecting the Online Consumer's Behavior



Sources: Authors Compilation

METHODOLOGY OF STUDY

Methodology comes from systematic and theoretical analysis of the methods to evaluate suitability of one specific method to apply to a field of study. It typically encompasses concepts such as paradigm, theoretical model, phases and quantitative or qualitative techniques. This study is conducted based on both primary and secondary data sources.

Data Collection Methods

Both the primary and secondary data collection methods were considered. The primary data was collected through a questionnaire designed exclusively for the study. Secondary data was taken from Research papers, Journals, Magazines and Websites.

OBJECTIVES OF STUDY

The main objective of this paper is to identify the impact of digital marketing on the consumer behaviour in the competitive market. The supportive objectives are following:

- To find out whether income has an impact on the elements of digital marketing;
- To focus on whether gender plays a role on the effect of digital marketing on consumer behaviour;
- To discuss the effects of education on the various forms of digital marketing and consumers opinion on digital marketing;
- To show the major factors that influence the impact of digital marketing on the customers.

DATA ANALYSIS

H₀₁: There is no significant association between gender and their opinions on prefer those brands advertised by digital marketing.

Table-2: Chi Square Values of Gender on Digital Marketing

| | Value | d.f. | Asymp. Sig. (2-sided) |
|------------------------------|---------------------|------|-----------------------|
| Pearson Chi-Square | 19.882 ^a | 4 | .001 |
| Likelihood Ratio | 19.631 | 4 | .001 |
| Linear-by-Linear Association | 4.111 | 1 | .043 |
| N of Valid Cases | 868 | | |

Note: a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 15.31.

Sources: Authors Compilation

From the above table chi square is significant (sig. value is < 0.05), reject null hypothesis. It means that there is a significant association between gender and their opinions on prefer those brands advertised by digital marketing. It means consumer opinion and preference of products highly advertised by digital marketing is not dependent on gender.

H₀₂: There is no significant association between education and their opinions on online shopping.

Table-3: Chi Square Values of Education and Opinion on Online Shopping

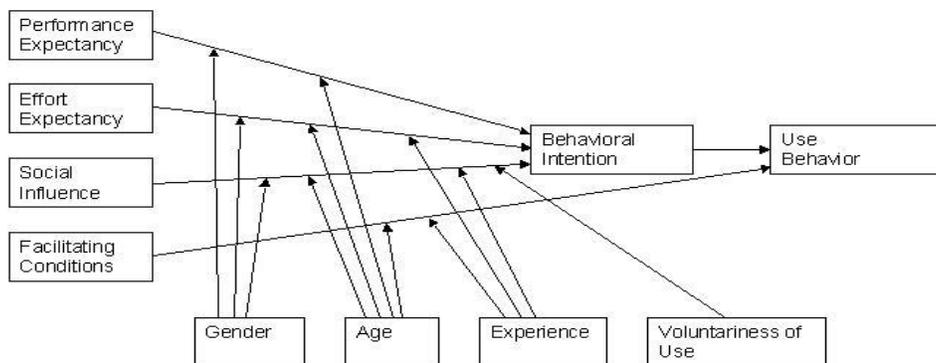
| | Value | d.f. | Asymp. Sig. (2-sided) |
|------------------------------|---------------------|------|-----------------------|
| Pearson Chi-Square | 35.954 ^a | 12 | .000 |
| Likelihood Ratio | 36.119 | 12 | .000 |
| Linear-by-Linear Association | 1.827 | 1 | .177 |
| N of Valid Cases | 872 | | |

Note: a. 2 cells (10.0%) have expected count less than 5. The minimum expected count is 3.85

Sources: Authors Compilation

From the above table chi square is significant (sig. value is < 0.05), reject null hypothesis. It means that there is a significant association between education and their opinions on the online shopping. It means opinions on online shopping is highly dependent on education.

Figure-2

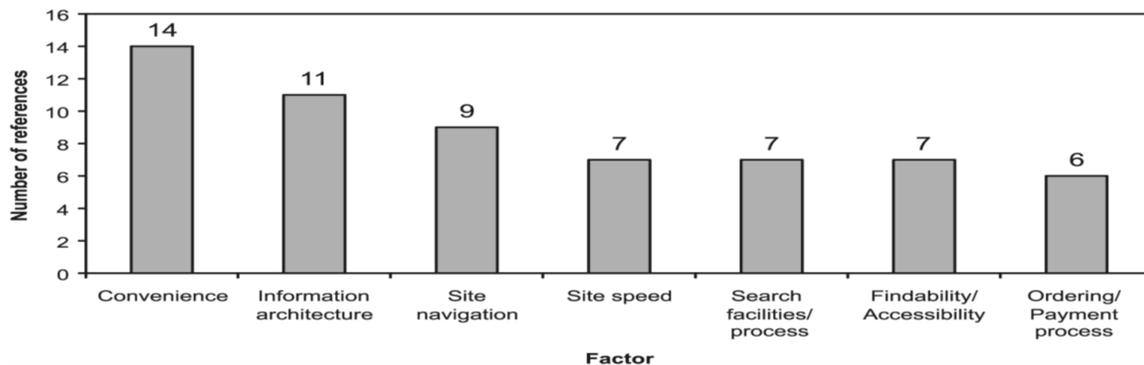


Sources: Authors Compilation

Factor Analysis is a data reduction technique. It also helps in structure detection among the variables and further helps in studying the underlying crucial factors that cause the maximum variation. Before we proceed for factor analysis, first the researcher tested the eligibility of the data by checking KMO- Bartlett's test, which is a measure of sampling adequacy. The KMO value is 0.826 > 0.5 (indicates meritorious).

Figure-3

Functionality factors: a. Usability



Sources: Authors Compilation

Figure-4

Psychological factors: Online Trust

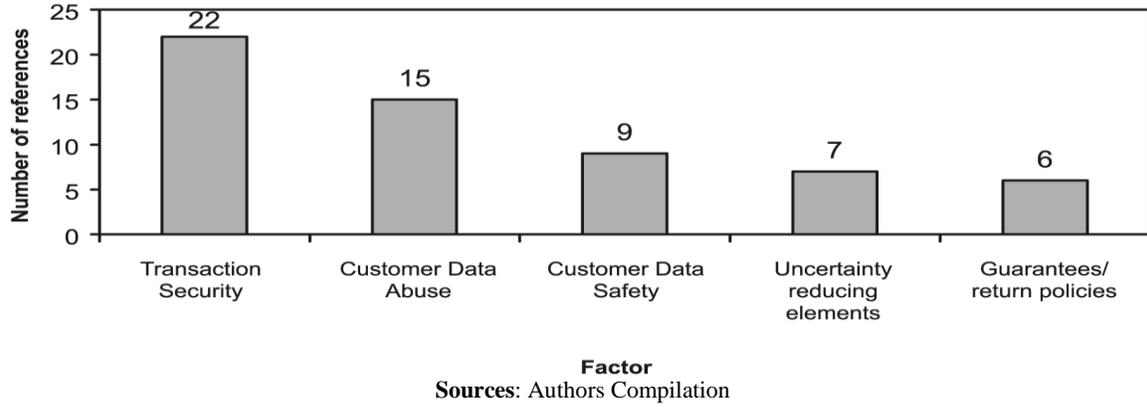


Figure-5

Content factors: a. Aesthetics

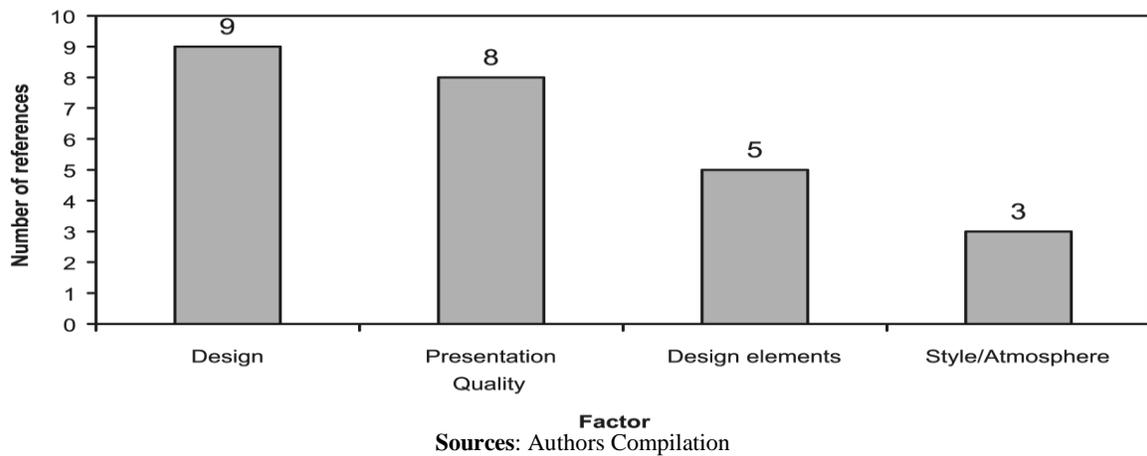
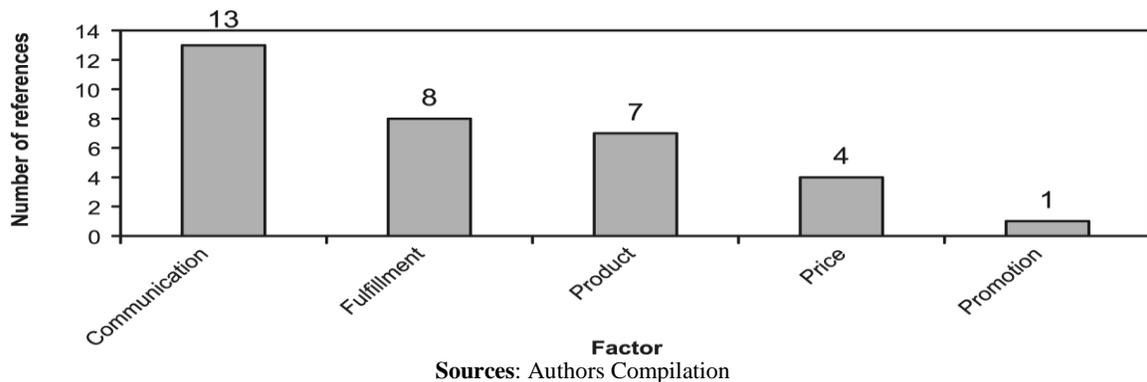


Figure-6

Content factors: Marketing Mix



From the above analysis, it is evident that the convenience in the usability and the aesthetics play a major role in influencing the consumer behavior. Companies, which use digital marketing tools, should focus on these factors to achieve success.

CONCLUSIONS AND IMPLICATIONS

Research on the buying behavior and the factors influencing the decision-making process of online consumers has revealed similarities as well as differences between them and the traditional customers. The uncontrollable factors (external and personal ones) affecting consumer behavior are similar for both types of consumers. The tools however used by traditional and online marketers in order to influence the buying behavior of their customers are not quite the same. In the case of traditional consumers, the 4Ps of the marketing mix are considered as the main controllable tools influencing the buying behavior. Research indicates that in the case of the Web consumer a set of elements experienced during the virtual interaction are indeed the controllable factors affecting the online buyer.

The most significant fact revealed by this study is that there is not much significant difference in the shopping criteria between male and female customers. In other words, Indian (male and female) have almost common behaviour in digital shopping. With this information, e-retailers should not over emphasize, and rely on, the gender factor as a strategy in their efforts to attract customers.

Finally, digital marketers should realize that the nature of competition in the Indian digital sector is changing. The success and survival of individual player is therefore depends on the manager's ability to understand customer's needs and to find effective ways to satisfy these needs irrespective of their gender.

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APPLICATION OF MULTI-AGENT SYSTEMS IN ORGAN TRANSPLANT COORDINATION

Vani Chakraborty⁷

ABSTRACT

Organ transplantation is considered one of the greatest invention of the 20th century. It lists in the top five medical marvels. However, it is a very complex activity, which requires coordination of many people and hospitals. There are legal, ethical, and organizational issues involving many different parties. It is compounded by the fact that a national repository for organ donation is at a nasal stage in India. Since organ transplant coordination involves lot of decision making in a distributed environment, a multi agent system can be developed to help in the organ transplant coordination. A multi agent system would help the transplant coordinator take a quick decision saving time. This paper proposes a multi agent system choosing a appropriate recipient for a transplant. The software agent would be developed using JADE and expert reasoning will be implemented using JESS.

KEYWORDS

Multi-Agent Systems, Organ Transplantation, JADE, JESS etc.

INTRODUCTION TO SOFTWARE AGENTS

Software agents differ from traditional programs in many ways. Software agents are personalized, social, continuously running and semi-autonomous. Soham, describes a software agent as a software entity, which functions continuously and autonomously in a particular environment often inhabited, by other agents and processes. In general, software agents must possess the following characteristics [1].

- *Reactivity*: The ability to selectively sense and act.
- *Autonomy*: Goal-directedness, proactive and self-starting behaviour.
- *Collaborative behaviour* can work in collaboration with other agent to achieve a common goal. “*Knowledge-level*” communication ability the ability to communicate with human and other agents with language more resembling human-like speech than symbol-level protocols.
- *Inferential capability* can act on abstract task specification using prior knowledge of general goals and preferred methods to achieve flexibility.
- *Temporal continuity* persistence of identity and state over long periods.
- *Personality* is the capability of manifesting the attributes of a believable character such as emotion.
- *Adaptivity* being able to learn and improve with experience.
- *Mobility* being able to migrate in a self-directed way from one host platform to another.

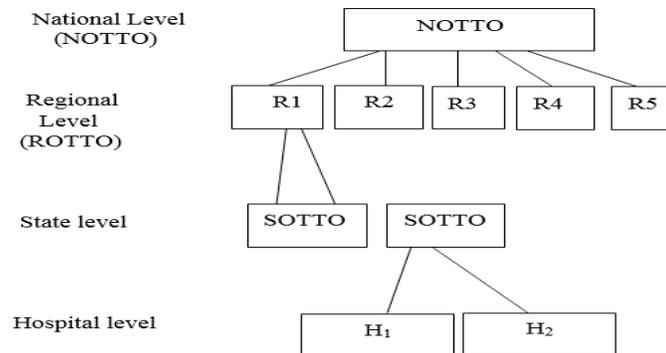
GENERAL ARCHITECTURE OF THE MULTI-AGENT SYSTEM

Organ transplant procedure has given a new lease of life to innumerable patients. Still there is a lot of gap between demand and supply. Every year there are around one-lakh corneal transplants required, but only 25000 transplants are done. Organ transplant requires the coordination of many different organisations, hospitals, donors, receivers, their relatives, and availability of expert staff. The use of multi agent system in such a complex scenario, will help save time and increase the transplant results. In addition, it helps the transplant coordinator make a right decision in a short span of time.

In this paper, we propose the structure of a multi-agent system. The architecture has been proposed taking into account Indian context. Guidelines has been taken from the success of the Spanish Organ Transplant coordination, which is considered one of the best in the world.

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Figure-1: Multi Agent System Hierarchy



Sources: Authors Compilation

The National Organ and Tissue Transplant Organisation (NOTTO) has been set up by the Government of India to take care of all organ transplant related issues. NOTTO has identified five regional centres termed as ROTTO (Regional Organ and Tissue Transplant Organisation) in the following states of Tamil Nadu, Maharashtra, Assam, West Bengal, and Chandigarh in India. They in turn interact with SOTTO (State Organ and Tissue Transplant Organisation) standing for the state wise unit, which in turn has to be in touch with the hospitals which do organ transplant in every state. The multi agent system proposed takes into account such a hierarchy.

According to the guidelines laid down by NOTTO, allocation will be done first based on city waiting list. If no recipient eligible in city waiting list, then allocation will be done to state and then to other states in the ROTTO and then to other ROTTO and then nationally. Most donated organs should be allocated within the city or at the most state, where retrieval has been done. Let the agent for the donor's hospital be represented by H_1 . They have a list of possible receptors of the organ. H_1 must perform the following process. H_1 will start a reasoning process to choose the most appropriate patient, according to the characteristics of the organ and the potential receptors. This process can involve the use of a standard rule-based expert system. Interaction with a human transplant coordinator would also be required. After choosing the potential receptor, information must be sent to the receiving hospital and the required logistics need to be arranged.

INTRA-HOSPITAL MULTI AGENT SYSTEM

Here, a hierarchical MAS for finding the most appropriate receipt of an organ is proposed. Each hospital has its own repository with the information of the local patients who are waiting for a transplant. We propose the construction of a MAS in each hospital that can link these data with the national coordination transplant process described in the previous section. The proposed agents are as follows. There are three agents in this multi agent system.

1. **Interface Agent:** To manage the communication between the whole coordination system and the hospital staff. It is possible for the authorized personnel to perform operations on the local patient's database like additions, removal, modifications, and queries and add data of new available organs.
2. **Transplant Coordinator Agent:** Receives from interface agent information about new organs that are available at the hospital. Search for a possible receiver is initiated. TC agent will have sub agents to perform the search and report the result. The allocation criterion for each of the organs are different and so each of the subagents does the job independently.
3. **Database Agent,** which receives messages from interface, and TC agents with requests to perform operations on the hospital databases, translating queries into database query language.

CONCLUSION AND FUTURE WORK

The above paper proposes a multi agent architecture for handling the organ transplant. In addition, an intra hospital multi agent system, which will take care of all the activities of a single hospital, is proposed. It can be expanded to run in other ROTTO and NOTTO centers as well. Other applications of multi agent system can also be considered. Multi agent system can be developed for determining the fastest transport route for the organ. In addition, a multi-agent system for scheduling the human / material resources needed to perform the transplant operation can also be designed.

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IMPACT OF INFORMATION COMMUNICATION TECHNOLOGY (ICT) ON EDUCATION SECTOR

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ABSTRACT

Information and communication technologies (ICT) are extremely influencing every discipline under the sun including Education. It is affecting every aspect of education from teaching learning to assessment and evaluation. It improves the effectiveness of education. It aids literacy movements. It enhances scope of education by facilitating mobile learning and inclusive education. It facilitates research and scholarly communication. Impact of ICT and its potential for the education field is manifold. It positively affects all the stakeholders of the education field. The current papers discuss the same along with the discussion of what factors which motivate and preventing in the use of ICT in educational field. In many countries, information and communication technology (ICT) has a lucid impact on the development of educational curriculum. This is the era of Information Communication Technology, so to perk up educational planning it is indispensable to implement the ICT in Education sector. Student can perform well throughout the usage of ICT. ICT helps the students to augment their knowledge skills as well as to improve their learning skills. For this purpose, I undertook study to know the impact of ICT on students' achievement and students' motivation. Based on the results of the study suggestions are given to educational institution and government.

KEYWORDS

ICT, Impact on Student, Factors Motivates, Prevents ICT, Learning Skills etc.

INTRODUCTION

ICT can be defined as the use of hardware and software for efficient management of information. ICT refers to the forms of technology that are used to transmit, store, create, share or exchange particular task. ICT has become a part of life. The discoveries and inventions in science and technology have improved the speed of communication. By making use of available tools, ICT is helping common person to fulfill his needs. It has become integral part of new era.

There is widespread belief that ICTs can and will empower teachers and learners, transforming teaching and learning processes from being highly teacher-dominated to student-centered, and that this transformation will result in increased learning gains for students, creating and allowing for opportunities for learners to develop their creativity, problem-solving abilities, informational reasoning skills, communication skills, and other higher-order thinking skills. However, there are currently very limited, unequivocally compelling data to support this belief.

Even in the most advanced schools in OECD countries, ICTs are generally not considered central to the teaching and learning process. Many ICT in education initiatives in LDCs seek (at least in their rhetoric) to place ICTs as central to teaching and learning.

OBJECTIVES OF THE STUDY

- To know the scope of ICT in education.
- To know the factors motivate or prevent teachers from using ICT in classroom teaching.
- To know the impact of ICT on students' achievement.
- To know the impact of ICT on students' motivation.
- To provide some findings and suggestions based on study.

RESEARCH METHODOLOGY

The study is based on secondary data consist of books, journals, websites etc.

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LIMITATIONS OF STUDY

- Time limitation,
- Used only secondary data for study.

MEANING OF ICT

Information and communications technology (ICT) is an extended term for information technology (IT) which stresses the role of unified communications and the integration of telecommunications (telephone lines and wireless signals), computers as well as necessary enterprise software, middleware, storage, and audio-visual systems, which enable users to access, store, transmit, and manipulate information.

Scope of ICT in Education

- A person from village also can refer the latest information and research every day.
- Television broadcast is one of the best communication media to educate students, farmers, and sportsman.
- The difficult experiments, advance surgery for medical students etc. can be viewed.
- LCD projectors can be used for effective training.
- The manpower problem, the human mistakes can be avoided by on-line examination.

“What Factors Support or Prevent Teachers from Using ICT in their Classrooms?”

Over the past 25 years, alongside a series of national and local programmes for the development of ICT in education, there have been research studies of the uptake of ICT in education. Many of these studies have shown that inspite of teacher training programmes, an increase in ICT resources and the requirements of national curricula there has been a disappointingly slow uptake of ICT in schools by the majority of teachers. Some of the reasons for this lack of more widespread uptake of ICT are discussed in more detail below.

FACTORS PREVENTING TO USING ICT IN THE CLASSROOM

Understanding the Need for Change: One of the most fundamental problems in education reform is that people do not have a clear and coherent sense of the reasons for educational change, what it is and how to proceed. Thus, there is much faddism, superficiality, confusion, failure of a change programme, unwarranted and misdirected resistance and misunderstood reform. They maintain that teachers who resist change are not rejecting the need for change but they are often the people who are expected to lead developments when they lack the necessary education in the management of change and are given insufficient long-term opportunities to make sense of the new technologies for themselves.

Questioning Professional Practice: There are many studies, which have shown that teachers are "not given to questioning their professional practice" (Underwood, 1997). Once they have finished their initial training they do not expect to need much further training therefore do not take the initiative to improve their practice and learn new skills. It is found that "many teachers are perfectly well satisfied with their practices and are unlikely to question prevailing educational processes". Therefore, if teachers see no need to change or question their current professional practice they may not accept the use of ICT in their teaching.

Pedagogical Practice versus Technical Skills: It is found that until recently the majority of courses offered to train teachers in the uses of ICT have focused on the technical aspects of ICT with little training about the pedagogical practices required and how to incorporate ICT in the curriculum. In many ICT professional development courses, teachers are not often taught how to revise their pedagogical practices, how to replace other traditional lessons without depleting the curriculum coverage and so on. This means that after teachers had attended a course they still did not know how to use ICT for teaching pupils, they only knew how to run certain software packages and to fix the printer. There were many such courses offered all round the UK, which had very little long-term impact on the uptake of ICT in schools.

Support from the Whole School: It is found that the most effective way to bring about the adoption of an innovation in schools is to engage the whole school in a democratic process of planning change. This means that all the teachers are involved in the decision to adopt ICT in the school and are supportive of any individual teacher going on a course and willing to learn from their new knowledge and skills when they return. If the school, and particularly the head teacher, are not committed to adopting change and particularly ICT, then if one teacher goes on a course, the rest of the school sets up antibodies to any new ideas which the unfortunate teacher brings back into the school. The last thing the other teachers will then do is to change their practice.



