YASHASWI EDUCATION SOCIETY'S

INTERNATIONAL INSTITUTE OF MANAGEMENT SCIENCE CHINCHWAD, MAHARASHTRA, PUNE, INDIA

in association with

National Institute of Personnel Management (NIPM)

&

Indo European Education Foundation, Poland

2nd INTERNATIONAL CONFERENCE

ON

INNOVATIONS IN MANAGEMENT & INFORMATION TECHNOLOGY (ICIMIT - 22)

25 - 26th FEBRUARY, 2022

ISBN : 978-81-927230-0-10

CONFERENCE PROCEEDING

EDITOR

DR. SHIVAJI D. MUNDHE

DIRECTOR, IIMS

Proceedings

2nd International Conference on Innovation in Management & Information Technology

ICIMIT-2022

February 25-26, 2022

Chinchwad, Pune, India

Organised by

Yashaswi Education Society's

International Institute of Management & Science

Chinchwad, Pune, India

Association with

National Institute of Personnal Management

&

Indo-European Foundation, Poland

Table of Contents

 ISBN 978-81-927230-0-10

Implications of Cross-Cultural Communication in Global Business: India-Poland Perspective

Dr. Pradeep Kumar
Department of Modern Languages
University of Applied Sciences in Nysa, Poland
E-mail: pradeep.kumar@pwsz.nysa.pl

Abstract: ***Someone's culture could be understood as their learned behaviour patterns from childhood as a part of their adaptive nature. The surroundings and the collective behaviour patterns that are shared since birth, become part of the culture of that individual. The similar psychological reasoning also applied to a legal entity or enterprises working at regional, national or international levels. The corporate culture is always influenced by the people or group of people controlling an organisation or owning that organisation with majority. The country of origin keeps impacting the operational conduct through learned knowledge, belief, art, morals, customs, languages, and other habits acquired by that individual or group of people as a member of that particular society. In normal practice, we try to project our mindset onto other people. We expect the similar practices and behaviour from the counterparts either from a day today's life practices or, from the business partners. But successful execution in a cross-cultural environments depends on how they are presented by one and accepted by the other.*** ***Keywords: business, communication, India, influence, intercultural, Poland***

INTRODUCTION

Since the dawn of civilisation, globalisation has helped business locally as well as internationally by using different skills, and understanding many different cultures by crossing borders. But in recent months, we have experienced opposite behaviour towards expansion of businesses from the open market economy into total shutdowns, a larger concept of global business expansion strategies converted into local made strategies "**Vocal for Local"**. Local business has been more appreciated by avoiding dependencies on global business specially during this pandemic period. The word **vocal for local**[1] is a new initiative taken by Indian Prime minister in order to encourage local business as well as an open invitation to the global companies to come to India and do manufacturing locally according to local demands. It has helped India to receive the highest foreign capital into the economy by hosting many global investments in various sectors.

Now, especially when methods of interactions are increasing in a way depending on the technologies which is increasing misunderstanding of cross-cultural communications and harming businesses across the globe. Office working culture has converted into technology based virtual platforms as a place of discussion *and* strategies making mechanism. At the same time the

[1] *Vocal for Local* means encourage local business and manufacturing in India, a concept launched by Indian Prime Min.ister, Shri Narendra Modi

diversification of the consumer needs in global as well as local markets added a new understanding of cross-cultural communication by presenting the importance of technology for the expansion of businesses for the local as well as globe markets. Establishing a viable business relationship between two or more nations is in itself a complex procedure which can potentially benefit both and the impact of the pandemic has transformed it into a more complex one.

Today, when we understand the value of interconnection of the global world more than ever before, we are forced to be dependent on technologies and virtual communications that are threatening with uncertainty and miss-communication in cross-cultural business. But interestingly, within Poland and India such uncertainty has not been noticed and both markets are showing interest for new opportunities. Poland is watching India as one of the largest market in the world where Polish companies can increasing their investment and gained highest profit by supplying increasing demands from the local market, India is persuading Poland as a best place to do business in Central Eastern Europe which is not only providing opportunities to expand Indian business in Central-Eastern Europe but also used as a getaway to the European Market. Even in this challenging time India and Poland have come closer as business partners and are looking forward to the expansion of bilateral trade. Though India and Poland are very distinct countries in practices of culture, language, and social behaviours, both entities are sharing the similar interest of social-economic development, openness towards new corporate culture and welcoming global businesses with open arms.

In recent years bilateral trade between Poland and India has reached over US$ 3.1 billion and is targeted to cross US$ 5 billion in the next coming years. There are many well doing Polish businesses present in India and some of the under assessment such as Toruńskie Zakłady Materiałów Opatrunkowych (TZMO S.A. Toruń), Can-Pack S.A. (packaging company based in Krakow), Famur S..A. (mining machinery and equipment manufacturing company, based in Katowice), Geofizyka Toruń S.A., Ekolog (green technology), Solaris (green transport), BBT (defence), Meble Forte (furniture), Thaiger Nutraceuticals (nutrition), Maflow (autoparts, under assessment), Inglot (cosmetics, under assessment) etc. At the same time many India business are already present in Poland and expanding their business in other EU member states such as ArcelorMittal, Videocon, Escorts, Strides Arcolab, Ranbaxy, EsselPropack, KPIT Cummins, Zensar Technologies Ltd, Tata Consultancy Services, HCL Technologies Ltd, Infosys, Wipro, Jindal Stainless, Berger Paints India, UFLEX, Glenmark Pharmaceuticals, Rishab Instruments (acquired Lumel), CRISIL, etc.

COMPLEX IN CULTURE: CHALLENGES AND OPPORTUNITIES FOR INDIA AND POLAND

The progress of trade relations between India and Poland is very significant which is also presenting very promising and potential markets for doing businesses. In recent years, bilateral trade between India and Poland has increased based on a real supply and demand model of business strategies. On one hand where Poland has technologies and well performing companies looking for their expansion abroad other hand India is looking for new partners for technologies and innovative projects. It is not only limited to technology investment but has been seen in the education sector as well, when Polish Universities are harshly affected by demographic impact and not able to efficiently number on qualified students, numbers of Indian students are admitted to the Polish University. Comparing the

total number of Indian students studying in Poland at Polish universities in 2014 were 227, it has increased up to 6500 in 2019. [2] Compared to previous academic years specially 2015/2015, it was such a spectacular increase in 2019/2020. The reason for such an increase is the impact of rapid population growth in India which is increasing the demand for places at the educational institutions. Lack of places at the educational institutions in India encourages students to go abroad for higher education. In such a scenario Poland has been identified as a good destination for quality education at a lower tuition fee structure which is not only giving opportunities to students for getting quality education from well established universities but also provide exposure of the European Union by utilising mobilities under Erasmus+ and other cultural and academic exchanges.

Though the number of students from India are increasing at Polish Universities by following the demand and supply model of business equation, what about the complexities when two completely different people from vastly separate cultures communicate with one another, or expectations from students and universities meet for progressive development? Is it so simple or are there challenges? When it comes down to language, Polish (Polish language as one of the most difficult languages in practice). Students from India joining Polish Universities, expect their studies in English but many universities are not ready for such changes with entire courses / programs which is impacting their admission / recruitment globally by not getting the required number of qualified students under their programs. Therefore, they have no choices and are admitting anyone for any existing programs and under launching programs by receiving full tuition fees. In general it's applicable for Polish private universities which is also degrading the quality of education. Another part is cultural shock - students from South India have never seen snowfall and used to live with 30+ degree temperature, arriving in Poland in the month of September/October and enjoying cold Poland with-20+ degree temperature with snowfall and rain. Going to local shops/grocery stores and not being able to buy any products due to language barriers. Communicating in local markets, learning and after completion of the degree/diploma programs going to the labour market itself is challenging.

It is worth mentioning that Poland is not a favourite destination among Indian students due to the quality of education but its offering in a package as quality educational degrees at lowest cost of tuition fees. Tuition fees applicable at many Public and Private universities are even lower than seen applicable in India by Indian educational institutions which is encouraging students to go to Poland. On priorities, always Indian students prefers to go English speaking countries such as the USA, the UK, Australia, New Zealand, Canada, etc., then non-English speaking countries in the European Union e.g. Sweden, Denmark, France, Germany, Italy, Norway, Switzerland, Czech Republic, etc.

Let's present a corporate scenario: when a Polish companies work abroad or cooperate in a global business environment with English language, their expectations are that most people in commerce, especially higher ranking employees (executives, chief officers, managers, etc.) speak English in a communicative way. So the Indian companies are expecting. But at the same time India is known for multilingual and multicultural practices. Each Indian State's practices different languages and

[2] P. Kumar, Emerging Trends in Higher Education: A Roadmap for Poland-India Relations, Lap Lambert Academic Publishing, Mauritius 2019, p72.

cultures based on their regional customs and local languages. An Indian, himself is to be considered a foreigner in his/her own country when they are in another part of the Indian states e.g. an Indian citizen from North India traveling to South India makes them feel like a foreigner because they don't speak the same language or practice the same habits. So they have to use a common language such as English for their communication, just as a foreign nationals are going to establish their communications, or a Polish company will establish their business relations. Therefore, English has been used as a linked language in India among Indians as well as for foreign collaborations which helps India to attract foreign investors.

Apart from languages, cultural practices are another barrier which is not easy to overcome. From things like clothing to way of conduct, there are differences, e.g., a hygiene company TZMO (Toruńskie Zakłady Materiałów Opatrunkowych) from Poland will behave differently working in India than a company from India. Most of the top management officials will be from Poland and practising the similar working culture as practiced in Poland. It might take some time to learn local Indian languages and cultural practices to make happy local employees and integrate with Indian working style, e.g., letting a woman / female colleagues go out first or coming in may not be seen as normal practices in India, and it may be considered as lack of manners, but it'll be practiced by Polish colleagues. Another example of eating by hand using fingers by Indians might be embracing for Poles (Western culture), then not using fork and knife, but it's a very normal practice for Indian society. While it is important to respect one's cultures, these differences can become a stumbling block within the field of business. Whereas one gesture/way of speaking may seem innocuous to you, could be greatly offensive to the chief executive officer you're having a business meeting with. And that's not exactly a good thing if you want to help both companies have a close work relationship.

Enterprises from various nations ought to realise the significance of recognising their counterparts' cultures and beliefs, as well as improving intercultural contact awareness. In this issue, neither Poland is an exception nor India. After the fall of communism, Polish economy has opened itself to international trade, and as such, came into business contacts that it has not had before. Just like with other countries that emerged from the eastern side of the Iron Curtain, Poland has struggled, but made progress and developed new opportunities through adapting intercultural communication in global business. Considering India which has emerged from a colonial era to shining India known as digital India - its progress which has gone through major ups and downs since centuries from the East India Company (17th Century) to British Raj (1858 onwards), from a British colony to an Independent India (15th August 1947), and from an emerging economy to world's top leading economy (5th largest economy in the world).[3]

Therefore, it is necessary to understand the establishment of cross-cultural tools applied between India and Poland which has led them to create successful stories towards new trade relations. This research paper will discuss how cross cultural understanding is important for intercultural communication in global business considering India, Poland experiences.

HYPOTHESIS

[3] Investopedia, Caleb Silver, *Ranking the Richest Countries in the World*. Updated on Dec 24, 2020. Available: https://www.investopedia.com/insights/worlds-top-economies/

This research paper is based on the following five hypotheses:

1. Better understanding of different cultures and local practices are directly proportional to increasing better socio-economic relations.
2. Educational needs are directly proportional to students inflow to Poland from India.
3. Language influences the regional and local businesses.
4. Cultural background influences to corporate culture and it's global practices
5. Demand and supply equation can improve the social and economic relations between India and Poland.

IMPORTANCE OF INTERCULTURAL COMMUNICATION FOR GLOBAL BUSINESS

Importance of effective communication has always been present which leads businesses towards success or failure either in the educational sector or an industrial sector. It always depends on the participant's background, knowledge and their learned behaviour that converts even complex negotiations into successful communication. It is not only about effective and efficient delivery abilities, but it is also about the receiving abilities of an individual working with an organisation, industry, or from a nation that reflects their skills and acquired knowledge from that organisation and ability to convert difficult negotiations into fruitful cooperation. Once intercultural communication takes place for any negotiation process, it is always influenced by two mechanisms or strategies of participants - Listening and responding abilities. If matters are well presented and counterpart has been well received then only it influences the positive environment for global businesses.

In the case of India and Poland, a cross-cultural environment is more complex and not easy to create a successful business environment without respecting each other's expectations and cultural practices. Sometimes, even lack of competence and knowledge influences the easy going business cooperation. Though the business atmosphere is getting better and positive, it is important for both the entities to participate actively by respecting each other's needs. It is suggested to follow a few steps in order to make successful communication and business partners by analysing the influential factors and elements for their business progress. Though uncertainties are always there in cross-cultural negotiation, participants can achieve their organisational goals in a global business environment by following a few steps:

- **Anticipation** - participants should give a new angle to think about potential communication based on expectations and predictions.
- **Assessment** - make proper assessment determining the factors, and elements that might be influential and supportive for positive communication.
- **Evaluation** - evaluation of the impact of the current negotiation and its results. By realising the value and worth of the factors and elements based on their needs or requirements.
- **Selective** - we must be selective by giving importance to the found factors and elements worth presenting and handling based on the skills and abilities.
- **Apply** - we should give attention to the factors or elements that are relevant to our organisational goals.

By following above mentioned steps can lead our tuff negotiation in successful strategies by knowing our institutional or organisational goals. Apart from that we should give attention and full

respect to the local culture. Ignorance or disrespect of such practices means losing your business globally which will be getting affected from regional level to the global businesses.

Cultural practices, rules, dress codes and eating habits can influence the business globally. Therefore it is important for an organisation planning to go abroad as an extension of their business to think about the local demands and requirements. For instance, an Indian "Saree" manufacturing giant, starting their manufacturing unit in Poland for Polish customers. Business will simply collapse, because none of the Polish ladies would be able to wear 'Saree' in Poland especially when more than 8 months Poland has the colder weather. Another example can be seen as MacDonald starting its branch in Saudi Arabia with Pork products, where (Saudi Arabia) pork meat is forbidden. Knowing these requirements is crucial to find a mutual ground where cooperation can be built and business can be established.

On the other hand, there are certain cultures that have little differences between them. This could be tied to a shared historical past, common religion, similar customs, e.g., the Scandinavian countries are close together because of their Norse roots, centuries of co-rulers and a religion that is prevalent in all Nordic countries (Lutheran Christianity). These factors helped influence the current socio-economic background, where the people of Norway, Denmark and Sweden are social democrats with welfare states; the wealth their nation accumulates must benefit the common, less-fortunate folk. Also, there are gestures, ways of speaking, symbols, ethics, etc, that cross national boundaries. Putting your feet up on the desk, for example, would be frowned upon with the same level of disdain in France as it would in Indonesia. It is as every bit important to find these commonalities as it is to find what separates us. Analysing both and drawing the right conclusions is the cornerstone of intercultural communication.

What is important to consider is cultural shifts, as these happen, on average, once a generation. What our grandparents perceived as normal and innocent, we may look at it with scorn, and vice versa. Things that influence cultural shifts are (but not limited to): major world events, such as wars, pandemics and economic crises, advancements in science and education, and a change in political climates. A perfect example of that would be Poland, as it underwent all these changes in the past century, with the most profound one being the socioeconomic changes of the 1980s.

THE DEVELOPMENT OF INTERNATIONAL BUSINESS IN POLAND

After the Second World War, the Republic of Poland was in essence, a satellite state of the Soviet Union, along with countries such as Czechoslovakia, Romania, Hungary, Bulgaria, and others. Its economy was dependent on whatever the USSR wanted it to be, so as such, there was no mutuality in business contacts. The relationship was that of dominance and subservience. Nevertheless, there were some attempts of liberalisation of the economy during the 1970s which happened under Edward Gierek, the leader of Poland. Gierek enjoyed support from the West, due to his contacts with French and German leaders. For a time, Polish economy boomed, but then rapidly collapsed due to debt. This in turn led to widespread protests in 1980, which were followed by the creation of the Solidarity movement, and subsequently - the collapse of communist rule in Poland in 1989.

Unlike during the Gierek period, Poland was in full control of its economy, and was now free to establish business relations with countries that it previously could not. With the ascension to the European Union in 2004, the economic situation in Poland was more open towards international trade.

Simultaneously, the need to develop international business communication appeared.

From the moment that Poland opened its economy to the global market, foreign investors were keen on setting up their businesses in Poland. At the same time, Polish companies set up business relations in other countries, both neighbouring and those far away. Poland from the beginning was pro-Western, and as such, sought to establish contacts with the US, the UK, France, Germany, and so on. At the same time, however, it tried to leverage that with additional countries not included in the Western bloc; countries it was formerly allied with (the Eastern bloc) were strategically important for Poland to develop its economy. Countries like Czech Republic, Slovakia, Hungary, Ukraine also were in Poland's interest. Lastly, Eastern powers like Russia, China and Japan became important for commerce, albeit with strained diplomatic relations with Russia, this was difficult.

With the ascension to the European Union in 2004, Poland experienced an economic boom, which was so strong that Poland remained largely unaffected during the global recession in 2008-2009. Cross-national contacts became frequent, and it was these events which later influenced the need to develop viable intercultural communication in global business.

Educational efforts were influential in the development of this field in order to install good practices when dealing with foreign businesses. Based upon previous research that other nations have undertaken, Poland too was eager to complete its transformation to a global player in economics. Successes have been made without a doubt, but not without certain difficulties at the beginning.

DEVELOPMENT OF CROSS-CULTURAL UNDERSTANDING BETWEEN POLAND AND INDIA

Though Poland and India had a very difficult past both the entities managed to come across from all the burdens of their own cultural practices and integrated with global culture for the development of their people, nation and economies. Polish economy has transformed since its opening to the global market in the 1990s and has made successes in obtaining new partners, as well as strengthening ties with its neighbours. This opening has introduced ways of learning intercultural communications. Thanks to an improved business culture that has transformed and taught a generation of employees the need to learn proper contacts with employees from different countries, Poland's opportunities can only expand at this point, as it has been happening for quite some time now.

Conducting cross-border business relationships required Polish entrepreneurs not only to know about the political and economic conditions in the partners' country but it was also useful to know and understand organisational culture of the nation that Poland is cooperating with. There are many similarities in the business behaviour of neighbouring countries and even far-away countries, but also many differences. Compliance with applicable rules and respect for partners will avoid misunderstandings and improve the climate of mutual relations. Good business relations with Poland's foreign commerce contacts, despite the many barriers resulting from a difficult economic and even political situation-confirm that the culture represented by Poles is high and is successful.

In the similar manner, India's experience from colonial burden to an open economy policy, led the country towards socio-economic development. Indian economy has also lifted up since 1991, when India adopted an open market economic policy. And since then its economy is growing as one of the fastest economies in the world. And in 2019, India became the world's fifth largest economy.

Nevertheless, due to India's friendly behaviour towards Poland, and Poland's willingness to negotiate, help out and respect the other side's time, it was able to benefit from these traits in developing a desirable level of Polish-Indian business communication.

To give an example of such difficulties, we can look into how Poland developed trade relations with India, and how cultural differences influenced the way this cooperation turned out to be. Polish importers often expect Indian producers to adapt more to the culture of their customers. Unfortunately, the reality looks a little different. Some Indian culture researchers believe that Indian development is cognitively and emotionally separated from Westernisation. Simultaneously cultivating their culturally specific behaviours, the Indian were also able to adopt Western practices and achieve success in modern companies without losing their Indian identity in fact, Western (Polish) managers, fitted in style of communication to local colleagues from collectivist culture (Indian), choosing a less direct communication strategy.

In the case of Polish companies exporting to the Indian market, knowledge of local culture can be much more important in business success than limiting oneself only to knowledge of etiquette and formalities at official meetings. India is the fastest growing consumer market, also in the e-commerce market, with increasing competition from global and local companies fighting for customers. Therefore, for the development of a marketing strategy to be effective, it must be adapted to the local culture. Knowledge of the culture of the importing company significantly reduces the risk of failure in introducing new products. An example would be - one of the largest Polish exporters of shower gel, did not take into account that most of their Indian customers are using soaps and not shower gel, which resulted in a collapse of sales due to less demand in the market.

The field of intercultural communication has developed a categorisation of cultures, grouped into several labels depending on their traits. Some of these traits are typical for people within the Indian culture sphere, and this influences the way they conduct their businesses. In India, hierarchy within the workplace is firmy upheld, and those following orders hardly ever discuss decisions made by the management. The Western model allows discussion between lower-end employees and the higher-ups; decisions can be changed if the people will do it.

Over recent years, businesses from Poland and India have taken places at larger scales in a very friendly environment by reducing the cultural barriers and enhancing the trade ties. At the same time as the threat of China's market is growing, Polish and European markets are looking at India as an option for replacing China and showing their confidence in the Indian market. It is predicted that in the coming years Polish and Indian bilateral trade relations will be growing which is truly based on supply demand rather than influenced by cultural barriers.

5. CONCLUSION

The success in global business requires openness for greater tolerance, acquiring new skills, and learning about the world's culture. It is important to maintain trust, credibility and a positive environment which will lead the negotiations into positive results. It is well understood and accepted that nations differ from each other and this will not change. But there is no doubt that intercultural misunderstandings make it difficult when managing business contacts. Bad communication can result in a loss of time, money, credibility or trust.

It should be also remembered that there is no guarantee of knowing how a person from another culture will behave in a given situation. The reaction

of a person from a different culture may be different from the one you are from. The course that intercultural meetings will take and the results depend on many factors (e.g., cultural differences, rooted stereotypes, prejudices, and present needs, etc.). But knowing such factors certainly will be helpful for the development of socio-economic relations.

It has been seen in the Indian and Polish cultural practices which are totally opposite then one another but their enthusiasm to learn their cultural practices and increasing interest to do business, brings two nations closer than ever before. The need and fulfilment of their desires for tackling demographic issues enhanced them to cooperate with Indian market in order to get a number of qualified students at their universities by breaking the stereotype of Polish Universities and barriers of regional languages. Many foreign investors and companies found these two countries attractive for investment because of their free market policy, openness, reforms in financial institutions, changes in corporate related laws and regulation, flexibility in tax structure and availability of raw material and efficient labor market. These countries are posing investment opportunities to each other by reducing cultural barriers and lingual differences based on the demand and supply equation of doing businesses.

REFERENCES

- Caleb, Silver. *Ranking the Richest Countries in the World*. Investopedia, Dec 24, 2020.
- *Embassy of India* , Warsaw, February 2020.
- Kumar, Pradeep. *Emerging Trends in Higher Education: A Roadmap for Poland-India Relations.* Lap Lambert Academic Publishing, 2019.
- Kumar, Pradeep. *Foreign Capital Remains Buoyant for the Development of Indian Economy: Beyond the Pandemic.* Scholar's Press, 2020.
- Kumar, Pradeep. "Evaluation of Indo-Polish Relations: A Realistic Approach under Legal framework of Free Trade Area (FTA)", *Kwartalnik Naukowy Uczelni Vistula*, Issue. 1(35) , 2013. pp.2-13.
- Kuzniar, Roman. *Poland's Foreign Policy after 1989.* Wydawnictwo Naukowe scholar, 2009.

DOING BUSINESS ACTIVITY BY KEEPING BALANCE BETWEEN ECONOMIC, SOCIAL AND ENVIRONMENTAL DIMENSIONS OF SUSTAINABLE DEVELOPMENT: EU REALITIES AND THEIR APPLICATIONS IN UKRAINE

Iryna Kramar – Professor, Doctor of Science, Economics and Finance Department, Faculty of Economics and Management, Ternopil Ivan Puluj National Technical University, Ukraine
Ruska Str., 56, Ternopil, 46001, Ukraine
ira_kramar@yahoo.com, +380980225713

Tetiana Vitenko – Professor, Doctor of Science, Food Technologies Equipment Department, Faculty of Engineering of Machines, Structures and Technologies, Ternopil Ivan Puluj National Technical University, Ukraine
Ruska Str., 56, Ternopil, 46001, Ukraine
vitenko@tntu.edu.ua

Nataliia Marynenko – Professor, Doctor of Science, Economics and Finance Department, Faculty of Economics and Management, Ternopil Ivan Puluj National Technical University, Ukraine
Ruska Str., 56, Ternopil, 46001, Ukraine
n_marynenko@ukr.net

Abstract. Small and medium enterprises (SMEs) in Ukraine are a powerful socio-economic driver, which provide jobs and more than half of production. SMEs dominate the economy of Ukraine in terms of quantity, employment (generate about 80 % of employment) and value added. According to the State Statistics Service of Ukraine, before the pandemics the country had 446 large enterprises and 1,839,147 SMEs [10]. Eighty per cent of all SMEs were selfemployed individuals in a situation where 75 % of women participating in labour force are self-employed and the sector generated around 20 % of GDP. Currently Ukrainian enterprises work under various conditions which are of great importance to analyze in terms of country's economic growth to be achieved: war in the Eastern part of Ukraine, European integration, COVID-19 pandemics and sustainability constrain. Each of the above mentioned has a significant impact on business activities and all together they create a very challenging environment for its development.

Sustainability issues has become a widely discussed question around the globe before, during and after COVID-19 pandemics arose. Its spread in different areas of our lives has been tremendous and as the time goes, it is getting bigger and bigger. Talking from business perspectives, sustainability patterns have caused changes in consumer behavior and if one might think that COVID-19 made people care more about their spendings (which is for sure also true), not environment, responsible consumption alongside with sustainability paradigm has become a real trend in developed countries.

Sustainable development goals (SDGs) are crucial components of practical implementation of Ukraine's new model of inclusive growth and an integral part of European integration [7]. Taking into account that the EU is becoming Ukraine's main trade partner (almost 42% of Ukraine trade volume), business sustainable practices may become those tools which enhance the process of European integration and positively impact on market expansion, investment climate, job creation, better social and environmental standards [9]. Although how does it work now, in the time of economies recovery from COVID-19? What are the main challenges business faces due to that? And is it possible to keep the balance between economic, social and environmental dimensions of sustainable development today for Ukrainian business entities on its way to European Integration? These are the main questions the paper aims to answer.

RESEARCH

It is well known that time of crisis sets both – challenges and opportunities. It depends on certain actions to be taken to face the first and meet the latter ones. The findings of the EBA survey conducted in late March 2020 highlight that the main concerns for Ukrainian SMEs were: lack of cash flow for rent, utilities, salary and supplies; failure to meet deadlines for the supply of raw materials and components under contracts; debts owed to banks; administrative burdens; penalties for late payments [4]. At the same time field surveys showed that about 30% of business owners [1] claimed a 90% drop in revenue since the adoption of the lockdown measures; about 50% reported a 20–50% loss of income; 25% planned to reduce employees wages and 20% planned to reduce staff. Such challenges that businesses had to face caused urgent necessity of the analysis of possible measures to be taken in order to overcome crisis times which both depends on and impact on the overall economic situation of the country.

Analysis of the above mentioned in the regard of sustainability shows that market expansion and economic growth to be achieved in a country will at the same time boost the consumption of natural resources and result in waste generation which puts more pressure on the environment. That is the time when "green economy" plays a vital role.

Transition to green economy is a long and complicated process. "Green business" can be defined as a business that follows the principles of environmental sustainability in its operations, strives to use renewable resources and tries to minimize the negative impact on the environment [6]. It is difficult (if possible at all) to find a company in the world which can be called as fully "green" not having any negative environmental impacts. However, many companies (small, medium, and large) have taken the path to become "greener". Some of them have achieved "zero waste" or\and "closed-loop water use" or\and use only recycled materials in the production process. Some business owners take such strategy as a tool to be more profitable by reducing costs or increasing sales; some – have taken it as a long-term social responsibility action. The level of which the company aims to "go greener" differs greatly but in each case certain decisions and actions have reduced their impact on the environment.

Current business policies, models and strategies used in Ukraine depend greatly on Ukraine-EU Association Agreement on a Deep and Comprehensive Free Trade Area with the EU together with the action plan of its implementation (in particular, the Economic and Sectoral Cooperation section) and regulations related to energy, environment and technical guidelines, which are considered as the core ones in Ukraine's transition to the European green development model [3]. To better understand possibilities how to keep balance between economic, social and environmental dimensions of sustainable development based on the above mentioned it is important to analyze its measuring system.

In 2016 it was adopted "The Measuring the green transformation of the economy. Guide for EU Eastern Partnership countries" (by OECD), where there were made efforts to establish a common system for economic, social and environmental evaluation of country's green transformation progress. According to this Guide, Economy Green Transformation [8] should be measured by the following:

1. OECD indicators and statistical database (member and partner countries):

1.1. Economic performance, national accounts, productivity.

1.2. Environmental performance, resource productivity.

1.3. Science and technology innovation, entrepreneurship.

1.4. Energy, agriculture, transport.

1.5. Employment, education.

1.6. Development aid, investments, trade.

2. Measuring well-being and progress towards Green Growth (UNEP, WB, UNECE, EU, national indicators):

2.1. Socio-economic and growth characteristics.

2.2. Environmental and resource productivity.

2.3. Natural asset base.

2.4. Environmental quality of life.

2.5. Economic opportunities and policies.

3. Measuring the progress of societies - GDP and beyond (UN SDGs).

Of more than 100 indicators proposed by OECD in 2011 and 2014, 80 were examined and 60 adapted to be used in Ukraine [3]. It was researched that the indicators data varies greatly from each other which makes it hard to evaluate the exact situation with the Ukraine green growth.

Meanwhile the importance of greening the economy is seen in the following: it creates less resource-intensive economy sectors along with new jobs; introduces efficient technologies and boosts innovation activities in the sector of energy efficiency; increases enterprises' competitiveness and labour productivity; minimizes waste. Green economy role becomes at a fore front in the COVID-19 pandemics as more pressure has been put on business.

It was found that the most affected by COVID-19 were micro and small businesses in such areas as beauty, hospitality, tourism and leisure (often operate in the informal economy) where mainly women work; the largest decrease in the number of female employees occurred in wholesale and retail trade [11].

There were defined the following mechanisms of SMEs to cope with COVID-19 [5]:

– purchase of protective equipment;
– decrease in purchases;
– reduction of costs of rented premises and equipment;
– part-time employment, salary cuts;
– change of logistics and transportation of goods;
– cessation of work of production lines and outlets; payment deferral;
– search for new suppliers;
– introduction of flexible schedule, telecommuting, etc; dismissal of employees;
– reduction of the costs of paying interest, debt deferral;
– applying for assistance from the state;
– reduction of the cultivated land area.

The extent of the economic shock as well as how well businesses are able to cope with COVID-19 largely depends on how much the policy response is able to deal with it. The Europe 2020 Strategy outlines the EU's priorities for becoming a "sustainable economy". Governments within the EU have identified the development of SMEs and the transition to a green economy as core objectives of their economic development policy. In EU countries the "green" goods and services sector employs around 3.4 million persons [5] and green business sector has been one of the fastest growing business sectors over the past decade. As part of the Europe 2020 Strategy the EU has developed a Green Action Plan, which aims at helping SMEs to exploit business opportunities that green economy offers.

Also the EU is leading the "Greening Economies in the Eastern Neighbourhood" (EaP Green) project in six countries, including Ukraine. The project is working at government and private sector levels (including SMEs) to: (1) mainstream sustainable consumption and production into national development plans, and legislation; (2) promote the use of strategic environmental assessment and environmental impact assessment as essential planning tools for environmentally sustainable economic development; (3) facilitate the greening of selected economic sectors [6]. On its way to European integration, Ukraine should focus its recovery policies on puting the economy on a more sustainable path. The private sector has great potential to drive green growth. Fostering entrepreneurship, supporting startups, and creating a stable environment for business to grow using green growth principles are important.

Based on the above mentioned we consider that the following measures and policy options enable to keep balance between economic, social and environmental dimensions of sustaianable development for businesses after COVID-19 recovery (picture 1).

Measures that enable to keep balance between economic, social and environmental dimensions of sustainable development for Ukrainian business after COVID-19 recovery

1. Employment retention and generation:

- development of a comprehensive employment policy, linking policy decisions to support trade, foreign direct investments, industrial policy, infrastructure development and skills development to increase in the quantity and quality of jobs, especially for vulnerable groups;
- strengthening of institutions that bear direct responsibility for the efficient governance of the labour market;
- promotion of a decentralized implementation of the employment policy through local employment partnership initiatives;
- employment retention schemes aimed at preserving employment at crisis times
- adoption of international labour standards

2. Safe work environments

(scientific, health, humanitarian and development communities should collaborate with state and interested private actors towards enhanced understanding of transmission through waste management)

3. Greening the small and medium-sized enterprises

- strengthen SMEs' contribution to the lowcarbon transition;
- policies to support the greening of SMEs (financial support measures; incentives for better environmental performance; provision of clear and simple procedures to apply to business support mechanisms and business incubators that could encourage more enterprising SMEs to transition from the informal to the formal sector)

4. Digitalizing of SMEs

5. Circular migration

- safeguard decent work for Ukrainian labour migrants;
- support the safe return and reintegration of Ukrainian migrant workers;
- develop a framework that enables investments and incentivizes the return of qualified nationals;
- establish economic support measures that benefit migrants and remittance service providers

6. Digital infrastructure

7. E-Government

(to reduce administrative barriers by accelerating the implementation of e-government initiatives)

8. Food and agriculture

- develop a crop insurance system with state support;
- develop legislation and infrastructure along food value chains;
- support digital connectivity in agriculture;
- facilitate foreign trade and investment

Picture 1. Measures that enable to keep balance between economic, social and environmental dimensions of sustainable development for Ukrainian business after COVID-19 recovery [2]

Measures mentioned on the picture 1 show that approach to business sustainable recovery after COVID-19 should be complex. A common strategic planning for Ukrainian Green Economy defines the main areas of sustainable economic growth, environment and employment. As elements of sustainability are economic, social and environmental, business sustainable practices can be seen in social responsible companies, ecologically clean production facilities, "green" investments, eco-friendly products and services, labour protection policies at work, decent work provided in urban and rural areas etc. Each of the above mentioned is an example of "green business" as a part of "green economy", which provides solutions to some of society's greatest environmental challenges.

CONCLUSION

Ukraine has substantial national resources, in particular land and minerals. Ideas for green businesses are driven by increased environmental awareness in the community, which in turn creates a demand for green products and services. As levels of environmental awareness increase over time, demand for green goods and services also increases, together with opportunities for business development. It is therefore necessary to create conditions that enable a transition by SMEs to a greener performance. The introduction of sustainable practices with a people-centred approach is a helpful tool for meeting challenges business faces today and application of complex measures enables to keep the balance between the three core elements of sustainability.

References:

1. An enterprise survey conducted by the Federation of Employers of Ukraine (FEU), in collaboration with the ILO. (2020). https://www.ilo.org/budapest/whats-new/WCMS_745555/lang--en/index.htm

2. Assessment of the socio-economic impact of covid-19 in Ukraine. Response and Recovery Plan. (2020). https://ukraine.un.org/sites/default/files/2020-12/UN%20SEIA%20Report%202020%20%281%29.pdf

3. EaPGreen. Report on Green Transformation in Ukraine. Based on OECD Green Growth Indicators. (2016). http://www.green-economies-eap.org/resources/2016_GreenTransformation%20in%20Ukraine%20ENG.pdf

4. European Business Association (EBA). Research and analytics. (2020). https://eba.com.ua/en/research/doslidzhennya-ta-analityka/

5. European Commission. Environmental economics. Green jobs and social impacts. (2016). http://ec.europa.eu/environment/enveco/jobs/

6. "Green business" for small and medium-size enterprises. Guide. (2017). http://pleddg.org.ua/wp-content/uploads/2018/05/SME-Guide-ENG-150.pdf

7. Kozlowska, M., Shcherbyna, S. (2018). *Ukrainian strategies relevant to sustainability*. *The European Union's ENPI Programme for Ukraine Support for the implementation of the EU Ukraine Association Agreement*. https://eu-ua.kmu.gov.ua/sites/default/files/inline/files/annex_c.3.12_a4u_an._studies_and_business_consultations_n21_-_ukrainian_strategies_relevant_to_sustainability.pdf

8. OECD. (2016). *Measuring the Green Transformation of the Economy. Guide for EU Eastern Partnership Countries.*

9. Resolution of the Cabinet of Ministers of Ukraine. (2018). *On Approval of Criteria for Assessing the Validity of State Assistance to Business Entities for Research, Technical Development and Innovation Activities.*

10. State Statistics service of Ukraine. https://ukrstat.org/en

11. UNDP, UN Women and FAO. (2020). Analytical report. COVID-19 in Ukraine: Impact on Households and Businesses. file:///C:/Users/User/Downloads/COVID19%20in%20Ukraine_Impact%20on%20Households%20and%20Businesses.pdf

Role and Importance of Social Media for Digital Marketing

Dr. Rajesh R. Gawali

Sinhgad Institute of Management and Computer Applications, SPPU, Pune
drrajeshgawali2019@gmail.com

Prof. Pradeep Shitole
Sinhgad Institute of Management and Computer Applications, SPPU, Pune
Shitolepradeep@yahoo.co.in

Abstract—

Today billions of users or customers make use of social media due to which it becomes a place for businesses and different brands to market their products or services. As using social media marketers can effectively communicate with customers or find potential customers, which result in customer retention i.e. repeat orders from existing customers and customer loyalty.

From last decade every industry use digital marketing to reach to their customers and importance of digital marketing increased from last decade in every industry. Use of right marketing policy industry can reach to many customers and operate more efficiently to achieve long term financial objectives of it.

Today many people make use of information online. Therefore using digital marketing industry can reach to targeted customers. Digital marketing is not only useful to marketers but also for customers.

This paper highlights different types, ways, role and importance of social media in the digital marketing today.

Keywords- Social media, loyalty , Digital Marketing, Services, Brand, Consumers

I. INTRODUCTION

Across the world majority of population make use of social media by the use of different social media applications, the number is increasing day by day as these applications are compatible across different devices like desktop, laptop, mobile phones etc. therefore management of these applications will be easy. Businesses can interact with their customers more efficiently using these applications.

Customers can get information about products and services offered by the industry in less time.

Using social media website customer can express or share their opinion or reviews about product and services which can help other customers to take decision.

Now a days become internet is largest advertising market as information goes viral due to which traditional marketing techniques like print media, television, hoardings has taken over by internet due to speed and cost.

Advertising is moving towards electronic from traditional due to cost saving. Industry can make use of different techniques like website banner, pop-up ads, *affiliate marketing*.

Strong communication can be established between existing customers or potential customers using social media. Social media helps to personalize "brand" and helps you to spread message and benefits both parties by creating bonding between them.

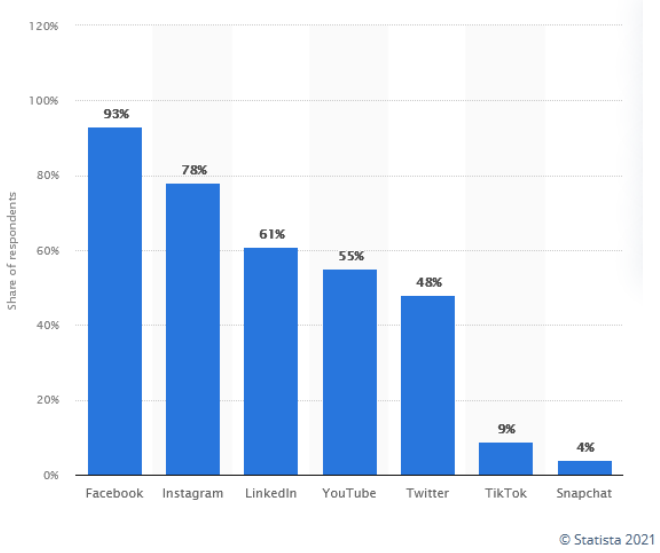
II. DIFFERENT SOCIAL MEDIA PLATFORMS USED FOR DIGITAL MARKETING

For complete and integrated marketing plan social media is an essential element. To create, share content, reach to specific customer to achieve business goal through marketing by increasing revenue.

Best Social media platforms used for marketing are as follows:

1. **Facebook-** Largest social media platform used by billions of users today.
2. **Instagram** – It is owned by Facebook.
3. **YouTube** – To post video and afterword's sharing it on social media or on email. It is a product by google therefore we can get added benefit of SEO. As YouTube is second largest search engine after google.
4. **Google My Business** – It is free platform offers all features of Facebook, Instagram, Twitter etc. with this posts can be searched by keywords therefore can have impact on SEO ranking.
5. **LinkedIn** – Also known as B2B social media platform for professionals.
6. **Pinterest** – Like Instagram this visual platform allows organizations to show product offerings
7. **Twitter** – To share latest trends using hashtag you can participate in the conversation. Hashtag allows businesses to reach potential customers.

According to the report published by Statista Research Department, Aug 3, 2021 leading social media platforms used by marketers by Jan 2021 shown in the following graph [7]



(Source Statista 2021)

III. ROLE OF SOCIAL MEDIA

Due to the fact of diversity, Social media can be used in different ways which can best suits business needs. [1]

Social media make use of different tools like Facebook, YouTube, Twitter, Instagram etc. using internet.

Role of social media as a tool businesses to gain maximum return on investment (ROI) as follows:

- Share information regarding products and services.
- Creates identity for the business.
- Creating relationship with customers.
- Creating association with the peers.
- Brand's online presence.
- Reach to target audience.
- Generating quality leads.

Businesses can integrate social media as a communication tool along with other marketing methods to promote product or services offered.[2]

Social media is one of the channel used in digital marketing. Digital marketing make use of other components for marketing campaign.

By using different digital channels Digital marketing creates awareness, brand promotion or product online.

Different components of digital marketing are categorized as Internet and non-internet.

Internet marketing makes use of:

- Search engine marketing i.e. SEM which include SEO and pay per click advertisement.
- Smartphones
- Mobile markets like Google Play, Apple store
- Email
- Online Banners for advertisement
- Social media

Non internet make use of different digital channels like SMS, TV, Radio billboards (indoor and outdoor)

IV. IMPORTANCE OF DIGITAL MARKETING

Opportunity to reach to more customers with lesser cost to promote products and services

Conversion rate is high due to search engine optimization (SEO), Email and social media marketing as these methods can generate effective and quick communication with customer.

Better lead generation and conversion due to quick and effective communication with customers.

Due to effective communication with customers all kinds of doubts of customer can be solved which ultimately increases conversion ratio

Increase in revenue and sales due to increase number of customers prefer to buy online.

V. 360 DEGREE DIGITAL MARKETING

Digital marketing uses different services like:

- Social Media used for creating and sharing content using Websites and applications.
- Video Marketing can be used to connect with customers to promote or make awareness of brand. Among search engines google ranks first and YouTube ranks second. Online customers after watching the product video more likely to buy the product.
- Search engine optimization (SEO)
  It increases the visibility of a website by increasing website traffic.
  To find sites on WWW i.e. World Wide Web, Search engine searches database for keywords or characters specified by the user.
- Content Marketing is the way of distributing contents to target audience by creating, publishing and distributing, it is the act of sharing knowledge using:
  - ✓ Blog articles
  - ✓ Apps

- ✓ Videos
- ✓ Podcasts
- ✓ Social media marketing
- ✓ Emails
- ✓ Webinars
- ✓ Info graphics
- ✓ Quizzes

To gain traffic and also to attract targeted customers different social networking platforms are used for digital marketing.

Use of Social media in marketing:

1. Communication – Now a days many users are active on social media therefore it will be easy to communicate with target customers using e-mail marketing, Facebook, Twitter, LinkedIn

2. Every business have Competitors so we can learn from our competitors by monitoring their involvement on social media.

3. By building engaged communities brands shine the brightest on social media.

VI. Importance of Social Media Marketing and Advertising for Web Traffic

For Every business right from small local shop to big company Social media is essential part of business marketing strategy.

Using effective Social platforms today companies can connect with their customers and can create brand awareness to boost leads and ultimately will affect sales. As we know billions of people in the world using social media every month.

1. Using Social media Customers gets an opportunity to find new products offered by the company that can increase leads..
2. Use of social media will improve search engine optimization and to redirect traffic to business website as pages can be located more quickly.
3. When we share new content aor tweet by tagging experts so they can see popup in their notification thus Social media can increase target population using quoted experts.
4. To understand our audience social media marketing helps a lot by understanding customer behavior, and can anser various questions like:What products they are interested in., What products they are buying., What type of products they are searching online etc. This will help organization to update contents online to attract more customers.
5. Effectively using social media platforms like facebook, twitter, instragram one can builds relationships with your audience.
6. Social media allow to display product or services to target audience and turn prospects into customers.
7. Active participation in the social media also helps for effective promotion of products and services.
8. Customer service can be improved with social media as customer problems can be solved using online interactions.
9. Brand loyality can be build using strong social media presence.
10. To launch new product press release plays an important role. As using social media one can reach to taget audience in more personal way, if customers have questions they can ask it then and there only.
11. Marketing using social media helps organization to find the customers who are searching for your products and services this helps organization to find potential customers who don't already know companies brand.
12. Using social media to answer questions, sharing information and giving advice can establish ones authority in the industry.
13. By right social media posts can divert lot of traffic as compared to cost of google ads. Therefore ROI on social media ads is unbeatable.
14. Regular interaction with followers, leaders can improve public image and can improve brand awareness and sales.

VII. Conclusion

With rapid use of mobile social media becomes a front runner in digital marketing to develop strong relationship with customers. Digital world gives new marketing environment to the industry to engage customers.Social media makes businesses visible to those customers who don't know and also to the customers interested in product and services offered. This creates not only repeat orders from the same customers but customer loyalty. Due to the Fact that social media is so diversified can be used different ways which best suits the interest and the needs of the industry.

References:

[1] *https://www.thebalancesmb.com/understanding-the-role-of-social-media-in-marketing-2296140*

[2] *https://www.eyerys.com/articles/role-social-media-marketing*

[3] *http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.300.8311&rep=rep1&type=pdf*

[4] *Michael A. Stelzner (2010), Social Media Marke ting Industry Report, "How Marketers are using social media to grow their businesses", Social Media Examiner, April 2010*

[5] *https://frozenfire.com/video-marketing/*

[6] *https://www.impactbnd.com/blog/what-is-content-marketing*

[7] *https://www.statista.com/statistics/259379/social-media-platforms-used-by-marketers-worldwide/*

ANALYSIS OF BREAST CANCER DATASET AND IT'S PREDICTION USING MACHINE LEARNING

Prof. Prashant N. Wadkar[1]
Asst.Professor[1], YES's, IIMS, Pune, India
Research Scholar[1]
[1]pnwadkar@gmail.com

Dr. Sachin Misal[2]
Assoc. Professor[2] YES's, IIMS, Pune,India
misal.sachin@gmail.com

Sanket Mundhe[3]
Student[3], YES's, IIMS, Pune,India
Research Student[3]
[3]mundhesanket97@gmail.com

Abstract:
Machine learning can be the process of developing systems that learn from data to recognize patterns and make accurate predictions of future events in healthcare too. It has considerable potential to transform it to health care. Today the healthcare domain relies more on computer technology. Medical diagnosis is an important task of intelligent systems. Machine learning systems are used to find the abnormalities at an early stage of disease diagnosis. Optimal and accurate diagnosis is a critical factor for identifying appropriate treatment. This study with the importance of Machine Learning systems in healthcare, also focuses on the significance of Machine Learning using Python on the jupyter platform. The application of Machine Learning plays a vital part in public healthcare, the significance of the role of ML in medical data analysis is widely used in many applications. For current study the researcher has used the secondary data of patients. The exploratory analysis of this dataset and creating models for machine learning was the challenge. The other challenge was pre-processing, but fortunately researchers have received the clean data. The machine has been trained and tested and in a later stage the accuracy of the model was tested by making use of a confusion matrix by the research, since the critical task in medical data analysis is the prediction of the accuracy results. For doing so the researcher has made it on one of the diseases, the beast cancer prediction by using Machine Learning using python and which has been proved with 87% accuracy. The future research can be carried out by making use of other Machine Learning algorithms.