Losing Control of the Learning: The majority of teachers' first priority is to maintain order in the classroom and to have a controlled learning environment. Any suggestion of adopting very innovative teaching techniques such as using ICT is therefore seen as threatening this orderly pattern and therefore not desirable. There is a genuine fear amongst many teachers about ICT and scepticism of its value to their pupils.

Inadequate Resources: Even if the above problems are overcome, there is often a difficulty for teachers who have had some training to be able to use ICT because there are insufficient ICT resources in the school or there is not enough time to review them and plan lessons incorporating their use.

FACTORS CONTRIBUTING TO USING ICT IN THE CLASSROOM

External Factors

The external factors represent the many influences on teachers, which come from outside their sphere of control. These will include:

- The changes in society with the rapid growth in the uses of the Internet and ICT in general,
- School policies on using ICT,
- Opinions of colleagues,
- Responsibilities of the teacher,
- Pressure from parents and pupils.

Perceived Ease of Use

There are a number of factors, which have been identified which relate to the perceived ease of use of ICT, which in our case is for experienced practicing ICT/IT users. It is identified a wide range of skills and competencies which teachers felt they needed in order to find ICT easy to use, they are:

- Regular use and experience of ICT outside the classroom,
- Ownership of a computer,
- Confidence in using ICT,
- Easy to control the class,
- Easy to think of new lesson ideas,
- Can get help and advice from colleagues.

Perceived Usefulness

If teachers see no need to question or change their professional practice then they are unlikely to adopt the use of ICT. However, if they perceive ICT to be useful to them, their teaching and their pupils' learning, then they are more likely to have a positive attitude to the use of ICT in the classroom. There are number of factors, which will contribute to teachers' perceived usefulness of ICT. Some of these factors are given below:

- Makes my lessons more interesting,
- Makes my lessons more diverse,
- Has improved the presentation of materials for my lessons,
- Gives me more prestige,
- Makes my administration more efficient,
- Gives me more confidence,
- Makes the lessons more fun,
- Enhances my career prospects,
- Help(s) me to discuss teaching ideas.

IMPACT OF ICT ON STUDENTS' ACHIEVEMENT

The positive impact of ICT use in education has not been proven: In general, and despite thousands of impact studies, the impact of ICT use on student achievement remains difficult to measure and open to much reasonable debate.



Positive impact more likely when linked to pedagogy: It is believed that specific uses of ICT can have positive effects on student achievement when ICTs are used appropriately to complement a teacher's existing pedagogical philosophies.

'Computer Aided Instruction' has been seen to slightly improve student performance on multiple choice, standardized testing in some areas: Computer Aided (or Assisted) Instruction (CAI), which refers generally to student self-study or tutorials on PCs, has been shown to slightly improve student test scores on some reading and math skills, although whether such improvement correlates to real improvement in student learning is debatable.

Need for clear goals: ICTs are seen to be less effective (or ineffective) when the goals for their use are not clear. While such a statement would appear to be self-evident, the specific goals for ICT use in education are, in practice, are often only very broadly or rather loosely defined.

There is an important tension between traditional versus 'new' pedagogies and standardized testing: Traditional, transmission-type pedagogies are seen as more effective in preparation for standardized testing, which tends to measure the results of such teaching practices, than are more 'constructivist' pedagogical styles.

Mismatch between methods used to measure effects and type of learning promoted: In many studies, there may be a mismatch between the methods used to measure effects and the nature of the learning promoted by the specific uses of ICT. For example, some studies have looked only for improvements in traditional teaching and learning processes and knowledge mastery instead of looking for new processes and knowledge related to the use of ICTs. It may be that more useful analyses of the impact of ICT can only emerge when the methods used to measure achievement and outcomes are more closely related to the learning activities and processes promoted by the use of ICTs.

ICTs are used differently in different school subjects: Uses of ICTs for simulations and modeling in science and math have been shown to be effective, as have word processing and communication software (e-mail) in the development of student language and communication skills.

Access outside of school affects impact: The relationships between in-class student computer use, out of class student computer use and student achievement are unclear. However, students in OECD countries reporting the greatest amount of computer use outside school are seen in some studies to have lower than average achievement (the presumption is that high computer use outside of school is disproportionately devoted to computer gaming).

Users believe that ICTs make a positive difference: In studies that rely largely on self-reporting, most users feel that using ICTs make them learners that are more effective.

IMPACT ON STUDENT MOTIVATION

ICTs motivate teachers and students: There appears to be consensus that both teachers and students feel ICT use greatly contributes to student motivation for learning.

Access outside of school affects user confidence: (Not surprisingly) Students who use a computer at home also use them in school more frequently and with more confidence than pupils who have no home access.

Where to place computers has an impact: Placing computers in classrooms enables much greater use of ICTs for 'higher order' skills than placing computers in separate computer laboratories (indeed, fewer computers in classrooms may enable even more use than greater numbers of computers located in separate computer labs). Related to this is an increasing attention given to the use of laptops by both teachers and students (and in some places, 'computers-on-wheels'), as well as, to a much lesser extent, to the use of personal digital assistants and other mobile devices.

Models for successfully integrating ICT use in school and after school hours are still emerging: There are few successful models for the integration of student computer use at home or in other 'informal settings' outside of school facilities with use in school.

The appropriate ages for introducing computers to students are hotly debated: On a general level, appropriate ages for student ICT use in general are unclear. However, it is clear that certain uses are more or less appropriate, given student ages and abilities. Emerging research cautions against widespread use at younger ages.

ICTs can promote learner autonomy: Evidence exists that use of ICTs can increase learner autonomy for certain learners.

Gender affects impact: Uses of ICTs in education in many cases to be affected by the gender of the learner.



The 'pilot effect' can be an important driver for positive impact: Dedicated ICT-related interventions in education that introduce a new tool for teaching and learning may show improvements merely because the efforts surrounding such interventions lead teachers and students to do 'more' (potentially diverting energies and resources from other activities).

FINDINGS

From the study, it is found that the major impact of ICT on education can be classified as follows:

Impact on the Curriculum

- Traditional closed curriculum,
- Based on fixed content which students are required to learn and reproduce,
- Focuses on the skills needed to build and communicate knowledge,
- Goal oriented curricula and syllabuses can be changed according to learner's needs.

Impact on Teaching / Learning Process

- Motivates learner,
- Learning process can be anywhere and anytime,
- Students use interactive whiteboard in classroom.
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Impact on Teacher's Role: Teacher access to:

- Lesson plans,
- Network of teachers,
- Pedagogical techniques,
- Information resources.

Impact on Assessment / Evaluation

- Student accepts more responsibility for his or her own learning and its assessment, developing expertise in the process.
- Teacher application of curriculum can be monitored by analyzing test results. This can be used by teachers for assessing and improving their own performance meeting state and national standards

SUGGESTIONS

- Promote the development of e-learning resources;
- Facilitate public-private partnerships to mobilize resources in order to support e-learning initiatives;
- Promote the development of an integrated e-learning curriculum to support ICT in education
- Promote distance education and virtual institutions, particularly in higher education and training;
- Promote the establishment of a national ICT centre of excellence;
- Provide affordable infrastructure to facilitate dissemination of knowledge and skills through e-learning platforms;
- Promote the development of content to address the educational needs of primary, secondary, and tertiary institutions;
- Create awareness of the opportunities offered by ICT as an educational tool to the education sector;
- Facilitate sharing of e-learning resources between institutions

CONCLUSION

The major finding of this research is that availability and usage of ICT is very essential to improve the educational efficiency of students. This indicates that availability of ICT in Education is supportive for the students to improve their learning skills, as well as latest technologies of ICT are helpful for the students to better prepare their assignments and projects. Results also show that ICT can help to produce the productive knowledge of students related to their studies. Our findings suggest that more the availability and usage of ICT in education sector will increase then as a result, more the efficiency of students will increase. Students were agree that ICT provides vast knowledge to students through internet and digital libraries, so it can helpful to enhance the educational efficiency at local, regional and national level. After analyzing all the results, we conclude that ICT brings a positive impact on Education sector.

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ROLE OF E-COMMERCE IN THE CONTEMPORARY BUSINESS

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ABSTRACT

The present article emphasizes the role of e-commerce in the contemporary business management based on an extensive review of literature. The e-commerce, which has been limited to a number of specified companies, is entering a new era where many unspecified persons, including general consumers, are involved on the networks. The e-commerce and electronic business (e-business) have become an essential component of business strategy for economic development. The e-commerce has also significantly contributed to overall capital deepening and therefore, helped in increasing labour productivity. The e-commerce enables developing country producers to overcome traditional limitations associated with restricted access to information, high market-entry costs, and isolation from potential markets. Thus, e-commerce reshapes competitive dynamics in the traditional producer-driven and buyer-driven value chains such as automobiles, coffee and a host of other commodities and services. E-commerce forms part of a broader process of social change, characterized by the globalization of markets, the shift towards an economy based on knowledge and Information, and the growing dominance of technology. The e-commerce focuses primarily on enterprise's customers and e-business enlarges the connectivity of the enterprises to include their suppliers, employees and potential investors or partners. The rapid growth in e-business around the world has prompted many to look for better ways of measuring the phenomenon.

PROLOGUE

The electronic commerce is an act of buying and selling of goods and services, or the transmitting of funds or data over an electronic network primarily the Internet. In modern times, e-commerce facilitates the business transactions such as business-to-business, business-to-consumer, consumer-to-consumer or consumer-to-business. The terms e-commerce and e-business are often used interchangeably. The e-commerce has also grown remarkably in India. It is the second-largest user base in world, only behind China. It is growing at an unprecedented rate in India. Applications for electronic and mobile commerce are, however, developed sufficiently to cover all aspects of the market. Smartphone applications are implemented on different operating systems based on the installation of a Spree application, which allows partial web services to function because not all applications may work with these web services. The role of e-commerce in the contemporary business is primarily examined in this article, which is based on qualitative research methodology.

CONCEPT OF E-COMMERCE

Technological breakthrough in such areas as fax machines, telephone, video player, audio devices and televisions took many years to commercialize and measure their impacts on business. Compared to these breakthroughs, telecommunications, information communication technology, miniaturization, computers and Internet went through shorter product life styles, achieved widespread diffusion, reformed the nature of business operation, and enhanced competitive business environment instantly. This technological advancement has resulted in evolution and innovation of many products, services and business processes. One of them is the emergence of e-commerce or electronic commerce (Talha, 2011:17).

THE PRACTICE OF ELECTRONIC COMMERCE

Many of the implicit and explicit definitions of e-commerce rely on experience rather than on possible futures. There are various ways to define ecommerce by different people, different books or different parties. E-commerce is a general term for any type of business, or commercial electronic transaction that involves the transfer of information across the Internet. Electronic commerce is defined as the use of computers and electronic networks to conduct business with other businesses or with customers over the Internet or another electronic network. Electronic commerce consists of the buying and selling of products or services over electronic system such as internet and other computer network. Electronic commerce offers easier ways to access companies and individuals at very low cost in order to carry out day-to-day business transactions. Modern companies practice e-commerce to promote their products and services on search engine results pages, effective use of search engine advertisements and other forms. The United Nations Conference on Trade and Development has summarized the descriptive definitions of electronic commerce as stated below:

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E-commerce is commercial interaction over the internet, which can lower costs dramatically and facilitating new types of commercial transactions. As the Internet empowers citizens and democratizes societies, it is also changing classic economic paradigms. New models of commercial interaction are developing as businesses and consumers participate in an electronic marketplace and reap the resultant benefits. The Internet has the potential to revolutionize commerce and other areas. The Internet will revolutionize retail marketing. Commerce on the Internet could total tens of billions of dollars by the turn of the century (U.S. Executive Office of the President).

Electronic commerce is the carrying out of business activities that lead to an exchange of value across telecommunication networks (European Information Technology Observatory). E-commerce refers generally to all forms of transactions relating to commercial activities, including both organizations and individuals that are based upon the processing and transmission of digitized data, including text, sound, and visual images (Organization for Economic Co-operation and Development).

Electronic commerce or e-commerce has been defined as the ability to perform transactions involving the exchange of goods or services between two or more parties using electronic tools and techniques. It encompasses many diverse activities, including electronic trading of goods and services, online delivery of digital content, electronic fund transfers, electronic share trading, electronic bills of lading, commercial auctions, collaborative design and engineering, online sourcing, public procurement, direct consumer marketing, and after sales service (European Commission, 1998).

Electronic commerce, which has been limited to a number of specified companies, is entering a new era where many unspecified persons, including general consumers, are involved on the networks. In addition, its contents have come to include not only simple transactions of data concerning placement of orders or order acceptance but also to general commercial acts such as publicity, advertisements, negotiations, contracts, and fund settlements (International Trade and Industry, Japan). Electronic Commerce White Paper Electronic commerce, defined simply, is the commercial transaction of services in an electronic format (Transatlantic Business Dialogue). E-commerce builds on the structures of traditional commerce by adding more flexibility with computerized business transactions using the Internet, networks, and other digital technologies. E-commerce is commerce that is transacted electronically over the Internet, such as transact or facilitate the selling of products or services online (Malaysian International Chamber of Commerce and Industry).

Electronic commerce is about doing business electronically. It is based on the electronic processing and transmission of data, including text, sound, and video (UNCTAD, 2000). Electronic commerce or e-commerce refers to a wide range of online business activities for products and services. It also pertains to any form of business transaction in which the parties interact electronically rather than by physical exchanges or direct physical contact. E-commerce is usually associated with buying and selling over the Internet, or conducting any transaction involving the transfer of ownership or rights to use goods or services through a computer-mediated network. E-commerce is the use of electronic communications and digital information processing technology in business transactions to create, transform, and redefine relationships for value creation between or among organizations, and between organizations and individuals (Euro Info Correspondence Centre, 2002:09).

Electronic commerce involves the conduction of business communication and transactions over net works and through computers. It is an act of buying and selling of goods and services and the transfer of funds, through digital communications. It primarily includes all inter-company and intra-company functions (such as marketing, finance, manufacturing, selling, and negotiation) that enable commerce and use electronic mail, EDI, file transfer, fax, video conferencing, workflow, or interaction with a remote computer. Electronic commerce also includes buying and selling over the Web, electronic funds transfer smart cards, digital cash and all other ways of doing business over digital networks (Ardissono et. al, 2004:04).

Electronic commerce, or e-commerce, refers to economic activity that occurs online. E-commerce includes all types of business activity, such as retail shopping, banking, investing and rentals. Electronic commerce draws on technologies such as mobile commerce, electronic funds transfer, supply chain management, Internet marketing, online transaction processing, electronic data interchange (EDI), inventory management systems, and automated data collection systems. The buying and selling of products, services by business and consumers through an electronic medium, without using any paper documents constitute e-commerce (Niranjanamurthy et. al, 2013:14).

Electronic commerce or e-commerce refers to a wide range of online business activities for products and services. It also pertains to "any form of business transaction in which the parties interact electronically rather than by physical exchanges or direct physical contact. E-commerce is usually associated with buying and selling over the Internet, or conducting any transaction involving the transfer of ownership or rights to use goods or services through a computer-mediated network. Though popular, this definition is not comprehensive enough to capture recent developments in this new and revolutionary business phenomenon. A more complete definition is E-commerce is the use of electronic communications and digital information processing technology in business transactions to create, transform, and redefine relationships for value creation between or among organizations, and between organizations and individuals (Gupta, 2014:10).

Electronic commerce refers to the purchase and sale of goods and/or services via electronic channels such as the Internet. E-commerce was first introduced in the 1960s via an electronic data interchange (EDI) on value-added networks (VANs). The medium grew with the increased availability of Internet access and the advent of popular online sellers in the 1990s and early 2000s. Like any digital technology or consumer-based purchasing market, e-commerce has evolved over the years. As mobile devices became more popular, mobile commerce has become its own market. With the rise of sites like Facebook and Pinterest, social media has become an important driver of e-commerce. The changing market represents a vast opportunity for businesses to improve their relevance and expand their market in the online world (Arline, 2015:05).

The e-commerce concept relates to business or financial transactions that facilitate electronic payments of items purchased from online stores and service vendors. E-commerce covers a broad range of business activities, from digital content used for online consumption to conventional orders of online merchandise. Online banking is another form of e-commerce. E-commerce transactions are conducted between businesses, businesses and consumers, businesses and government, businesses and employees and consumers and businesses. E-commerce is an interactive collaboration between a consumer and merchant. In online shopping, there is no intermediary - just the interaction between the online buyer and store/service provider. E-commerce involves electronic financial transactions, which are conducted securely. E-commerce also describes the exchange of data between the financing, billing and payment aspects of electronic business transactions (Beal, 2016:06).

E-commerce refers to business over the Internet. Web sites such as Amazon.com, Buy.com, and eBay are all e-commerce sites. The two major forms of e-commerce are Business-to-Consumer (B2C) and Business-to-Business (B2B). E-commerce is the buying and selling of goods and services on the Internet or other computer network. Any brick and mortar store can become an e-commerce business by adding a virtual storefront with an online catalog. In most cases, e-business refers exclusively to Internet businesses, but it may also refer to any business that uses Internet technology to improve productivity and profitability (Tech Terms, 2016:18).

E-commerce and electronic business (e-business) have become an essential component of business strategy for economic development. E-commerce trading practically supports the users with complete information and comments on the products and vendors in global business. E-commerce is the transaction of goods and services over the Internet. E-Commerce practitioners have long tried to promote the technological characteristics of the Internet to support better information seeking and decision making by consumers online. Continual innovations and achievements in enabling technologies are necessary for developed countries to sustain their leading positions in the global economy. Technological, organizational, and environmental contextual factors adapt the ability of e-businesses. Emerging e-commerce systems are anticipated to be available anytime, anywhere, and utilizing various official or personal computing devices. E-commerce trading practically supports the users with complete information and comments on the products and vendors in global business.

The various definitions of e-commerce given above suggest that e-commerce can be defined both in the narrow and broader sense. In narrow terms, e-commerce covers all transactions conducted on closed or open network using non-proprietary protocols, like the Internet, or over proprietary networks like intranet or extranet. While this definition excludes discrete sales (sporadic sales that do not involve substantial amounts) and transactions involving the use of electronic data interchange (EDI) and electronic funds transfer (EFT) and other electronic networks that were extensively used prior to the 1990's, it does not exclude electronically based transactions of the pre-internet era and includes the new possibilities of the future mode of transactions. In broader terms, it includes all those communication applications that support commercial activities. This definition focuses on e-commerce as a strategy or business model, rather than on e-commerce as an application or technology. In brief, the broader term encompasses e-commerce business activity and the narrower definition covers e-commerce transactions only. Various definitions given by the same organization have also changed over time. This points to the fact that an e-commerce definition is dynamic and varies with the objective one wants to measure. It is also important to note that e-commerce is more than a technology; it is a business model built around the application of information and communication technologies to any aspect of the value chain for products and services.

PROCESS OF E-COMMERCE

E-commerce involves a multiplicity of transactions and a large number of chains to complete the cycle of transactions. E-commerce begins with the customer who accesses the Internet by dialing a local phone number or using a direct connection. The customer surfs the Internet using a web browser to locate the company's cybermall and then browses through the cybermall itself. Upon selection of the products to be purchased, he can click on a payment icon that provides the necessary credit (or debit) card information to consummate the sale. The company permits the customer to download the products or services in digital form after the payment is complete. The customer can contact the service provider through a video conference in respect of procuring services. The company also makes shipping arrangements and the customer may download the payment receipt and the shipping information. This form of e-commerce gives the customer's credit facilities but is typified by the 'cash' trade cycle where a 'cash' payment is taken to include settlement at the time of purchase by a credit card or some form of e-cash. The first stage of the trade cycle involves 'search' and the facilities of the Internet can be used to locate sites offering or advertising, appropriate goods or

services; a function, as already mentioned, that is similar to an electronic market. In many instances, Internet sites offer only information and any further steps down the trade cycle are conducted on the telephone or at a conventional shop outlet. The delivery may be in electronic form or by a home delivery service depending upon the nature of the goods or service being offered. The final chain of the e-commerce transaction involves after-sales service (Whiteley, 2000:21).

E-COMMERCE AND ECONOMIC DEVELOPMENT

E-commerce has generated new dimensions in economic growth and has helped many countries to prosper economically in recent years. It has affected the investment climate for furthering development. The studies have revealed different effects on productivity and growth. The e-commerce has also significantly contributed to overall capital deepening and therefore, helped in increasing labour productivity. The rapid technological progress in the production of ICT goods and services has also contributed to higher multi-factor productivity growth in the ICT-producing sector. The lower transaction costs and more rapid innovation have considerably improved the overall efficiency of the national economy.

It is generally believed that e-commerce enables developing country producers to overcome traditional limitations associated with restricted access to information, high market-entry costs, and isolation from potential markets (April and Craddock, 2000:03). The e-commerce has affected the global economy but the developing countries fall further technologically behind the industrialized world. The new information and communication technologies would deliver ever-higher rates of inflation-free growth. The e-commerce clearly has a positive impact on the business sector and enhanced the macroeconomic growth and productivity growth across the globe. However, there will be no productivity growth for many developing countries if they fail to catch up technologically with the industrialized world (United Nations Conference on Trade and Development, 2001:19). It is now widely accepted that information and communications technologies (ICT) and e-commerce are at the centre of an economic and social transformation that is affecting all countries (Chan and Lee, 2001:08).

The revolution of e-commerce presents micro- and macro- economic challenges, not only for organizations, but also for governments (Callioni, 2004:07). The business processes have improved considerably due to application of e-commerce technology in modern times. The e-commerce has brought about a new age of innovation led development. The link between ICT and development is represented by access to networks, information and knowledge. ICT reduces market imperfections, as buyers and sellers are aware of the present market situations and can improve their business prospects tremendously. Thus, e-commerce reshapes competitive dynamics in the traditional producer-driven and buyer-driven value chains such as automobiles, coffee and a host of other commodities and services (Purohit and Purohit, 2005:16).

Organizations that are going to adopt e-commerce need to consider restructuring their entire business and create new strategies. They also need to implement new management processes, change their business culture, follow different procedures for managing their employees and build a well-structured and secure payment system (Well, 2005:20). Faster rates of economic growth can be achieved using IT as the driving factor in the economic policies of the worldwide economies. However, developing countries do not have appropriate infrastructure to support the development of IT. Most commonly, some of the major concerns with the advent of IT in such countries are the inability to invest in the IT field due to poor financial infrastructure and inadequate human power having knowledge of IT (Kodakanchi et al., 2006:12).

E-commerce forms part of a broader process of social change, characterized by the globalization of markets, the shift towards an economy based on knowledge and Information, and the growing dominance of technology. In order to allow a smooth transition to e-commerce, investments are required in the social infrastructure and skills to allow the use of the technology in a way that is compatible with the local circumstances, cultures and abilities of users in developing countries. E-commerce provides developing country producers with opportunities for accessing new international markets at low cost and minimal capital investment, for improving competitiveness and customer services, and for reducing transaction costs and overheads. It also enables producers to overcome traditional limitations associated with restricted access to information, high market-entry costs, and isolation from potential markets (Hamed, 2009:11).

The Internet has resulted in the emergence of virtual markets with four primary distinctive characteristics, which are real time, shared, open and global. The application of Internet is divided into three major activities that are publishing corporate information, conducting electronic commerce and business transformation. The greatest feature of the Internet is the absence of intermediaries; the manufacturers are able to sell their product relatively easier to buyers via Internet. E-commerce today is no longer technological issue, but is also a business issue. E-commerce involves a number of forms, varying level of cost and complexity, depending on business need. For the past few years, across a globe, e-commerce has improved significantly, but some issues remain elusive (Talha, 2011:17).

EU's agenda is focused in the raise of efforts for profit from utilization of information technology like a fast way for overcome the crisis. The utilization of information technology would be a good way for businesses that operate in Albania to better overcome the crisis and to continue successful their activity. The economy of Albania would improve commendably based on adoption of e-



commerce technique (Acka, 2012:01). Along with the substantial and rapid development of ICT, e-commerce technologies have emerged as an important type of knowledge capital for operating a business. Information and communication affect to both the supply and demand sides. ICT have effects on the economic behavior of consumers through the utility function on the demand side, and it is influential on the producer treatment on the supply side. The relationship between ICT and economic growth and efficiency on the supply side of the economy is determined by some complementary factors including organization and management experience, organizational and legislative part, and communications structure as an output on the supply side of the economy, among other factors entering into the capital, thereby leading to the improvement of the production process through capital deepening, advances in technology, and the quality of the labor force. The governments should adopt appropriate policies and provide the necessary conditions for the development and promotion of ICT. The government should also pay further attention to economic planning in order to improve e-commerce indicators, so that the total government measurements could eventually lead to economic development in the country. Our empirical results provided a good reference for other developing countries (Anvari and Norouzi, 2016:02)

The e-commerce has positive impact on macroeconomic variables as GDP, welfare, wages and terms of trade. Studies have reported that e-commerce would become an important tool for national development by reducing costs, increasing efficiency, reducing time and distances. The e-commerce would actually work in favour of developing countries, as most of them rely heavily on such taxes for their government budgets and will be net importers of e-commerce in the medium term. The e-commerce has also brought about greater business consolidation, the formation of strategic alliances and greater focus on the provision of differentiated and specialized products and services across the globe.

ROLE OF E-COMMERCE IN THE NEW MILLENNIUM

E-commerce encompasses many areas, which include electronic catalogues that refers to means whereby sellers can communicate their offerings to potential buyers. In addition, electronic data interchange that refers to a particular family of standards for expressing the structured data that represent E-commerce transactions; and electronic auctions, which is a particular set of mechanisms that help in the setting of prices. E-commerce can be understood as a system designed as an online storefront that manages orders and inventory, processing transactions, where people can buy and sell goods and services, including sports, computers, hobbies, antiques, electronics, books, music, automobiles, holidays and much more, all around the world. The goods and services available through E-commerce can be finished goods as well as raw materials for the manufacture of other goods or services that are provided for the same reason.

E-commerce is known to use some tools such as electronic commerce service and a particular payment system, to make its use easier for customers and to secure transactions. Modern electronic commerce typically uses the World Wide Web for at least one part of the transaction's life cycle, although it may also use other technologies such as e-mail. A Smartphone is a mobile phone with an advanced mobile operating system that combines features of a computer operating system with other features useful for mobile or handheld use. They typically combine the features of a cell phone with those of other popular mobile devices, such as personal digital assistant (PDA), media player and GPS navigation unit. Most smart phones can access the Internet, have a touch screen user interface, can run third-party apps, music players and are camera phones. Most smart phones produced from 2012 onwards also have high-speed mobile broadband 4G LTE internet, motion sensors, and mobile payment. Smart phone applications for e-commerce have become a new way of life in the present times.

The e-commerce has become an integral part of everyday life since it is a necessity for most people, particularly in the urban areas. This was the predecessor of online commerce, which started in India post 2000. The e-commerce offers greatest opportunities in the retail sector since it provides a dramatic change from brick and mortar establishments to virtual shops, which could operate for a fraction of the cost. An in-depth understanding of the legal regime and the possible issues that an e-commerce business would face coupled with effective risk management strategies has been the need of the hour for e-commerce businesses to thrive in this industry (Nishith Desai Associates, 2015:15).

E-commerce can be an extraordinary job and economic development tool in the new millennium. The e-commerce has become most common especially in the developed world. It is in the stage of infancy in India and other developing nations. The US, Europe and other nations have not capitalized on e-commerce as an avenue for a full participation in global trade by their SMEs. Very little has been done to develop the trade finance structure and capital goods trade settlement infrastructure of e-commerce platforms so that these provide the full array of financial alternatives for SMEs wishing to engage in importing, exporting and investing (Laraque, 2016:13).

CONCLUSION

The explosion of e-commerce has created new phenomena in our lifestyle especially in shopping activities. Consumers can easily buy products or services like magazines and airlines tickets via Internet. The e-commerce focuses primarily on enterprise's customers and e-business enlarges the connectivity of the enterprises to include their suppliers, employees and potential investors



or partners. The security aspect is expected to improve such as introduction of new protocol like Ipv6 and it is within enterprise control, tax and legal aspect beyond enterprise's discretion as it involves government intervention and global commitments for more standardize definition and regimes. The rapid growth in e-business around the world has prompted many to look for better ways of measuring the phenomenon.

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83. Retrieved from <https://pierpaolog.wordpress.com/>
84. Retrieved from <https://www.coursehero.com/file/13111451/Business-Today-and-the-Internet/>
85. Retrieved from <https://www.coursehero.com/file/p1tbh82/The-buying-and-selling-of-goods-and-services-over-the-Intern...>
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87. Retrieved from <https://www.coursehero.com/file/paigld7/is-the-buying-and-selling-of-goods-and-services-over-the-int...>
88. Retrieved from <https://www.coursehero.com/file/ptvqc7/and-Development-OECD-E-commerce-refers-generally-to-all-forms...>
89. Retrieved from <https://www.linkedin.com/in/ali-atiyat-27a0b138>
90. Retrieved from <https://www.linkedin.com/in/nishant-sirohi-9a60b2101>
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96. Retrieved from <https://www.scribd.com/document/237814989/E-Commerce-in-India>
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100. Retrieved from <https://www.scribd.com/document/334680388/33126745-E-Business-Assignment-Rasheed-Soetan>
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103. Retrieved from <https://www.scribd.com/document/93248400/Role-of-Ecommerce-in-21st-Century>
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IMPLEMENTING DATA STORAGE SECURITY IN CLOUD COMPUTING USING OPTIMIZED FISHER-YATES ALGORITHM

A. Mahesh Babu¹³ Dr. G. A. Ramachandra¹⁴

ABSTRACT

In distributed computing information stockpiling is a huge issue because the whole information live over a set of interconnected asset pools that empowers the information to be gotten to through virtual machines. It moves the application programming and databases to the vast server farms where the administration of information is really done. As the asset pools are arranged over different corners of the world, the administration of information and administrations may not be completely dependable. In this way, there are different issues that need to be tended to regarding the administration of information, administration of information, security of information, security of information and so on. Nevertheless, the protection and security of information is very difficult. To guarantee protection and security of information very still in distributed computing, we have proposed a compelling and a novel methodology to guarantee information security in distributed computing by method for concealing information inside pictures emulating is the idea of Image Shuffling using Optimized Fisher-Yates Algorithm. The fundamental objective of this paper is to keep information access from cloud information stock piling focuses by unapproved clients. This plan perfectly stores information to cloud database and information stock piling focuses and recovers information from it when it is required.

KEYWORDS

Cloud Computing, Data Storage Security, Steganography and Image Shuffling, Fisher-Yates Algorithm etc.

INTRODUCTION

Cloud computing is available over the internet to share data, applications and hardware. Cloud computing provides unlimited infrastructure to store data and execute the applications. The customers do not need to own the infrastructure. One of the main problems with cloud based computing services, is that the uncertainty about the level of information security offered by these services. Infrastructure-as-a-service (IaaS) of cloud computing system is seen as providing all access control security. In the clouds, data are sent to and processed in the environment that is not under the user or data owner control. Therefore, it could potentially be compromised either by clouds insiders or by other users sharing the same resource. Data must be secured during all processing stages including: Uploading, processing, storing, streaming and/or visualizing. Policies and security requirements must be bound to the data. To enforce these policies, the corresponding security mechanisms should be in place.

1. DATA SECURITY ISSUES IN THE CLOUD DATA BASE

Privacy and Confidentiality

Once the client host data to the cloud database there should be some guarantee that access to that data will only be limited to the authorized access. Inappropriate access to customer sensitive data by cloud personnel is another risk that can pose potential threat to cloud data. Assurances should be provided to the clients and proper practices and privacy policies and procedures should be in place to assure the cloud users of the data safety. The cloud seeker should be assured that data hosted on the cloud database would be confidential.

Data Integrity

With providing the security of data, cloud service providers should implement mechanisms to ensure data integrity and be able to tell what happened to a certain dataset and at what point. The cloud provider should make the client aware of what particular data is hosted on the cloud, the origin and the integrity mechanisms put in place. Cloud computing acting as a hot topic in IT industry. Cloud computing is internet based development and is used in computer technology. Cloud computing manages and schedules the computing resources through network, and constitutes a large computing resources pool which can provide service to users on their demand.

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The network is called “cloud”. Resources in cloud is seems that can be extended unlimitedly, got anytime, used on-demand and paid according to apply. It dynamically delivers everything as a service over the internet based on user demand, such as network, operating system, storage, hardware, software, and resources.

These services are classified into three types: Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS).

There are Four main Types of Cloud

Public Cloud: The cloud computing resources are shared outside, anyone can use it and some payment maybe required.

Private Cloud: It is opposite to public cloud, private cloud’s resources are limited to a group of people or a single person, like a staff of a company or an individual etc.

Hybrid Cloud: This is a mixture of previous two clouds, some cloud computing resources are shared outside but some do not which depends on requirement.

Community Cloud: This is a special cloud to make use of cloud computing features. More than one community shares a cloud to share and reduce the cost of computing system.

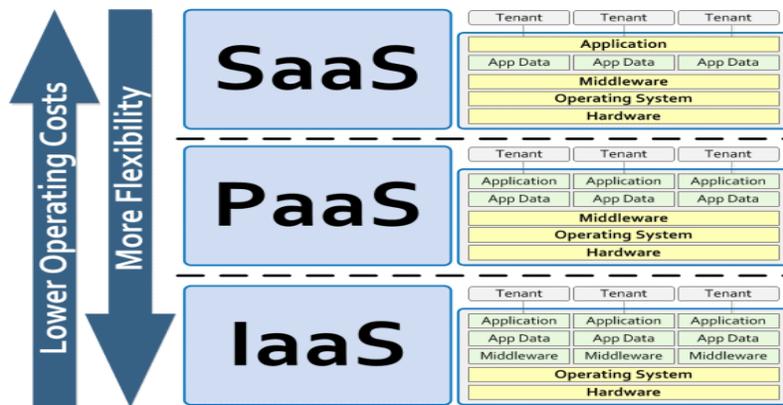
Data storage in Cloud Offers so Many Benefits to Users

- It provides unlimited data storage space for storing user’s data.
- Users can access the data from the cloud provider via internet anywhere in the world and by using the different kind of client devices.

We do not buy any storage device for storing our data and have no responsibility for local machines to maintain data.

Each service delivery model has different possible implementations, as in Figure 1, which complicates the development of standard security model for each service delivery model. Moreover, these service delivery models may coexist in one cloud platform the security management process.

Figure-1: Cloud Service Delivery Model



Sources: <http://www.ibm.com>

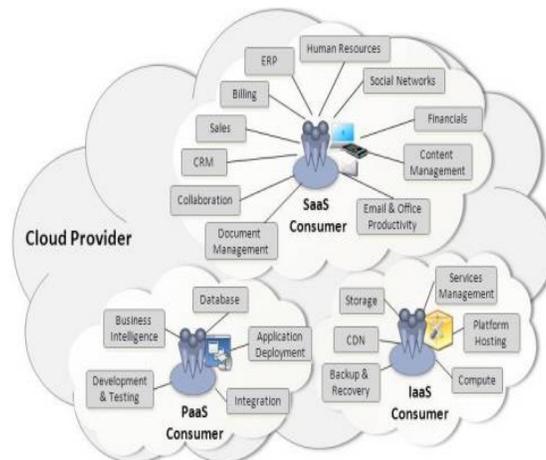
It is clear that the security issue has played the most important role in hindering cloud-computing acceptance. Without doubt, putting your data, running your software on someone else’s hard disk using someone else’s CPU appears daunting to many. Well-known security issues such as data loss, phishing, and botnet (running remotely on a collection of machines) pose serious threats to organization’s data and software. Moreover, the multi-tenancy model and the pooled computing resources in cloud computing has introduced new security challenges that require novel techniques to tackle with. For example, hackers can use cloud to organize botnet as cloud often provides more reliable infrastructure services at a relatively cheaper price for them to start an attack.

2. PROBLEM STATEMENT

Managing data-when sending to the cloud database and when retrieving the data from the cloud database plays a crucial role in cloud computing. The main issue with data- in cloud, computing is providing security and unauthorized user may have access the data in a shared environment. However, now a-days storage devices are powered by encryption methodologies, which restrict unauthorized access to data to share extents. If the encryption and decryption keys are accessible to malicious users encryption methodologies fails to provide authorized access. Another approach to provide security in data-at-rest is to hide data behind images, following the concept of steganography. This paper aims to provide a better security through steganography.

System Architecture: Schematic network architecture for our proposed model for cloud data storage is illustrated in Figure 2. In this architecture, we have different network entities, which can be identified as follows:

Figure-2: Architecture of Cloud Data Security Model



Sources: Authors Compilation

Users or organizations who have their data for storage in the cloud and rely on the cloud for data computation.

A cloud service provider, which has significant resources of grayscale images of various sizes, a database that maintains records of file names, number of characters present etc. Security Model our proposed model aims to secure data of cloud database. Not by physically storing the data, instead of the data transferring over the network. This underlining concept is known as steganography.

3. PROPOSED SYSTEM

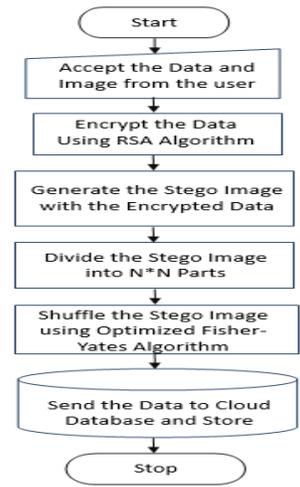
The proposed system is improving the security of the data sending to the cloud database by Image Shuffling using Optimized method of Fisher-Yates algorithm, in this method the data will be encrypted and a stego image is generated which is shuffled using the Optimized method of Fisher-Yates algorithm and sent to the cloud database.

The shuffled and stego image will be retrieved from the cloud database in which original data is available, from which the image is unshuffled and data is retrieved from stego image then decrypted then displayed to the user.

When sending the data to the cloud database use the following steps.

- Step1:** Accept the data from the user including the image.
- Step2:** Encrypt the data using RSA algorithm.
- Step3:** Hide the data in to the image and generate the 'Stego Image'.
- Step4:** Divide the Stego Image into the N*N Parts.
- Step5:** Shuffle the parts of created in Step4 using Optimized Fisher-Yates algorithm.
- Step6:** Send tis data to the Cloud Database.

Figure-3: Flow Chart Represents Sending the Data to the Cloud Database



Sources: Authors Compilation

4. FISHER YATES ALGORITHM

The Fisher–Yates shuffle is an algorithm for generating a random permutation of a finite set—in plain terms, the algorithm shuffles the set of given values using random generator. The Fisher–Yates shuffle, in its original form, was described in 1938 by Ronald Fisher and Frank Yates in their book *Statistical tables for biological, agricultural and medical research*. Their description of the algorithm used pencil and paper a table of random numbers provided the randomness. The basic method given for generating a random permutation of the numbers 1 through N goes as follows:

Algorithm1: Original Fisher-Yates Algorithm

```

Input: n: The Number of Blocks, SourceArray[n]
Output: Shuffle Order Pattern, ShuffleArray[n]
Start ← The Start value of the Shuffle
Stop ← The Stop value of the Shuffle and is equal to n
for i = 0 to Stop do
  Rand=Generate a RandomValue(0, n)
  Initialize Count=0
  for j=0 to Count-1
    if ShuffleArray[j] == Rand
      bool check=true;
      break;
    else
      Count++
  End if
End for
If(!check)
  ShuffleArray[i]=Rand;
End for
  
```

Drawbacks in Fisher – Yates algorithm

- Takes more time for large number of shuffles.
- There are many possibilities for generating duplicate values, which is frustrating.

To overcome the above drawbacks we propose a new binomial method to optimize the Fisher-Yates algorithm:

- Divide the total count into 2 sets.
- Use Fisher – Yates algorithm to generate the first half of the permutations.

- Use Fisher – Yates algorithm to generate the second half of the permutations.

Modified algorithm is like

Algorithm2: Optimized Binomial Split of Fisher-Yates Algorithm

```

Input: n: The Number of Blocks, SourceArray[n]
Output: Shuffle Order Pattern, ShuffleArray1[n/2], ShuffleArray2[n/2] ShuffleArray[n]
Start1 ← The Start value of the First Shuffle
Stop1 ← The Stop value of the First Shuffle and is equal to n/2
Start2 ← The Start value of the Second Shuffle and is equal to n/2
Stop2 ← The Stop value of the Second Shuffle and is equal to n
  for i = 0 to Stop1 do
    Rand=Generate a RandomValue(0, n)
    Initialize Count=0
    for j=0 to Count-1
      if ShuffleArray1[j] == Rand
        bool check=true;
        break;
      else
        Count++
    End if
  End for
  If(!check)
    ShuffleArray1[i]=Rand;
    check=false
  End if
End for
  for i = Stop1+1 to Stop2 do
    Rand=Generate a RandomValue(n/2 +1, n)
    Initialize Count=0
    for j=0 to Count-1
      if ShuffleArray2[j] == Rand
        bool check=true;
        break;
      else
        Count++
    End if
  End for
  If(!check)
    ShuffleArray2[i]=Rand;
    check=false
  End if
End for
Merge ShuffleArray1 and ShuffleArray2 into ShuffleArray

```

Still to improve the performance we propose a new quadruple split method to the Fisher-Yates algorithm:

- Divide the total count into 4 sets.
- Use Fisher – Yates algorithm to generate the first half of the permutations.
- Use Fisher – Yates algorithm to generate the second half of the permutations.

Modified algorithm is like

Algorithm3: Optimized Quadruple Split of Fisher-Yates Algorithm

```

Input: n: The Number of Blocks, SourceArray[n]
Output: Shuffle Order Pattern, ShuffleArray1[n/4], ShuffleArray2[n/4], ShuffleArray3[n/4], ShuffleArray4[n/4]
ShuffleArray[n]

```



```
Start1 ← The Start value of the First Shuffle
Stop1 ← The Stop value of the First Shuffle and is equal to n/4
Stop2 ← The Stop value of the Second Shuffle and is equal to n/2
Stop3 ← The Stop value of the Third Shuffle and is equal to 3n/4
Stop4 ← The Stop value of the Fourth Shuffle and is equal to n
  for i = 0 to Stop1 do
    Rand=Generate a RandomValue(0, n/4)
    Initialize Count=0
    for j=0 to Count-1
      if ShuffleArray1[j] == Rand
        bool check=true;
        break;
      else
        Count++
    End if
  End for
  If(!check)
    ShuffleArray1[i]=Rand;
    check=false;
  End if
End for

for i = Stop1+1 to Stop2 do
  Rand=Generate a RandomValue(n/2 +1, n)
  Initialize Count=0
  for j=0 to Count-1
    if ShuffleArray2[j] == Rand
      bool check=true;
      break;
    else
      Count++
    End if
  End for
  If(!check)
    ShuffleArray2[i]=Rand;
    check=false
  End if
End for

for i = Stop2+1 to Stop3 do
  Rand=Generate a RandomValue(n/2 +1, 3n/4)
  Initialize Count=0
  for j=0 to Count-1
    if ShuffleArray3[j] == Rand
      bool check=true;
      break;
    else
      Count++
    End if
  End for
  If(!check)
    ShuffleArray3[i]=Rand;
    check=false;
  end if
End for

for i = Stop3+1 to Stop4 do
  Rand=Generate a RandomValue(3n/4, n)
  Initialize Count=0
  for j=0 to Count-1
    if ShuffleArray4[j] == Rand
      bool check=true;
```

```

    break;
  else
    Count++;
  End if
End for
If(!check)
  ShuffleArray4[i]=Rand;
  check=false;
end if
End for

```

Merge ShuffleArray1, ShuffleArray2, ShuffleArray3 and ShuffleArray4 into ShuffleArray

4.1 Metrics calculated for Image Shuffling Algorithm

We have checked the following metrics for the Image Shuffling algorithm:

- Execution Time of Algorithm,
- NPCR (Number of Pixels Chang Rate),
- UACI (Unified Average Changing Intensity),
- Image Histograms,
- PSNR (Peak Signal-to-Noise Ratio).

4.1.1 Execution Time Comparisons

Below table shows the execution time comparisons for the Fisher-Yates algorithm and our proposed algorithm by dividing the total count of values into 2sets and 4sets.