Key Words: Machine Learning, Python, Breast Cancer, Logistic Regression, sklearn

I. INTRODUCTION

Breast cancer is a disease in which cells in the breast grow out of control. There are different kinds of breast cancer. The kind of breast cancer depends on which cells in the breast turn into cancer. Breast cancer can begin in different parts of the breast. Worldwide, breast cancer is the most common type of cancer in women and the second highest in terms of mortality rates. Diagnosis of breast cancer is performed when an abnormal lump is found (from self-examination or x-ray) or a tiny speck of calcium is seen (on an x-ray). After a suspicious lump is found, the doctor will conduct a diagnosis to determine whether it is cancerous and, if so, whether it has spread to other parts of the body. This breast cancer dataset was obtained from the University of Wisconsin Hospitals, Madison from Dr. William H. Wolberg, USA.

The best attempt is made to do the exploratory analysis of the dataset. But prior to that the dataset has been checked for whether the pre-processing of the dataset is required or not. After doing so and exploring the dataset in python the target column (dependent column) and independent columns has been identified. Then later data is trained by giving it to the machine by creating a model. The accuracy of the algorithm has been checked. The entire study focused on creating a Machine Learning model and checking its accuracy. The Machine learning algorithm model used is logistic regression, which has proved more accuracy of the model.

II. BACKGROUND

1. Python

Python, the dynamic programming language is used for this research, which made the testing and debugging extremely quick. There are extensive open source libraries available for this version of python

2. Python Libraries

Many of the python libraries has been used in visualization and performing statistical analysis like pandas, numpy, seaborn, matplotlib, sklearn etc by the researchers.

3. Algorithms

There are many Machine Learning algorithms, in this case logistic regression has been used for this research..

III. OBJECTIVE

The objective of the study is to :

1. To do exploratory data analysis of the breast cancer dataset.
2. To do the pre-processing of the dataset if it is not cleaned.
3. Analyse the dataset statistically and by visualizations.
4. To train the Machine and test the Machine.
5. To check the accuracy of the Machine learning model.

IV. RESEARCH METHODOLOGY ADOPTED

The Secondary data has been used for doing the research and it has been taken from the genuine website kaggle.com. There are 569 rows in the dataset and 6 columns.

V. DATA ANALYSIS & INTERPRETATION

Firstly the all required python libraries have been imported like numpy, pandas, matplotlib and seaborn. The secondary data which has been taken for the analysis and for creating the model has been taken into dataframe by using the pandas library. It has been observed that the dataset consists of six columns namely mean_radius, mean_texture, mean_perimeter, mean_area, mean_smoothness, and diagnosis as shown in Fig. 1.

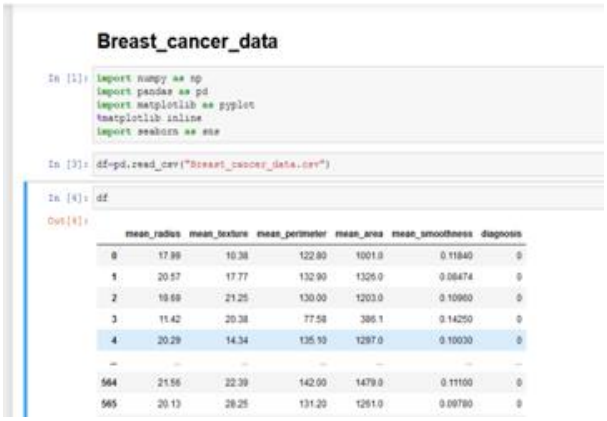


Fig 1 . Breast Cancer Dataset taken into Dataframe.

It has been observed that there are a total 6 columns and 569 rows in the dataset.

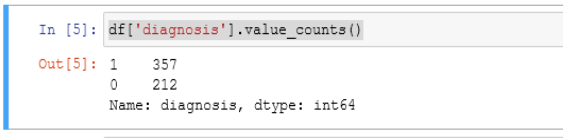


Fig 2 The Target column 'diagnosis' showing the two categories and count of each one.

It has been found that out of 569 there are 357 as positive cancer patients and 212 as negative reports, and this has been denoted by 1 and 0 respectively.

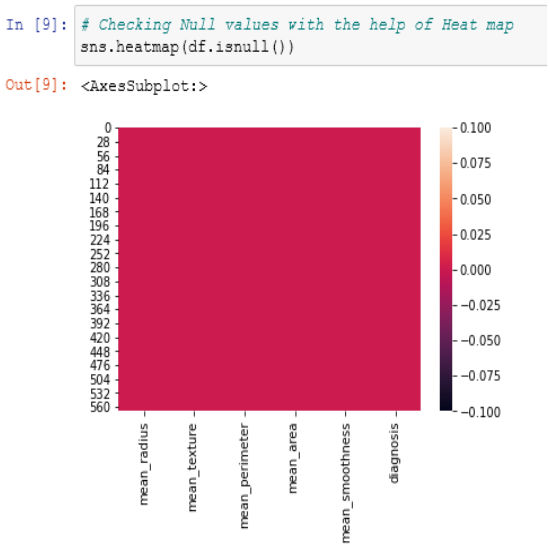


Fig. 3 The heatmap of isnull() showing the data is cleaned and nothing to pre-process

Researcher have also checked if pre-processing of the dataset is required or not. So, for that, it is observed in the heatmap of null values, that there are not any null values in the dataset, hence the dataset found to be as cleaned otherwise it would have been cleaned by doing pre-processing. It has been also assumed

that the dependent column and independent columns from the dataset and assumed that the 'diagnosis' as the dependent (target) column and rest columns as independent column.

The Fig 3 shows that there are no null values in the dataset, it has been shown visually by this colour shade magenta in the above figure and observed no evidence of null values.

```
In [12]: df.describe()
```

Out[12]:

	mean_radius	mean_texture	mean_perimeter	mean_area	mean_smoothness	diagnosis
count	569.000000	569.000000	569.000000	569.000000	569.000000	569.000000
mean	14.127292	19.289649	91.969033	654.889104	0.096360	0.627417
std	3.524049	4.301036	24.298981	351.914129	0.014064	0.483918
min	6.981000	9.710000	43.790000	143.500000	0.052630	0.000000
25%	11.700000	16.170000	75.170000	420.300000	0.086370	0.000000
50%	13.370000	18.840000	86.240000	551.100000	0.095870	1.000000
75%	15.780000	21.800000	104.100000	782.700000	0.105300	1.000000
max	28.110000	39.280000	188.500000	2501.000000	0.163400	1.000000

Fig. 4. Pandas describe() views basic statistical details like percentile, mean, std etc. of a data frame or a series of numeric values

```
In [11]: df.corr()
```

Out[11]:

	mean_radius	mean_texture	mean_perimeter
mean_radius	1.000000	0.323782	0.997855
mean_texture	0.323782	1.000000	0.329533
mean_perimeter	0.997855	0.329533	1.000000
mean_area	0.987357	0.321086	0.986507
mean_smoothness	0.170581	-0.023389	0.207278
diagnosis	-0.730029	-0.415185	-0.742636

Fig 5. Shows there is a correlation between different parameters of the dataset.

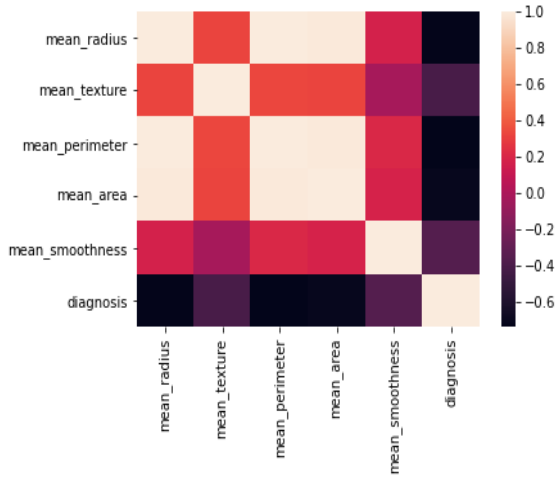


Fig 6. Shows how correlation is (visually) between different parameters of the dataset

Fig 6. shows there is strong correlation between the dependent column 'diagnosis' and mean_texture, mean_smothness, so researcher proceed next for boxplot to do further exploratory analysis to study their impact on cancer patients and noncancerous patients.

```
[5]: sns.boxplot(x='diagnosis',y='mean_texture',data=df, palette='winter')
```

```
[5]: <AxesSubplot:xlabel='diagnosis', ylabel='mean_texture'>
```

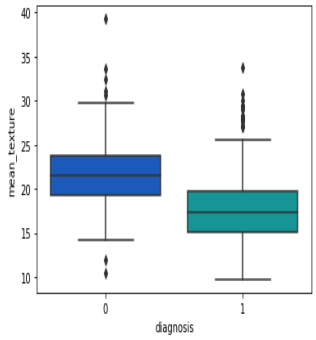


Fig 7. Box plot of diagnosis v/s mean_texture

```
In [16]: sns.boxplot(x='diagnosis',y='mean_smoothness',data=df, palette='winter')
```

```
Out[16]: <AxesSubplot:xlabel='diagnosis', ylabel='mean_smoothness'>
```

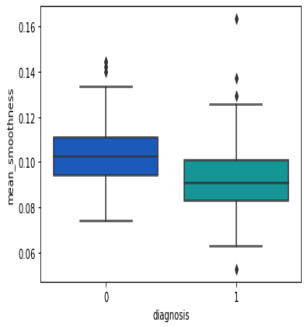


Fig 8. Box plot of diagnosis v/s mean_smoothness

Fig 7 and Fig 8 have been drawn assuming that the mean_texture and mean_smoothness are playing a vital role and affecting the value of the dependent column 'diagnosis'. It seems that both are affecting as shown in figure i.e. lower the value of mean_texture and/or lower the mean_smoothnes tends to be cancerous. Later the researcher, proceed further for training the Machine Model and testing the Machine Learning Model by 70%, 30% of data respectively by making use of Logistic Regression.

```
In [29]: from sklearn.metrics import confusion_matrix

In [30]: confusion_matrix(y_test,predictions)

Out[30]: array([[55, 11],
                [10, 95]], dtype=int64)
```

We have received 87% Accuracy in the model

Fig 9. When applied confusion metrics after training and testing of the model

A confusion matrix is a table that is often used to describe the performance of a classification model (or "classifier") on a set of test data for which the true values are known. ... The classifier made a total of 569 predictions (e.g., 569 patients were being tested for the presence of that disease).So the model has been checked for accuracy with the help of a confusion matrix. The figure shows the 55 and 95 as the TRUE Values (and 10 and 11 as FALSE values)

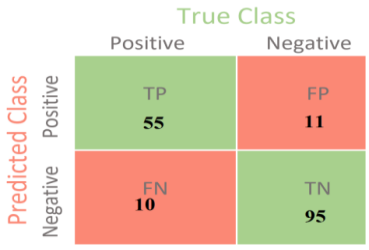


Fig 9. Confusion Matrix and their values

Accuracy = TP+TN/TOTAL Accuracy = 55+95/171= 87 %	Inaccuracy =FP+FN/TOTAL Inaccuracy = 11+10/171 = 13 %

VI. FINDINGS

It has been found that Machine learning has played a vital role in predicting breast cancer in early stages. Not only this, it has been proved with 87% accuracy. The Logistic Regression algorithm is proved best for this study.

VIII. SUGGESTIONS & RECOMMENDATIONS

It has been seen that the Machine Learning model seems to be best for predicting the early stage of cancer. So this research suggest the implementation of this model as live on website, so any doctor or patient can give the parameters of patients and check the early stage of cancer, and hence treatment can be commenced in advance to avoid death loss. Researcher would also suggest and can go for the best algorithm than logistic regression which may prove better accuracy.

IX. CONCLUSION

It seems that for predicting the cancerous patient manually is very difficult and time consuming. The above research by using Machine Learning overcomes these problems due to speed and accuracy. The above desk research has proved how accurately the Machine learning model gives the accurate result (87% in our case and gives accurate predictions. So this model can be used for early detection of cancer patients and avoid the death of patients and save the life of people. For further study researcher can go for other Machine Learning Algorithms too for comparing the result of each algorithm and their accuracy. This study will help a lot to the doctors, patients and people for early diagnosis of cancer so it is found to be beneficial to the society and hence it has been proved the significance of the study.

REFERENCES:

A. Book reviews

1. Mastering Machine Learning with Python in Six Steps: A Practical Implementation Guide to Predictive Data Analytics Using Python by Manohar Swamynathan

2. Machine Learning by Tom Mitchell

B. Journals, Articles and News.

1. BREAST CANCER PREDICTION USING MACHINE LEARNING Ramik Rawal School of Computer Science and Engineering (SCOPE), Vellore Institute of Technology, Gorbachev Road, Vellore, Tamil Nadu 632014, India. 2020 JETIR May 2020, Volume 7, Issue, www.jetir.org (ISSN-2349-5162

2. Wang, D. Zhang and Y. H. Huang “Breast Cancer Prediction Using Machine Learning” (2018), Vol. 66, NO. 7.

3. B. Akbugday, "Classification of Breast Cancer Data Using Machine Learning Algorithms," 2019 Medical Technologies Congress (TIPTEKNO), Izmir, Turkey, 2019, pp. 1-4.

4. Keles, M. Kaya, "Breast Cancer Prediction and Detection Using Data Mining Classification Algorithms: A Comparative Study." Tehnicki Vjesnik - Technical Gazette, vol. 26, no. 1, 2019, p. 149+.

5. V. Chaurasia and S. Pal, “Data Mining Techniques: To Predict and Resolve Breast Cancer Survivability”, IJCSMC, Vol. 3, Issue. 1, January 2014, pg.10 – 22.

[5]] Delen, D.; Walker, G.; Kadam, A. Predicting breast cancer survivability: A comparison of three data mining methods. Artif. Intell. Med. 2005, 34, 113–127.

C. Web References:

1. www.Kaggle.com

Reflection on SQL Injection attacks

Mrs. Anjali S. Gaikwad[1] ,
Research Scholar of Bharati Vidyapeeth (Deemed to be University), Pune
Institute of Management, Kolhapur,
anjali.gaikwad@bharatividyapeeth.edu
Miss. Akanksha S. Gaikwad[2] Govindrao Nikam College of Pharmacy, Sawarde.
akankshagaikwad2610@gmail.com

ABSTRACT: - SQL Injection (SQLi) injects the data from client to application. Injection of SQL commands into a sensitive database. Various operation on the database as Insert, Delete, Update and administrative operations are shutdown the DBMS and recovery the content. . When using SQL injection, hackers try to enter SQL commands instead of expected information into a form field. Authors are given a reflection on the various SQL Injection Attacks as Bypassing WAF to inject SQL, Blind SQL Injection, Code Injection, Doubling SQL Injection, etc.

Keywords:- SQLi , SQL , WAF , OMR

1. INTRODUCTION

For input from client to application a SQL injection attack consists of insertion or "injection". By successfully exploiting SQL injection, a successful SQL injection exploit can read sensitive data from a database, modify database data (Insert/Update/Delete) and execute administration operations on the database where the shutdown the DBMS, File recovery attacks are a type of injection attack that obtains the content of a specific file within the DBMS file system and, in some cases, issues commands to the operating system. SQL injection attacks are attacks that insert SQL commands into data-plane input to modify predefined functions. Related Attacks

- SQL Injection Bypassing WAF
- Blind SQL Injection
- Code Injection
- Double Encoding
- ORM Injection

WAF (web application firewall) Bypasses SQL Injection: Unlike regular firewalls, WAFs are able to filter the content of specific web applications, while regular firewalls merely act as a safety gate between servers.

Working of WAF:-

- The Exception Detection Protocol refuses requests that do not follow HTTP standards
- White List & Blacklist
- The rules-based and exception-based protections: a more rigid framework based on rules, and a more flexible framework based on exceptions
- State management: focus on session protection. There is also: The internet uses anti-

intrusion technology, cookie protection, response monitoring, and information privacy protection.

1.1. SQL Injection ByPASS WAF Mechanism

Mixed Case **Change case**: - Changing case bypasses any blacklist used by WAF if it is case-sensitive. It might trigger WAF protections if it does. Union may become uNIoN.

Replace the keyword :- (Insert special characters that will be removed by WAF) –

a) SELECT may become SEL<ECT which would be passed on as SELECT once the offending character is removed.

b) **Encode + URL encodes**: - e.g. page.php?id=1%252f%252a*/UNION%252f%252a /SELECT.

c) **+Hex encode** :- e.g. SELCET(extractvalue(0x3613E61646D696E3 C2F613E,0x2f61))

d) **+Unicode encode** :- SELECT 'Ä'='A'; #1

e) **Use comments**: - Insert comments in middle of attack strings. For example, My SQL database instance, /*!SELECT*/ could be overlooked by the WAF, but passed on to the target application and processed by a MySQL database.

f) **Special symbols**: - The special symbols of a class have non-alphanumeric characters; these symbols are used for special purposes.

1.2. Blind SQL Injection: - An attacker exploits SQL injection by displaying error messages from the database stating that the SQL queries syntax is incorrect. In blind SQL injection, the only difference is how the data is retrieved. There are two types of SQL Injection

1) SQL Injection into a String/Char parameter.

2) SQL Injection into Numeric Parameter

```
Code  Output
1 --SQL Injection into a String/Char parameter
2 SELECT * from table where example = 'Product'
```

```
Code  Output
1 -- SQL Injection into a Numeric parameter
2   Example: SELECT * from table where id = 456
```

Examples

An attacker may verify whether a sent request returned true or false in a few ways, the as Content Base where users are using simple page, which displays an article with given ID as the parameter, the attacker may perform a couple of simple tests to determine if the page is vulnerable to SQL Injection attacks

1.3Code Injection: - Code Injection: - Code injection refers to attacks that involve injecting code into an application, which is then interpreted or executed by it. It exploits poor data handling by the application. A lack of input and output data validation makes these types of attacks possible, for example:

- allowed characters (standard regular expressions classes or custom)
- data format
- amount of expected data

It differs from Command Injection in that an attacker is only constrained by the functionality of the injected language itself. If an attacker is able to inject PHP code into an application and have it executed, they are only limited by what PHP is capable of.

The process of command injection involves using existing code to execute commands, usually through a shell.

Risk Factors

These types of vulnerabilities can range from very hard to find, to easy to find

- If found, are usually moderately hard to exploit, depending of scenario
- If successfully exploited, impact could cover loss of confidentiality, loss of integrity, loss of availability, and/or loss of accountability

1.4. Double encode: - This attack technique consists of encoding user request parameters twice in hexadecimal format in order to bypass security controls or cause

unexpected behavior from the application. It's possible because the web server accepts and processes client requests in many encoded forms.

By using double encoding it's possible to bypass security filters that only decode user input once. The second decoding process is executed by the backend platform or modules that properly handle encoded data, but don't have the corresponding security checks in place.

Where the page displaying an article with its ID and it is
as parameter may be used by an attacker to whether the page is vulnerable to SQL Injection attacks.

There are some common characters sets that are used in Web applications attacks.

For example, Path Traversal attacks use../ (dot-dot-slash) while XSS attacks use < and > characters. These characters give a hexadecimal representation that differs from normal data.

1.5. Object Relational Mapping (ORM) Injection: - The data access object model where it is an attack using SQL Injection to an ORM generated .Testing-wise, this attack is almost identical to a SQL Injection attack. There is, however, vulnerability in code generated by the ORM layer.

The advantages of using an ORM tool include quick creation of an object layer for communicating with a co-relational database, standards code templates for these objects, and providing safe functions for preventing SQL Injection attacks. Database CRUD (Create, Read, Update, Delete) operations can be performed on ORM-generated objects by using SQL or, in some cases, a variant of SQL. It is possible, however, for a SQL Injection attacks may occur when web applications using objects generated from ORMs accept un-sanitized input parameters.

How to Test

ORM tools have a number of benefits, including quick creation of an object layer for communicating with a relational database, standardizing code templates for these objects, and providing safe functions for preventing SQL Injection attacks.

Identify the ORM Layer

To test and understand what is happening between your requests and the backend queries, as with everything related to conducting proper testing, it is essential to identify the technology used. After reading the information gathering chapter, you should be familiar with the technology used by the application.

Abusing the ORM Layer

Identifying an ORM is only the beginning, because it becomes crucial to know how its parser functions, and possibly even identify CVEs pertaining to the library used, application which contains a using an old version of the library. There are times when ORM layers are not properly implemented, allowing the tester to perform normal SQL Injection without worrying about the ORM layer.

CONCLUSION: - SQL Injection (SQLi) where it is sector of an injection attack that makes it potential to execute means SQL statements. These statements control a database server at the back a web application. They can go around verification and approval of a web page or web application and retrieve the content of the entire SQL database. Using SQL injection, a hacker will try to enter a specifically crafted SQL commands into a form field instead of the predictable information. The intent is to secure a response

from the database that will help the hacker understand the database construction, such as table names. SQL Injection attacks can lead to: Theft, modification, or even destruction of sensitive data such as personally identifiable information and usernames and passwords.

REFERENCES:-

1) H. Orman, “Blockchain: the Emperors New PKI?” IEEE Internet Computing, vol. 22, no. 2, pp. 23–28, Mar. 2018.
2) E. Pollack, “Protecting Against SQL Injection,” Dynamic SQL, pp. 31–60, Dec. 2018.
3) S.-D. AXINTE, “SQL Injection Testing in Web Applications Using SQLmap,” International Journal of Information Security and Cybercrime, vol. 3, no. 2, pp. 61–68, Dec. 2014.
4) K. Kamtuo and C. Soomlek, “Machine Learning for SQL injection prevention on server-side scripting,” 2016 International Computer Science and Engineering Conference (ICSEC), Dec. 2016.
5) N. Singh, M. Dayal, R. S. Raw,and S. Kumar, "SQL injection: Types, methodology, attack queries and prevention," 2016 3rd International Conference on Computing for Sustainable Global Development (INDIACom), New Delhi, 2016, pp. 2872-2876

Quality Enhancement in Higher Education Institutions through Feedback Mechanism and Student Satisfaction Survey

Dr. D.R. Vidhate

Asst. Prof, MKSSS's College of Computer Application for Women, Satara,
[1]vidhatedhananjay@rediffmail.com

Dr. S. V. Nikam

Principal, MKSSS's College of Computer Application for Women, Satara,
[2]nikam_samiksha@rediff.com

***Abstract*— University Grants Commission is a statutory organization of the Government of India for the coordination, determination and maintenance of standards of teaching, examination and research in university education. NAAC is autonomous body of UGC. As per NAAC guidelines, quality assessment and quality assurance is important in higher education institutes. It measures how well the learning opportunities, infrastructural facilities, resource facilities and general facilities available to students. NAAC takes review of these facilities and report it to the higher education institutes as valuable suggestion for the benefit of student and society. The aim of this paper is to study and implement feedback mechanism and student satisfaction survey for quality enhancement in the higher education institutes.**

***Keywords*— NAAC, Feedback, SSS, institution, criterion.**

I. INTRODUCTION

The primary goal of higher education institutes is to create knowledge based society. To achieve this goal, it is necessary to have effective tool for quality assurance of higher education institutions in our country. So University Grants Commission in 1994 established Notational assessment and accreditation council (NAAC) for quality assessment and assurance. There are various quality parameters used by NAAC for assessment. In this context we have focused mainly on two parameter feedback mechanism and student satisfaction survey for quality enhancement in Higher Education. This research paper studies the details of feedback mechanism and shows implementation of it using real life data of an institution. This paper also introduces strategy to carry out student satisfaction survey within short span of time.