Table-1: Shows Execution Time Calculations of Our Algorithm Compared with Fisher-Yates Original Algorithm

| S. No. | N Value (n =N*N Number of Blocks) | Fisher-Yates Algorithm | Binomial Split of Fisher-Yates Algorithm | Quadruple Split of Fisher-Yates Algorithm |
|--------|--------------------------------------|---------------------------|---|--|
| | | Time in Seconds | Time in Seconds | Time in Seconds |
| 1 | 40 | 0.12 | 0.09 | 0.059 |
| 2 | 50 | 0.24 | 0.118 | 0.082 |
| 3 | 60 | 0.341 | 0.175 | 0.142 |
| 4 | 70 | 0.529 | 0.268 | 0.258 |
| 5 | 80 | 0.738 | 0.384 | 0.315 |
| 6 | 90 | 1.113 | 0.773 | 0.432 |
| 7 | 100 | 2.564 | 0.833 | 0.55 |
| 8 | 110 | 2.685 | 1.232 | 0.763 |
| 9 | 120 | 2.947 | 1.631 | 0.985 |
| 10 | 130 | 5.537 | 2.144 | 1.346 |
| 11 | 140 | 6.3 | 2.984 | 1.628 |
| 12 | 150 | 9.621 | 3.805 | 2.282 |
| 13 | 160 | 10.306 | 4.732 | 3.013 |
| 14 | 170 | 14.545 | 6.559 | 3.881 |
| 15 | 180 | 23.144 | 8.476 | 4.436 |
| 16 | 190 | 31.548 | 12.24 | 5.393 |
| 17 | 200 | 36.95 | 15.821 | 7.465 |
| 18 | 250 | 73.445 | 30.582 | 16.603 |
| 19 | 300 | 173.721 | 63.518 | 30.271 |
| 20 | 350 | 265.664 | 137.896 | 59.404 |
| 21 | 400 | 399.235 | 229.561 | 109.288 |
| 22 | 450 | 723.374 | 377.851 | 173.187 |
| 23 | 500 | 1130.636 | 554.427 | 292.587 |

Sources: Authors Compilation

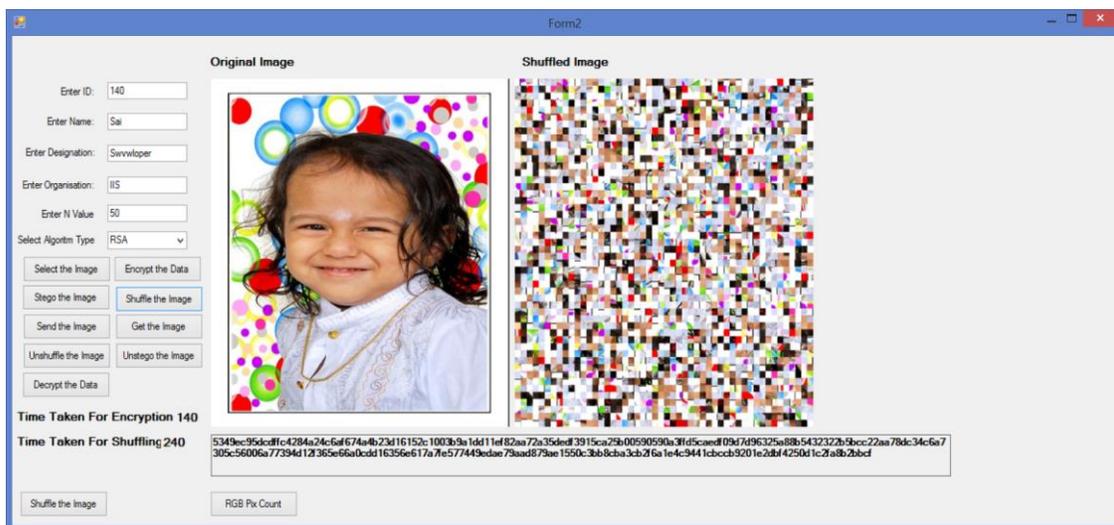
From this execution, we have found that our algorithm with 2sets is taking half of the time and with 4sets is taking one-fourth of the time as compared with the original Fisher-Yates algorithm; by this, we have proved that our proposed algorithm for shuffling is efficient as compared with the original Fisher-Yates algorithm.

The time complexity of the Fisher-Yates algorithm is $n \log n$ and we can say that time complexity of Fisher-Yates algorithm with Binomial split is $(n \log n)/2$ and time complexity of Fisher-Yates algorithm with Binomial split is $(n \log n)/4$.

Results Screens to Show the above Time Comparisons

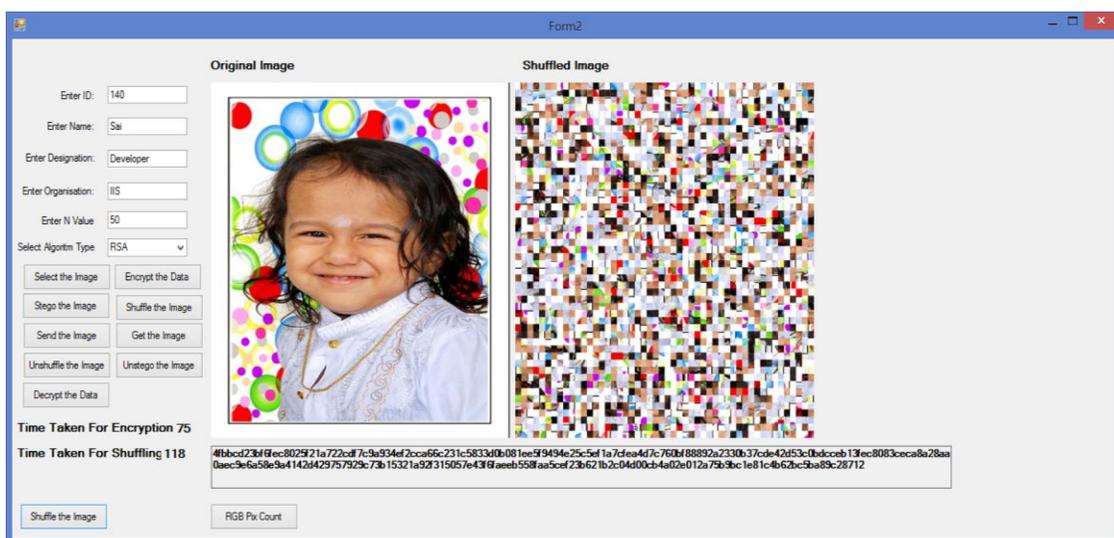
In a method we have used C# programming language for coding, Visual Studio as the Ide to develop the application, Microsoft Azure Data services cloud to store and retrieve the data. Below we have included some of the results and screen shots of the implementation.

Figure-4: Image shuffled with 50X50 parts using the Fisher-Yates Original Algorithm



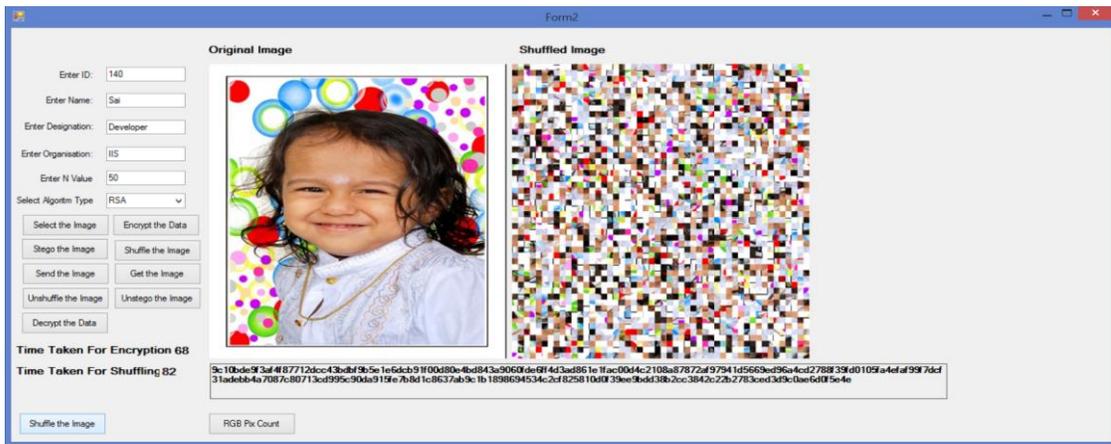
Sources: Authors Compilation

Figure-5: Image shuffled with 50X50 parts with Binomial Split of Fisher Yates Algorithm



Sources: Authors Compilation

Figure-6: Image shuffled with 50X50 parts with Quadruple Split of Fisher Yates Algorithm



Sources: Authors Compilation

Figure-7: Image shuffled with 100X100 parts with original Fisher-Yates Algorithm



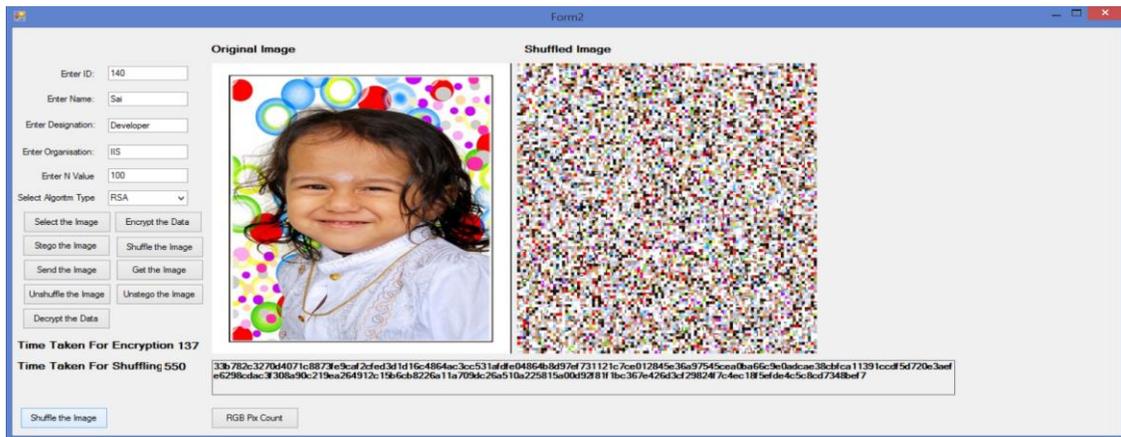
Sources: Authors Compilation

Figure-8: Image shuffled with 100X100 parts with Binomial Split of Fisher Yates Algorithm



Sources: Authors Compilation

Figure-9: Image shuffled with 100X100 parts with Quadruple Split of Fisher Yates Algorithm



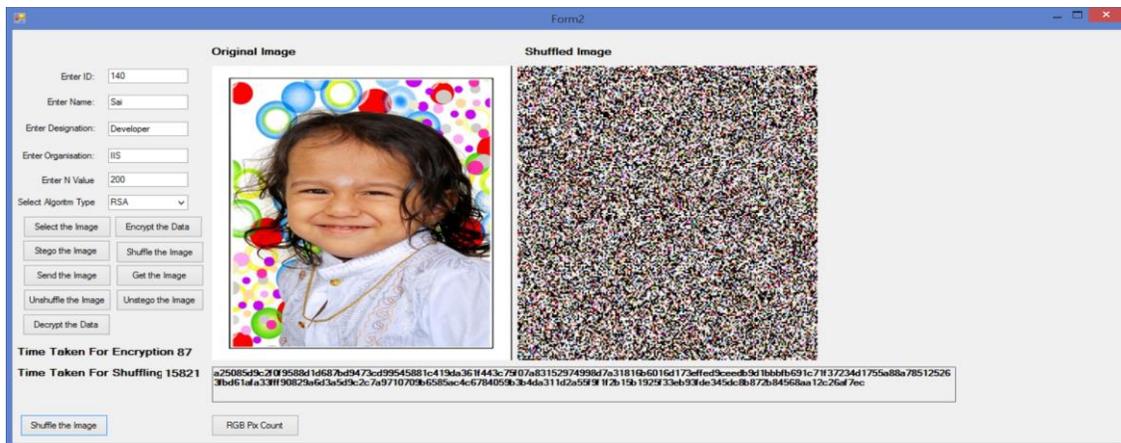
Sources: Authors Compilation

Figure-10: Image shuffled with 200X200 parts with original Fisher-Yates Algorithm



Sources: Authors Compilation

Figure-11: Image shuffled with 200X200 parts with Binomial Split of Fisher Yates Algorithm



Sources: Authors Compilation

Figure-12: Image shuffled with 200X200 parts with Quadruple Split of Fisher Yates Algorithm



Sources: Authors Compilation

4.1.2 NPCR (Number of Pixels Change Rate)

Consider two images, whose corresponding plain image and encrypted image, be denoted by IMG(o) and IMG(enc). A bipolar array, D with the same size as images IMG(o) and IMG(enc) is defined. Then, D(i,j) is determined by IMG(o) and IMG(enc), namely, if IMG(o)(i,j) = IMG(enc)(i,j) then D(i,j) = 0; otherwise, D(i,j) = 1. Then NPCR is defined as:

$$NPCR = \sum_{i=1}^m \sum_{j=1}^n D(i,j) * \frac{100\%}{M * N}$$

Where $D(I,j) = \begin{cases} 0 & \text{if } IMG(o)(i,j) = IMG(enc)(i,j) \\ 1 & \text{if } IMG(o)(i,j) \neq IMG(enc)(i,j) \end{cases}$

For the Image size 512 X 512 we have calculated NPCR value for different blocks and comparison is made in the below table.

Table-2: Shows NPCR Calculations of Our Algorithm Compared with Fisher-Yates Original Algorithm

| Blocks | Fisher-Yates Algorithm | | | Our Algorithm with 2sets | | | Our Algorithm with 4sets | | |
|---------|------------------------|-------|-------|--------------------------|-------|-------|--------------------------|-------|-------|
| | R | G | B | R | G | B | R | G | B |
| 50X50 | 73.49 | 87.47 | 94.35 | 72.73 | 87.30 | 94.75 | 74.33 | 87.45 | 94.40 |
| 100X100 | 73.71 | 87.45 | 94.96 | 73.40 | 88.20 | 96.24 | 72.88 | 87.54 | 94.89 |
| 150X150 | 63.14 | 73.32 | 79.85 | 63.54 | 73.94 | 80.40 | 62.77 | 73.34 | 79.70 |
| 200X200 | 79.21 | 83.83 | 87.25 | 78.85 | 83.32 | 86.6 | 78.64 | 83.56 | 86.98 |
| 250X250 | 73.60 | 87.77 | 95.36 | 73.86 | 87.85 | 95.24 | 73.60 | 87.87 | 95.69 |
| 300X300 | 78.80 | 83.48 | 87.01 | 78.30 | 83.00 | 86.40 | 78.59 | 83.48 | 87.12 |
| 350x350 | 37.24 | 43.69 | 47.86 | 37.31 | 43.64 | 47.87 | 37.18 | 43.57 | 47.67 |
| 400X400 | 50.19 | 58.14 | 63.33 | 49.98 | 58.04 | 63.21 | 50.08 | 58.12 | 63.36 |
| 450X450 | 63.00 | 73.70 | 80.33 | 63.12 | 73.62 | 80.12 | 62.89 | 73.59 | 80.07 |
| 500X500 | 73.78 | 87.74 | 95.55 | 73.69 | 87.81 | 95.56 | 73.77 | 87.57 | 95.43 |

Sources: Authors Compilation

From the Table2 values we can see that our algorithm is giving >=99% Quality of the RGB Values for the cypher image as compared with original Fisher-Yates algorithm with the less execution time as discussed in section 4.1.1

4.1.3 UACI (Unified Average Changing Intensity)

Consider two images, whose corresponding plain image and encrypted image, be denoted by IMG(o) and IMG(enc). A bipolar array, D with the same size as images IMG(o) and IMG(enc) is defined. Then, D(i,j) is determined by IMG(o) and IMG(enc), Then UACI is defined as:

$$UACI = \left\| \sum_{i=1}^m \sum_{j=1}^n \left| \frac{IMGo(i,j) - IMGenc(i,j)}{255} \right| \right\| * \frac{100\%}{M * N}$$

For the Image size 512 X 512 we have calculated UACI values for different blocks and comparison is made in the below table.

Table-3: Shows UACI Calculations of Our Algorithm Compared with Fisher-Yates Original Algorithm

| Blocks | Fisher-Yates Algorithm | | | Our Algorithm with 2sets | | | Our Algorithm with 4sets | | |
|---------|------------------------|-------|-------|--------------------------|-------|-------|--------------------------|-------|-------|
| | R | G | B | R | G | B | R | G | B |
| 50X50 | 24.50 | 29.16 | 31.45 | 24.24 | 29.10 | 31.58 | 24.78 | 29.14 | 31.47 |
| 100X100 | 24.57 | 29.15 | 31.65 | 24.47 | 29.40 | 32.08 | 24.30 | 29.18 | 31.63 |
| 150X150 | 21.05 | 24.44 | 26.62 | 21.18 | 24.65 | 26.80 | 20.92 | 24.46 | 26.56 |
| 200X200 | 26.40 | 27.95 | 29.09 | 26.28 | 27.77 | 28.87 | 26.22 | 27.85 | 29.00 |
| 250X250 | 24.53 | 29.26 | 31.80 | 24.62 | 29.28 | 31.75 | 24.53 | 29.29 | 31.90 |
| 300X300 | 26.26 | 27.83 | 29.00 | 26.10 | 27.67 | 28.80 | 26.12 | 27.83 | 29.04 |
| 350x350 | 12.41 | 14.56 | 15.95 | 12.43 | 14.55 | 15.96 | 12.39 | 14.52 | 15.89 |
| 400X400 | 16.73 | 19.38 | 21.11 | 16.66 | 19.35 | 21.07 | 16.69 | 19.37 | 21.12 |
| 450X450 | 21.00 | 24.57 | 26.78 | 21.03 | 24.54 | 26.70 | 20.96 | 24.53 | 26.69 |
| 500X500 | 24.59 | 29.24 | 31.85 | 24.56 | 29.27 | 31.85 | 24.59 | 29.19 | 31.80 |

Sources: Authors Compilation

From the Table3 values we can see that our algorithm is giving >=99.5% Quality of the RGB Values for the cypher image as compared with original Fisher-Yates algorithm with the less execution time as discussed in section 4.1.1

4.1.4 Comparisons of Image Histograms

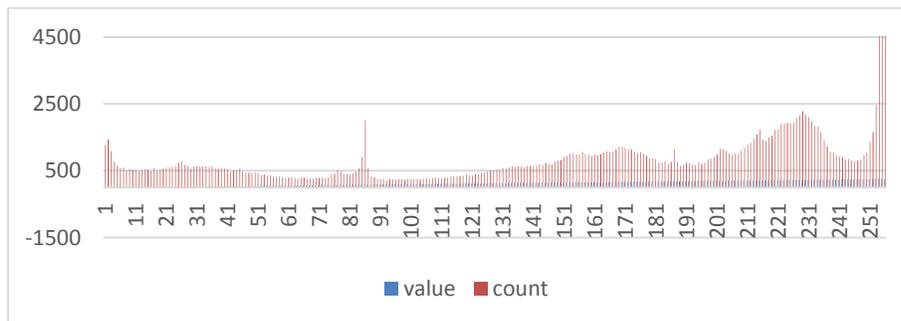
An **image histogram** is a graphical representation of the number of pixels in an image as a function of their intensity.

An image histogram is a type of histogram that acts as a graphical representation of the tonal distribution in a digital image. It plots the number of pixels for each tonal value. By looking at the histogram for a specific image, a viewer will be able to judge the entire tonal distribution at a glance.

Histograms are made up of *bins*, each bin representing a certain intensity value range. The histogram is computed by examining all pixels in the image and assigning each to a bin depending on the pixel intensity. The final value of a bin is the number of pixels assigned to it. The number of bins in which the whole intensity range is divided is usually in the order of the square root of the number of pixels.

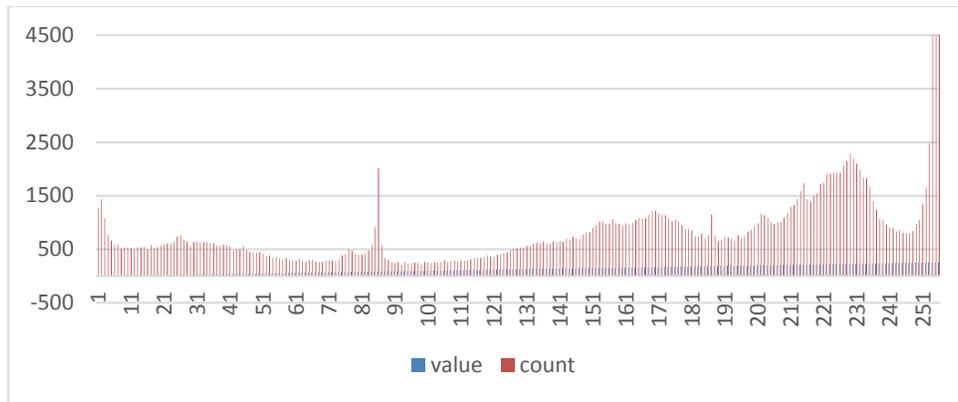
The horizontal axis of the graph represents the tonal variations, while the vertical axis represents the number of pixels in that particular tone. In the field of computer vision, image histograms can be useful tools for thresholding. Because the information contained in the graph is a representation of pixel distribution as a function of tonal variation, image histograms can be analyzed for peaks and/or valleys.

Figure-13: Image Histogram for 50X50 Blocks using Fisher-Yates Algorithm



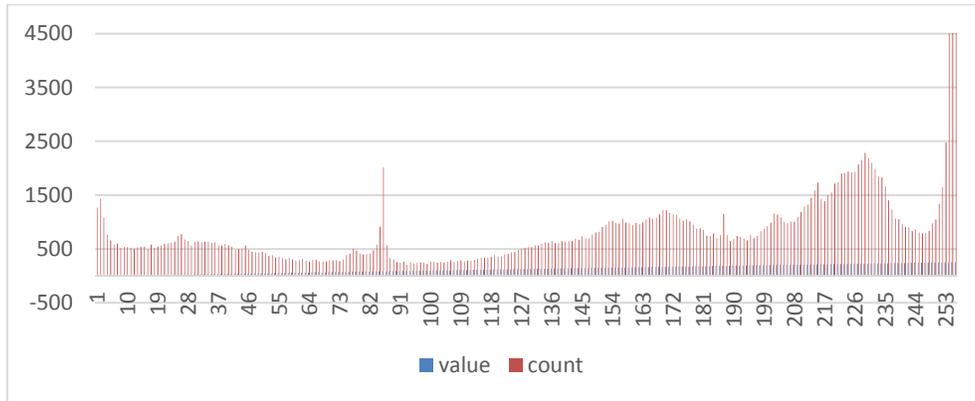
Sources: Authors Compilation

Figure-14: Image Histogram for 50X50 Blocks using Binomial Fisher-Yates Algorithm



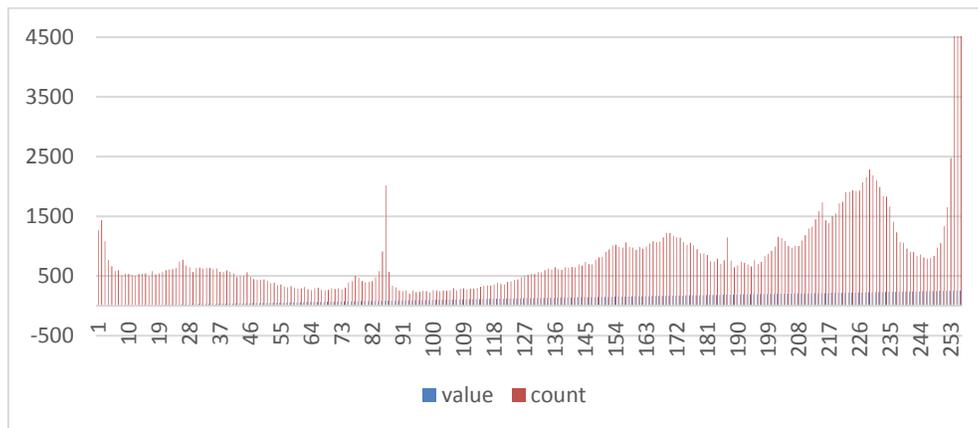
Sources: Authors Compilation

Figure-15: Image Histogram for 50X50 Blocks using Quadruple Fisher-Yates Algorithm



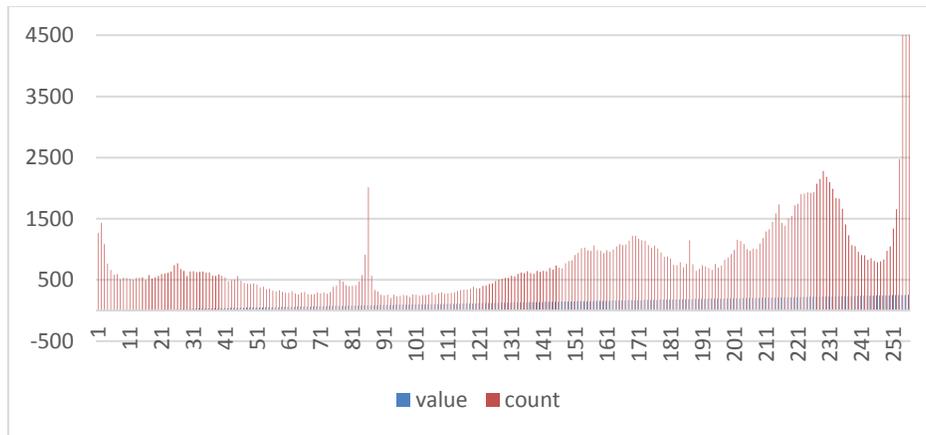
Sources: Authors Compilation

Figure-16: Image Histogram for 100X100 Blocks using Fisher-Yates Algorithm



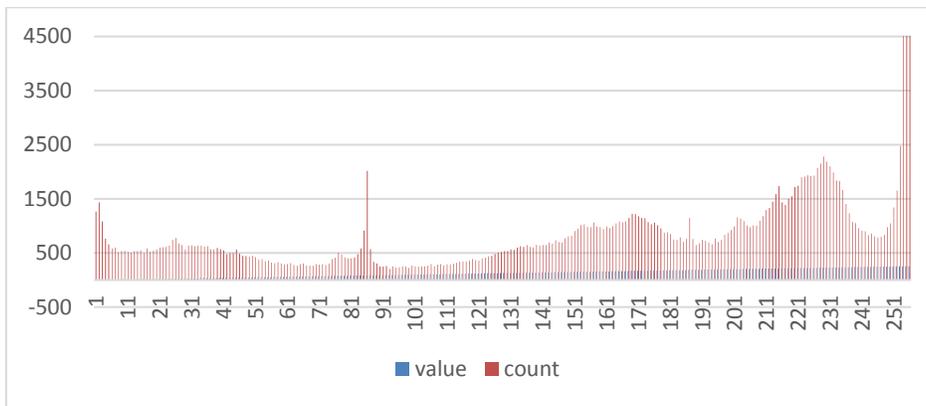
Sources: Authors Compilation

Figure-17: Image Histogram for 100X100 Blocks using Binomial Fisher-Yates Algorithm



Sources: Authors Compilation

Figure-18: Image Histogram for 100X100 Blocks using Quadruple Fisher-Yates Algorithm



Sources: Authors Compilation

From the above histograms we can observe that the histograms of the Fisher-Yates algorithm and Our Algorithm with 2sets and 4 sets are Identical and we can say that there is $\geq 99\%$ Identical as compared our algorithm with Fisher-Yates algorithm and which takes less tie for execution as discussed in section 4.1.1

4.1.5 Comparisons of PSNR (Peak Signal-to-Noise Ratio)

A very useful measure of the performance of the decryption procedure is the Peak Signal-to-Noise Ratio (PSNR). The PSNR of a given color component is the ratio of the mean square difference of the component for the two images to the maximum mean square difference that can exist between any two images. It is expressed as a decibel value. The greater PSNR value ($>30\text{dB}$), the better the image quality recovered. For encrypted image, smaller value of PSNR is expected preferably ($\leq 10\text{dB}$). Let P and P' being a plain image and cipher image respectively, the PSNR for the each color component (RGB) is defined as:

$$\text{MSE} = \frac{\sum_{i=1}^m \sum_{j=1}^n [\text{IMGo}(i, j) - \text{IMGenc}(i, j)]^2}{M * N}$$

$$\text{PSNR} = 20 * \log_{10} (255 / \sqrt{\text{MSE}})$$

Here MSE stands for Mean Square Error, The MSE assesses the quality of an **estimator** (i.e., a mathematical function mapping a sample of data to a parameter of the given values from which the data is sampled) or a **predictor** (i.e., a function mapping

arbitrary inputs to a sample of values of some random variable). Definition of an MSE differs according to whether one is describing an estimator or a predictor.

For the Image size 512 X 512 we have calculated UACI values for different blocks and comparison is made in the below table.

Table-4: Shows PSNR Calculations of Our Algorithm Compared with Fisher-Yates Original Algorithm

| Blocks | Fisher-Yates Algorithm | | | Our Algorithm with 2sets | | | Our Algorithm with 4sets | | |
|---------|------------------------|--------|------|--------------------------|-------|------|--------------------------|-------|------|
| | R | G | B | R | G | B | R | G | B |
| 50X50 | 7.89 | 6.78 | 6.11 | 7.95 | 6.82 | 6.11 | 7.81 | 6.78 | 6.12 |
| 100X100 | 7.87 | 6.80 | 6.10 | 7.90 | 6.74 | 6.02 | 7.93 | 6.78 | 6.09 |
| 150X150 | 8.46 | 7.58 | 6.86 | 8.43 | 7.52 | 6.84 | 8.51 | 7.58 | 6.90 |
| 200X200 | 6.54 | 6.28 | 5.92 | 6.57 | 6.32 | 5.96 | 6.58 | 6.30 | 5.94 |
| 250X250 | 7.88 | 6.76 | 6.06 | 7.86 | 6.76 | 6.07 | 7.87 | 6.77 | 6.04 |
| 300X300 | 6.57 | 6.31 | 5.94 | 6.61 | 6.34 | 5.98 | 6.60 | 6.31 | 5.95 |
| 350x350 | 10.97 | 10.034 | 9.27 | 10.96 | 10.03 | 9.28 | 10.98 | 10.05 | 9.30 |
| 400X400 | 9.54 | 8.69 | 7.99 | 9.57 | 8.70 | 7.99 | 9.57 | 8.70 | 7.98 |
| 450X450 | 8.49 | 7.55 | 6.85 | 8.48 | 7.56 | 6.86 | 8.50 | 7.56 | 6.87 |
| 500X500 | 7.87 | 6.78 | 6.06 | 7.87 | 6.77 | 6.05 | 7.87 | 6.80 | 6.07 |

Sources: Authors Compilation

From the above table *Table4* of PSNR there is not even 0.5 difference of values between Fisher-Yates algorithm and Our proposed algorithm so here also we are getting $\geq 99.5\%$ efficiency as compared with Fisher – Yates Algorithm.

4.6 Summary of the above Metrics

As compared with Fishers-Yates Algorithm Our Proposed algorithm is summarized in the below table.

Table-5: Shows Compares the Metrics of Fisher-Yates Algorithm with Our Proposed Algorithm

| Metric | Our Algorithm with 2sets | Our Algorithm with 4sets |
|-----------------|--|--|
| Execution Time | 50% of Fisher-Yates Algorithm Execution Time | 25% of Fisher-Yates Algorithm Execution Time |
| NPCR | $\geq 99\%$ | $\geq 99\%$ |
| UACI | $\geq 99.5\%$ | $\geq 99.5\%$ |
| Image Histogram | $\geq 99\%$ | $\geq 99\%$ |
| PSNR | $\geq 99.5\%$ | $\geq 99.5\%$ |

Sources: Authors Compilation

From all these implemented metrics, we say that our algorithm is efficient as compared with Fisher-Yates Shuffling Algorithm. By this study we conclude that if number of parts i.e N value is increased to 20 then it becomes impossible to any hacker or intruder to steal the original data that is being sent to the cloud database refer *table1 for the calculations*.

CONCLUSION

In this paper, we have investigated the problem of security in cloud computing, which is essentially a distributed storage system. To ensure the security of user' data in cloud database storage, we proposed an effective and efficient Steganographic and Image Shuffling using Optimized Fisher-Yates Algorithm for enhancing security on data-at-rest and data transferring over the network. Therefore, when these images are stored in the cloud data center and transferring over the network, no one can view the original content of the data without any proper identification. Through detailed security and performance analysis, we have seen that our scheme almost guarantees the security of data when it is residing on the data center of any Cloud Service Provider (CSP). The concept we have discussed here, will help to build a strong architecture for security in the field of cloud computation. This kind of structure of security will also be able to improve customer satisfaction largely and we will attract more investor in this cloud computation concept for industrial as well as future research farms. Security in a very large-scale cross-cloud environment is an active issue. This present scheme is able to handle only a limited number of security threats in a small environment. We need further simulations to verify the performance. In the future, we will extend our research by providing security through steganography in RGB images by including multiple blocks into a single block. In addition, if the raw data is encrypted and the steganographic issues are employed then the protection will be a bit enhanced. The protections can also be enhanced if we can change the pixel positions after steganography. Until now, we are working on it to get better performance.

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**A STUDY ON OPINION DIFFERENCES IN RESPONDENTS
EMOTIONAL DISSONANCE, WORK EXHAUSTION, JOB SATISFACTION
AND TURNOVER INTENTION AMONG INFORMATION TECHNOLOGY
PROFESSIONALS WITH SPECIAL REFERENCE TO COIMBATORE DISTRICT**

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ABSTRACT

Emotional dissonance is defined as “the conflict between expressed and experienced emotions” (Abraham, 1998a). It arises when an employee’s displayed emotions represent the obeying organizational rules, but do not represent his or her actual feelings (Rafaeli & Sutton, 1987). This study examines whether there is any opinion differences in Emotional Dissonance, Work Exhaustion, Job Satisfaction and Turnover Intention among Information Technology (IT) Professionals. Data were collected from 246 IT professionals within Coimbatore District. Results shows that there is significant difference found in respondent’s opinion on Negative Emotional dissonance with respect to their Age and Educational Qualification and there is significant difference found in respondent’s opinion on Job Satisfaction and Turnover Intention with respect to their Monthly Income.

KEYWORDS

Emotional Dissonance, Role Conflict, Work Exhaustion, Job Satisfaction, Turnover Intention etc.

INTRODUCTION

Emotion is a feeling, psychological arousal and plays a powerful and central role in our lives; they influence our beliefs and attitudes and they help and guide our thinking, decision-making, and actions (Gratch and Marsella 2004; Lazarus and Folkman 1984; Loewenstein *et al.* 2001). Emotions and emotional displays have become an important attention of organizational research (Rafaeli and Sutton, 1987; Sutton, 1991; Sutton and Rafaeli, 1988; Van Maanen and Kunda, 1989). Essentially, employees need to engage in a certain degree of emotion in order to generate the appropriate feelings (Conger and Kanungo, 1988, Lashley, 1999) and to follow the required display rules (Hochschild, 1983; Ashforth and Humphrey, 1993; Morris and Feldman, 1996a; Grandey, 2000). It is expected that Flight attendants and sales clerks to be cheerful, police officers to be authoritative, and nurses to be compassionate in work place. Although no one has studied display rules in an IT context, one can infer emotional display expectations from the nature of the IT function. For example, as business partners, IT personnel need to show concern for business, rather than just technical, functions. A technically focused IT professional who conveys an attitude of indifference toward business outcomes may suffer a lack of credibility in the eyes of IT user and management (Markus and Benjamin 1996). While systems development often involves conflict (Barki and Hartwick, 2001), IT professionals may feel they should not display anger when conflict arises. Computer support personnel may be expected to display concern for those seeking technical assistance rather than frustration for their technical inexperience. IT managers and project leaders may be expected to display neutrality when making work assignments or sternness when dealing with underperforming subordinates. These examples illustrate a few possible IT-related display rule expectations. Information technology professional is often expected to work with colleagues in both IT and other areas of the organization. During these interactions, the IT employee is expected to conform to occupational or organizational norms regarding the display of emotions. How do these display norms affect the IT professionals? Therefore, this study examines an IT professional’s emotional dissonance, the conflict between norms of emotional display and an employee has felt emotion. Emotional dissonance is studied as a factor of IT professionals’ work exhaustion, job satisfaction, and turnover intention. Therefore, there arises a need for this study.

Today’s information technology professionals shoulder a heavy load. Spending cuts and changes in IT implementation have forced these employees to work longer hours and take on expanded organizational roles (Hoffman 2003). IT workers are experiencing increased complexity in both the underlying technology and its creative use. Hence, firms today demand not only technical skills but also problem solving and customer service expertise (Pawlowski and Robey 2004; Thibodeau 2004). A byproduct of these demands may be increased levels of exhaustion and burnout (Moore 2000a). IT professionals are also being asked to expend more interpersonal effort at work. The importance of business and interpersonal skills for IT professionals is well established. Many stakeholders, including IT customers (Bostrom 1984; Nelson and Coopridner 1996), IT managers (Leitheiser 1992; Lee *et al.* 1995), and other IT professionals (Bailey and Stefaniak 1999; Green 1989; Khan and Kukalis 1990; Yen *et al.*

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2001) prescribe that IT people must understand the business and communicate effectively with organizational counterparts. The impact of these added expectations of the IT professionals is not well understood. This study begins to address this issue by examining whether Opinion Differences in Respondent Characteristics on Their Emotional Dissonance, Work Exhaustion, Job Satisfaction and Turnover Intention.

THE RECOGNITION OF EMOTIONS IN WORK ENVIRONMENT

Research into emotions is directed towards the changing nature of the work environment and tends to link motivation and job satisfaction into the way work is considered and structured (Robbins and Judge, 2010). Emotions are not associated with the work place, and the concept of 'emotion' is not typically spoken about, or disclosed in this environment. But it can also be said that in all organizations in which human interaction is part of the job, rules apply as to when and which emotions should be expressed (Hochschild, 1983). Since the end of 19th century, the rise of scientific management organisations has been associated with the objective of trying to control emotions (Hunt, 1997). A well run organisation has been seen as one that successfully eliminates frustration, fear, anger, love, hate, joy, grief and similar feelings. In reality, this is not the case. Grandey (2000) conveys that organisations manifest, produce, and represent emotions more than ever before. Reason and cognition were viewed as suited to the bureaucratic process inherent in most organisations, and emotions in large part, remained undiscussable at work. The central ideology surrounding emotions in organisations is that they are irrational, peculiar disturbances that are best controlled and kept under cover (Stearns & Stearns, 1986). Our thoughts and emotions are intertwined and emotions give us insight into the impact of work situations at the deepest level. Hence, there is a need to recognize both the wholeness and humanity of workers within the organizational context, because people cannot help but bring themselves into the work context. (Fineman, 1996). The growing interest in this area of organizational studies generated an expansion in the field of emotions, which was first prompted by Arlie Hochschild in 1983, who opened up the never ending possibilities and significance that emotions contributed to understanding how organisations function. Hochschild introduced the idea of 'emotional labour', which articulated a further level of insight into how emotion is related to self- identity, and work performance. This then led to further discoveries of emotional dissonance.

EMOTIONAL LABOUR AND IT'S CONSEQUENCES

Researchers have identified deep and surface acting as the two most commonly-used emotional strategies for coping with display rule requirements, defined as 'emotional labour' (Hochschild, 1983; Kruml & Geddes, 2000; Zapf, 2002). In deep acting, employees attempt to modify their felt emotions so that a genuine, organizationally desired emotional display can follow (Hochschild, 1983). She illustrated the deep acting by using flight attendants as a prime example, as they cope with angry and annoying passengers by thinking of them as frightened first-time fliers, therefore changing their inner feelings from annoyance to acceptance, pity and empathy. When employees engage in deep acting, they endeavor to express authentic emotions, and though not every attempt succeeds, emotions expressed as a result of deep acting are more likely to be authentic than those expressed through surface acting, which occurs when employees only change their outward emotion without genuinely altering how they actually feel. In surface acting, frustrated employees may suppress their frustration and simply smile at an annoying customer, thus "putting on a mask" without actually changing their feelings and expressing feigned rather than genuine emotion (Grandey, 2003).

VARIANTS OF EMOTIONAL DISPLAYS

There are three types of emotions associated with different display rules (Mann, 1997). Firstly, integrative emotions are classified as those that combine groups together, such as love, loyalty and pride; secondly, differentiating emotions are those that trigger group differences, such as fear, anger and contempt (Kemper, 1984). Thirdly, a possible type of emotional display is emotional masking which refers to displays of emotional neutrality and restraint. Each will be discussed in turn.

Integrative Emotions

Integrative emotions such as friendliness are often highlighted in service roles or public contact encounters in which the services are intangible, consisting of services provided rather than objects that are possessed (Wharton & Erickson, 1993, p. 466). In a study of McDonald's it was found that the fast-food workers were told to be "cheerful and polite at all times" and that "crew people were often scolded for not smiling" (Leidner, 1991). Because the "emotional style of offering the service is part of the service itself", display rules are concerned towards emotions that instill a sense of well-being, good will or satisfaction in customers (Hochschild, 1983, p. 5).

Differentiating Emotions

Work roles requiring emotional displays oriented towards negative emotions, or what Hochschild (1983) called "positive bad will" are less understood. These are roles in which workers are encouraged to display mistrust, irritation or hostility towards others for infusing in them unease, worry or fear. (Ritzer 1992) calls these displays "the McDonaldization of society" whereby

society has come to expect McDonald-style courtesy and friendliness typified by the “have a nice day” sentiment (even if such sentiments are considered un-genuine). As a result, differentiating display norms are likely to govern fewer and fewer authentic work based emotions such as trust and team co-operation. So far, it has been argued that, despite the view held by many in organisations that emotions play no role in organisation life, the management and control of emotional displays continue to be an important part of the formal or informal organizational culture. Societal, occupational and organizational norms give rise to display rules that govern the expression of emotion in the workplace. These display rules can lead to the display of integrative emotions that bind groups together or differentiating emotions that cause group differences. Alternatively, display rules can lead to emotional masking whereby emotional displays are suppressed altogether.

Masking Emotions

Masking of emotion is “an aspect of all work roles to some degree”, but that it is a more salient display norm in some work roles than others and is particularly noticeable in middle management and most professions (Stearns and Stearns, 1986). For example, the pressures on middle managers “to exercise iron self-control and to have the ability to mask all emotion and intention behind bland, smiling, agreeable public faces” (Jackal 1988). Other researchers also note how professionals are encouraged to mask emotion, a norm or display rule expressed as “detached concern” (Hochschild, 1983) or the avoidance of “too much liking or disliking” (Lief and Fox, 1963)

THE ROLE OF EMOTIONAL DISSONANCE AMONGST IT PROFESSIONALS

The IT industry has become one of the most popular industries in the world and it is in the phase of transforming the world to the next generation from a slow moving bureaucratic economy to a land of innovation. The transformation has been so drastic that no other field in the world is independent without the help of information technology. Today’s Information Technology professionals are required to be multitalented with knowledge in more than one specific skill. IT workers need to be in frequent touch with their customers and has to think from the customer’s point of views. IT professionals are expected to manage their emotions to obtain a facial and physical expression that is neutral, solid, and controlled. For IT sector increasing work exhaustion, percentage of turnover is among the basic challenges they face today (Aşkun, 2007). Recent studies have differentiated various dimensions of emotion work while most of them comprise the frequency of emotion expression and emotional dissonance (Brotheridge & Grandey, 2002; Bussing & Glaser, 1999). Due to these reasons, pressurized deadlines, personal conflicts, etc. they are susceptible to emotional dissonance. Emotions and emotional displays have become an important focus of organizational research. IT Employees need to engage in a certain degree of emotion in order to generate the appropriate feelings (Conger and Kanungo, 1988, Lashley, 1999) and to follow the required display rules (Hochschild, 1983; Ashforth and Humphrey, 1993; Morris and Feldman, 1996a; Grandey, 2000).

METHODOLOGY

The data were collected from four IT companies located in Coimbatore district. The questionnaire is distributed to different levels of IT professionals. In order to distribute the sample equally, every 6th employee in the middle level, every 2nd employee in the junior level and senior level were selected to respond to the instruments. A total number of 270 IT professionals were contacted for this study, out of which a total of 246 responses were found usable for the final analysis. Multi - stage sampling was the sampling technique used for this study. Different measurement scales were utilized to measure individual perception of emotional dissonance, work exhaustion, job satisfaction and turnover intention. The variables used in the study are based on standardized scales available in the literature. All the variables were measured using a 5- point Likert scale.

Table-1: Variables’ Measure

| Measurement Items | |
|-------------------------------|---|
| Constructs | Source of Measures |
| Negative emotional dissonance | Schaubroeck and Jones scale (2000) |
| Positive emotional dissonance | Schaubroeck and Jones scale (2000) |
| Perceived workload | Kirmeyer and Dougherty 1988 Moore 2000a |
| Role ambiguity | Rizzo, House, and Lirtzman 1970 Moore 2000a |
| Role conflict | Rizzo, House, and Lirtzman 1970 Moore 2000a |
| Autonomy | McKnight 1997 |
| Fairness of rewards | Niehoff and Moorman 1993 Moore 2000a |
| Work exhaustion | Schaufeli, Leither, and Kalimo 1995 Moore 2000a |
| Job satisfaction | McKnight 1997 |
| Turnover intention | Moore 2000a |

Sources: Authors Compilation

DATA ANALYSIS

Table-2: Respondents Characteristics

| Demographic Variables | Criterion | Frequency | Percentage |
|------------------------|----------------|-----------|------------|
| Gender | Male | 144 | 58.5 |
| | Female | 102 | 41.5 |
| Age | Below 25 | 33 | 13.4 |
| | 26 – 30 | 53 | 21.5 |
| | 31 – 35 | 105 | 42.7 |
| | 36 – 40 | 28 | 11.4 |
| | Above 41 | 27 | 11 |
| Educational Background | Diploma | 42 | 17.1 |
| | Under Graduate | 65 | 26.4 |
| | Post Graduate | 101 | 41.1 |
| | Others | 38 | 15.4 |
| Designation | Senior Level | 76 | 30.9 |
| | Middle Level | 110 | 44.7 |
| | Junior Level | 60 | 24.4 |
| Experience (in years) | Below 1 year | 36 | 14.6 |
| | 1 – 3 | 38 | 15.4 |
| | 4 – 6 | 85 | 34.6 |
| | 7 – 9 | 46 | 18.7 |
| | Above 10 | 41 | 16.7 |

Sources: Authors Compilation

Table 2 represents respondent's characteristics. The average of respondents was 58.5% male, and which is dominated by 31 - 35 years old. Furthermore, 41.1 % respondent was undergraduate degree, and 44.7 % respondents was Middle level. The respondents have been experienced with the companies for 4 - 6 years.

Table-3: Independent Samples t- Test between Gender and the factors used in the study

| Factors | Gender | | | | | |
|-------------------------------|---|-------|------------------------------|------|-------|-----------------|
| | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | |
| | F | Sig. | t | d.f. | Sig. | Mean Difference |
| Positive Emotional Dissonance | 0.125 | 0.724 | -1.574 | 244 | 0.117 | -0.72222 |
| Negative Emotional Dissonance | 2.551 | 0.112 | -0.884 | 244 | 0.378 | -0.62745 |
| Work Exhaustion | 0.294 | 0.588 | 0.297 | 244 | 0.767 | 0.13685 |
| Job Satisfaction | 0.942 | 0.333 | 1.967 | 244 | 0.500 | 0.62296 |
| Turnover Intention | 0.000 | 0.986 | 0.337 | 244 | 0.736 | 0.06822 |

Note: *Significant at 5 percent level

Sources: Authors Compilation

Table-3 shows that Independent samples T test between Gender of the respondents and IT professionals' Positive emotional dissonance, negative emotional dissonance, work exhaustion, job satisfaction and turnover intention. The Levene's *F*- test for equality of variances and the probability values are not statistically significant at the 5% confidence level. Therefore, the variance of the Gender from which the samples were drawn is equal.