II. CRITERIA'S OF NAAC

NAAC has 7 criteria's which are mentioned below as:

1. Curricular aspects
2. Teaching-learning and evaluation
3. Research, innovations and extension
4. Infrastructure and learning resources
5. Student support and progression
6. Governance, leadership and management
7. Institutional values and best practices

Each criterion has some key indicators which give a detail about the work is expected from the concern criteria. Criterion-1 has 4 key indicators namely Curriculum design and development, Curriculum planning and implementation, Academic flexibility and Feedback system.

III. NEED OF NAAC

The following are the needs of NAAC:

1. It helps management to take funding decisions.
2. It is used to get recognition from society about institute quality.
3. It encourages self-improvement in the institutions.
4. It helps to build faith in stakeholders through various measures.
5. It helps to ensure quality assurance of various activities of institution.

IV. NAAC ACCREDITATION PROCESS

NAAC accreditation process can be carried out using following seven steps as:
Step1: College registration in the NAAC Website

Step2: Filling institutional information for quality assessment (IIQA)

Step3:Process of SSR submission after acceptance of IIQA

Step4:Process of data validation and verification and prequalify score

Step5:Process of student satisfaction survey (SSS)

Step6: Process of Peer Team Visit (PTV)

Step7: Grading by NAAC

V. OBJECTIVES

The proposed research study has following objectives:

1. To take overview of need and process of NACC accreditation.
2. To study the feedback mechanism of criterion -1.
3. To design strategy for student satisfaction survey.
4. To implement the feedback mechanism for quality improvement.

VI. RESEARCH METHODOLOGY

To study the details of feedback mechanism questionnaire need to be developed. Data need to be collected. Data should be analyzed using statistical techniques to get expected results.

Feedback mechanism of NAAC:

Feedback mechanism is very essential in the changing educational environment. There is separate key indicator namely Feedback System in criterion -1 of NAAC. It helps to identify the expectations of students, teachers, alumni, parents, employers and other stakeholders. So it is important for institutions to encourage the stakeholders to participate in the feedback process. Feedback will be collected through well designed questionnaire. Feedback collected will be analyzed properly and corrective actions will be taken by the expert committee.

Questionnaire Development:

To design the questionnaire, 10 different variables are considered. These variables will be asked in the questionnaire. The questionnaire is used for assess satisfaction level from the students of the various faculties of Satara district. The validation of the questionnaire is done by selected students from Satara district as quality assurance. In this questionnaire, each statement is measure by six Likert scales rating. The scale that are used in this research:

1: Excellent (E) 2: Good (G) 3: Average (A) 4: Poor (P)

Data Collection:

After developing questionnaire, the questionnaire was distributed to 100 Arts, commerce and computer science graduates from various colleges of Satara district as shown in below table as:

Table1: Table of respondents

Faculty	Total Student
Computer Science	40
Commerce	35
Arts	25

Result:

Questionnaire was filled by many respondents. Some respondents have not responded to the questionnaire. After analysis of data from responses we have following results obtained.

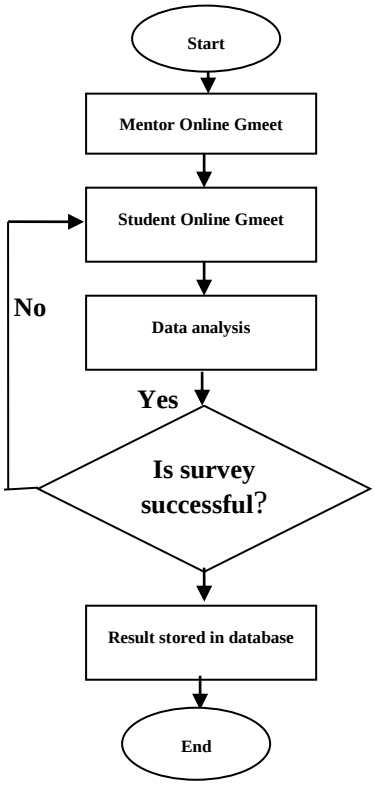
Table2: Analysis of student feedback about curriculum

QN	Question	Excellent	Good	Average	Poor
1	The 100% syllabus taught in the class	88	7	2	1
2	The sequence and flow of contents of subject in this semester is proper	89	6	3	1
3	Usefulness of curriculum in the employment & Entrepreneurship	85	7	3	2
4	The syllabus is appropriate in global competence and ICT	85	5	2	3
5	An internal evaluation is fair and transparent	81	6	3	2
6	Usefulness of syllabus for admission in PG course and its useful while learning P.G. course.	89	4	5	1
7	The syllabus adds value to Social responsibility	85	5	3	3
8	The syllabus adds value to Environment awareness.	90	2	4	2
9	Various skill development courses run in the college are useful for improving your employability skill.	96	1	1	1
10	Various Workshops and Guest Lectures conducted in the college are useful for improving curriculum.	88	2	4	1
Average Response =		**88**	**5**	**3**	**2**

VII. STUDENT SATISFACTION SURVEY

It is process conducted by NAAC regarding Teaching - Learning and Evaluation, which will help to upgrade the quality in higher education. Students have to respond to all the questions given in the specified format. Identity of student will not be revealed.

SSS model: The following is model designed to carry out SSS online in very short span of time.



Above process will be carried out online. The entire process will completed within 8 days. The process will be started on any day of the week which will be first day of the process. The Google meet of mentors will be conducted. All mentors will be given overview of questions. On day-2 mentor will take Google meet of respective classes and will give overview of questions to students. They will be asked to fill questionnaire with sincere effort and thought. Mentor will explain only questions and student will fill questionnaire on their own with their experience in the institution. Data filled by students will be analyzed. If filled data is irrelevant or data not filled by some students the process repeated till we get satisfactory results. We can repeat this process in future for first or subsequent cycles of NAAC.

VIII. CONCLUSION

In conclusion, it is important to pay attention to quality of education to survive in the competitive environment. NAAC has introduced many ways to promote quality in higher education. Without quality, higher education is of no use to anyone. NAAC has made great attempts in bringing about quality culture among the HEI's of India. In particular, this study highlights the need of NAAC accreditation process. Also this study gives implementation details of feedback mechanism using case study. Taking into consideration the importance of student satisfaction survey, this study has presented the model of SSS which can be used to implement student satisfaction survey.

REFERENCES

1. Briony J Oates, Researching Information Systems and Computing, South Asian Edition, 2006.
2. Tongbram R Singh, "Role of NAAC in Enhancing Quality on Higher Education in India: Issues and Challenges", international journal of science and research (IJSR), Volume 7 Issue 11, November 2018.
3. Dr. Saroj Kumar Singh, "NAAC assessment for higher education: A boon", international journal of current research, Vol. 9, Issue 08, August 2017.
4. Kamlesh Maharwal, Richa Tripathi, "An Emperical Analysis to Access the Impact of Naac on Overall Development of Libraries in Higher Education Institutions in Rajasthan", International Journal of Engineering and Advanced Technology (IJEAT) ISSN: 2249-8958, Volume-8 Issue-5, June 2019.
5. http://www.naac.gov.in/docs/Apply%20now/SSS-Questinnaire_Students.pdf
6. http://svyasa.edu.in/pdf/2020/Feedback%20Analysis.pdf
7. https://en.wikipedia.org/wiki/National_Assessment_and_Accreditation_Council
8. http://lnmuacin.in/studentnotice/newdata/Workshop%20Material%20Final-min.pdf
9. https://www.slideshare.net/RishabhGarg109/naac-accreditation-process

 ISBN 978-81-927230-0-10

Impact of Covid-19 Pandemic on Digital Transformation in Cement Industry of Chandrapur District

Dr Sarika Nande
Assistant Professor
Gondwana University Gadchiroli
Sau Leena Kishor Mamidwar Institute of Management Studies & Research Kosara Chandrapur (M.S.)-442406 India
sarikanande@gmail.com
Contact No. 8624048031

***Abstract*— This paper is deal with Impact of Covid-19 pandemic on digital transformation in Cement Industry. Digital transformation is the incorporation of digital technology into all areas of a business. Cement demand drop down by an estimated 10-12% in year 2020 due to the COVID-19. Lockdown led demand disruption was the highest in the second quarter of 2020 on the back of suspension of production, stalled construction activities and mass exodus of labour. Due to Covid-19 pandemic the sudden fall in production and demand, especially in developing countries where Construction Industry is the backbone of the economy. In operations Process plants and construction sites came to idle condition with complete lockdowns to contain the spread of the virus, so the production and consumption of cement fell significantly. In particular, the cement industries suffered a fall as a result of a scarcity of workers due to fears of infection, disturbances in supply chains, be short of safety equipment, and social distancing. All industries get pleasure from the benefits of digital transformation, it enables businesses to adapt new processes, speed up efficient workflows, build up security, increases productivity. Cement companies should focus on three key areas – supply chain robustness, operational excellence, and cost-effectiveness.**

***Keywords*—Digital Transformation, Covid-19, Cement Industry, benefits, Impact.**

I. INTRODUCTION

During the pandemic year 2020 has been came with full of exceptional change around the world. It is disrupting time for the cement industry. The industry projected and was prepared for a strong year at the beginning of the first quarter of 2020, however, with the COVID-19 pandemic, it is experiencing the steepest fall in production and demand, especially in developing countries where Construction Industry is the backbone of the economy. (Padiyath, 2020) In the Cement Industry digital transformation is helpful for predicting demand accurately by controlling cognitive technologies and historical data to optimize the overall supply network through greater coordination between quarries and production plants, technology adoption across the supply chain will deliver better business outcomes. Digital transformation can enhance productivity with reducing the cost of production. Cement Industry can drive significant business outcomes and gain an edge over their competition.

Digital Transformation

Digital transformation is the process of using digital technologies to create new or modify existing business processes, culture, and customer experiences to meet changing business and market requirements. This reimagining of business in the digital age is digital transformation. (Marc Benioff, 2022)

"Digital transformation is the integration of digital technology that has the power to change an area of business or process. Drastic changes occur within cement industries when they adapt to using technology, it can be a planned, incremental or a radical process, but it will transform industries, business models, products or services."

II. REVIEW OF LITERATURE

COVID-19 pandemic is pushing the cement industry to re imagine legacy processes and embrace digital to create operational efficiencies and reduce expense factors. (Padiyath, 2020)
According to Deloitte, "digital transformation is all about becoming a digital enterprise is an organization that uses technology to continuously evolve all aspects of its business models (what it offers, how it interacts with customers and how it operates)." (Whatfix., 2021)

At ACC, Health and Safety is a core value. We act responsibly to protect our employees, our business and our communities, to help where we can during Corona virus (Covid-19). (ACC, 2020)

The Covid-19 pandemic has highlighted critical gaps in manufacturing capacities. Insufficient supply chain agility, over-dependence on human effort, and the inability to respond to demand spikes are among the common challenges plaguing the sector during this time – and beyond. Digital transformation gives an effective solution, helping manufacturers bring back business continuity on the road ahead. (Mewari, 2020)

III. Profile of cement industries

India is the second largest producer of cement in the world. It accounts for more than 7% of the global installed capacity. India has a lot of potential for development in the infrastructure and construction sector and the cement sector is expected to largely benefit from it. Some of the recent initiatives, such as development of 98 smart cities, are expected to provide a major boost to the sector. (An initiative of the Ministry of Commerce & Industry, 2022)

There are many cement industriesin the Chandrapur District, ACC Cement Let, Ambuja Cement, Ultratech Cement, Manikgardh Cement etc.

ACC Cement, Chandrapur

ACC Limited (ACC) is a leading player in the Indian building materials space, with a pan-India operational and marketing presence. Synonymous with cement, we have established our reputation as a pioneer organisation that has consistently set new benchmarks with our innovative research and product development. With our experience and expertise spanning over eight decades, we have actively contributed to India's progress. **(**ACC, 2020)

Ambuja Cements Ltd

Ambuja Cements Ltd, a member of Holcim - global leader in innovative and sustainable building solutions, is among the leading cement companies in India and is known for its hassle-free, home-building solutions. Its unique products tailor-made for Indian climatic conditions, sustainable operations and initiatives that advance the company's philosophy of contributing to the larger good of the society have made it the most trusted brand in Indian cement industry. (https://www.ambujacement.com/about-ambuja, 2019)

UltraTech Cement Ltd

UltraTech Cement Limited is the cement flagship company of the Aditya Birla Group. A $ 5.9 billion building solutions powerhouse, UltraTech is the largest manufacturer of grey cement, ready mix concrete (RMC) and white cement in India. It is the third largest cement producer in the world, excluding China. UltraTech is the only cement company globally (outside of China) to have 100+ MTPA of cement manufacturing capacity in a single country. The Company's business operations span UAE, Bahrain, Sri Lanka and India. *(UltraTech)*

Manikgarh Cement Ltd

In 1978 industrialist BK Birla founded Mangalam Cement. The company has been functioning as a division of Century Textiles and Industries, a BK Birla Group Company. The group is a leading business house with presence in core industries like textiles, rayons, chemicals, paper and pulp and cement. The company has a state-of-the- art new cement plant with German Technology for producing 7 lakh tonne per annum at its existing site in Morak, Rajasthan under the name of Neer Shree Cement. (Ltd, 2022)

IV. Benefits of Digital Transformation

1. Enhanced Efficiency

Digital transformation helps to improve the efficiency of the employees. This is one of the biggest benefits of implementing an ERP system into your business operations is the dramatic improvement in efficiency. Efficient employees help to reduce cost and time.

2. Increased Transparency

The combination of an ERP or SAP system will also brighter light on current processes, helping to identify trends and patterns. Transparency is important factor in industry that play crucial role in both the Customer Success Team and the accounting team would be able to see which clients are behind on a payment and could address the problem more quickly rather than simply waiting on accounting to loop everyone in.

3. Better Supply Chain Management

Effective supply chain management leads to visibility in your supply chain, improved vendor management, and a better understanding of the microeconomics your products – from raw materials to delivery to your customer. If shipping and logistics are a part of your business, make sure to consider how this department will factor into your needs through your ERP transformation process.

4. Optimize operating expenditure

Cost reduction becomes critical to maintaining profitability during an economic slump. Cement manufacturers can leverage data and powerful machine learning algorithms to drive cost efficiencies with proven application in maximized fleet utilization, alternative fuel optimization, and raw

material cost reduction. The use of digital twins to streamline the entire production process is also an excellent digital intervention to achieve the lowest possible cost while ensuring the optimal output and quality.

5. Revenue Growth

Minimizing cost is best way to improve revenue By improving transparency in different aspects of the business, employees and management can improve their best practices and drive revenue through pattern recognition, trend evaluation, and capitalization of data-driven opportunity.

6. Better Customer Experience

During the pandemic digital transformation is lifeline for customer due to critical situation in covid-19 everything is online so customer can get many facilities online. The Customer Service manager can dig deeper into the order to see what happens the product is delayed in delivery by simply by looking at the system. Instead of potential order cancellation, the customer better understands the process and the sale are saved.

V. STATEMENT OF PROBLEM

During the Covid-19 pandemic cement Industries are facing the lots of challenges in the production and demand. Due to infection fears, disruptions in supply chains, lack of safety equipment the result of this is manpower scarcity. Digital transformation is the helpful mode of operation to manage the industrial problem, due to industry to continue the supply chain of the industry in the covid-19 pandemic.

VI. RESEARCH OBJECTIVE

1. To analyse the impact of covid-19 on digital transformation.
2. To identify the Benefits of digital transformation to the industries in covid-19 pandemic.

Research Question/Hypothesis

1. What are the impacts of covid-19 on digital transformation in cement industry?

2. How are the digital transformations helpful in covid-19 pandemic?

VII. RESEARCH METHODOLOGY

Research is an essentials activity of the investigation of study. It explain purpose of research were to identify and explore the specific dimension affecting the organization. This study related with impact of covid-19 on digital transformation in Cement Industry.

I have selected Area for the study is Cement industries in Chandrapur District

*Population:-*The target populations for this study are Employer and employees of Cement Industries.

*Sample Size:-*I have Collected 40 sample with help of the Google form.

Data Collection and Analysis

Primary Data: It has been collected with help of Google form.

Secondary Data: It has been collected from websites, industry magazine, and website of the organization.

Data Analysis

For this study 40 respondents were identified and questionnaire distributed among them. Only 32 respondents were responds to Google form, hence analysis is done on the basis 32 respondent.

VIII. FINDING

1. The digital transformation is work as a life line of the industries. Due to digitization cement industries smoothly continue the production process and fulfill the demand of the cement.
2. There are several benefits had been taken by the industries in period covid-19 like as digital supply chain management, prioritizing automation.

IX. CONCLUSION

The Covid-19 pandemic has highlighted major gaps in producing capacities. Insufficient supply chain management, over-dependence on human effort, and the inability to respond to demand spikes are among the common challenges plaguing the sector during this time and beyond. Automation could prove to be an effective solution, helping manufacturers reestablish business continuity on the road ahead.

X. REFERENCES

1) ACC. (2020). Covid-19. Retrieved 2022, from https://www.acclimited.com: https://www.acclimited.com/covid-19
2) An initiative of the Ministry of Commerce & Industry, G. o. (2022). Cement Industries in India. India Brand Equity Foundation.
3) https://www.ambujacement.com/about-ambuja. (2019). Retrieved from https://www.ambujacement.com/: https://www.ambujacement.com/about-ambuja
4) Ltd, M. C. (2022). https://cement.industry-report.net/manikgarh-cement-ltd/. Retrieved jan 12, 2022, from https://cement.industry-report.net/manikgarh-cement-ltd/: https://cement.industry-report.net/manikgarh-cement-ltd/

5) Marc Benioff, C. a.-C. (2022, jan). Salesforce . Retrieved jan 5, 2022, from https://www.salesforce.com: https://www.salesforce.com/in/products/platform/what-is-digital-transformation/
6) Mewari, M. M. (2020, April). Combating the COVID-19 crisis with automation in the manufacturing world. Retrieved Jan 13, 2022, from https://www.birlasoft.com/: https://www.birlasoft.com/articles/combating-the-covid-19-crisis-with-automation-in-the-manufacturing-world
7) Padiyath, G. (2020). COVID-19, cement industry, and digital transformation: Connecting the dots. Birlasoft Ck Birla Group , pp. https://www.birlasoft.com/articles/covid-19-cement-industry-and-digital-transformation-connecting-the-dots.
8) Team, E. (2021, November 19). Virtru. Retrieved january 11, 2022, from https://www.virtru.com: https://www.virtru.com/blog/8-benefits-digital-transformation/
9) UltraTech. (n.d.). https://www.ultratechcement.com/about-us/overview. Retrieved from https://www.ultratechcement.com/.
10) Whatfix. (2021). Digital Transformation. Retrieved from https://whatfix.com/digital-transformation/: https://whatfix.com/digital-transformation/

Selection of model for evaluation of Training effectiveness for Govt/ PSU Organisation: A systematic literature review.

Amit Kumar Mehta[#1], Sumati Sidharth[#2]

[#]*Department of Technology Management, Defence Institute of Advanced Technology, Pune, India*

[1]amehta75@rediffmail.com

[2]sumatisidharth@gmail.com

***Abstract*— Training of employees is widely accepted by Industry/Organisation in every sector as a means to enhance their performance and productivity. Organizations whether in Govt/Pvt sector are confronting growing competitiveness as a result of globalization, technology advances, political and economic environments and see training of their employees as one of a way to meet these challenges. Govt organisations allocate high budget for Training and development but show lack of accountability towards expenditure of same. However, with changing scenarios towards accountability of Govt organisations, it becomes imperative to evaluate the effectiveness of training and development intervention to show that it helps to achieve stated objectives. Organizations find it difficult to determine the impact of training due to inability to find a measurement tool that is both result-oriented and parsimonious. The present study addresses this issue by first reviewing and comparing various training evaluation models. Thereafter it concentrates on reviewing research work conducted by various researchers to identify suitable model for Govt/PSU organisations. Based on both these methodologies most suitable framework for Govt Organisation is identified. The comparative analysis of features of Five training evaluation models presented also assists in identifying the suitability for other organisations.**

***Keywords*— Training Effectiveness, Evaluation, Model, Govt/PSU, Kirkpatrick, Phillip ROI, Kauffman, CIPP, CIRO.**

I. INTRODUCTION

Out of many HRD functions, Training and development is an important function for the performance of any organization. Now a days, Organisations are facing increased competition due to globalization, changes in technology, and economic environments [1] and see training their employees as one of way to equip them to tackle these challenges. Well trained workforce is indicated as main factor for business success in earlier management practices in Japan [2]. Causal link between training and development and organisational performance is also established in recent researches [3]. Highly trained and well-developed workforce helps to sustain any organisation's competitive advantage. It is agreed by all organisations whether in private or in public sector, that to meet strategic objectives, and growth of business, training, and development of employees is essential [4].

Training and development interventions are even more important for Govt sectors as product/services they provide are mostly intangible in nature which defy profit assessments as in other businesses [5]. Public departments allocate high budget for training and development but shows lack of accountability towards expenditure in same. However, increase in accountability of Govt organisations necessitates that more evidence-based practices are needed to show how training and development practices helps in achieving the stated objectives of the organization. Unless the learning during training is transferred into job behaviour and performance the investment in training can't give sustainable competitive advantage [6]. Thus, necessitates to know the effectiveness of Training.

Training effectiveness is defined as a measure to determine the extent training accomplished specific training objectives/ desired outcomes. Effectiveness of training has to be measured to know the optimal utilization of the resources invested by the organisation in training. Training effectiveness is measured through Training evaluation. Training evaluation is a systematic process to gather information on effects of training programme and to assess worth in view of obtained information. It is critical to evaluate the effectiveness of training programs [7]. However, evaluators found it difficult to determine the impact of the training [8]. Organisation's inability to find a measurement tool which is both results-oriented and parsimonious is cited as the main reason due to which majority of HRD managers are still reluctant to evaluate [9].

II. LITERATURE REVIEW

A. Training

Training is a Systematic process for the purpose of develop -ing skills, modifying behaviour, and increasing knowledge to achieve intended performance. It aims to improve current job-related competencies or attain future competencies through systematic learning events.

Organisations can achieve competitive advantage through training and development by addressing employee's performance inadequacies, preparing them to adopt changing environment, reducing turnover, accidents, material waste,

and gaps between current and future needs. It is found by ASTD study involving 500 publicly traded U.S. based companies that the shareholder return was 46 percent higher than the market average for companies that invested the most in training and development [10]

B. Training Effectiveness

Training effectiveness is defined as the extent to which training provides intended/desired outcomes. Unless learning from the training is transferred into job behaviour or performance, training provides little value addition to the organizations [6,11]. Training is considered as effective when it provides confidence in participants to apply the KSA learned in the workplace [12].