The independent samples *t*-test for the difference between two groups probability value is not significant. From this statistical result, it is evident that there is no significant difference in respondent's opinion on Positive emotional dissonance, negative emotional dissonance, work exhaustion, job satisfaction, and turnover intention. The respondents do not differ in their emotional dissonance; Work Exhaustion seems to be common with both male and female IT professionals irrespective of their gender.

Table-4: One Way ANOVA between the Demographic Variables and the Factors used in the Study

| Factors | | Age | Educational Qualification | Monthly Income | Designation | Work Experience |
|-------------------------------|------|---------------|---------------------------|----------------|-------------|-----------------|
| Positive Emotional Dissonance | F | 1.095 | 1.711 | 1.166 | 0.946 | 0.293 |
| | Sig. | 0.360 | 0.165 | 0.327 | 0.390 | 0.882 |
| Negative Emotional Dissonance | F | 2.762 | 3.283 | 0.963 | 0.404 | 2.000 |
| | Sig. | 0.028* | 0.022* | 0.428 | 0.668 | 0.095 |
| Work Exhaustion | F | 0.916 | 0.240 | 0.634 | 0.803 | 0.742 |
| | Sig. | 0.455 | 0.868 | 0.639 | 0.525 | 0.564 |
| Job Satisfaction | F | 0.803 | 0.946 | 2.775 | 1.201 | 1.685 |
| | Sig. | 0.524 | 0.419 | 0.028* | 0.311 | 0.154 |
| Turnover Intention | F | 0.670 | 0.197 | 3.783 | 0.990 | 1.287 |
| | Sig. | 0.614 | 0.899 | 0.005* | 0.414 | 0.276 |

Note: *Significant at 5 percent level

Sources: Authors Compilation

Table 4 shows that One-way ANOVA result between the demographic variables of the respondents and the emotional dissonance, work exhaustion, job satisfaction and turnover intention of Information technology professionals. One-way ANOVA was used to determine whether the respondents' opinion on positive and negative emotional dissonance differ among the age category of the respondents. It could be inferred from the table there is significant difference found in respondent's opinion on Negative Emotional dissonance with respect to their Age and Educational Qualification and there is significant difference found in respondent's opinion on Job Satisfaction and Turnover Intention with respect to their Monthly Income.

FINDINGS

Independent samples t-test was run as test of the statistical significance of the means of the responses between the gender of the respondents and Emotional dissonance of IT Professionals. There is no difference in Gender of the respondents for Emotional dissonance. All are affected equally by Emotional dissonance irrespective of the gender.

Independent samples t-test was run as test of the statistical significance of the means of the responses between Gender of the respondents and Work Exhaustion. There is no difference in Gender of the respondents for Work Exhaustion. Work Exhaustion seems to be common with both male IT professionals and female IT professionals irrespective of their gender.

Independent samples t-test was run as test of the statistical significance of the means of the responses between Gender of the respondents and Job Satisfaction. There is no difference in Gender of the respondents for their job satisfaction. Job Satisfaction plays the common role in both male and female employees with no regard to their gender.

Independent samples t-test was run as test of the statistical significance of the means of the responses between Gender of the respondents and Turnover Intention. The independent samples t-test for the difference between two groups, probability value is not significant. Collected data proves that Turnover Intention seems to occur approximately at the same time irrespective of the gender of the IT workers.

One way ANOVA was run between all the other demographic variables (age, educational background, monthly income, designation, and experience) and emotional dissonance in order to assess the difference in opinion among the respondents.

It was found that there exists a significant difference on respondent's opinion on Negative emotional dissonance based on their age. It is also clear that the Positive Emotional Dissonance is not significant with the age of the respondents.

It was found that there exists a significant difference on respondent's opinion on Negative emotional dissonance based on their educational levels. The Positive Emotional Dissonance is not significant with Educational Qualification proving that education of the respondents give them almost equal positive emotion with regard to any educational stream they may belong.

It was found that there exists no difference on respondent's opinion on positive and negative emotional dissonance based on their monthly income.



By performing one way ANOVA, it is evident that there exists a significant difference on respondents' opinion on Negative emotional dissonance based on their age and education. Whereas Negative emotional dissonance is not significant with their monthly income, designation, and experience. With regard to Positive Emotional Dissonance, there is no significant difference with the Age, Educational qualification, monthly income, designation and work experience.

It was found that there exists no difference about respondents' opinion on work exhaustion based on their Age, Educational qualification, monthly income, designation and work experience.

SUGGESTIONS

Information technology professionals have unique attitudes, interests, sense of identity, and work consciousness that significantly differ from workers in other professions. On a particular note, scientists observe that IT professionals must continually learn new skills over their entire career in order to adapt to new technological developments and ever-changing business requirements. The learning demands would add to the exhaustion already created by conventional job characteristics inherited in the IT work environment. Following are the few suggestions that would help the IT professionals relieve themselves from the stress factor and emotional dissonance.

Emotional dissonance creates employee strain, low self-esteem, alienation from work and depression. This study proves and suggests that both male and female employees undergo the same level of stress and emotional dissonance. Therefore, the IT organizations should treat both equally and conduct individual counseling to overcome their emotions and to lead a healthy work environment.

In IT organizations employees are present in different age categories. It was found that there exists a significant difference on respondents' opinion on Negative emotional dissonance based on their age. The manager can play a key role in helping the employee identify the cause of exhaustion. IT managers can take the responsibilities to understand the emotional dissonances faced by his subordinates irrespective of their age and act accordingly towards them.

CONCLUSION

It can be concluded that there is significant difference found in respondents' opinion on Negative Emotional dissonance with respect to their Age and Educational Qualification and there is significant difference found in respondent's opinion on Job Satisfaction and Turnover Intention with respect to their Monthly Income. There is no difference in Gender of the respondent's opinion on Emotional dissonance, work exhaustion, job satisfaction and Turnover intention. Both male IT professionals and female IT professionals are affected equally by Emotional dissonance, work Exhaustion, job satisfaction and turnover intention irrespective of their gender. Negative and positive emotional dissonance increased IT professionals' work exhaustion, which reduced job satisfaction and ultimately increased turnover intention. IT professionals become exhausted due to work overload like pressurized targets, day-to-day task completion and organization-critical systems. Unless adequate steps are taken to safeguard the IT professionals from this pressure-filled job, it could affect their emotions and suppress them. Higher-level authorities in IT field should be aware of not only role stressors like role conflict and role ambiguity, but also the incremental tension that emotional dissonance can produce. This study unveils the importance of emotional dissonance in understanding the work exhaustion and turnover intention of IT professionals.

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SMARTPHONE APPLICATION FOR E-COMMERCE IN MODERN TIMES

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ABSTRACT

Smartphone application for e-commerce has been discussed in this article based on qualitative research methodology. The businesses in India, especially e-commerce firms, are waking up to the potential that mobiles offer in this country and are pushing their mobile applications to Smartphone users. The adoption of Smartphone and growth in mobile internet traffic has made a significant impact of app installation. India has been on the verge of something spectacular in e-commerce due to increasing number of owners of Smartphones. More shoppers visit the e-commerce sites especially from Smartphone to do business in modern times. The Smartphones have become important means of web shopping and constitute about 60 percent of e-commerce visits in modern times. The rise of Smartphone shopping provides retailers with an opportunity to reach customers any time and any place. The service providers are more dependent on Smartphone applications, which are very well connected to the various devices including the computer, laptop, or cell phone. They are conducting their business smoothly with the help of mobile applications. The e-commerce sector has grown commendably because of revolutionary changes in information and communication technologies including Smartphone application. The growth of Internet connection has also boosted e-commerce in modern times. The Smartphone could account for most e-Commerce transactions by 2018. It is definitely the age of Smartphone application for e-Commerce.

PREAMBLE

The e-commerce has grown remarkably all over the world based on the greatest use of new technologies including Smartphone applications. The e-commerce has changed the lives of the people. There has been a rise in the number of companies' taking up e-commerce in the recent past. Major Indian portal sites have also shifted towards e-commerce instead of depending on advertising revenue. Many sites are now selling a diverse range of products and services from flowers, greeting cards and movie tickets to groceries, electronic gadgets, and computers, etc. With stock exchanges, coming online the time for true e-commerce in India has finally arrived. The real value lies in the ever-expanding range of capabilities Smartphones possess and the services they can access. Smartphone application for e-commerce has been evaluated in this article based on qualitative research methodology.

Salient Features of Smartphones

The Smartphone enables the user to add all the contacts. The user can also delete and edit the details just like on a computer. The Smartphone has very clear viewing screens and can play many video formats with sound, as well as record video with sound. The Smartphone also incorporates the same features of a digital music player, which enables the users to store music files on it. The Smartphone provides for text messaging just as most cellular phones do. The built in keyboard or software keyboard can be displayed on the phone's screen. It is easier to type with than cellular phones. The Smartphone acts very much like a desktop or laptop computer. It includes a web browser programme just like a conventional computer.

The users can browse the World Wide Web just as a computer can. The Smartphone is able to hear the voice and follow predesigned commands. The Bluetooth is a wireless connection technology used to connect Bluetooth capable hardware over short distances. A Global Positioning System enabled Smartphone makes it possible for the phone to detect its specific location on the globe by latitude and longitude coordinates provided by certain satellites. The GPS can be turned on and off easily and quickly on the phone.

The Smartphone usually includes common computer programmes used in office settings. The users can create, read and edit these types of files. The Smartphone includes a full keyboard, which is physical, either covering the lower half of the front of the phone or sliding out from under the phone. There are many 'Apps' available for free and for cost for all the Smartphone brands and models. Smartphone service providers offer free phones. The fee paid each month for a Smartphone includes data charges beyond what a regular cell phone user pays.

All over the world, the Smartphone sales have exceeded the expectations with approaching the point where one in five mobile phones are smart (Doughty, 2011:05). Smartphones and Smartphone proxy systems using simpler phones, equipped with the

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capabilities to identify location/time and link to the web are excellent platform to support healthcare self-management, delivery, quality and supervision. Smart phones allow information to be delivered by voice, texts, pictures, and videos as well as be triggered by location and date. The policy makers should encourage substantial investment to create mobile health platforms that serve the public good, by promoting health service innovations while attending to the need for the individual to control access and sharing of their personal data stream (Rotheram-Borus et. al. 2012:13). Smartphone is not only a communication device but also a continuation of their personality and definition of who they are as a human being (Persaud and Azhar, 2012:12).

In the present times, most of the people in the developed countries use Smartphone for a variety of purposes. Today in Finland, mobile phone has become more common also for the elderly people. The portable nature of Smartphones and tablets has led researchers to investigate pre-trip, during trip and post-trip traveler behaviors (Miller, 2014:11). Smartphones have transformed behaviors, information needs, decision-making, experiences, documenting and sharing (Lamsfus et al., 2014:09).

The phenomenal growth in Internet and in the number of Smartphone users has resulted in an unparalleled growth in mobile – commerce. Internet accessibility and Smartphone proximity are reasons for mobile retail use. With the increase of Smartphone users, it has also been embraced as overarching theory for mobile commerce adoption. In contrast, mobile devices such as Smartphones are closely connected to users' personal lives. The strong mobility of Smartphone technology brings great convenience to users lives with which they can conduct commerce anywhere and at anytime (Mathew et. al. 2004:10). The Smartphone application for e-commerce has practically turned the miniature window to the virtual world into a fully-fledged shopping catalogue. The Smartphone application has facilitated constant customization as per the needs of the business. There are lot of core applications in an e-commerce business, which need to be integrated with the mobile app in order to ensure smooth business operations and transactions.

The mobile phones such as Android-based Smartphones, iPad and iPhones were appropriate for promoting e-commerce in modern times since mobility of people and technologies were the key factors in contemporary economy. Mobile applications are of utmost importance when companies market their products or services. Mobile phones have generated an incredible opportunity for accessing the Internet, while m-commerce has increased the level of using a mobile phone for business. The Smartphone applications have allowed users to change the web services' URLs. The application should allow the user to add multiple sources for the same web server by cell phone so that the user can code flex, which means that a user can develop and deploy cross-platform Internet applications being run on cell phones. This implies that a mobile application should be able to locate a list of products from different remote applications, which provide the same web services being supported by a mobile application (Alqahtani and Goodwin, 2012:02). The Smartphone applications have become the core of the e-commerce environment in the present times. The online retailers are able to position themselves well in the market and uniquely tap into the vast opportunities of mobile commerce. The users make use of Smartphone to search for products, compare prices and look for the best deals that are available online. The modern customers are increasingly searching for products online using the mobile shopping apps.

Smartphone Application for E-Commerce

Mobile has become an increasingly important driver of growth in ecommerce. The mobile visits account for one-third of the traffic on top ecommerce sites. The retail outlets are also getting more and more visitors who do their research-using mobile before visiting or during shopping. The mobile apps are used widely in the e-commerce sector because the users prefer apps to mobile browser, the apps have push notifications, the users have good experience and the mobile apps encourage brand loyalty. The mobile apps have provided a seamless and personalized experience to the customers (Saeed, 2014:14). The modern customers who own Smartphones want product information on their phones when shopping in store. They make large purchases through their phones and preferred to have a mobile wallet-style program to be able to pay for purchases.

Businesses in India, especially e-commerce firms, are waking up to the potential that mobiles offer in this country and are pushing their mobile applications to Smartphone users. "There has been a massive shift in mobile usage patterns. The next generation might well skip desktops and laptops for mobiles. The mobile is a fascinating way of creating a personalized communication channel with the customer. The frequency of engagement is also higher with mobiles. The user interface is much better in a mobile application than on a mobile site. The Today, every business is dependent on Smartphone application for electronic commerce (Sarkar, 2014:15). The mobile applications have been on a steady rise in modern times. The buyers who perform searches via mobile apps have a greater propensity to purchase those products that they are researching. There is a steady and very consistent drift towards the usage of mobile phone apps such as e-commerce magneto i-phone app and android app in e-commerce.

The adoption of Smartphone and growth in mobile internet traffic has made a significant impact of app installation. The mobile phone users are slowly moving from mobile web to mobile app usage and this is evident with the changing traffic to few top e-Commerce Stores in India. The Indian enterprise mobility market is driven by the three major factors such as Smartphones shipment, growth of Smartphone market, and India's position at the global Smartphone market. The Smartphone application would boost the e-commerce in India due to its customer – friendly characteristics (Swathi, 2015:16). E-commerce is an optimal

way to bring a product and the opportunity to make a deal with it close to the consumer. In the present times, the process of e-commerce has been strengthened because of new media applications including smart phones.

India has been on the verge of something spectacular in e-commerce due to increasing number of owners of Smartphones. The merchants use their Smartphones to convey inventory updates; meanwhile dispatchers rely on cell phones to keep track of couriers and to improvise last-minute substitutions or refunds if available goods and customers' requests do not quite align. Some e-commerce entrepreneurs in India originally tried to create separate warehouses and logistics systems in the way that Amazon.com has done in the U.S. and Europe (Anders, 2015:03). Mobile commerce has been heavily on the minds of retailers lately as usage and sales continue to rise. Smartphone applications have benefit to e-commerce and provide tremendous opportunity to boost customer experience, engagement and loyalty in ways not possible with mobile browsers.

More shoppers visit the e-commerce sites especially from Smartphone to do business in modern times. The e-commerce has grown remarkably based on Smartphone application over a period. The dramatic increase in shopping attraction highlights a fundamental shift that retailers are dealing with: buyers are making more visits, and doing so across multiple devices. The Smartphones accounted for 49% of traffic in the USA according to the latest statistics (Demandware Shopping Index report, 2016:04). The online shopping and selling experiences changed in a way that it became less time consuming and much less of a hassle for the customers, as well as for sellers who do not have to incur in many costs as they did before, such as the cost of a selling force, extensive paper work, and eventually the cost of installing or refurbishing a selling point.

The modern customers in urban areas use Smartphones to make digital purchases than any other device according to recent survey conducted by Intage Group in India. The male Smartphone users in India prefer to use an app to their female counterparts. The women in India do prefer to use an app to a mobile browser; the gap between the two is much smaller than the male platform gap. The Indian e-commerce sites are moving from mobile websites to mobile apps. Major companies like Flipkart, Myntra, Snapdeal, Ola, Reach CRM, and Makemytrip have come out with their own Mobile Apps since the Smartphone users in India are constantly increasing. The Mobile App is a conscious decision made by the companies rather than the users since they wanted to streamline their cost in technology. During a normal working day a shopper does not find much time to browse his laptop / desktop to do the shopping. Naturally, the Mobile App benefits the companies and customers to undertake e-commerce anytime and anywhere. The Smartphone application has become crucial from e-commerce point of view in India.

The Smartphones have become important means of web shopping and constitute about 60 percent of e-commerce visits in modern times. The rise of Smartphone shopping provides retailers with an opportunity to reach customers any time and any place. The e-commerce has become popular with the adoption of mobile shopping across the globe. The larger phone screens and better mobile web-browsing capabilities have enabled the easier shopping experience for the customers. Smartphone is the only computing device, which is known for the universality in e-commerce sector (Harty, 2016:07).

The dramatic increase in shopping attraction highlights a fundamental shift that retailers are dealing with: buyers are making more visits, and doing so across multiple devices. About 47% of all traffic to these sites worldwide had come from Smartphones, higher than the 44% of traffic to desktop sites and 9% of traffic from tablets. The Smartphones accounted for 39% of traffic, according to the Q2 2015 report (Ali, 2016:01). E-commerce has grown in India because of the increasing penetration of Smartphones and Internets. The 'Digital India' project which aims to offer a one-stop shop for Government services will definitely boost this sector by introducing the internet to remote corners of India. After taking a holistic view of the industry trends, it is seen e-commerce is emerging as an important tool to ensure exploding growth of Indian economy. With a rapidly growing internet, penetration e-commerce offers an attractive option for the retailers to expand (Kalita, 2016:08).

Tens of millions of Smartphone owners attached their bankcards to the app - thereby opening the door for purchasing rides, meals, and other goods. The Chinese e-commerce market is already the largest in the world, having overtaken the United States, with an estimated 400 million Chinese consumers already buying online. China's online retail ecosystem is evolving quickly. Today, not just people's purchasing habits are going digital. The e-commerce is increasingly going mobile and the use of devices as Smartphone is to make purchases is significantly higher than average compared to other countries surveyed. The Smartphone penetration is expanding rapidly in Asia as brands release lower-priced handsets into the market. The growing penetration of Smartphones has led to a boost in e-commerce throughout the region (Wilson, 2016:17).

The consumers are already using the Smartphones, which have become central part of the shopping experience. The shoppers want to use Smartphones to buy online but find the process flunky and confusing. The social media gets retailer and opportunity to recreate that shopping with friendly experience, which has become increasingly important. The global mobile wallet market is predicted to reach one thousand six hundred billion dollars by 2018. The e-commerce is the next great retail opportunity and it is the start of the journey. The Smartphone applications have transformed customer's lives by providing a smarter, richer and more boarding reality. The most popular social media networks are present on Smartphones and even on the most basic cell phone, which is best for today's business (Haroon, 2016:06).



The Smartphone has become the go-to shopping device, especially after features like fingerprint recognition make transactions effortless. According to the recent statistics, more than 80 percent of mobile transactions took place on a Smartphone in Southeast Asia significantly more than the US and the UK, where at least 30 percent of retail mobile transactions took place on tablets. Smartphone application offers the delightful experience to the customers in the field of e-commerce. Smartphone application is also highly dependable means of communication. The e-commerce is highly convenient for the customers who are fully preoccupied with various responsibilities. They naturally choose an app over physical shopping.

The service providers are more dependent on Smartphone applications, which are very well connected to the various devices including the computer, laptop, or cell phone. They are conducting their business smoothly with the help of mobile applications. There are about 25 best mobile applications for e-commerce, which are more productive and profitable. They include - Evernote, Google Keep, IFTTT, Slack, Trello, GoToMeeting, Buffer or Hootsuite, All of Your Social Networks, Facebook Pages, Snapseed, Over, Mention, Chromecast, BoxMeUp, DocuSign, CamScanner, Mint, Expensify, Pocket, Feedly, CRM, Live Chat, Google Analytics and Your e-Commerce Platform's Mobile App.

CONCLUSION

The Smartphone applications have effectively changed the scenario of the e-commerce industry in India. The marketing strategies of small and large companies have shifted to become more mobile-focused as customers have rapidly adopted mobile shopping. The modern business owners have entered into the mobile market by introducing their own Smartphone app. The e-commerce organizations are striving hard to enhance the user experience on Smartphones with a reliable tech infrastructure using mobile apps. The e-commerce has attracted the lion's share of venture capital investment in India. The mobile commerce has been ranked as the fourth in terms of general commerce. The larger screen size of tablets offers an unparalleled convenience for users when browsing and shopping for products via apps. The Indian users opt for apps over websites when it comes to accessing the Internet. The e-commerce sector has grown commendably because of revolutionary changes in information and communication technologies including Smartphone application. The growth of Internet connection has also boosted e-commerce in modern times. The number of Smartphones has nearly reached 400 million units as of now. Their acceptance as not only a mobile phone, but also as an internet portal, is increasing dramatically. The Smartphone could account for most e-Commerce transactions by 2018. It is definitely the age of Smartphone application for e-Commerce.

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DYNAMIC SOURCE ROUTING PROTOCOL (DSR) **STUDY OF EVALUATION OF PERFORMANCE ON WSN**

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ABSTRACT

Wireless Sensor Network (WSN) has been viewed as a well-known Ad Hoc Network that can be used for a particular application. In view of the fact that a WSN consists of small size, low cost and sensor nodes that are battery powered, it is more useful than other types of Ad Hoc networks to be positioned in lots of promising fields. To route the packets in these types of networks a number of routing protocols have been put into practice. Dynamic Source Routing protocol (DSR) is one of the best routing protocols.

To evaluate the performance of DSR routing protocol, an attempt has been made in this paper using some simulation network models. For the purpose of investigation, NS-2 simulator is used in mobile and static environments under the WSNs. Network density and network size are factor for performance study. In this paper, we have used the performance metrics like packet delivery fraction, average end-to-end delay, average energy consumption per delivered packet and routing overheads.

KEYWORDS

Wireless Sensor Networks, Adhoc Networks, DSR Protocol, Performance Study etc.

INTRODUCTION

Wireless sensor network is a wireless type of network that consists of number of nodes with computation, sensing and wireless communications capabilities [1]. The sensors determine ambient situation in the environment and then transfer data into signals that be able to be processed to disclose some characteristics about fact located in the area in the region of sensors [2].

Constraints like bandwidth and energy supply, combined with a typical deployment of sensor nodes that are of huge number, have faced lots of challenge to the plan and design of sensor networks [2]. The wireless sensor networks contains unique behavior, for example, high density of node employment, sensor nodes that are unreliable, and severe different types of constraints like storage, energy and computation constraints [3], which have several innovative challenges in the development of WSNs.

There might be various remarkable feature of WSN including multi-hop routing, self-organization and dynamic network topology. These features are very much important for many real world applications like disaster management, protection, combat field surveillance, and any place where humans cannot easily access or unsafe to human life [4].

Although both MANETs and WSNs are same in nature in some extent, equally both WSNs and MANETs belong to networks that are Ad Hoc type; to forward packets for others each and every node serves as a router; number of node can communicate with each other through multi-hop associations; and the various nodes are resource-constrained and generally batteries are used to power these nodes. As well as they are fundamentally dissimilar in various phases. The differences comprise of: the sensor nodes are typically tightly and densely installed in a field of interest and most of the nodes can be several orders of level which is much higher than MANET; WSNs also fulfill the constraints like storage, energy and computation constraints; sensor networks are generally designed and deployed for a particular application because sensor network are application specific; due to damaged or failure of node, network topology changes frequently; there can be number of sources for a particular sink after sensing the data sensed by sensor nodes, revealing a many -to- one traffic pattern[1, 2, 3, 4].

There are number of routing protocol for Ad Hoc networks. The protocols are as follows Include: Ad hoc on Demand Distance Vector (AODV), Destination Sequenced Distance Vector (DSDV), Dynamic Source Routing (DSR), Optimized Link State Routing (OLSR) and Temporally Ordered Routing Algorithm TORA.

In this research, a study of performance is accomplished for DSR protocol and the parameters for evaluating DSR routing protocol are: network density, network size are measured and investigated. To bring out a systematic and orderly performance study on DSR is the objective of this research. The DSR protocol was initially developed and designed to be used in MANETs but later on its capability to be used as a routing protocol on WSNs.

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RELATED WORKS

Z. Zhang and et. al., [4] explored that the way in which Ad Hoc routing protocols work on WSNs with a dissimilar amount of sources. Different parameters were tested for different routing protocol namely AODV, DSR, DSDV, TORA and OLSR. The examination of 50 nodes in (1500×300) m² was done under the Parameters like Average end-to-end delay, packet delivery fraction and routing overheads. Using different situations, the simulation study carried out for these routing protocols, and concluded some merits and demerits. The AODV protocol was among the best while doing performance comparison of these WSN routing protocols with single and multiple sources and the DSDV is second WSN protocol, which is better performer in the context of low packet delivery fraction.

M. N. Jambli et. al., [5] assessed the ability of AODV by investigating the metrics of performance that is energy consumption and packet loss. For 9 nodes in (100×100) m² network, mobile nodes with various route update interval (RUI), speed and density have been implemented. Which results was reduction in total network energy consumption and packet loss.

For diverse simulation time and mobility situation, the analytical research and development of the average jitter of AODV Routing M. Pandey et al [6] present protocol in WSN. Various performance measurement conditions were carried out for the AODV routing protocol for various simulation times and network topologies. M. Pandey et al are investigating the performance of 105 nodes in (500×500) m² of various mobility models of WSN.

DYNAMIC SOURCE ROUTING PROTOCOL (DSR)

Dynamic source routing protocol indicates that the source end had the complete knowledge of the entire hop-by-hop route information to the destination end. Various features of the DSR includes reduced infrastructure cost, very less network overhead and the use of source routing. Two major method of DSR protocol is of Route Discovery and Route Maintenance. There is a route cache of each node in which routes are normally stored. Whenever a node wants to make communication with the destination, then first it inspects for the entire route for that particular destination in the route cache. If the particular path find, the packets are sent with all the source route header information to the destination end. A route discovery method is used to find the route if the route is not available at the route cache. The route detection method will flood the network with route request (RREQ) packets, and in response to that the neighbors will take delivery of RREQ packets as well as check for the path to destination end in their route cache and if the route is not available in caches then the network need to be broadcast again, otherwise route reply (RREP) packet will be used to replies to the originator. Since RREQ and RREP packets both are source routed, usually source can acquire the route and add to its route cache. During the communication if the link on a source route is broken down, route error (RERR) packet is used in response to the source node. The route detection procedure is again initiated once the RERR is received as well as the source end discards the route from cache [13].

SIMULATION ENVIRONMENT & SETUP

Simulation Model

In this research version 2.32 of NS-2 simulator is used. NS2 is a distinct event simulator extensively used in the community of networking research. NS2 is used as a flexible tool for researcher of networking to inspect how a variety of routing protocols carry out with dissimilar network configurations and topologies [14]. Mobile and static are two cases. The WSN application under consideration in this work is environmental data collection wireless sensor network, i.e. is one of WSN applications [1]. In such type of application, huge numbers of sensors are installed in the area to determine different parameters like speed, temperature, humidity and direction. The sensor node stay sleep majority of the instance and report measurements very frequently to the source station in data collection applications. The employment of large size sensors in such applications either mobile or static and they possibly will be operational with effective power searching techniques [1]. In a number of other applications, sensors are installed on moving objects like animal, robots and animals that can gather and sense and appropriate data and information [5]. The source end initiates number of data packets that are routed to destination end in the center of the WSN, in the case of simulation.

We have used 512 byte data packets and CBR traffic, for allowing comparison with other experiments [4, 5, 6, 7, 8]. We simulate populations of 100, 200, 300, 400, and 450 nodes in regions of 2121m×425m, 3000m×600m, 3675m×735m, 4250m×850m, and 5000m×900m for 200s of simulation time with 10 CBR sources for the impact of network size. We have selected variety of nodes involved to work with around the similar node density and simulation area proportions. A noticeably lesser density might cause the network to be very much often detached, and subsequently a study and investigation of the efficiency of varied routing protocols is still more complex. In addition to that, we simulate 10%, 20%, 30%, 40%, and 50% CBR traffic sources for 2121m × 425m network size with 100 nodes.

All source-to-sink connections are started at times uniformly distributed between 0 and 100s. The number of unique traffic sources is 70% of the total number of sources. The chosen sending rate is 4packets/s. Each data point presented in this paper is an average of five runs, each lasting for 200s of simulated time. The IEEE 802.11 Distributed Coordination Function (DCF) is used as the Medium Access Control Protocol with the suggested parameters to model 914MHzLucentWaveLAN DSSS radio interface at a 2 Mb/s data rate. The adjusted parameters in the simulation are given in Table.1.

Performance Metrics

The evaluation of DSR routing protocol is completed by following metrics:

Packet Delivery Fraction (PDF): PDF deal with the percentage of data packets generated by various nodes, and the data packet are successfully delivered from source end to the destination end, articulated as:

$$(Total\ number\ of\ data\ packets\ successfully\ delivered) / (Total\ number\ of\ data\ packets\ sent) \times 100\%$$

Average End-to-End Delay: End-to- End delay computed the mean time it takes to way a data packet from the starting nodes to the destination, articulated as:

$$(\sum\ Individual\ data\ packet\ latency) / (\sum\ Total\ number\ of\ data\ packets\ delivered)$$

Routing Overheads (ROH): Routing Overheads consider the average amount of control packets, which is produced per sensor node. There are three types of control packets having route request, reply and error message.

Energy Consumption per Delivered Packet: This measure the energy expended per delivered data packet. It is expressed as:

$$(\sum\ Energy\ expended\ by\ each\ node) / (Total\ number\ of\ delivered\ data\ packets)$$

Table-1: Parameters Used in the Simulation

| Parameter | Mobile Scenario | Static Scenario |
|-----------------------------|-------------------|-------------------|
| Maximum Number of Nodes (N) | 450 nodes | 450 nodes |
| MAC Type | IEEE 802.11/ DCF | IEEE 802.11/ DCF |
| Propagation Model | Two Ray Ground | Two Ray Ground |
| Traffic Type | Constant Bit Rate | Constant Bit Rate |
| Agent | UDP | UDP |
| Queue Length | 50 Packets | 50 Packets |
| Connection Rate | 4 pkts/sec | 4 pkts/sec |
| Tx Power | 0.2818 W | 0.2818 W |
| Transmission Range | 250 m | 250 m |
| Initial Energy | 200J | 200J |
| Simulation Time | 200 Seconds | 200 Seconds |
| Node Mobility | Random Waypoint | NA |
| Pause Time | 50 sec | NA |
| Max Speed of Mobile Node | 5 m/sec | NA |

Sources: Authors Compilation

SIMULATION RESULTS

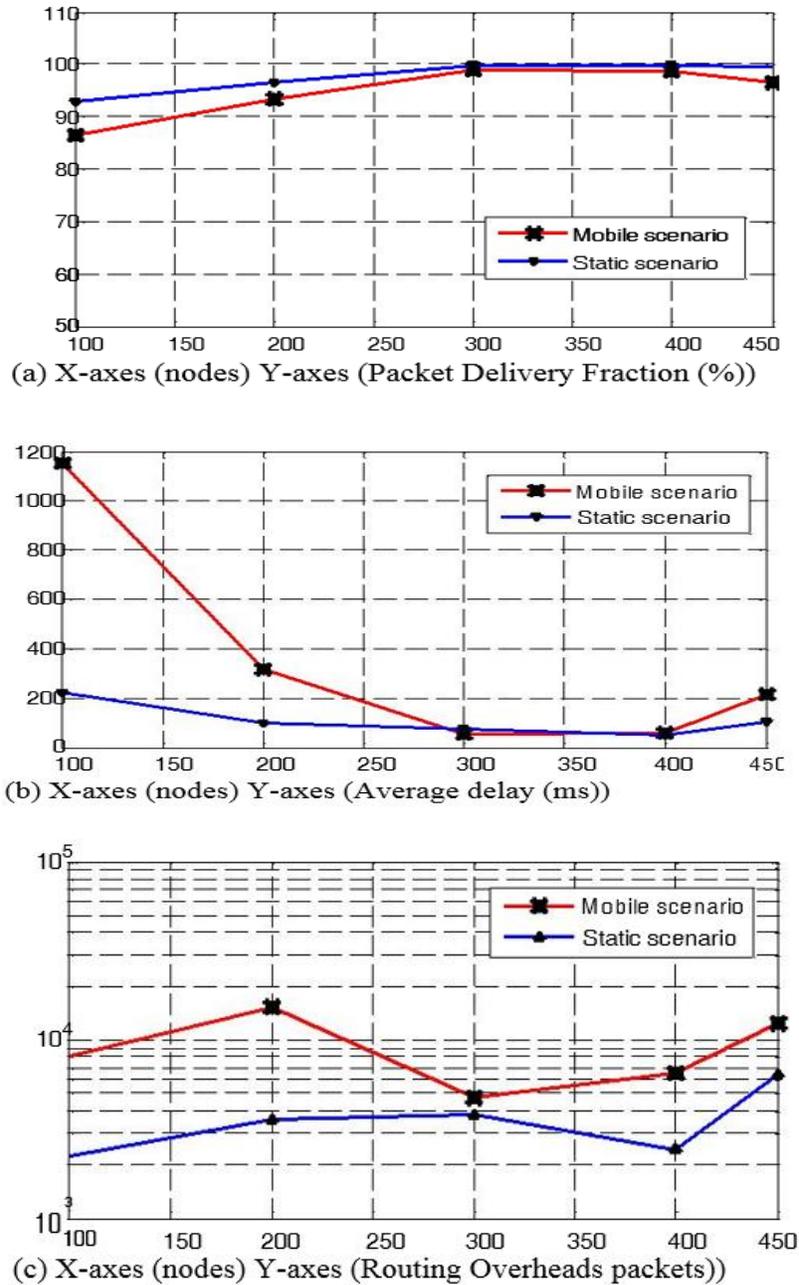
Impact of the Number of Nodes

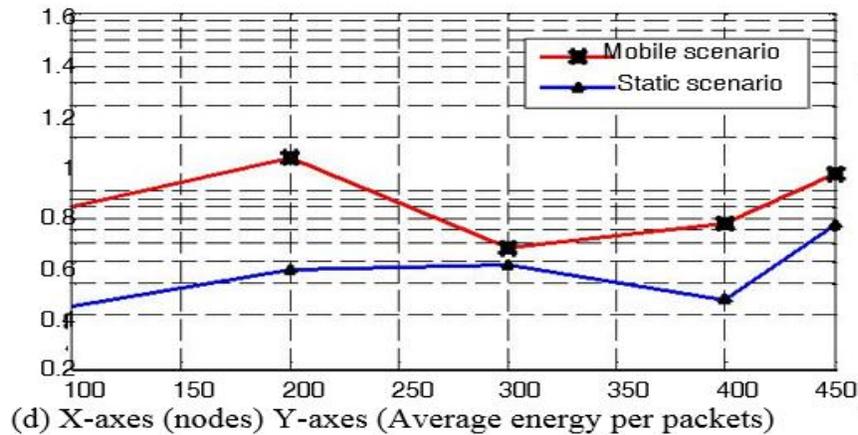
The high number of nodes expected to have a significant influence on the DSR performance. In comparison to the high-density node, the low-density node may affect the network to be frequently detached. As the node becomes denser, it will increase the contention. This trial demonstrates the effect of altering of the node density by changing the number of nodes inside the network and how it will effect on the performance of the DSR protocol. The Figure 1 shows the Packet delivery fraction, average end-to-end delay, ROH, and average energy consumption for each transported packets measured to 100, 200, 300, 400, and 450 nodes for deployment in mobile and static and mobile environments. The performance of the DSR is somewhat degraded at less node density, in terms of Packet delivery fraction. It is observed that the PDF for static node gives better result as the density of node enhance, as well as the network reliability is improved with the increase in the number of nodes as shown in Figure 1-(a).

From Figure 1-(b), it is noticed that, for both static and mobile deployments, the best average end-to-end delay exhibited by DSR when the number of nodes within the network are between 300 and 400; it is almost less than 0.1 s. However, the average end-to-end delay is found to be degraded as the node density decreases, especially for mobile node deployment case.

In terms of ROH, as shown in Figure 1-(c), it is noticed that the DSR protocol generates a higher routing load for mobile nodes deployment. There is minor increase in the routing overheads as the number of nodes increases. As shown in Figure 1-(d), the Average energy consumption increases as the number of nodes within the network increases.

Figure-1: Impact of the Number of Nodes





Sources: Authors Compilation

Impact of the Network Size

The evaluation and performance of the DSR protocol in region 2121m × 425m, 3000m × 600m, 3675m × 735m, 4250m × 850m, and 5000m × 900m inhabited by 100, 200, 300, 400, and 450 nodes, correspondingly. The number of nodes is kept stable for all the above arrangement of areas and nodes. The outcomes of simulation for this test shows in Figure 2. While using the PDF, the DSR work excellent with the amendment made in the size of network, as shown in Figure 2-(a). However, for more than 200 nodes with mobile situation the performance turns down. The DSR is capable of managing the node most of the time (about 95%) with less than 200 nodes. Therefore, we have reached to the conclusion that as the density of nodes increases or we can say network size increases, the PDF starts decline.

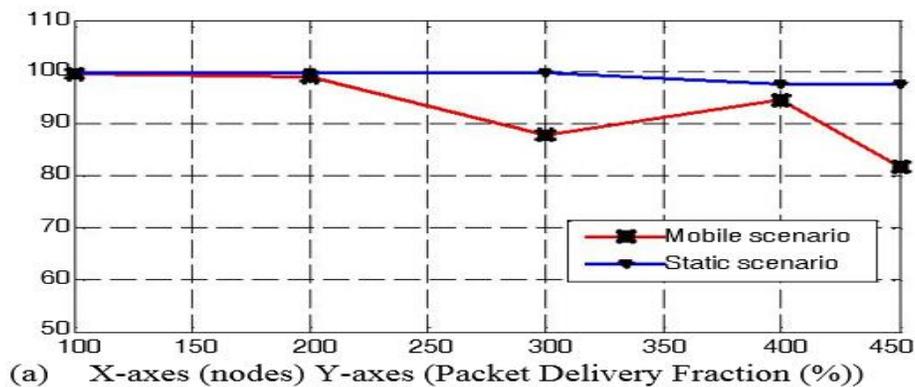
The criteria end-to-end delay for mobile as well as static situations likely to be same for small size of networks, as depicted in Figure 2-(b). However, as in the PDF when the density of nodes increases i.e for bigger networks (more than 200 nodes), there will be a noticeable degradation in the end-to-end delay performance, particularly for the mobile scenario.

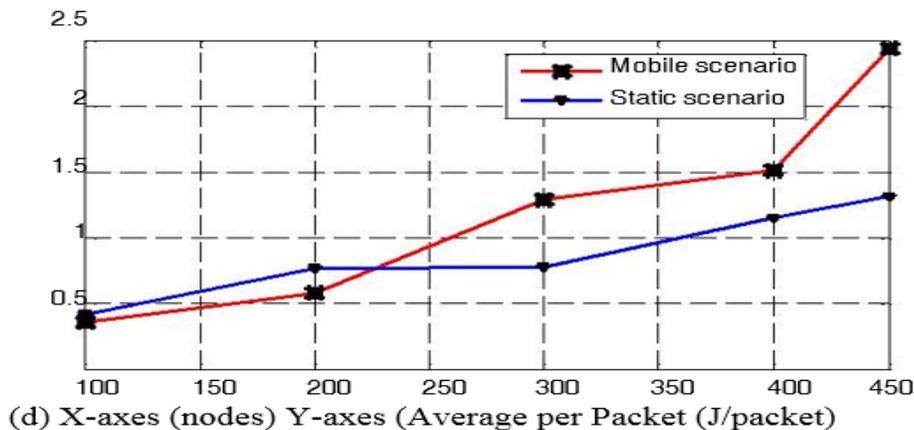
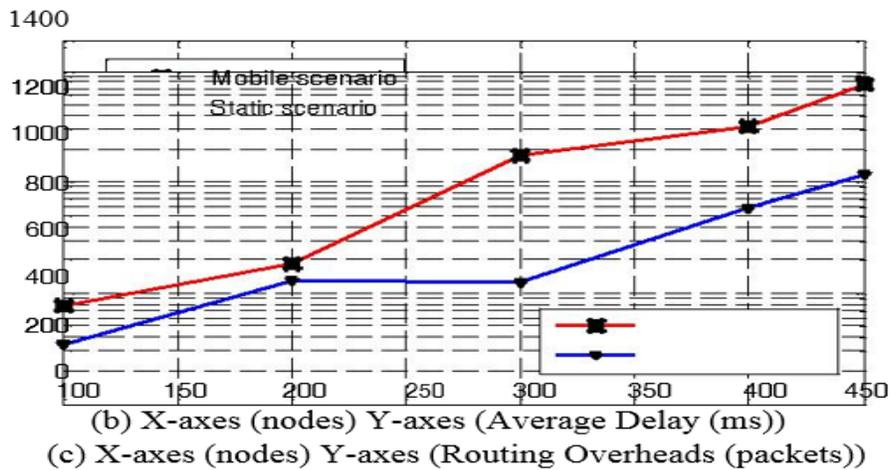
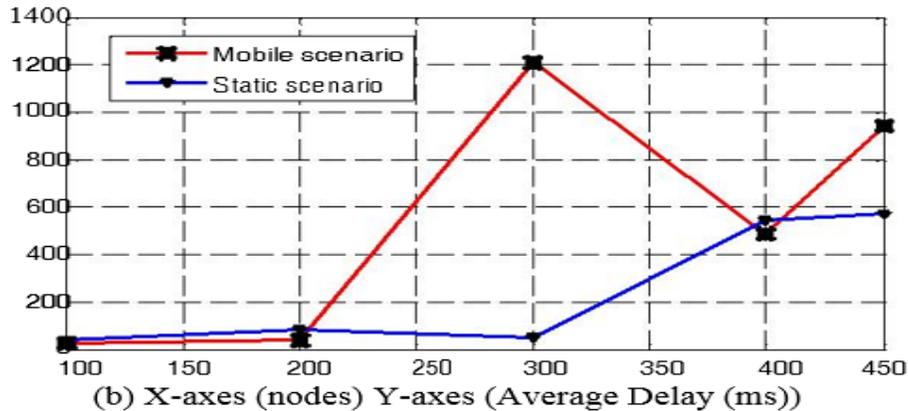
In comparison to the mobile scenario, the static scenario gives lower routing overheads, shows in the DSR protocol has demonstrated in Figure 2-(c).

According to the outcome shows in Figure 2-(d), for the average consumed energy per packet, it is noticed that the DSR protocol has shows a significant performance with lesser energy consumption for network of small sized. As the size of network increases, the consumed energy also increases.

In all the above experiments the DSR protocol shows that as the number of connection in the network increases, the performance of WSN degrades.[11][12]

Figure-2: Impact of the Network Size





Sources: Authors Compilation

CONCLUSIONS

In this paper, all the factors like average end-to-end delay, packet delivery fraction, routing overhead and the average energy consumption per delivered packet with the effect of the number of nodes (density) of network and size of network is presented. Numbers of scenarios have been tested, in which DSR carry out very well and in static scenario case, the DSR performance is better than the mobile scenario. An excellent level of reliability and stability is provided by the network in the case of multiple paths that are registered earlier and kept in the route cache of the nodes. The DSR protocol shows low latency, high Packet



Delivery Fraction, and energy consumption in which under heavy load conditions, most of experiments shows that there is degradation of performance, in the case of delay and PDF. The work presented here aims to find out the effect of different parameters on the performance of the DSR routing protocol in WSN. The results though do not present a steep comparative orientation of the results towards a specific routing protocol, but the comparative study leads towards some interesting results. Further research is needed to find out the most suitable protocol for each application. [9][10]

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THE ANALYSIS OF IMPACT OF FINANCING DECISION BY ISSUE OF GREEN BOND

Karthik Reddy T. S.²¹ Sujay S.²²

ABSTRACT

As the world is moving towards globalisation, the sustainability is taking back seat. Profit motive has become key to growth and expansion. "Business of Business is Business". This dictum is the bottom line of the global companies. In this whole process environment is hit badly. Green Bonds are one hope in this direction that balances Battle of Profit & Sustainability.

The researchers try to understand and analysed the impact of Green Bonds.

GREEN BONDS

Green Bonds are any type of bond instruments whose proceeds will be exclusively applied to finance or re-finance, in part or in full, new or existing eligible projects that will promote progress on environmentally sustainable activities.

TYPES OF GREEN BONDS

- High-Yield Green Bonds,
- Corporate Green Bonds,
- Municipal Green Bonds,
- Commercial Bank Green Bonds,
- Asset- Backed Securities (ABS),
- Labelled Green Covered Bond.

GENESIS AND EVOLUTION OF GREEN BONDS

- The first green bond was issued in 2007 and was initially characterized as a niche product.
- The European Investment Bank (EIB) issued the "Climate Awareness Bond" in 2007.
- \$81 billion worth of Green Bonds were sold worldwide in 2016, dominated by the Asian countries (India & China mostly).