C. Training Evaluation

The training evaluation is defined as, "any attempt to obtain information or data on the effects of training programme and to assess the value of the training in the light of that information" [13].

To ascertain Effectiveness of Training, Training Evaluation is required [14]. Like any other organisational endeavour, training requires time, energy and money. Therefore, it is necessary to determine cost-effectiveness of training and whether it is worth the effort. During such evaluation, the performance of participants is compared with some predetermined criterion after training is completed. No single and universally accepted criterion can be followed since Different training programs follows different methodology and have different goals.

D. Need for Training Evaluation

To design, analyse and implement an effective training programme, training evaluation is helpful. Training evaluation is used to provide feedback for determining the improvement required in training programme, whether to continue the programme, and to create a database that can assist management in decision making [15].

Due to lack of evaluation organisations are not able to link the organisation's performance with the contributions of training and development and hence treated expenditure on training as unnecessary. Though a lot of emphasis has been given to this aspect most of the organisations conduct evaluation superficially and find it difficult to determine the impact of the training ASTD,1997 [8].

E. Models for Training Evaluation

Six general approaches to evaluation have been described [16]. Out of them, mostly used approaches for evaluation of training are Goal-based and systems-based [9]. A number of frameworks have been proposed under these approaches. The most significant model following goal-based approach is Kirkpatrick's, Phillips's ROI, Kaufman's model. The most significant models based on systems approach are CIRO (Context, Input, Reaction, Outcome), TVS (Training Validation System), IPO (Input, Process, Outcome) and Context, Input, Process, Product (CIPP) model.

This paper provides overview of 5 evaluation models that are found mostly used in current literature and are also most useful. We analysed each model and compared its features. The comparative analysis is given in Table 1. Other models are inclined towards theoretical aspect but have less practical application hence they are not included**.**

F. Training Evaluation and Govt/PSU Organisation

Government organisation today faces number of challenges. Globalisation, new technology, efficient and effective services are some of the external challenges whereas shortage of manpower, ageing workforce, employee motivation are internal challenges. Training has become major HRD activity that meets most of these challenges.

The difference between most Govt/ public sector and private sector activities is that Govt sector mostly produces intangible services that defy profit calculations. The same analogy is followed while evaluating the training effectiveness. Public departments spent heavy budget and other resources on training and development but fail to examine its contribution to organizational performance. Unable to find a suitable tool/framework for measurement is one of the cited reasons.

To remain competitive in changing scenarios, it is imperative to evaluate the training programme for its contribution to the organisation's objectives and performance. A number of evaluation models are currently in practice as brought out in previous section. Each model has their own relevance and pros and cons. However, the appropriateness and selection of evaluation model is contextually dependent. The next part of paper addresses the issue to find a suitable framework for evaluation of training in Govt sector.

III. METHOD

A. Research Design

Systematic Literature Review is chosen as the research methodology for this paper SLR provides a cogent approach to search, collect, and analyse different materials related to the focus of this paper and assist to analyse the latest research conducted on subject under study. Identification of relevant research studies to review is most important in literature review process. "Snow Balling" i.e." searching from databases or search engines and chaining from known research papers" is one of the several methods which is frequently followed [17]. Google Scholar "is a good resource which provides a broad range of literature across different fields of study" [18]. The title of proposed research being "Evaluation of training effectiveness in govt/PSU sector", the research papers of relevance were searched with the initial help of Google Scholar and chained through other databases such as ScienceDirect, Research gate, Academia, Taylor & Francis, etc. for following terms –

1) Training evaluation.
2) Training effectiveness evaluation.
3) Training evaluation in various sectors.

4) Training evaluation models.

B. Inclusion and Exclusion of Studies

The primary search produced 212 records. After exclusion of duplicates 202 potentially eligible papers were identified.

TABLE I: COMPARISON OF MODELS

Model	Kirkpatrick's	Kaufman	Phillips's ROI	CIRO	CIPP
Levels	Reaction	Enabling & Reaction	Reaction & planned action	Context	Context
	Learning	Acquisition	Learning	Input	Input
	Behaviour	Application	Job application	Reaction	Process
	Result	Organisation Output	Business result	Outcome	Product
	-----	Societal Outcome	ROI	-----	----
Outcome	Learning & behavioural Outcomes.	Societal Outcomes.	Return on Investment Outcomes.	Identifying contextual factors.	Program Decision making.
Pros	Simple, clear, and easy to implement. Focus on behavioural outcomes.	Includes societal value-added. Focus on continuous improvement rather than summative evaluation.	Determine the value/worth of training programme in monetary terms which is easily understood by top management	Focus on both before and after training measurement.	Provide system view during various phases (Beginning, in-process and its end)
Cons	Simply tells training was put into practice or not, doesn't help to improve the training.	Getting robust data and evidence about Societal and customer impact is often not feasible.	Complexity in determining monetary returns on soft aspect as well as more time and cost requirement for evaluation.	Does not measure behavioural changes.	Overly abstract and hard to implement in practice.
Prime Suitability	Any type of organisation and any type of training.	Organizations having societal / Customer impact in their business goal.	Business/Profit oriented organisations.	Management training courses.	Education organisation, Program evaluation.

Following inclusion and exclusion criteria were applied to review them-

1) Article focus: Pertaining to the selection of paper, the criteria are "Include Empirical evidence relating to Training in Govt/PSU organisation". A large portion of the initially identified studies were eliminated because they were conducted in Non-Govt/Pvt sector. In total, **42** papers met this inclusion criteria and subjected to full review for next criteria.

2) Method: Training evaluation must be carried out at any level i.e., reaction, learning, behaviour or result and quantitative result of at least one outcome be reported.

3) Training Participants: As the primary focus was to investigate Govt/PSU training effectiveness, the training audience in studies included was primarily Govt/PSU employees attended training conducted by their organisation. We did not include papers on training provided by Govt organisations to non govt employees because such programs were considered to be qualitatively different from traditional organizational training programs.

4) Exclusion: Because of myriad articles, book reviews, editorial notes, Contextual approaches were excluded. Studies other than English language are excluded.

After full review and using above criteria, 15 papers out of 42 papers were identified and included in the study. To minimise random errors and bias dual review process was used.

IV. ANALYSIS OF FINDINGS

The main focus of analysis of findings is to obtain data regarding the framework being followed for evaluation of effectiveness of training. For this we first acquainted ourselves with various models found mostly used in evaluation literature. A thorough comparison between these models was carried out. It is observed that the outcome of Kirkpatrick's model is primarily based on learning & behaviour aspects. In Govt/PSU organisation the whole emphasis of training intervention is on learning & behavioural outcomes from the training as against profit in business for which Kirkpatrick's model is best suitable.

The systematic literature review summarizes the studies that have evaluated training effectiveness in one or more level of evaluation in Govt/PSUs. In total, 86% (13) of the included studies assessed training effectiveness by using the Kirkpatrick's framework and 14% (02) studies assessed training effectiveness by using Philip's ROI framework. This outcome is in line with the review on evaluation models conducted by Hilbert et al [19] in HRD and psychology literature, which revealed that out of 57 journal articles, describing evaluation models,44 (77percent) included Kirkpatrick's framework as well as ASTD 1997 survey of 300 HR managers indicating organisations which conduct evaluation,67% use Kirkpatrick's model. The higher %

i.e.,86% in our review is due to fact that in Govt/PSU focus is not on the return on investment as in business-oriented organizations but is on learning outcomes from the training for which Kirkpatrick's framework is most suitable.

The Six included studies have assessed all Four levels whereas Nine studies have assessed behaviour (third level). Thus, all (100 %) included studies have assessed up-to the Behaviour level which is departure from earlier studies which shows that 77 percent of organizations measure trainee responses, 38 percent measure learning, 14 percent measure job behaviour and 7 percent measure results [20]. One of the reasons is that in Govt/PSU organisations the emphasis of training and development is on improvement in job behaviour so as to provide effective services to the public at large. The other reason is that evaluators have now understood the importance of evaluation beyond classroom learning (Level-2) to some sort of outcome-oriented effectiveness measurement (Level 3 and above) on ground. The 07 included studies in their finding emphasised the need of training evaluation with a well-defined evaluation mechanism/framework which is in line with the finding of Philip,1991[9] that One of the reasons for reluctance of evaluation is inability of organizations to find a suitable tool.

The Systematic literature review findings concur with the theoretical review, analysis, and comparison of models thus, it can be inferred from theoretical as well as systematic literature review that Kirkpatrick's evaluation model is most suitable for Govt/PSU organization training evaluation.

V. LIMITATION

The systematic literature review is dependent upon information available in electronic data base, and limited to outcome evaluations reported in those literature. Some papers may have been left out of this review because of the inclusion and exclusion criteria developed by researcher as well as the accessibility of some journals.

VI. CONCLUSION

Govt organizations should adopt appropriate training evaluation tool to show how training and development interventions contribute to the organisational performance and achieving desired results.

This review fills a void in the training assessment literature by elucidating the nature of existing studies focused on the evaluation of training effectiveness in Govt/PSU organisations. No such existing summary of empirical studies could be found in the literature.

We have started with understanding of concept of training itself and followed with review of various models used during literature review in our study. A comparison of these models was presented to understand relevance, suitability and relative advantage/disadvantage. The analysis suggests suitability of Kirkpatrick's model for evaluation in Govt/PSU organisation.

The systematic review shows how training evaluations in Govt organisation is covered in literature. The summary of studies presented gives a fair idea to address the issue of finalising the tool for measurement of training effectiveness. The review suggests that Kirkpatrick's Four level evaluation model remains useful framework for the evaluation of training effectiveness in Govt/PSU organizations as compared to other models.

REFERENCES

[1] P. Evans, V. Pucik and J.L. Barsoux, "The Global Challenge: Framework for International Human Resource Management", Boston: McGraw-Hill, 2002.

[2] G. Brown and A. R. Read, "Personnel and Training Policies – Some Lessons for Western Companies", Long Range Planning, 17(2), pp 48-57,1984.

[3] M.G. Patterson, M. A. West, A. Lawthom and S. Nickell, "The Impact of people Management Practices on Business Performance", London: CIPD,1998.

[4] Noe, R. Anderson, "Employee training & development (2nd ed.)", Boston: McGraw- Hill,2002.

[5] J. Kee and R. Black, "Is excellence in the public sector possible?" Public Productivity Review, 9(1), 25-34,1985.

[6] I.L. Goldstein and J.K. Ford, "Training in Organizations: Need Assessment, Development, and Evaluation", (fourth ed.), Wadsworth, 2002.

[7] D.L. Kirkpatrick," Evaluating in-house training programs", Training and Development Journal, 38, pp 32-37,1978.

[8] American Society for Training and Development, National HRD executive survey, measurement and evaluation,1997 fourth quarter survey report.

[9] J. Phillips, "Handbook of training evaluation and measurement methods (2nd ed.)" Houston: Gulf Publishing Company,1991.

[10] L.J. Bassi, J. Ludwig, D.P. McMurrer and M. van Buren," Profiting from Learning: Firm-Level Effects of Training Investments and Market Implications" Singapore Management Review, Volume 24, No.3,2002

[11] J. Kirkpatrick, "The Hidden Power of Kirkpatrick's Four Levels," T+D (61:8), pp 34-37,2007.

[12] J.D. Kirkpatrick and W.K. Kirkpatrick, "Kirkpatrick's four levels of training Evaluation", Alexandria, V.A., ATD Press,2016.

[13] A.C. Hamblin, "Evaluation and Control of Training", McGraw-Hill,1974.

[14] C. Tennant, M. Boonkrong and P. Roberts, "The design of a training programme measurement model", Journal of European Industrial Training, 26(5), 230-240,2002.

[15] D.L. Kirkpatrick, "Invited reaction: Reaction to Holton article", Human Resource Development Quarterly, 7, 23- 25,1996.

[16] P. Bramley, "Evaluating Training Effectiveness", UK: Mc Graw-Hill,1991.

[17] D. Gamage, S. Fernando S. and I. Perera, "Quality of MOOCs: A review of literature on effectiveness and quality aspects". 8th International Conference on Ubi-Media Computing (UMEDIA): 224-229,2015.

[18] Bandara, Wasana, M. Suraya and F. Erwin, "A Systematic, Tool-supported Method for Conducting Literature Reviews in Information Systems." Paper presented at the Proceedings of the19th European Conference on Information Systems (ECIS),2011.

[19] J.Hilbert , H. Preskill and D. Russ-Eft, " Evaluating training's effectiveness", In L. Bassi & D. Russ- Eft," What works: Assessment, development, and measurement, PP 109–150, ASTD ,1997.

[20] M.E. Van Buren, "The 2001 American Society of Training Development (ASTD) State of the Industry Report", Alexandria, VA,2001.

Impact of Production Control Practices on Business Performance of Large Scale Industries in Pune.

Hemant Vishwanath More [#1], Dr. Milind Audumbar Kulkarni *[2]

[#1]Research Student, Savitribai Phule Pune University, Pune, Maharashtra, India
[*2]Director, Chetan Dattaji Gaikwad Institute of Management Studies, Management Department
Affiliated to Savitribai Phule Pune University, Pune, Maharashtra, India
.
#Email : hemantvmore@gmail.com
*Email: dr.milind.a.kulkarni@gmail.com

***Abstract*— Every industry indented to gain the profit from its performance, product, service and the practices. Industry working with dedicated objectives i.e. profit, social goodwill, innovation and overall business performance. Industries always perform their best to achieve the objectives. Customer satisfaction is one of most considerable objectives. Business performance of the industry depends on the demand of the product or service through the customer. Business performance depends upon the management practice followed. Planning leads to optimum performance of business which execute all activities of production. Production control practices are required to maintain the proper inventory and its management, which supports the production management, cost control to maintain the cost of product within range, more effective use of equipment to produce specified quantity of products, right forecasting methods to manage future requirements, use of automated production for improving accuracy and precise work, lower capital investment to increase the profit of industry. Production control practices are used in most the industry to achieve the targets as per the dedicated planning, most of the deviations are resolved due to the production control practices. Respondents 12 from the 33 respondents mentioned production control practices are highly impacted on the business of the industry, which is more than 30% of overall population size. None of the respondent gives extreme negative remarks for mentioned practices in the study. Production control practices mentioned in the study gives positive impact for large-scale industries business performance. These are proven through the graphical representation of data i.e. bar chart and statically evaluated with one sample t-test.**

Keywords — Impact, Production control, Business performance Large scale industries, Pune

I. INTRODUCTION

Every industry following the many functions like Purchase management, Inventory management, Production management, Distribution management. Every function has its own rule, regulations and practices which needs to followed for proper implementation of overall management system. The practices followed in the industries are always impact on the performance of the industries. There are several practices which are followed in the industries i.e. GMP (Goods Manufacturing Practices), GLP (Good Laboratory Practices), GDP (Good Documentation Practices), GXP (Good Software Practices), like all above mentioned practices production Control Practices is one of the beneficial practices to the industry. PCP (Production control practice) also recognize as Production control system. Production control practices are change as per the nature of products, size of industries, nature of work and nature of job. Production control practices used in the study are mentioned below: -

1. **Better service to customer: -** Every industry always perform for the satisfaction of the customer, which leads the future perspective of the business.
2. **Less overtime work: -** Working hours of the production impacts the cost of the products, means increases in the working hours leads to the cost increases of product.
3. **Less work stoppage: -** During production many surprises are occurs dur to this work stoppage initiated which may lead quality impact. Cost impact and target date compliance impacted.
4. **Need of smaller inventories of work in process and finished goods: -** Inventory management is one part of production control practices, which support the production process without interruption.
5. **More effective purchasing: -** Purchasing should be defect less and with optimum volume and with the intension of cost control.
6. **More effective use of equipment: -** Usage of equipment during production process required effectively so the man working hours and machine working hours properly handled. Usage of machine also related to the quality parameters of the product.
7. **Loss of time: -** During every production time schedule is most important thing, when production process suffered due to loss of time then every planning

get disturbed which may impact the supply the product to the customer.

8. **Cost saving: -** Every industry is like to do the cost saving in every function and every process. Cost saving leads to the increase in profit.

Production control practices changes as per the size of the industries. Industries are segregated as Micro, Small, Medium and Large-scale industries. Industries requires huge infrastructure and manpower with an influx of capital assets are Large Scale Industries. In India, large-scale industries are with a fixed asset of more than two hundred million rupees or Rs. 20 crores. Another parameter used is turnover of the industry, when turnover of the industry should be more than ten hundred million or 100 crores. In this study segregation of the industries is decided on the turnover basis. The new classification of the industries are declared by Government of India on 1st July 2020.

Table No.1

Revised MSME Classification, W.E.F. 1July2020			
Composite Criteria: Investment and Annual Turnover			
Classification	**Micro**	**Small**	**Medium**
Manufacturing Enterprises and Service Enterprises	Investment < Rs.1Cr. and Turnover < 5Cr.	Investment < Rs. 10Cr. and Turnover < 50Cr.	Investment < Rs. 20Cr. and Turnover < 100Cr.

II. REVIEW OF LITERATURE

[1]Business world become versatile and vast in today era. India is the major player in the global market as supplier, distributor, customer and producer. Many global giants are interested to penetrate in Indian market for sale and gain the profit. The paper discusses about the current position and performance evaluation process of Indian corporate organization. Survey conducted by involving more than parameter i.e. products, process, function is collected.

[2]Production planning and control are core factor of any organization. Implementation of production planning and control are important for the organization. For checking the Production planning and control performance and practices of Nigerian small-scale industries quantative techniques are used. Implementation or no implementation of quantative techniques (QT) in production planning and control.

[3]SIMKON is the specific computer aided design methodology, which is used for the large scale dynamics process control systems. SIMKON V is newly developed software for the control system. Algorithms sets are used as base for the SIMKON.SIMKON is prepared from the art of simulation and control technology. SIMKON are used from the earlier software DIGIKON-IV, ADAPS and KONPACT programs.

[4]Manufacturing systems become complex as per requirement of customers and products. Autonomous production control (APS) is the one of the system which improves the production system performance through fast and flexible reaction to dynamic change. APC works for decision of central planning unit. It also works as intelligent and distributed logistic objects.

[5]Production control systems impact for any industry. This production control system depends upon the four method i.e. order controlled, stock level controlled (SLC), Flow scheduled (FC) and Hybrid system of each respondents was evaluated which gives the same reviews, 1. Production control systems are based on the shop floor environment. 2. Stock level control system is mostly applicable to the shop floor control system. 3. Flow schedule system is applicable to the adequate and non-repetitive environment but used lower than SLC. 4. Hybrid systems are mostly used in research type environment jobs which are non-repetitive environment.

[6]Production control system is works with help of simulations and emulation. Production, planning and scheduling as well as production control systems optimization possible with internal study and survey. This study concentrated on the transportation department, automation and retrieval system. Simulation study used for analysing, improving and evaluating the control system. Scheduling methods which are currently used are tested under the emulation system.

[8]Leading management industries are always work to improve their product and service quality for improving the business performance metrics i.e. increased profits, increased market share, and reduced costs and best quality. Management of customer requirement for elicitation, analysis and specification of the process. This study describes and evaluator's concepts and techniques in process development and industrial applications. Industries always focus on the methods and methodologies apply on production development and management concepts. Relationship between components customer and supplier always make impact on the performing measures of industry. Manufacturing industries also explores the relationship between industrial context and knowledge management.

III. OBJECTIVE

1. To evaluate the impact of less overtime work, less work stoppage and less loss of time on business performance.
2. To identify more effective purchasing, use of equipment and inventory on the business performance.
3. To analyse the role of cost saving and service to customer on business performance.

IV. RESEARCH METHODOLOGY

Production control practices are used in every large-scale industry which is requirement to control the production, planning, inventory supply, intermediate production processes, quality and precision of products and finally the distribution of the products to the customer location.

ISBN 978-81-927230-0-10

Industries are using several production control practices during their production processes. Some of them are taken for the evaluation of business performance industry. Better service to customer, Less overtime work, Less work stoppage, Need of smaller inventories in process and finished goods, More effective purchasing, More effective use of equipment, Loss of time, Cost saving.

In this study the industries are selected from Pune and around area are considered for the survey.50 respondents from large scale industries are taken as respondents from which 32 respondents have completed the all questionnaire of study. During this pandemic period one to one discussion are avoided, so Google forms are used as instrument for the survey.

V. HYPOTHESIS

H0: There is no significant difference across usage of production control practices in large industries gives no impact on business performance.

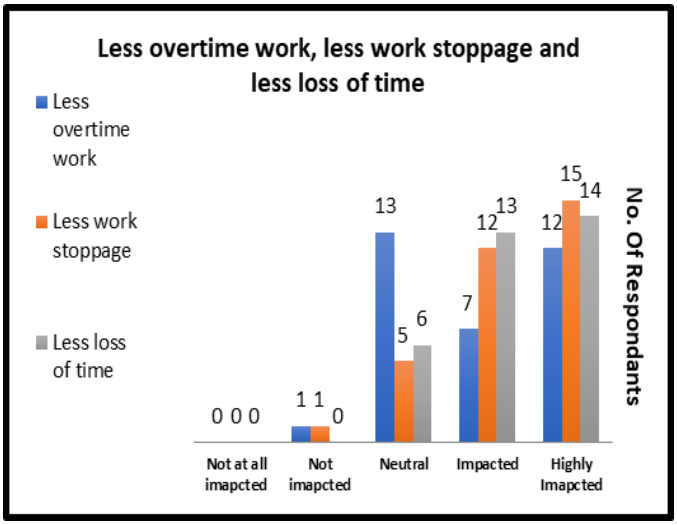
H1: There is significant difference across usage of production control practices in large industries gives positive impact on business Performance.

VI. DATA ANALYSIS

Data collected from the large-scale industries of Pune and around. Data collected through the Google forms. Data collected about impact of production control practices usage in the large-scale industries with respect to the impact on the business performance.

1. **Less overtime work, less work stoppage and less loss of time:** Overtime ,work stoppage and loss of time impacted on the cost of the product.In consideration of all production practices no respondents mark that mentioned practices are not at all impacted the business performance. More than 12 respondents are mark that mentioned practices highly impacted to the business performance.

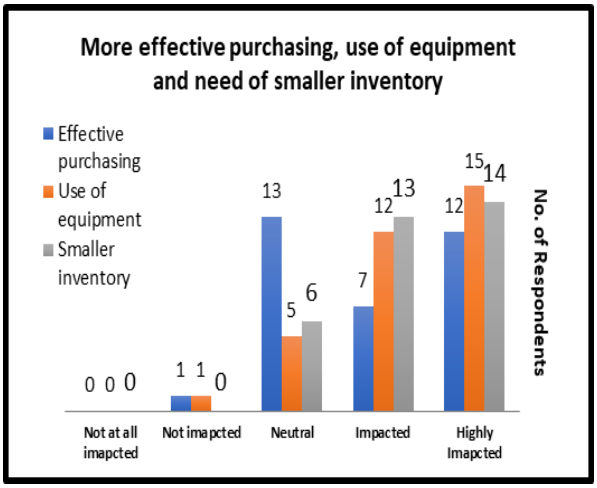
Table No.2



2. More effective purchasing, use of equipment and need of smaller inventory:

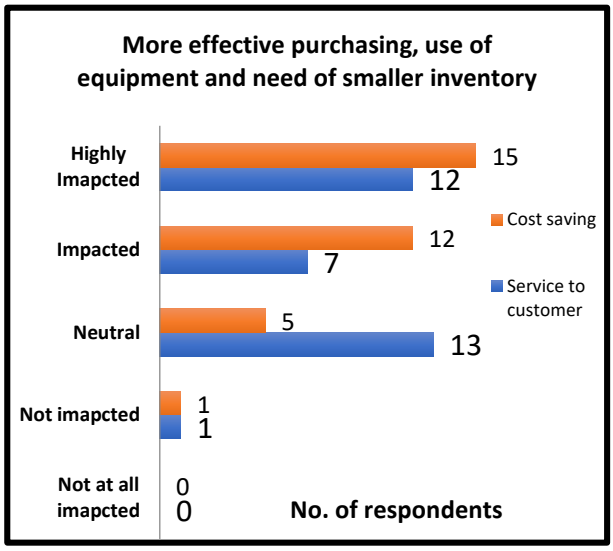
Effective purchasing always leads to good wastage control in production process. Machine or equipment usage decide the quality and cost of the product. Maintaining the smaller inventory always crucial job, which may interrupt the process. In above production control practices none of the respondents say not at all impacted, but more than 7 respondents say business performance impacted due to the above-mentioned practices. More than 12 respondents mark chosen highly impacted option.