Potential projects explicitly recognized by the Green Bonds Principles (GBP) include:

- Renewable energy.
- Sustainable waste management.
- Biodiversity conservation.
- Clean transportation.
- Sustainable water management (including clean and/or drinking water).
- Climate change adaptation.

REVIEW OF LITERATURE

Khouri, Christina (2015) reports that there has been no spike in the Asian green bond this year in the use of the instrument by the borrowers in the Asean region, where the challenges with the conventional debt markets is faced as they develop. Khouri also mentions that the facility could also end up doing the same for the other countries that are eyeing green issuance as well. CGIF told Global Capital Asia that it hoped to back a green bond as part of its efforts to introduce new types of notes in the region.

Vijayakumar, et. al; (2016) has reported that higher interest rates and unattractive terms under which debt is available in India raise the cost of renewable energy by 24-32 per cent compared to the U.S. and Europe. Green Bonds are issued by multilateral agencies such as the World Bank, corporations, government agencies and municipalities. Institutional investors and pension funds

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also have appetite for such bonds. "India has big goals in terms of renewable energy installations, but a big hurdle has been financing and the cost of financing," says Raj Prabhu, CEO and Co-founder of Mercom Capital Group. In addition, many notable CEO's have given their opinions about the matter.

Kim (2015) has analyzed about the birth of the green bond boom in India through IDBI's dollar denominated Green Bonds issue in 2015, Kim analyses the boom with the help of personal interviews of market experts and bankers in his article. Kim also found out that since there are not yet many dedicated funds in the Asian markets like the ones in the European market there is no pricing advantage for the issuer in the Asian markets.

Hui, Rev (2016) informs about the development in the green bond framework in India with SEBI given a formal framework for India's green bond market. SEBI also came up with guidelines that revolve around the Green Bonds use of proceeds & management of the same, project evaluation, selection and reporting standards. He has mentioned that India plans to build 175 gigawatt of renewable energy capacity by 2022, which requires an estimated funding of \$200bn.

Prasad, Rachita (2016) has analyzed the CLP India Private Limited (herein after referred as CLP for ease) wind energy arm issue of Rs 600 crore worth Green Bonds and also issued unlisted, redeemable non-convertible debentures with tenure of three, four and five years at a coupon of 9.15 per cent.

Palma, Stefania (2015) has analyzed about the masala bonds impact on India's green energy projects in the article 'Masala bond' to fuel India's green energy ambitions. This article puts a spotlight on the ambitious green investments in the country. Palma concludes telling that The IFC bond was also testament to the incredible growth of the green bond market.

Kim (2016) focuses on the initial impact on the investors and the issuers by issue of Green Bonds in the Indian market. The researcher feels that the atmosphere is right for the boom of Green Bonds. With all the above observations the researcher concludes that though on the outside it may feel like the government is backing the issue it is the asset class is which is going to set a trend and leave a mark in the market.

Kumar, Rashmi (2016) has analyzed how the Green Bond market has blossomed from being a minnow a couple of years back to a strong dominant position now in the Asian Markets, however there are numerous challenges needed to overcome in the Asian region to reach the status of green bond markets in the United Kingdom. Kumar concludes with a view telling that though the market has blossomed it needs more architecture to make a mark for itself in the Asian markets.

Gilbert has written this research article stating whether standardization is required or not when it comes to issue of Green Bonds and will it affect the market and its growth The people who are for standardization agree with the move of Mexican Stock Exchange which has released its own set of rules relating to the issue of Green Bonds and also the rules set by People's Republic of China. While the other side argues that standardizing makes the growing market to go down and it will be curbed before the market reaches greater heights. In the end it what is best for the growth should only be done instead of taking unnecessary steps by making the process more difficult.

Hui (2015) has researched about the problems faced during the issue of Green Bonds and has provided some suitable solutions for the problem. The researcher has also suggested a few solutions to overcome these problems like listing the bonds in an exchange to lower the risk and provide liquidity and government guarantee on these types of bonds would secure the investors interest and thus helping in the growth of the market.

Kim (2016) has expressed views about how financial institutions are driving the Indian Green bond market with reference to the latest Axis Bank issue Even though Axis Bank had issued Green Bonds successfully there were problems which were to be overcome like the pricing of the bonds. Thus this is how the researcher has measured, analyzed the success of Green Bonds issued by Axis Bank.

Khoury (2015) has researched about the emergence of markets in Asia specifically in China & India. The researcher has analyzed on the number of transactions over the years related to Green Bonds. The researcher has also mentioned about how the green bond market has already been developed in western counties like USA and the European Union. Overall, the research paper has given a full view about the green bond market and how the Asian market should strive upon developing the market to reach the western standards.

STATEMENT OF PROBLEM

This study is to illustrate how Green Bonds have an impact on the Investing Pattern in the market and how the bonds are facilitating the company and the investors to grow.

OBJECTIVES

- To enumerate the gains from issue of green bond (**Tax Shield**).
- To understand and analyze Green Bond impact with the help of financing decision / Capital Budgeting Technique.

PROCESS TO CALCULATE WITH VARIOUS FINANCING DECISION TECHNIQUE

Internal Rate of Return (IRR)

$$IRR = \sum_{t=1}^n \frac{C_t}{(1+r)^t} - C_0 = 0$$

Where, r = the internal rate of return, C_t = Cumulative cash flow at the end of t years, C₀ = Initial Outlay.

Pay Back Period (PBP)

$$DPBP = (A - 1) + \frac{C - \text{Cumulative Present Value of Cash Flow}^{(A-1)}}{(\text{Present Value of Cash Flow})^A}$$

Where,

A = Year in which the cumulative present value of cash flows from investment exceed the initial cost.

A-1 = the year prior to A.

Present Value of Cash Flow ^A = Present Value of Net Cash Flow in year A.

Cost = the initial cost of investment

Net Present Value (NPV)

$$NPV = \sum_{t=1}^n \frac{A_1}{(1+K)^t} - C$$

Where,

A1 = represents the stream of benefits expected to occur if a course of action is adopted,

C is the cost of that action.

K is the appropriate discount rate to measure the quality of A's.

LIMITATIONS

- The data mainly used in study is secondary in nature.
- The research is time and rate specific.
- The findings cannot be generalized as it deals with specific companies.
- The predictions made are based on past trends, which may vary due to different situations and circumstances.

DATA ANALYSIS

CLP India Private Limited (CLP)

CLP entered the Indian Power Sector in the year 2002 with the acquisition of a 655 MW gas fired power plant, which is located in Bharuch, Gujarat. CLP India is the wholly owned subsidiary of CLP Holdings Ltd, which is listed on the Hong Kong Stock Exchange and is one of the leading investor-owned power businesses in Asia. Entering the Indian power sector in 2002, it has become one of the largest foreign investors in the Indian power sector with a total committed investment of over INR 14,500 Crores. CLP India is one of the largest renewable energy producers in India with operational and committed capacity of around 1100 MW across wind and solar.

Greenko Energies Private Limited (Greenko)

Greenko is a mainstream participant in the Indian energy industry and a market-leading owner and operator of clean energy projects in India. This group is building a portfolio for wind, solar, hydropower, natural gas and biomass asset within India and

intends to increase the installed capacity it operates by developing new Greenfield assets. Right now, Greenko has 1.5 GW of operating capacity and it plans to achieve 3.0 GW capacity by 2018.

Ascertainment of Capital Cost of Wind Power (1 MW)

Table-1

| Particulars | Capital Cost of Wind Power (Rs. In Crores) | % of Total Cost |
|--------------------------|--|-----------------|
| Wind Turbine | 384 | 64% |
| Foundation | 96 | 16% |
| Planning & Miscellaneous | 54 | 9% |
| Grid Connection | 66 | 11% |
| Total | 600 | 100% |

Sources: Authors Compilation

Tax Incentives for Wind Energy

- 80% accelerated depreciation on specified Non-conventional Renewable energy (including wind power requirement) devices/systems in the first year of installation of projects.
- 10-year Tax Holiday on Wind Power projects.

Table-2: Ascertainment of cost of Solar Power [1 Mega Watt (MW)]

| Particulars | Capital Cost for Solar PV projects (Rs. In Crores) | % of Total Cost |
|-------------------------|--|-----------------|
| PV Module | 340 | 55.74% |
| Land Cost | 31 | 5.08% |
| General & Civil Works | 50 | 8.20% |
| Mounting Structure | 50 | 8.20% |
| Power Conditioning Unit | 39 | 6.38% |
| Evacuation Cost | 50 | 8.20% |
| Preliminary Cost | 50 | 8.20% |
| Total | 610 | 100% |

Sources: Authors Compilation

Tax Incentives for Solar Energy

- A 10-year tax holiday for the solar power projects.
- Guaranteed market through solar power purchase obligation for states.
- Special incentives for exports from India in renewable energy, which is produced from an SEZ.
- A payment security mechanism to cover the risk of default by state utilities/discoms.
- A subsidy of 30% of the project cost for off-grid Photovoltaics and solar thermals projects.
- Loans at concessional rates for off-grid projects.

Assumptions

- All Indirect Taxes & Minimum Alternate Tax has been ignored.
- Direct Tax @ 30% is assumed throughout for all the projects.
- Machine rates & cost are based on documents published by Central Electricity Regulatory Commission.
- Interest of the year 2016, is added to the initial outlay as capital expense since the projects were not operational.
- It is assumed that new equity shares are issued at the time of maturity of bonds (i.e., on 2020 & 2023).
- Depreciation is provided at Straight Line Method according to several relevant laws and is calculated based on the cost ascertainment mentioned above.
- The cost, sales and production has been based on previous trends and market conditions.

Various Calculations to Ascertain Cash Flows of the Relevant Projects

Table-3

| Particulars | CLP WIND FARMS (101 MW) | | | | |
|----------------------------|-------------------------|----------|-----------|-----------|-----------|
| | 2017 | 2018 | 2019-2026 | 2027-2036 | 2037-2041 |
| Efficiency | 65% | 68% | 72% | 75% | 80% |
| Cost (Rupees) (Rs.) / Unit | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| Production (MW) | 561600 | 587520 | 622080 | 648000 | 691200 |
| Total Cost (Rs. in Cr) | 258.336 | 270.2592 | 286.1568 | 298.08 | 317.952 |
| Sale Price (Rs.) | 7 | 7 | 7 | 7.5 | 7.5 |
| Total Revenue (Rs. in Cr.) | 393.12 | 411.264 | 435.456 | 466.56 | 518.4 |

Sources: Authors Compilation

Table-4

| Particulars | GREENKO (150 MW) | | | |
|----------------------------|------------------|-----------|-----------|-----------|
| | 2017-2021 | 2022-2026 | 2027-2036 | 2037-2041 |
| Efficiency | 60% | 65% | 70% | 75% |
| Cost (Rupees) (Rs.) / Unit | 5 | 4 | 4 | 4 |
| Production (MW) | 777600 | 842400 | 907200 | 972000 |
| Total Cost (Rs. in Cr) | 388.8 | 336.96 | 362.88 | 388.8 |
| Sale Price (Rs.) | 8.25 | 8.25 | 8.25 | 8.75 |
| Total Revenue (Rs. in Cr.) | 641.52 | 694.98 | 793.8 | 850.5 |

Sources: Authors Compilation

Table-5

| Particulars | GREENKO (200 MW) | | | | |
|----------------------------|------------------|-----------|-----------|-----------|-----------|
| | 2017-2021 | 2022-2026 | 2027-2029 | 2030-2033 | 2034-2041 |
| Efficiency | 60% | 65% | 70% | 70% | 75% |
| Cost (Rupees) (Rs.) / Unit | 5 | 5 | 5 | 4.5 | 4.5 |
| Production (MW) | 1036800 | 1123200 | 1209600 | 1209600 | 1296000 |
| Total Cost (Rs. in Cr) | 518.4 | 561.6 | 604.8 | 544.32 | 583.2 |
| Sale Price (Rs.) | 7 | 7 | 7.5 | 7.5 | 7.5 |
| Total Revenue (Rs. in Cr.) | 725.76 | 786.24 | 907.2 | 907.2 | 907.2 |

Sources: Authors Compilation

Table-6

| Particulars | GREENKO (300 MW) | | | | |
|----------------------------|------------------|-----------|-----------|-----------|-----------|
| | 2017-2021 | 2022-2026 | 2027-2031 | 2032-2036 | 2037-2041 |
| Efficiency | 60% | 65% | 70% | 70% | 75% |
| Cost (Rupees) (Rs.) / Unit | 5 | 5 | 5 | 4.5 | 4.5 |
| Production (MW) | 1555200 | 1684800 | 1814400 | 1814400 | 1944000 |
| Total Cost (Rs. in Cr) | 777.6 | 842.4 | 907.2 | 816.48 | 874.8 |
| Sale Price (Rs.) | 8 | 8 | 8.5 | 8.5 | 8.5 |
| Total Revenue (Rs. in Cr.) | 124.416 | 134.784 | 154.224 | 154.224 | 165.24 |

Sources: Authors Compilation

Table-7: Income Statements for the Various Projects to Get the Required Cash Flows for Further Calculations YEAR

| Particulars | 2017 | 2017 | 2017 | 2017 |
|-------------|--------------|--------------|--------------|--------------|
| Efficiency | 65% | 60% | 60% | 60% |
| | CLP(101MW) | GREENKO(150) | GREENKO(200) | GREENKO(300) |
| | Amount (Rs.) | Amount (Rs.) | Amount(Rs.) | Amount (Rs.) |
| Sales | 3931200000 | 6415200000 | 7257600000 | 12441600000 |

| | | | | |
|----------------------|-------------------|-------------------|-------------------|-------------------|
| Less:- Cost | 2583360000 | 3888000000 | 5184000000 | 7776000000 |
| EBITDA | 1347840000 | 2527200000 | 2073600000 | 4665600000 |
| LESS:- Depreciation | 339360000 | 409500000 | 546000000 | 819000000 |
| EBIT | 1008480000 | 2117700000 | 1527600000 | 3846600000 |
| Less:- Interest | 549000000 | 376837500 | 502125000 | 754162500 |
| EBT | 459480000 | 1740862500 | 1025475000 | 3092437500 |
| Less:- Tax | NIL | NIL | NIL | NIL |
| EAT | 459480000 | 1740862500 | 1025475000 | 3092437500 |
| Less:-Dividend | 90000000 | 100000000 | 50000000 | 150000000 |
| | 369480000 | 1640862500 | 975475000 | 2942437500 |
| Add:- Depreciation | 339360000 | 409500000 | 546000000 | 819000000 |
| Net Cash Flow | 708840000 | 2050362500 | 1521475000 | 3761437500 |

Sources: Authors Compilation

Based on the above Figures we can calculate the Various Cash Flows of a Project Taking into Consideration of all the Above-Mentioned Assumptions.

Table-8

| Years / Particulars | CLP 101 MW(Rs.) | GREENKO 150 MW(Rs.) | GREENKO 200 MW(Rs.) | GREENKO 300 MW(Rs.) |
|---------------------|-----------------|---------------------|---------------------|---------------------|
| 2017 | 708840000 | 2050362500 | 1521475000 | 3761437500 |
| 2018 | 761048000 | 2030362500 | 1511475000 | 3731437500 |
| 2019 | 833992000 | 2010362500 | 1491475000 | 3711437500 |
| 2020 | 833992000 | 1990362500 | 1471475000 | 3691437500 |
| 2021 | 1042992000 | 1970362500 | 1451475000 | 3661437500 |
| 2022 | 1032992000 | 3003362500 | 1604275000 | 4020237500 |
| 2023 | 1022992000 | 2983362500 | 1584275000 | 4000237500 |
| 2024 | 1012992000 | 2830200000 | 1996400000 | 4734400000 |
| 2025 | 1002992000 | 2810200000 | 1966400000 | 4704400000 |
| 2026 | 992992000 | 2780200000 | 1946400000 | 4674400000 |
| 2027 | 914630400 | 2041770000 | 1930600000 | 4290980000 |
| 2028 | 934630400 | 2021770000 | 1900600000 | 4270980000 |
| 2029 | 964630400 | 2001770000 | 1880600000 | 4240980000 |
| 2030 | 994630400 | 1981770000 | 2283960000 | 4210980000 |
| 2031 | 1067248000 | 1971770000 | 2253960000 | 4190980000 |
| 2032 | 1077248000 | 2259290000 | 2223960000 | 4806020000 |
| 2033 | 1077248000 | 2239290000 | 2203960000 | 4776020000 |
| 2034 | 1077248000 | 2219290000 | 2365400000 | 4746020000 |
| 2035 | 1077248000 | 2189290000 | 2335400000 | 4726020000 |
| 2036 | 1077248000 | 2159290000 | 2305400000 | 4706020000 |
| 2037 | 1688784000 | 2354750000 | 2285400000 | 5068900000 |
| 2038 | 1688784000 | 2334750000 | 2265400000 | 5038900000 |
| 2039 | 1688784000 | 2305750000 | 2235400000 | 5008900000 |
| 2040 | 1688784000 | 2274750000 | 2205400000 | 4988900000 |
| 2041 | 1688784000 | 2254750000 | 2185400000 | 4938900000 |

Sources: Authors Compilation

Calculation of NPV, IRR&DPBP of Various Projects to Draw Conclusions

Table-9

| | | |
|--------------------------------|---|--|
| | CLP 101 MW | |
| INITIAL OUTLAY | Rs.6569000000 | |
| NPV@13% | 6940555129-6569000000 = Rs.371555129 | |
| INTERNAL RATE OF RETURN | | |
| | 7713189642-6569000000= 1144189642 | |

| | | |
|--------------------------------|--|--|
| | 7713189642-6018500326= 1694689316 | |
| IRR | 10%+1144189642/1694689316 | |
| RESULT | 10.68% | |
| DISCOUNTED PBP@13% | | |
| DISCOUNTED PBP@13% | 21+14163136/114837312 | |
| | 21.12 YEARS | |
| RESULT | 21 YEAR 1 MONTH 14 DAYS | |
| | GREENKO 150 MW | |
| INITIAL OUTLAY | Rs.9526837500 | |
| NPV@15% | 11107330053-9526837500=Rs.1580492553 | |
| INTERNAL RATE OF RETURN | | |
| | 14640981300-9526837500= 8062739200 | |
| | 14640981300-8856076390= 5784904910 | |
| IRR | 15%+8062739200/5784904910 | |
| RESULT | 16.39% | |
| DISCOUNTED PBP@20% | | |
| DISCOUNTED PBP@20% | 10+2743252/274822242 | |
| | 10.009 Years | |
| RESULT | 10 YEARS 0 MONTHS 3 DAYS | |
| | GREENKO 200 MW | |
| INITIAL OUTLAY | Rs.12702125000 | |
| NPV@13% | 12743133196-12702125000=Rs. 41008196 | |
| INTERNAL RATE OF RETURN | | |
| | 16192506903-12702125000= 3490381903 | |
| | 16192506903-11062631556= 5129875347 | |
| IRR | 10%+3490381903/5129875347 | |
| RESULT | 10.68% | |
| DISCOUNTED PBP@10% | | |
| DISCOUNTED PBP@10% | 13+601366668/982164997 | |
| | 13.62 YEARS | |
| RESULT | 13 YEARS 7 MONTHS 9 DAYS | |
| | GREENKO 300 MW | |
| INITIAL OUTLAY | Rs.19054162500 | |
| NPV@15% | 26249078428-19054162500=Rs.7194915928 | |
| INTERNAL RATE OF RETURN | | |
| | 37759570301-19054162500= 18705407801 | |
| | 37759570301-21323172927= 16436397374 | |
| IRR | 10%+18705407801/16436397374 | |
| RESULT | 11.14% | |
| DISCOUNTED PBP@15% | | |
| DISCOUNTED PBP@15% | 9+465183356/1155511680 | |
| | 9.40 Years | |
| RESULT | 9 Years 4 Months 24 Days | |

Sources: Authors Compilation

FINDINGS & SUGGESTION

The project has been computed for a time scale of 25 years to analyze the full-fledged benefit of Green Bonds on a company, hence for the same the companies CLP Wind Farms Limited & Greenko Energies Private Limited.

CLP India Private Limited

CLP Limited has issued Green Bonds for Rupees 600 crores at a coupon rate of 9.15% maturing after four years of issue. It has utilized this issue in a wind farm project. CLP had got the first mover advantage by issuing high yield corporate Green Bonds and also as the bonds had been issued in Rupees so no Hedging cost were incurred. CLP also got higher international rankings in the bond issue market due to Green Bonds. The higher interest rates were only the negative aspect of the issue from the viewpoint of the company.

Greenko Energies Private Limited

Greenko has issued dollar denominated Green Bonds valued at \$550 million for a coupon rate of 4.875% maturing after 8years of issue. Greenko has diversely invested in three different solar projects at different capacities and capital cost. The bond issue had an advantage of lower coupon rate but it had to incur hedging cost due to dollar denomination. As the rates were lower, Greenko had better opportunities to get its investment back. The company’s international rankings went up after the issue of Green Bonds.

Performance Analysis

CLP and Greenko had their own different and unique strategies to utilize the funds and they both were successful in getting positive returns, which can be seen in above table. This rate of return could not be expected from both the companies if they had used any other debt instruments in same projects. However, Greenko was a clear winner when it comes to utilization of funds and earning returns in a better manner.

Table-10

| Particulars | CLP | Greenko 150 | Greenko 200 | Greenko 300 |
|---------------------------|--------------|---------------|-------------|---------------|
| Net Present Value | Rs.371555129 | Rs.1580492553 | Rs.41008196 | Rs.7194915928 |
| Discounted Payback Period | 21.12 years | 10.009 years | 13.62 years | 9.40 years |
| Internal Rate of Return | 10.68% | 16.39% | 10.68% | 11.14% |

Sources: Authors Compilation

SUGGESTIONS

The green bond market is still evolving and is in its infant stage in India, so it needs a lot of support from the Government and other institutions. The main reasons to use Green Bonds are:

- It comparatively lowers the Cost of Capital, thus releasing the stress on companies.
- It helps in the growth of renewable energy in the country.
- It could also help achieve the country’s renewable energy target mentioned in the Paris Climate Summit.
- Green Bonds also helps in getting tax incentives or Holidays for both Investor and Issuers.
- The organization gains International recognition and higher rankings in the Bond Market.
- Given the nature of Green Bonds, there is a need for defining what all constitutes under Green Bonds by Securities and Exchange Board of India.
- There is a need for specific disclosure requirements about management of proceeds, reporting requirements etc.
- Any renewable projects in India require certification by Independent Third Party certifiers, which should be made available in-house.

CONCLUSION

After putting in a lot of effort into gathering accurate information about the subject matter, it is reported objectively and conveyed in an appropriate language. According to this study, we can get insights that the companies issuing Green Bonds have more benefits when compared to companies issuing other debt instruments.

Here we have taken two companies as subject matter to study, i.e. Greenko and CLP where both the companies proved to be effective in terms of earning good rate of return to the investments made by the investors. However, when compared Greenko has been in the front in terms of utilization of funds and getting positive returns.

By estimating all the risks & gains involved in Green Bonds along with the help of various statistical tools, we have achieved all the stated objectives for the projects. Hence, we can conclude that Green Bonds have a significant influence on the financing decision of a renewable energy company.

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