Table No.3



3. **Better service to customer and saving in the cost:** Industries always for customer satisfaction and cost saving. These two production control practices are most favourable to all respondents which reflects into their response. More than 20 respondents are says below mentioned practices are highly impacted to the business performance of large scale industries. None of respondent on negative parameter of impact on business performance.

Table No.4



4. Statistical evaluation:

Above data is evaluated with the one sample t- test.

Description	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Savings in the cost	40.808	30	.000	4.7097	4.474	4.945
Better service to customers	24.216	30	.000	3.9677	3.633	4.302
Less overtime work	32.186	30	.000	4.3226	4.048	4.597
Less work stoppage	30.114	30	.000	4.1290	3.849	4.409
smaller inventories and finished goods	26.007	30	.000	4.0000	3.686	4.314
More Effective Purchasing	34.180	30	.000	4.3548	4.095	4.615
More effective use of equipment	32.321	30	.000	4.2903	4.019	4.561
Less loss of time	37.152	30	.000	4.5161	4.268	4.764

Interpretation: It is observed from the test that the value of P is 0.000 and less than 0.05, so it can be concluded that the null hypothesis is rejected and the alternative hypothesis is accepted. Therefore, we can say that there is significant difference across usage of production control practices in large industries gives positive impact on Business Performance.

VII. RESULTS

Production control practices used in the large-scale industries of Pune and around area are evaluated for the impact of the business performance. Averagely 12 respondents say the mentioned production control practices are highly impacted on the business of the industry. None of the respondent on extreme negative parameter of mentioned practices.

VIII. CONCLUSIONS

All eight studied production control practices in the large-scale industries of Pune and around area are used for positive impact on the business performance, which are indicated through the graphical representation of data i.e. bar chart and statically evaluated with one sample t-test.

IX. ACKNOWLEDGMENT

I would like to thanks to Mr. Sumit Nisal and Mr. Shrikant Kesarkar working professional in the Biotechnology industry with rich experience of 20 years.

X. REFERENCES

1. Om prasad Vaidya and Asmita Chitnis, *Performance evaluation in Indian corporate organizations: A survey*, Procedia - Social and Behavioural Sciences 37 (2012) 38 – 45.
2. Anene E. C., Orji O. I., *Quantitative Techniques' Application to Production Planning and Control and the Implication on Nigerian Small-Scale Industries*, International Journal of Multidisciplinary Research and Development, Volume: 1, Issue: 3, 157-160, Aug 2014.
3. A. F. Konar, *Methodology For Large-Scale Process Control System Design*, IFAC MicrocomputerApplication in Process Control, Istanbul, Turkey 1986.
4. L. Martins, Nuno O. Fernandes, M.L.R. Varela, *Autonomous Production Control: A Literature Review, ResearchGate publication*, June 2018.
5. Flavio Cesar Faria Fernandes and Moacir Godinho Filho, *Production control systems: Literature review, classification, and insights regarding practical application*, African Journal of Business Management Vol. 5(14), pp. 5573-5582, 18 July, 2011.
6. Glenn Ballard & Gregory Howell, *Shielding Production: An Essential Step in Production Control*,
7. A. Pfeiffer, B. Kádár, L. Monostori, *Evaluating And Improving Production Control Systems By Using Emulation*, Computer and Automation Research Institute, Hungarian Academy of Sciences Kende u. 13-17, Budapest, POB 63, H-1518, Hungary
8. Yad Ram Singh1 and Suraj Kumar2, *A Study on Production Development and Management*, International Journal of Information and Computation Technology, ISSN 0974-2239 Volume 3, Number 9 (2013), pp. 881-886
9. Sarina Abdul Halim Lim, Jiju Antony, *Statistical Process Control Implementation In The Food Industry: A Systematic Review And Implications For Future Research*, Proceedings of the 11th International Conference on Manufacturing Research (ICMR2013), Cranfield University, UK, 19th – 20th September 2013, pp 593-598
10. Majid Aarabi , Sajedeh Hasanian, *Capacity planning and control: a review*, International Journal of Scientific & Engineering Research, Volume5,Issue8,August-2014, ISSN 2229-5518

 ISBN 978-81-927230-0-10

Inventory Management & control of Consumable tools

Mr. Gangadhar Dukare ,Ms.Shruti Kodak
International Institute of Management science chinchwad, pune
gangadhardukare@gmail.com, kdkshruti95@gmail.com

Abstract: - The main objective behind this project is to study the approach of Integrated Material Management for Effective Inventory Control; this in turn affects overall working capital efficiency in relation to Kalyani Maxion Wheels. This can be achieve by

- ***a) Elimination of Non-Value added activities.***
- ***b) Bench marking the best practices.***
- ***c) Converting Fixed cost as Variable cost.***
- ***d) Import Raw Material substitution.***
- ***e) Better Inventory control.***
- ***f) To change the Material without affecting the quality & features.***
- ***g) Negotiation with Vendor/ Service providers.***

INTRODUCTION:

Inventory management and supply chain management are the key components of any business operations. Inventory management has undergone revolutionary changes with increasing in development of technology and availability of process driven software's. In any business or

Organization all functions that are interlinked and connected to each other and are often overlapping.

Some key aspects like supply chain management, logistics and inventory form the backbone of the business operations.

Inventory management is the whole process of managing inventories from raw materials to finished products. It tries to efficiently streamline inventories to avoid both gluts and shortage Its role is to maintain a desired stock level of specific products or items and helps companies to find out which and how much stock to order at what time. Inventory management is very important to a company's health because it helps make sure there is rarely too much or too little stock on hand, limiting the risk of stock outs and inaccurate records. Inventory Managements are requires constant and contentious evaluation of external and internal factors and control through planning and review.

Inventory control: It is the process of keeping the right number of parts and products in stock to avoid shortage, overstocks and costly problems. It focuses on cutting the number of slow consumed products while also increasing high consumed products. This saves organizations time and money because they don't have to spend lots of man-hours reordering and receiving goods that they don't really need.

Methods of Inventory Control:

Reorder level (ROL): It is the inventory level at which organization would place a new order. Reorder level depends on a company's work-order lead time and its demand during that time and whether the company maintains safety stock.

(Maximum Consumption × Maximum Lead time)

REORDER QUANTITY (ROQ):

Reorder quantity is the total number of product units you request from manufacturer or supplier on an inventory replenishment purchase order. ROQ = (Avg Consumption × Avg lead Time) Maximum Stock Level: The maximum stock level is a not-to-exceed amount used for inventory planning. Maximum Stock Level= Reorder Level + Reorder Quantity-(Minimum consumption × Minimum lead time) **Minimum Stock Level:** It stipulates a point below which the inventory level is not allowed to fall. When a firm carries minimum stock, it rules out and stoppage of production.Minimum Stock Level=Reorder Level-(Average Consumption × Average Lead time)

RESEARCH OF THE PROJECT:

In Kalyani Maxion Wheels Pvt, ltd ABC analysis is used for managing the inventory. So the study of ABC analysis is done in this project.

ABC Analysis:

The concept ABC (Always Better Control) Analysis is based on 'Think on the Best and then on the Rest'. ABC analysis underlines a very important principle "Vital few: trivial many" Generally, companies are required to keep stock of large number ofitems used in production and distribution.

In ABC analysis, items are categorized in three broad groups, namely; A, B, and C, on the basis of their monthly/annual consumption value.

CONSUMPTION Value:

A Category Items-

It is usually found that 20% of the total teems account for 70 to 80% of the total money spent on the materials. These items require detailed and rigid control and need to be stocked in smaller quantities

B Category Items –

Average monthly/annual consumption valued items are grouped in category B. Generally 30% items account for approximately 20 to 25 % of the total sales or consumptionvalue.

C Category Items –

The low monthly/annual consumption valued items are grouped in C. Again, generally, 50% items account for approximately 10 to 5 % of total sales or consumption value.

Categories of Items:

Data Analysis:

Sheets:

ABC Analysis: Link for Analyzing Data

Calculation Sheets:

In the above sheets:

Total Number of Items is 164.In which,
A Items – 8
B Items -17
C Items - 139
Here,

A Items are 5-10% of the total quantity. This 5% Items covers 70-75% of cost.

B Items are near about 10-15% of the total quantity.
This 10-15% Items covers 10-15% of cost.

CATEGORY OF ITEMS	NO OF ITEMS	% OF YEARLY CONSUMPTION VALUE
A	8	74.30%
B	17	18.06%
C	139	7.63%
TOTAL	**164**	**100.00%**

C Items are 80-85% of the total quantity.This Items Covers 5-10% of cost
Hence, Pareto Law proved.

INVENTORY CONTROL:

The inventory control is done by finding Reorder Level, Reorder Quantity, Maximum Stock Level, Minimum Stock level. This is found with the help of Annual Maximum Consumption, Annual Minimum Consumption, and Maximum Lead Time & Minimum Lead time.

SAMPLE CALCULATION:

For Item Code PUN6337100751 (PIERCING PUNCH SHAS 16-60-P11.6 -938/37)

Given Data;

Maximum Consumption (10 month) =171 Units
Minimum Consumption (10 months) =87 Units
Maximum Lead Time=7 days
Minimum Lead Time=3 days
Solution:

Average Consumption (10 month) = (171+87)/2=129Units

Maximum Consumption /Month=171/10=17.1Units

Minimum Consumption/Month=87/10=8.7Units

Average Consumption/ Month=129/10=12.9Units

Average Lead Time= (7+3)/2=5days

Maximum Lead Time/month=7/30=0.23month

Minimum Lead Time/month=3/30=0.10month

Average Lead Time/month=5/30=0.16month

Reorder Level (ROL):

ROL= (Maximum Consumption/month × Maximum Lead time /month)

= (17.1×0.23)

= 3.93≈4Units

ROL (10 months) =4×10=40Units

ROQ = (Avg Consumption × Avg lead Time)

= (12.9×0.16)

=2.06≈2Units

ROQ (10 months) =2×10=20Units

Maximum Stock Level= Reorder Level + Reorder Quantity-(Minimum consumption × Minimum lead time)

=4+2-(8.7×0.10)

=5.3≈5Units

Maximum stock level (10 months)=5.3×10=53Units

Minimum Stock Level=ROL-(Avg Consumption × Avg Lead time)

=4-(12.9×0.16)

=1.8≈2Units

Minimum Stock Level (10 month) =1.8×10=18Units

CONCLUSION:
To study of "Inventory Management and Inventory Control" in relation to Kalyani Maxion Wheels. Today's market is a more customer oriented market and the customer satisfaction is the most important goal of each and every organization therefore it is inevitable to adopt the integrated Inventory Management approach for new product development strategy. Financial & Material management for any product is a dynamic decision making process which are involving a series of inter-related activities.

It is also important to have an additional Informational inputs like demand forecast, lead time estimate, and other cost estimates to be realistic to make effective use of inventory models.

Reference:

1.Deepesh Singh & Ajay Varma, overview the Inventory management in supply chain and their current Inventory related issue March-2018

2. Stephen ARO-GORDON, Jaideep GUPTE Contemporary Inventory Management Techniques: A Conceptual Investigation Jan-2016

3.Bijal Pandya, Hemant Thakkar, a Review on Inventory Management Control Techniques March-2016

4.Tom Jose V, Akhilesh Jayakumar, Sijo M T Analysis of Inventory control techniques 3March-2013

5.Bivash Mallick, Onkar Nath Dutta and Santanu Das, Study on Inventory Management Using Selective Control Techniques -2012

6. Kok, A.G. de, Co-promotor, External personvan der Duyn Schouten, F.A., Promotor , Inventory management systems: Control and information issues 9 Sep 1998

Hydroponic Solutions For Soilless Production Systems

Prof. Mahesh Mahankal #1, Miss. Sarita Solanke *2, Miss. Pallavi Deore *3

Assistant Professor, Yashaswi Education Society's IIMS- Chinchwad.
Savitribai Phule Pune University, Pune.
169/A,Station Road, Opp. Elpro International, Chinchwad, Pune, Maharashtra 411033 (India)
mahesh.mahankal@gmail.com

MBA Student, at Yashaswi Education Society's IIMS- Chinchwad.
Savitribai Phule Pune University, Pune.
169/A,Station Road, Opp. Elpro International, Chinchwad, Pune, Maharashtra 411033 (India)
Saritasalunke97@gmail.com

MBA Student, at Yashaswi Education Society's IIMS- Chinchwad.
Savitribai Phule Pune University, Pune.
169/A,Station Road, Opp. Elpro International, Chinchwad, Pune, Maharashtra 411033 (India)
pallavideore99@gmail.com

ABSTRACT

Agriculture in India is continuously moulting. Newer technologies are coming up to face the challenges arising due to overgrowing population, water scarcity, climate change, labour scarcity and urbanization leading to reduction in arable land. Various technologies like See & Spray Technology, field sensors for irrigation control, electrical conductivity sensing, machine learning and robotics in agriculture are on its way to come. These advanced technologies will no doubt boost agriculture. Still then, in spite of all these latest and modern technologies, food security amidst the overpopulation pressure with decreasing arable lands is a major concern all over the world. Vertical farming is arguably an intensive way to increase food production using less land. Plant heights were measured in both systems within 30 days. After data collection, data were analysed using Design Expert and Test of Variance (ANOVA). The hypothesis of the test is that the seed type, planting system, and their interactions have a significant effect on plant height. As a result of the experiment, it was found that the type of seed did not have a significant effect on plant growth. However, the planting system has a significant effect on the plant growth, the hydroponic system has a higher growth rate. This result achieves the aim of this paper which is finding a planting system that can increase the productivity to cover the food demand.

KEYWORDS

Hydroponic System, Soil Based System, ANOVA, Planting System, Hydro Yuga.

Introduction

Hydro Yuga

The word hydro originates from Greek which means Water & The word ` Yuga `Is derived from the Sanskrit (Sanskrit: Yug) Generation.

Hydro Yuga is based on Hydroponic farming.

What Are Hydroponic Systems and How Do They Work?

Hydroponics is the art of gardening without soil. Hydroponics is a Latin word meaning "working water." In the absence of soil, water goes to work providing nutrients, hydration, and oxygen to plant life. From watermelons to jalapeños to orchids, plants flourish under the careful regimen of hydroponics. Using minimal space, 90% less water than traditional agriculture, and ingenious design, hydroponic gardens grow beautiful fruits and flowers in half the time.

Though the technology sounds cutting edge, the history of hydroponics dates back to the famed Hanging Gardens of Babylon, one of the Seven Wonders of the Ancient World. The Euphrates River was diverted into channels that cascaded down the lavish garden walls. In the 13th century, Marco Polo wrote of witnessing floating gardens in China. However, hydroponics is far from merely an innovation of the ancient ages. In the 1990s, NASA grew aeroponic bean seedlings in zero gravity aboard a space station, opening up the possibility of sustainable agriculture in space. Hydroponics continues to be a timeless and dynamic method of water conservation and crop production.

Hydroponics work

Hydroponic systems work by allowing minute control over environmental conditions like temperature and pH balance and maximized exposure to nutrients and water. Hydroponics operates under a very simple principle: provide plants exactly what they need when they need it. Hydroponics administer nutrient solutions tailored to the needs of the particular plant being grown. This allows you to precisely control how much light and how long your plants receive. The pH level can be monitored and adjusted. Plant growth is accelerated in a tightly regulated and controlled environment.

Controls the factory environment to reduce many hazards. Plants growing in gardens and fields are exposed to many factors that negatively affect health and growth. Fungi in the soil can spread disease to plants. Wild animals such as rabbits can plunder ripe vegetables in the garden. Pests such as grasshoppers can attack crops and destroy them in half a day. Hydroponics systems eliminate the unpredictability of plant growth outdoors and on land. In the absence of mechanical resistance of the soil, seedlings can grow much faster. By eliminating pesticides, hydroponics produces much healthier and high-quality fruits and vegetables. Without obstacles, plants are free to grow vigorously and rapidly.

Components of a hydroponic system

To maintain a flourishing hydroponic system, you will need to become acquainted with a few components that make hydroponics run efficiently.

Growing media

Hydroponic plants are often grown in inert media that support the plant`s weight and anchor its root structure. Cultivation medium replaces the soil, but does not provide the plants with their own nutrition. Instead, this porous medium retains moisture and nutrients in the nutrient solution, which is then delivered to the plants. Many growing media are also pH neutral so they do not interfere with the nutrient solution. There are many different media to choose from, and your specific plant and hydroponic system will determine which medium is best for your purpose. Hydroponics media are widely available online and in local nurseries and horticultural stores.

Air Stone and Air Pump

Submerged plants can sink quickly if there is not enough air in the water. Air Stones disperse tiny bubbles of dissolved oxygen throughout the nutrient solution reservoir. This foam also helps to evenly distribute the dissolved nutrients in the solution. Air Stones do not generate oxygen on their own. It must be connected to an external air pump via opaque food grade plastic tubing (opaqueness prevents algae growth). Air stones and air pumps are popular aquarium components and are readily available at pet stores.

Net Pots

Net Pots are net pots for placing hydroponic plants. The grid material allows the roots to grow on the sides and bottom of the pot, giving them more exposure to oxygen and nutrients. Mesh flowerpots also provide superior drainage compared to traditional clay or plastic flowerpots.

HYDROPONIC STRUCTURES AND THEIR OPERATION

Hydroponic system are customized and modified according to the recycling and reuse of nutrient solution and supporting media. Commonly used systems are wick, drip, ebb-flow, deep water culture and nutrient film technique (NFT) which are described below (Fig. 1).

Wick System

This is simplest hydroponic system requiring no electricity, pump and aerators (Shrestha and Dunn, 2013). Plants are placed in an absorbent medium like coco coir, vermiculite, perlite with a nylon wick running from plant roots into a reservoir of nutrient solution. Water or nutrient solution supplied to plants through capillary action. This system works well for small plants, herbs and spiceand doesn't work effectively that needs lot of water.

Ebb and Flow system

This is first commercial hydroponic system which works on the principle of flood and drain. Nutrient solution and water from reservoir flooded through a water pump to grow bed until it reaches a certain level and stay there for certain period of time so that it provides nutrients and moisture to plants. Besides, it is possible to grow different kinds of crops but the problem of root rot, algae and mould is very common (Nielsen et al., 2006) therefore, some modified system with filtration unit is required.

Drip system

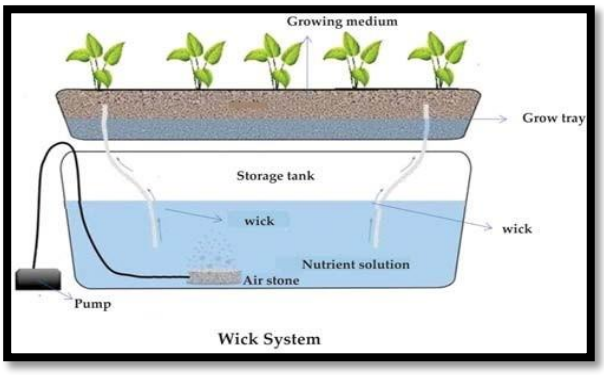
The drip hydroponic system is widely used method among both home and commercial growers. Water or nutrient solution from the reservoir is provided to individual plant roots in appropriate proportion with the help of pump (Rouphael and Colla, 2005). Plants are usually placed in suitable absorbent growing medium to allow the nutrient solution to drain slowly. You can grow a variety of crops systematically while saving more water.

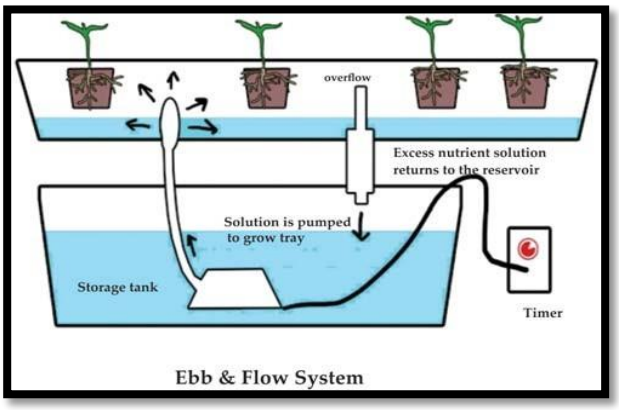
Deep water culture system

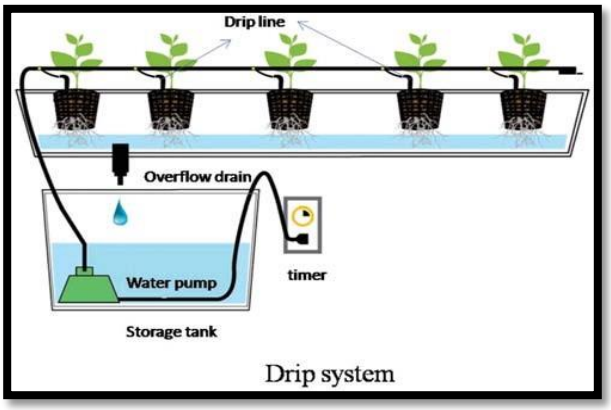
In deep-sea hydroponics, the roots of plants are suspended in nutrient-rich water and air is supplied directly to the roots using an air stone. The hydroponic bucket system is a classic example of this system. Place the plant in a mesh pot and hang the roots in a nutrient solution to quickly grow into large clumps. Oxygen and nutrient concentrations, salinity, and pH must be controlled as algae and mold can grow rapidly in reservoirs (Domingues et al., 2012). This system is suitable for larger plants that produce fruits that grow well on this system, especially cucumbers and tomatoes.

Nutrient Film Technique (NFT) system

NFT was developed in the mid 1960s in England by Dr. Alen Cooper to overcome the shortcomings of ebb and flow system. In this system, water or a nutrient solution circulates throughout the entire system; and enters the growth tray via a water pump without a time control (Domingues *et al.*, 2012). The system is slightly slanted so that nutrient solution runs through roots and down back into a reservoir. Plants are placed in channel or tube with roots dangling in a hydroponic solution. Although, roots are susceptible to fungal infection because they are constantly immersed in water or nutrient. In this system, many leafy green can easily be grown and commercially most widely used for lettuce production.







 ISBN 978-81-927230-0-10

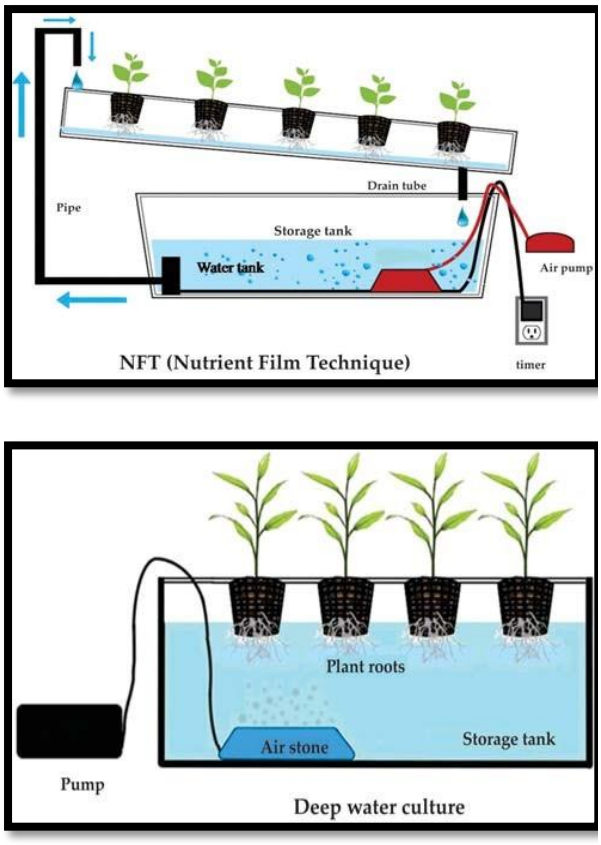


Fig. 1. Diagram of various structures of hydroponic system

1. Materials and Methodology

The first step of conducting this experiment is to choose the plants type. The selected plants are vegetables, and they are cucumber and Armenian cucumber. These were chosen because they germinate quickly to expedite the experiment. A totalof eight seeds will be used for this experiment, four cucumber seeds and four Armenian cucumber seeds.

The materials needed for creating the hydroponic system are the following:

1. Big plastic containers, (yogurt containers are used for recycling reason) included water with a big hole for the small plastic container to fix it in the middle of the big container.
2. A small plastic container with small holes that allows water enter inside it.
3. Small hydro stones to hold the plant.
4. Nutrient solution A, which consist of calcium and iron chelate.
5. Air pump device, which contains air hose end by an air stone.
6. Nutrient solution B, which consist of magnesium sulfate, potassium, copper sulfide, zinc sulfide and manganesesulfide.
7. Water.

For the traditional soil planting the following materials are used:

- Plastic container with small holes at the bottom.
- Planting soil.
- A and B nutrient solutions, as the one used for hydroponic system.
- Water for irrigation.

For both systems, a meter was used to measure the length of the plant and pH meter was used to measure the pH degree. After conducting the experiment, the results of the two systems will be analyzed and compared using statistical experimental design approach. The analysis of variance (ANOVA) test will be conducted to test the hypothesis, whether the hydroponic system is better than the traditional system or not. The experiment levels and the variables will be identified and then analyzed by Design-Expert statistical software to test the hypothesis. Test hypothesis, variables and factors will be defined in the nextsection of the paper.

The Experiment

The study will focus on comparing the growth of plants grown in soil and hydroponic system given the same seed type and growing condition. Thus, the hypothesis will be:

H_0: Seed type, planting system, and their interaction do not have significant effect on the height of the plant

H_1: Seed type, planting system, and their interaction have significant effect on the height of the plant

Variables

Table 1 represents all variables in the experiment and divides them into three types: independent, dependent and controlled variables.

Table 1: The list of all the variables.

Independent variables	***Dependent variables***	***Controlled variables***
➢ Types of seeds ➢ Planting system	➢ Height of the plant ➢ Length of leaves	➢ Location: rooftop of building Vitamins ➢ Solutions A and B Labor pH number

Procedures

The procedure of planting in soil system, summarized by the following steps:

1. Fill about ¾ of the plastic container with planting soil.
2. Place seeds about 1 cm inside the soil.
3. Add A and B nutrient solutions to the water. Then, carefully irrigate the soil with it. Check soil moisture and add100 ml of water every 3 days.

On the other hand, the procedure of hydroponic system, summarized by the following steps:

1. Prepare the hydroponic solution by adding A and B nutrient solutions in the water with a Ph of 5.5-6.5.
2. Connect the air pump device with electricity and put its air stone inside the container. Make sure that the hose is clearand transfer appropriate amount of air.

Finally, check and monitor daily plants growth for both systems in the experiment for 30 days and keep them away frompests and root-rot (if roots go slimy, the plant will turn brown and die)

Fig. 1: The hydroponic system design.

Data Collection

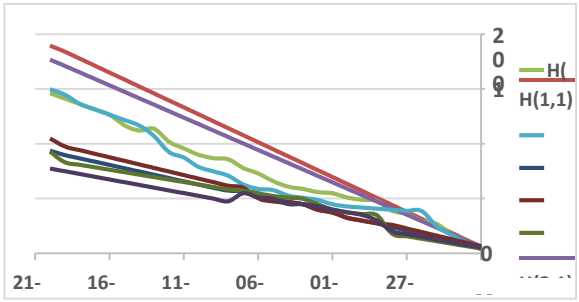
Seed type factor has two levels and the planting system has two levels. Also, there are 2 pots for each treatment combination (see Figures from 2-5). In fact, this is a factorial experiment consist of two-factors (planting system and seed type) in two levels with replication. The list of the treatments in the experiment is shown in Table 2.

Table 2: The list of treatments with its description

Symbol	*Description*
S(1,1)	*Cucumber seed in soil planting system. No.1*
S(1,2)	*Cucumber seed in soil planting system. No.2*
H(1,1)	*Cucumber seed in hydroponic planting system. No.1*
H(1,2)	*Cucumber seed in hydroponic planting system. No.2*
S(2,1)	*Armenian cucumber seed in soil planting system. No.1*
S(2,2)	*Armenian cucumber seed in soil planting system. No.2*
H(2,1)	*Armenian cucumber seed in hydroponic planting system. No.1*
H(2,2)	*Armenian cucumber seed in hydroponic planting system. No.2*

Length of Leaves (mm)		Seed Type (A)			
		Cucumber		Armenian Cucumber	
Planting System (B)	Soil	65	51	60	43
	Hydroponic	50	76	69	57

 ISBN 978-81-927230-0-10



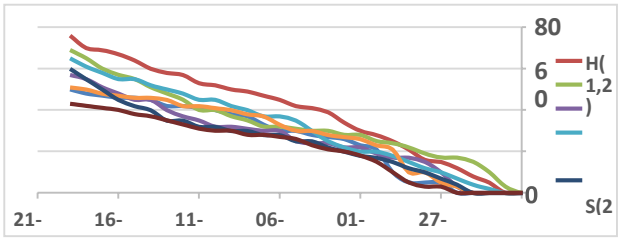


Fig. 2 and 3: Treatment H(1,1) in hydroponic system and treatment S(1,1) in soil system after 10 days.

Data Analysis

Statistical Analysis

The aim of the experiment is to measure the effect of different combinations of levels of planting system and seed typeon the plant height growth and leave lengths. The statistical approach analysis of variance (ANOVA) allows us to test the null hypothesis that seed type, planting system, and their interaction do not have a significant effect on the plant height and leaves. Figures 6 and 7 show the increasing trend in the plant heights and growths for 30 days.

Table 3:Heights of treatments after 30days.

Height (mm)		Seed Type (A)			
		Cucumber		Armenian Cucumber	
Planting System (B)	Soil	94	105	93	78
	Hydroponic	190	146	177	150

Table 4: Lengths of leaves of treatments after 30 days.

Fig. 6: Plants Height Growth in (mm) for 30 days.

Fig. 7: Plants Leaves Growth in (mm) for 30 days.

As the experiment include replications, the responses are available from two subjects at each combination of levels of planting system and seed type. So, the attendance of interaction can be measured. The test represents if that difference makes sense or it must be ignored. By analyzing the collected data from Table 3 and Table 4, three questions must be answered:

- Is there a significant difference between seed type, planting system and the interaction on plant heights and leave lengths?
- How much is the difference between the traditional planting system and the hydroponic planting system?
- Did hydroponic system give the best growth results with all seeds types?

Results

The Model F-value of 9.70 implies the model is significant. There is only a 2.63% chance that a "Model F-Value" this large could occur due to noise. Values of "Prob > F" less than 0.0500 indicate model terms are significant. In this case, B (the planting type factor) is the significant model term. Values greater than 0.1000 indicate the model terms are not significant which include both A and AB (the type of seed factor and the interaction between two factor). See Figure 8 from Design Expert which represent height response.

	Sum of		Mean	F		
Source	Squares	DF	Square	Value	Prob>F	
Model	10947.38	3	3649.13	9.70	0.0263	significant
A	171.13	1	171.13	0.45	0.5371	
B	10731.12	1	10731.12	28.51	0.0059	
AB	45.13	1	45.13	0.12	0.7466	
Pure Error	1505.50	4	376.37			
Cor total	12452.88	7				

Fig. 8: ANOVA results from Design-Expert for height response.

The "Model F-value" of 0.36 implies the model is not significant relative to the noise. There is a 78.34 % chance that a "Model F-value" is large could occur due to noise. In this case, there are no significant model terms. All values (A, B and the interaction AB) greater than 0.1000 indicate the model terms are not significant. See Figure 9 from Design-Expert which represent length of leaves response.

	Sum of		Mean	F		
Source	Squares	DF	Square	Value	Prob>F	
Model	178.38	3	59.46	0.36	0.7834	Not significant
A	21.12	1	21.12	0.13	0.7371	
B	136.13	1	136.13	0.83	0.4127	
AB	21.12	1	21.12	0.13	0.7371	
Pure Error	652.50	4	163.13			
Cor total	830.88	7				

Fig. 9: ANOVA results from Design-Expert for length of leaves response.

Discussion

The whole experiment took one and a half month to complete. The growth of the plants was measured for thirty days starting 22 October 2016 till 20 November 2016. The height of the plants and the length of the leaves were measured to indicate any difference in growth. The data shows treatments that are planted using hydroponic system did indeed grow faster than traditional soil system.

According to the results from Design-Expert software, the planting system did have a significant effect on the height of treatments. On the other hand, it will not affect the length of leaves. The other terms, seed type and their interaction between the planting system and seed type, did not affect the growth- height, and length of leaves of the treatments.

After the plants were germinated, the difference in the speed of growth was noticeable in the height of the treatments. For example, cucumber treatments equal 94 mm in soil and 190 mm in hydroponic. Similarly, for Armenian cucumber treatments equal 78 mm in soil and 177 mm in hydroponic. As for the length of the leaves, the differences were little. For instance, cucumber treatments equal 50 mm in soil and 76 mm in hydroponic. Similarly, for Armenian cucumber treatments equal 43 mm in soil and 69 mm in hydroponic. All plants in the hydroponic and soil systems germinated and grew. However, since only eight treatments were studiedthe chance of plants not germinated is lower. If more treatments were considered the chance of plants not germinated is higher. There could also be a probability for plants to die in the middle of the experiment, especially in the soil system due to human factors such as overwatering. The hypothesis of the experiment is accepted for

changing the planting system will influence the plants' height. In this case, the hydroponic system has a better effect as it makes the plant grow faster.

Conclusion of research

High demand for food production is increasing as the world population is growing. Meanwhile, the traditional farmingusing soil system will not cover the world's growing demand for food. Thus, developing a new farming and planting systemtechniques is required to avoid food crisis issue in the future. This study aimed to examine an efficient technique for alternative planting system which is the hydroponic system. The statistical experimental design approach was used to analyzeand compare between traditional soil system and hydroponic system by planting two types of seeds: cucumber and Armenian cucumber in both systems.

The analysis of variance (ANOVA) is used to test two factor factorial design with two levels hypothesis, whether the hydroponic system is better than the traditional system. The final results from Design Expert software show that hydroponicplanting system has a better effect than traditional soil system as it makes plants heights grow faster. On the other hand, the planting system has no significate effect on the length of leaves. Moreover, seed type and the interaction between seed type and the planting system have no signification effect on plant growth. For future work, the experiment can be done on a larger scale, this will help in reflecting whether the hydroponic systemwill meet the demand of today and future market. Considering various factors, such as soil type and solution type, helps to conduct experiments on a larger scale. In addition, new changes may appear after a while, so the duration of the experiment should be extended. An important thing to consider is the type of plant. Only two plants were considered in this experiment. However, experiments can be performed with other types of seeds to see if the results can be generalized to more plants.

Vertical farming is definitely a solution to critical problems in Indian farming like lack of supply or oversupply of farm produce, overuse of pesticides, overuse of fertilizers, deteriorating soils and even unemployability. But there are challenges, like the acceptance of vertical farming by Indian farming community. Indian farmers are facing various problems like lack of electricity supply throughout the day, assurance of minimum support prices, no control over market glut, water scarcity, etc. The initial huge cost of infrastructure for a large-scale farm is a major hurdle for implementing vertical farming in India. Vertical farming in India has to face another M.S. Sonawane IAAST Vol 9[4] December 2018 125 | P a g e ©2018 Society of Education, India challenges like public awareness, inclusiveness of the farming community, technical knowhow, cost incurred in managing and maintaining the vertical farm systems, and also its economic viability. There seems to be a great potential for developing hydroponics technology for fodder production. Hydroponics fodder can be produced and fed in situations where cultivated fodder cannot be grown successfully. The technology can also be adopted by progressive modern dairy farmers with elite dairy herd and produce hydroponics fodder for feeding their dairy animals. However, further research is needed to develop low cost devices for fodder production through this technology using locally available materials. We are not opposed to traditional agricultural methods, but as we are developing country we can also use traditional as well as hydroponic methods for agriculture through which our nation will take one step ahead toward being a developed country.

References

[1] E. Okemwa, "Effectiveness of Aquaponic and Hydroponic Gardening to Traditional Gardening," *International Journal of Scientific Research and Innovative Technology*, vol. 2, no. 2313-3759, p. 35, 2015.

[2] C. Treftz, *Comparison of Nutritional and Sensory Qualities between Hydroponic and Soil-Grown Strawberries and Raspberries.* Reno: ProQuest LLC, 2015.

[3] Wang, L., Chen, X., Guo, W., Li, Y., Yan, H. and Xue, X. 2017. Yield and nutritional quality of water spinach (*Ipomoea Aquatica*) as influenced by hydroponic nutrient solutions with different pH adjustments. *International Journal of Agriculture and Biology* 19: 635-642.

[4] Sparks, R. E.&Stwalley III, R. M. (2018). Design and testing of a modified hydroponic shipping container system for urban food production. International Journal of Applied Agricultural Sciences, 4(4): 93 -102.

[5] Wortman, S. E., Douglass, M. S., &Kindhart, J. D. (2016). Cultivar, growing media, and nutrient source influence strawberry yield in a vertical, hydroponic, high tunnel system. HortTechnology, 26(4): 466-473.

[6] Naik, P.K., Dhuri, R.B., Swain, B.K. and Singh, N.P. 2013c. Water management for green fodder production as livestock feed in Goa. In: Abstracts of International Conference on 'Water Management for Climate Resilient Agriculture' held at Jalgaon, Maharashtra, India, May 28-31, 2012, Pp. 126-127.

[7] Naik, P.K., Dhuri, R.B., Karunakaran, M. and Swain, B.K. and Singh, N.P. 2013a. Hydroponics technology for green fodder production. Indian Dairyman. 65: 54-58.

[8] Naik, P.K., Dhuri, R.B. and Singh, N.P. 2011. Technology for production and feeding of hydroponics green fodder. Extension Folder No. 45/ 2011, ICAR Research Complex for Goa, Goa.

[9] Tudor, G., Darcy, T., Smith, P. and Shallcross, F. 2003. The intake and live weight change of drought master steers fed hydroponically grown young sprouted barley fodder (Autograss), Department of Agriculture, Western Australia.

[10] Sparks, R. E.&Stwalley III, R. M. (2018). Design and testing of a modified hydroponic shipping container system for urban food production. International Journal of Applied Agricultural Sciences, 4(4): 93 -102. 4.

[11] https://phys.org/news/2018-05-urban-food-vertical-farming.htm

Critical Analysis of Investment in Bosch Ltd. with respect to Financial Position

Ms. Trupti Kokane #1, Prof. Mahesh Mahankal *2 Dr. Pushpraj Wagh*3

Student, MBA in Financial Management at Yashaswi Education Society's IIMS- Chinchwad.
Savitribai Phule Pune University, Pune.
169/A,Station Road, Opp. Elpro International, Chinchwad, Pune, Maharashtra 411033 (India)
dipzkokane30@gmail.com

Assistant Professor, Yashaswi Education Society's IIMS- Chinchwad.
Savitribai Phule Pune University, Pune.
169/A,Station Road, Opp. Elpro International, Chinchwad, Pune, Maharashtra 411033 (India)
mahesh.mahankal@gmail.com

Assistant Professor, Yashaswi Education Society's IIMS- Chinchwad.
Savitribai Phule Pune University, Pune.
169/A,Station Road, Opp. Elpro International, Chinchwad, Pune, Maharashtra 411033 (India)
pushprajwagh864@gmail.com

ABSTRACT:

This research paper aims to analyses the financial statements of Bosch Ltd. In this report, data was collected with the help of a secondary research method in which data was collected from the news, company's financial statements, investor's presentation, of Bosch Ltd. This research was completed by execution of fundamental analysis for Bosch Ltd. For the analysis, the authors have considered Revenue from Operations/Share, PBDIT/Share, PBIT/Share, PBT/Share, Net Profit/Share, Net Profit/Share, Return on Capital Employed, Return on Assets, Asset Turnover Ratio (%), Current Ratio, Quick Ratio, Inventory Turnover Ratio etc. all these ratios were calculated to determine the financial position of the company. Peer comparison was carried out to understand the performance of the company with respect to comparison and trend analysis was done to understand the price movement of share of Bosch Ltd.

KEY WORDS: Fundamental Analysis, PBDIT, Trend Analysis, Peer Comparison, Ratio Analysis

INTRODUCTION

Equity is the residual claim or interest of the most junior class of investors in assets after all liabilities have been paid in accounting and finance. Negative equity exists when asset valuations do not surpass liabilities. Shareholder's equity (also known as stockholders' equity, shareholders' funds, shareholders capital, or other similar names) is the remaining interest in a company's assets that is distributed among individual shareholders of common or preferred stock. This definition will assist you in comprehending the liquidation process in the event of bankruptcy. Initially, all secured creditors are paid out of asset revenues. Following that, a series of creditors, in order of precedence, have the

next claim/right on the remaining proceeds. The last or residual claim against assets is ownership equity, which is paid only after all other creditors have been paid. When even creditors are unable to pay their payments, there is no money left over to compensate the equity of the owners. As a result, the owner's equity is decreased to nil. Risk capital, liable capital, and equity are all terms used to describe ownership equity.

1.2 EQUITY SHARES:

An equity share, also known as an ordinary share, is a type of fractional or part ownership in which a shareholder, as a fractional owner, assumes the greatest amount of entrepreneurial risk in a company enterprise. Such shareholders are members of the company and have voting rights.

1.3 DERIVATIVES

A derivative is a financial instrument whose value is derived from the value of a real asset or stock. It is an underlying asset's derived value. It is essentially a contract between two parties to exchange value based on the action of a genuine good or service in its most basic form. Typically, the seller receives money in exchange for a promise to buy or sell a specific good or service at a later period.

As a mortgage, derivatives provide some leverage or multiplication. The investor can control a considerably higher worth of business shares for a modest amount of money than would be conceivable without the usage of these instruments. This, though, may operate both ways. If the investor is accurate, the investor can make more money than if the investment were placed straight into the firm. If the investor is wrong, though, the losses are doubled. Whether the underlying is a commodity or a financial asset, the essential premise of a derivative contract stays the same. There are, however, several characteristics that are unique to commodities derivative markets.

2.0 LITERATURE REVIEW

Dr. M Muthu Gopalakrishnan and, Mr. Akarsh P K (2017): Comparative study of risk and return of equity shares of automobile industry. In this research researcher has used tools like Mean, Standard Deviation, variance, co-efficient of variance, correlation and Beta. The result shows that Investors must analyse both the risk factor and the return potential of various firms under consideration in order to reach the goal of maximum return. This will differ from one company to the next.

Dr. S. Krishnaprabha and Mr. M. Vijayakumar (2015): Risk and Return Analysis of Selected Stocks in India was the subject of a research. Most investors rely heavily on risk and return analysis in their decision-making process. Long-term investors were able to profit from the

market's lower volatility. Long-term investors can foresee when the share will rise since there is less movement in the shares compared to the market and its values. When compared to the Banking and Automobile sectors, the bulk of the Information Technology, Fast Moving Consumer Goods, and pharmaceutical sectors provide a higher return.

Dr. P Vikkreaman and P Varadharajan (2009): For the years 2004 to 2007, they looked at the equity of a few businesses in the automotive sector. They analyse risk and return of automobile companies using Beta and Alpha techniques. The return indicator and systematic risk calculations give a clear picture of the investment decisions made on these firms.

Dr. Y. V. Reddy, The present challenges in the Government Securities Market are highlighted in his article "Developing Government Securities Market: Some Issues." He's also pointed out hidden opportunities for a family's money to diversify their investing portfolio by include Government Securities.

(www.investopedia.com) "Fundamental analysis (FA) is a method of analyzing security's intrinsic value by examining country's economic and company's financial factors. Fundamental analysts study any parameter that can affect the security's value, from macroeconomic factors such as economy and industry conditions to microeconomic factors like to have impact on the effectiveness of the company's management."

(www.myaccountingcourse.com) "Trend Analysis is a statistical technique that forecast the future movements of a given variable by analyzing historical data. In other words, it is a method that aims to forecast the future behaviors by examining past data."

(www.toolshero.com) "The DuPont Analysis method divides and clarifies the different components of the **Return on Equity (ROE)** formula, which can help to the companies to find ways for improve their returns. Companies always use this method to improve their performance and also to increase the return that they can distribute to investors and shareholder"

(www.entrepreneur.com) "A competitive analysis is an important part of any companies plan. With this evaluation, companies can create what makes our product or service unique and therefore what characteristics can play up in order to attract investors."

(www.toppr.com) "Ratio is a comparison of two numbers with respect to each other. Similarly, in finance, ratio analysis is a correlation between two numbers, or rather two accounts. So two numbers taken from the financial statements are compared to give us a more clear understanding of them".

3.0 OBJECTIVES

- To study the share investment status of Bosch Ltd.
- To study the past financial reports of the Bosch Ltd .

- To understand the movement and performance of stock of Bosch Ltd.
- To do comparative performance analysis of equity share and financial position of Bosch Ltd.

4.0 RESEARCH METHODOLOGY.

This research is based on secondary study. Secondary information was gathered from the internet, corporate websites, and financial research portals such as Google Analytics. However, the annual reports released by banks, as well as quarterly reports for the current year reflecting their performance in the current market setting, are the primary sources of information.

4.1 RESEARCH APPROACH

To begin, data was analysed based on the industry. The automobile industry was focused on, and its performance and relationship with the Indian economy were examined, before individual stocks were picked to be invested in based on the company's fundamentals. These stocks were examined separately to see if they would provide the best returns if purchased. Due to time and financial restrictions, primary data collection for this research was not possible. As a result, secondary data was gathered. Annual reports of Bosch Ltd. were analysed for the purpose of evaluating the company's performance while preparing this project. Because the majority of the data collected was taken from numerous websites, the internet was a primary source of information when developing the project.

4.2 SCOPE

- This research will be useful for prospective investor.
- This research will be useful for Research Analysts.
- This research will be useful for Management of the company.
- This research will be useful for the big broking institutions or the investment bankers.

4.3 RESEARCH TECHNIQUE

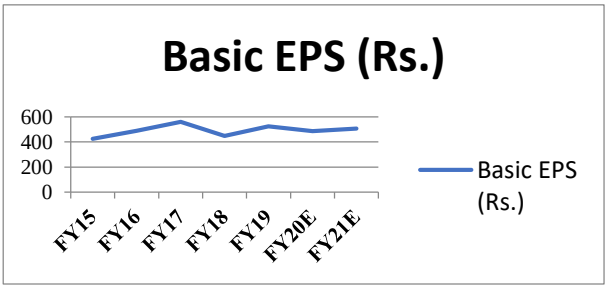
For this research paper I was used analytical research technique. Analytical research is a sort of study that entails the use of critical thinking abilities as well as the examination of facts and data relevant to the study. Secondary data sources are used to conduct analytical research.

5. 0 DATA ANALYSIS AND INTERPRITATION

1.Basic EPS

Particulars	FY 15	FY 16	FY 17	FY 18	FY 19	FY20E	FY21E
Basic EPS (Rs.)	426	488	561	449	525	487	506

Table 1.1



Graph 1.1

Interpretation:-

In case of Bosch Ltd. Basic EPS is increase from 426 (FY2015) to 525(FY2019). In upcoming year basic EPS will going to little fluctuate.

2.Book Value [ExclRevalReserve]/Share (Rs.) & Dividend / Share(Rs.)

Particulars	FY 15	FY 16	FY 17	FY 18	FY 19	FY 20 E	FY 21 E
Book Value [ExclRevalReserve]/Share (Rs.)	2,339.81	3,036.59	2,885.11	3,272.56	3,093.63	3183.1	3138.6
Dividend / Share(Rs.)	85	85	165	100	105	102.5	103.75

Table 2.1

Graph 2.1

Interpretation:-

Book Value [ExclRevalReserve]/Share (Rs.):-

Particulars	FY 15	FY 16	FY 17	FY 18	FY 19	FY20 0E	FY21 E
PBDIT/ Share (Rs.)	811.02	790.35	845.18	854.1	935.19	894.645	914.9175
PBIT/Share (Rs.)	636.37	667.29	695.61	700.92	798.07	749.495	773.7825
PBT/Share (Rs.)	622.9	663.18	686.69	669.05	793.56	731.305	762.4325

In case of Bosch Ltd. Book Value [ExclRevalReserve]/Share (Rs.) is increasing from 2339.81 (FY2015) to 3093.63 (FY2019). In upcoming year it is expected that it will increased.

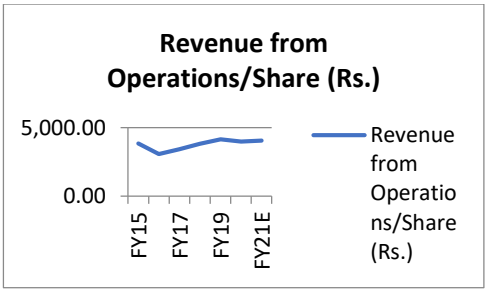
Dividend / Share(Rs.):-

In case of Bosch Ltd. Dividend per share is increasing from 85 (FY2015) to 105 (FY2019).

3.Revenue from Operations/Share (Rs.)

Particulars	FY15	FY16	FY17	FY18	FY19	FY 20E	FY 21E
Revenue from Operations/Share (Rs.)	3,848.89	3,089.62	3,421.38	3,832.82	4,155.22	3994.02	4074.62

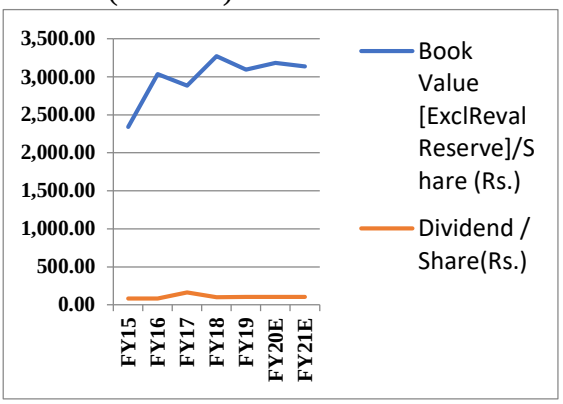
Table 3.1



Graph 3.1

Interpretation:-

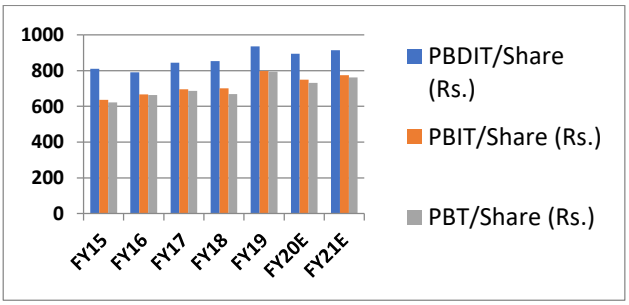
Revenue from Operations/Share (Rs.) is increasing from 3848.89 (FY2015) to 4155.22(FY2019). In



upcoming year basic it is expected that revenue from operations will going to little fluctuate.

4.PBDIT/Share (Rs.), PBIT/Share (Rs.), PBT/Share (Rs.)

Table 4.1



Graph 4.1

Interpretation:-

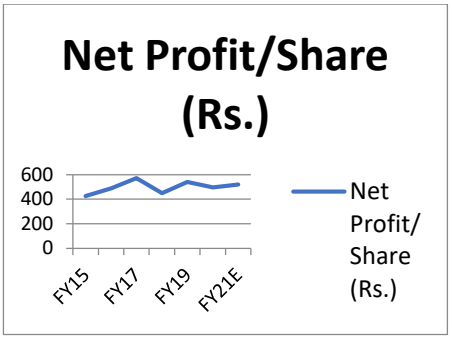
In case of Bosch Ltd. PBDIT/Share is increasing from 811.02 (FY2015) to 935.19 (FY2019). PBIT/Share is also increasing from 636.37(FY2015) to 798.07

(FY2019). PBT/Share (Rs.) is increasing from 622.9 (FY2015) to 793.56 (FY2019).

5.Net Profit/Share (Rs.)

Particulars	FY15	FY16	FY17	FY18	FY19	FY20E	FY21E
Net Profit/ Share (Rs.)	426.02	487.71	570.85	449.44	541.69	495.565	518.6275

Table 5.1



Graph 5.1

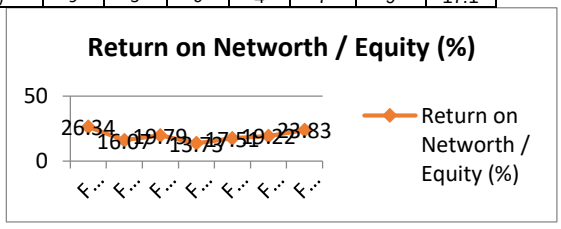
Interpretation:-

Net profit per share is also increasing from 426.02 (FY2015) to 541.69(FY2019). In upcoming year it is expected that it will going to little fluctuate.

6.Return on Networth / Equity (%)

Table 6.1

Particulars	FY15	FY16	FY17	FY18	FY19	FY20E	FY21E
Return on Assets (%)	19.79	12.33	14.76	9.84	12.57	13.79	17.1



Graph 6.1

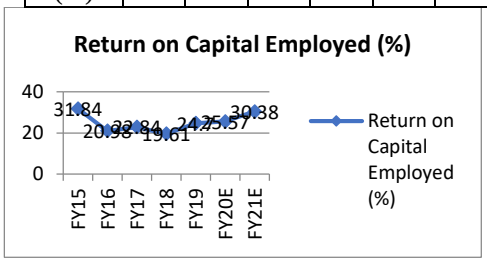
Interpretation:-

Return on Networth / Equity (%) is decreasing from 26.34 (FY2015) to 17.51(FY2019). In upcoming year it is expected that return on net worth per equity will increase.

7.Return on Capital Employed (%)

Table 7.1

Particulars	FY15	FY16	FY17	FY18	FY19	FY20E	FY21E
Return on Capital Employed (%)	31.84	20.98	22.84	19.61	24.7	25.57	30.38



Graph 7.1

Interpretation:-

Return on capital employed(%) was 31.84 in FY2015 it is declined upto 24.7 (FY2019). In upcoming year it is expected that it will increase upto 30.38 (FY2021E).

8.Return on Assets (%)

Particulars	FY15	FY16	FY17	FY18	FY19	FY20E	FY21E
Return on Networth / Equity (%)	26.34	16.07	19.79	13.73	17.51	19.22	23.83

 ISBN 978-81-927230-0-10

Particulars	FY 15	FY 16	FY 17	FY 18	FY 19	FY20E	FY21E
Current Ratio (X)	2.61	2.33	2.24	2.08	1.99	2.32	2.15

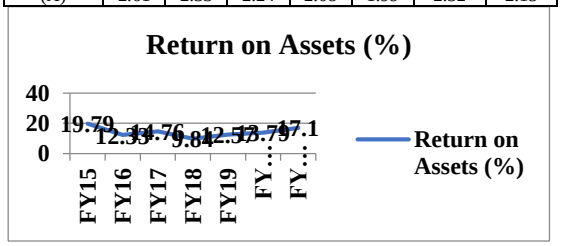


Table 8.1

Graph 8.1

Interpretation:-

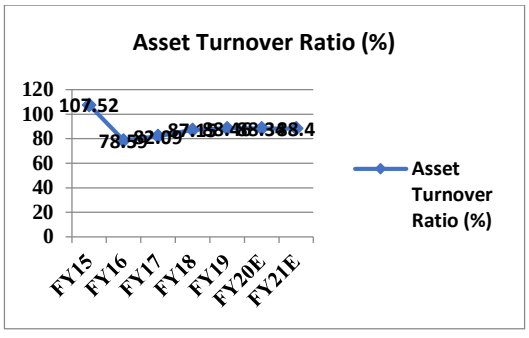
ROA = (Profit for the year/Total Assets) *100

Return on asset (%) of Bosch Ltd. is decreasing from 19.79 (FY2015) to 12.57 (FY2019). It is expected that in upcoming year ROA will be increase up to 17.1 in FY2021E.

9.Asset Turnover Ratio (%)

Particulars	FY15	FY 16	FY 17	FY 18	FY 19	FY20E	FY21E
Asset Turnover Ratio (%)	107.52	78.59	82.09	87.15	88.46	88.34	88.4

Table 9.1



Graph 9.1

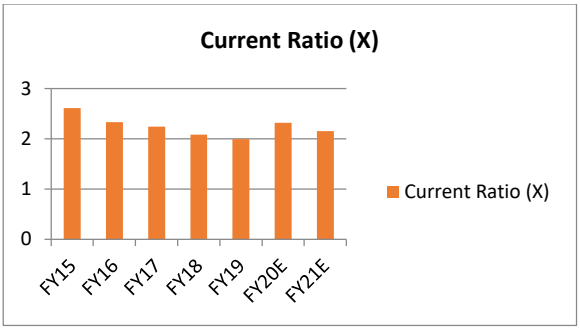
Interpretation: -

Asset Turnover Ratio (%) = (Sales/Avg.Total Asset)*100

Asset Turnover Ratio (%) is decreasing from 107.52 (FY2015) to 88.46 (FY2019).

10.Current Ratio (X)

Table 10.1



Graph 10.1

Interpretation:-

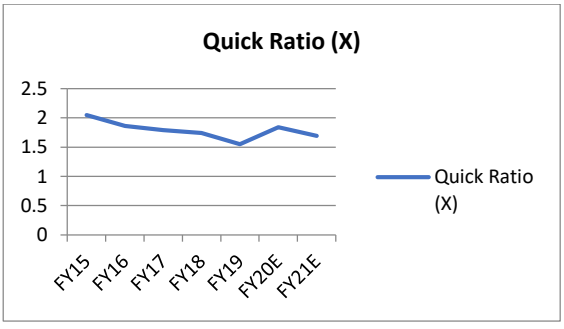
Current Ratio (X)= Current Assets/Current Liabilities

Current Ratio of Bosch Ltd. Is fluctuate from 2.61 (FY2015) to 1.99 (FY2019). In upcoming year it is expected that it will going to increase.

11.Quick Ratio (X)

Particulars	FY 15	FY 16	FY 17	FY 18	FY 19	FY20E	FY21E
Quick Ratio (X)	2.05	1.86	1.79	1.74	1.55	1.84	1.64

Table 11.1



Graph 11.1

Interpretation:-

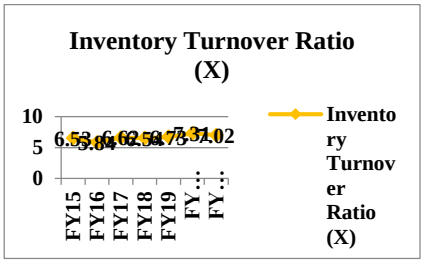
Quick Ratio (X)= (Current Assets-Inventories)/Current Liabilities

Quick Ratio of Bosch Ltd. is decreasing from 2.05 (FY2015) to 1.55 (FY2019). In upcoming year it is expected that it will going to increase.

12.Inventory Turnover Ratio (X)

Particulars	FY 15	FY 16	FY 17	FY 18	FY 19	FY20E	FY21E
Inventory Turnover Ratio (X)	6.53	5.84	6.62	6.54	6.73	7.31	7.02

Table 12.1



Graph 12.1

Interpretation:-

Inventory Turnover Ratio (X) = Cost of Goods Sold/Avg. Inventory

Inventory Turnover Ratio was 6.53 in FY2015 it is fluctuated up to 6.71 in FY2019. In upcoming year it is expected that it will increase.

13.Profit and Loss A/C- Consolidated (Rs. In Crore.)

Particulars	FY15	FY16	FY17	FY18	FY19	FY20E	FY21E
Continuing operations							
Revenue from operations :							
Sale of products (including excise duty)	12559.4	10013	10750	11392.9	11781.8	11800.9	12300
Sale of services	200	199.1	233.4	268.5	264.1	266.3	265.2
Other operating revenue	144.1	229.8	259.2	210.8	212	211.4	211.7
Other income	565.3	603.6	617.4	511.8	595.3	553.55	574.425
Total revenue	13468.8	11045.5	11860	12384	12853.2	12832.15	13351.325
Expenses :							
Cost of materials consumed	3871.9	2552.9	3007	2734.1	2992.4	2863.25	2927.825
Purchases of stock-in-trade	2652	2334.7	2421.9	3527.8	3968	3747.9	3857.95
Changes in inventories of finished goods, work-in-progress and stock-in-trade	-66.9	82.5	-119.7	39.5	-185.3	-72.9	-129.1
Excise duty	0	740.5	807.4	182.1	0	0	0
Employee benefit expense	1663.1	1303.1	1342.8	1356.5	1370.4	1363.45	1366.925
Finance costs	14.3	12.9	27.2	3.3	13.3	8.3	10.8
Depreciation and amortisation expense	548.4	386.4	456.2	467.2	404.5	435.85	420.175
Other expenses	1984.1	1550.1	1822.8	1939	1948.9	1943.95	1946.425
Total expenses	10666.9	8963.1	9765.6	10249.5	10512.2	10289.8	10401
Profit before exceptional item and tax	2801.9	2082.4	2094.4	2134.5	2341	2542.35	2950.325
Exceptional item	-28	0	0	93.9	0	0	0
Profit before tax (gross profit)	2829.9	2082.4	2094.4	2040.6	2341	2542.35	2950.325
Tax expense :							
Current tax 27							
(i) for the year	746.3	660.1	616.9	703	761.2	732.1	746.65
(ii) relating to earlier years	-9.8	-9.4	-0.6	-1.4	-53.8	-27.6	-40.7
Deferred tax charge/ (credit)	-118.3	-80.6	34	-31.8	35.6	1.9	18.75
Total tax expense	**618.2**	**570.1**	**650.3**	**669.8**	**743**	**706.4**	**724.7**

Profit after tax from continuing operation	**2211.7**	**1512.3**	**1444.1**	**1370.8**	**1598**	**1835.95**	**2225.625**
Discontinued operation							
Profit before tax from discontinued operation	0	26.2	371.1	0	0	0	0
Tax expenses of discounting operations	0	7.1	74.1	0	0	0	0
Profit after tax from discontinued operation		19.1	297	0	0	0	0
Profit for the year	2211.7	1531.4	1741.1	1370.8	1598	1835.95	2225.625
Other comprehensive income (OCI)							
Items that will not be reclassified to profit or loss							
Changes in fair value of the equity instruments		-86.4	151	124.8	86.2	105.5	95.85
Income tax relating to above		0	0	0	-2.2	-1.1	-1.65
Remeasurement of post-employment benefit obligations		5.9	-16.7	25.6	23.8	24.7	24.25
Income tax relating to above		-2	5.8	-8.9	-8.1	-8.5	-8.3
Other comprehensive income for the year (Net of tax)	0	-82.5	140.1	141.5	99.7	120.6	110.15
Total comprehensive income for the year	2211.7	1448.9	1881.2	1512.3	1697.7	1956.55	2335.775

Table 13.1

14.Balance sheet- Consolidated (Rs. In Crore.)

Table 14.1

16.Trend Analysis

Figure 16.1

Interpretation:-

In last 5 years of trend analysis it is seen that in 2015 the share price of Bosch Ltd. was Rs. 25,212. In 2016 total revenue of Bosch Ltd was decreased due to which profit also decreased. In 2016 share price of Bosch Ltd. was goes down upto Rs. 20,217. In 2017 it was increased upto Rs.22,751. In 2018 share price of Bosch Ltd was goes down and touched at the lowest in last 5 years. It was Rs. 11,599 as on march 2019. In 2019 it was recovered and increased upto Rs. 18,184.

15.Peer Comparison

Company	Bosch Ltd.	India Motor Parts and Accessories Ltd.	Mothers on Sumi Systems Ltd.	Maharashtra Scooters Ltd.	Sandhar Technologies Ltd.
Basic EPS (Rs.)	525	48.57	2.58	63.7	15.84
Diluted EPS (Rs.)	525	48.57	2.58	63.7	15.84
Cash EPS (Rs.)	678.81	49.68	3.27	65.06	15.84
Book Value [ExclRevalReserve]/ Share (Rs.)	3,093.63	1,213.79	20.39	9,907.79	117.73
Book Value [InclRevalReserve]/ Share (Rs.)	3,093.63	1,213.79	20.39	9,907.79	117.73
Dividend / Share(Rs.)	105	18	1.5	33	2.5
Revenue from Operations/Share (Rs.)	4,155.22	614.84	24.01	12.68	338.42
PBDIT/Share (Rs.)	935.19	69.73	4.62	66.46	37.81
PBIT/Share (Rs.)	798.07	68.62	3.93	65.1	26.73
PBT/Share (Rs.)	793.56	68.62	3.87	65.1	23.59
Net Profit/Share (Rs.)	541.69	48.57	2.58	63.7	15.84
Net Profit Margin (%)	13.03	7.89	10.73	502.23	4.67
Return on Networth / Equity (%)	17.51	4	12.64	0.64	13.45
Return on Capital Employed (%)	24.83	5.34	16.23	0.63	22.31
Return on Assets (%)	12.57	3.57	8.99	0.62	8.08
Asset Turnover Ratio (%)	96.44	45.25	83.83	0.12	172.66
Current Ratio (X)	1.99	5.73	1.72	6.82	1.04
Quick Ratio (X)	1.55	4.86	0.97	6.67	0.75
Inventory Turnover Ratio (X)	8.49	9.32	7.19	9.6	15.14
Enterprise Value (Cr.)	52,335.67	757.61	48,128.85	4,017.90	1,684.31
MarketCap/Net Operating Revenue (X)	4.37	1.49	6.22	277.58	0.77
Price/BV (X)	5.87	0.75	7.32	0.36	2.22
Price/Net Operating Revenue	4.37	1.49	6.22	277.59	0.77
Earnings Yield	0.03	0.05	0.02	0.02	0.06

Table 15.1

6.0 FINDINGS:

1. While doing research it was found that the Earning Per Share(EPS) was fluctuating continuously.
2. It is found that Book Value [ExclRevalReserve]/Share (Rs.) & Dividend / Share(Rs.) was fluctuating.
3. Revenue from Operations/Share (Rs.) was increasing which means company earn more revenue from its operations.
4. PBDIT/Share (Rs.), PBIT/Share (Rs.), PBT/Share (Rs.) was increasing which means company earn more profits before tax.
5. Net Profit/Share was fluctuating which means inconsistent net profit per share of the company.
6. Return on Net worth / Equity (%) was going to decreased from FY 2015 which means company cannot earn more profit with the invested money of equity shareholders.
7. Company's return on capital employed was decreasing which simply means company is not able to generate more profit from its capital.
8. Return on assets (%) ratio of Bosch Ltd. also more fluctuating which means company's management is not able to utilize assets of the company to generate earnings.
9. Asset Turnover Ratio (%) of Bosch Ltd. was increasing since FY 2016 which means company trying to generate more sales from its assets by comparing net sales with average total assets.
10. Current ratio of Bosch Ltd. is little fluctuating.
11. Quick ratio of the company was decreasing.
12. Inventory turnover ratio of the Bosch Ltd. was increasing.

7.0 CONCLUSION

Equity research is mainly help to investors for taking investment decisions. This report deals with the analysis of Bosch Ltd's past 5 years financial statements and projections of upcoming 2 years financial data. Through the calculating various kind of ratios, graphs, market study I tried to understand what will be the company's's

situation in upcoming years.The analysis of financial statements is one of the most important elements in fundamental analysis process.

At the same time the massive number of numbers in a company's financial statements cannot be understand by investors. However, through financial ratio analysis, I tried to work with these numbers in an organized manner and presented them in a such way which is easy to understand and helpful to management as well as investors who want to invest money in the shares of Bosch Ltd.

Generally, companies publish their financial statements on regular intervals like quarterly, monthly, half yearly but as a normal investor or the person who is not financial analyst for them financial statement analysis is not possible or not easy task. So as a finance manager or financial analyst's primary responsibility is to manage the financial matters of the company by evaluating the financial statement. I am also providing some important suggestions and opinions about the financial matters of the business.

From the study of financial statements of Bosch Ltd I would like to conclude that investment in Bosch Ltd is may not be profitable in future. The overall performance of Bosch Ltd is not increasing continuously as well as lack of consistency in the overall performance of the company. Its operations are divided into four business sectors: Mobility Solutions, Industrial Technology, Consumer Goods, and Energy and Building Technology. As per the current market situation there is tough competition in all these four business sectors. If company properly utilize its assets for generating more revenue, then it will help to company for earning more profits. As compared Bosch Ltd with its competitors like India Motor Parts and Accessories Ltd., Motherson Sumi Systems Ltd., Maharashtra Scooters Ltd., Sandhar Technologies Ltd. company perform well. Investment in this company may not give good returns in future to the investors.

8.0 REFERENCES

8.1 BIBLIOGRAPHY

K, A. and Gopalakrishnan, D., 2021. Equity Analysis of Automobile Industry in Indian Stock Market. [online] IJARnD. Available at: <https://www.ijarnd.com/manuscript/equity-analysis-of-automobile-industry-in-indian-stock-market/> [Accessed 24 December 2021].

Dr. S. Krishnaprabha and Mr. M Vijayakumar (2015), "A study on Risk and Return Analysis of Selected Stocks in India", International Journal of Scientific Research and Management, Vol. /3, Issue/4, Page/2550-2554.

Dr. P Vikkraman and P Varadharajan (2009), "A Study on Risk & Return analysis of Automobile industry in India (2004-2007)", Journal of Contemporary Research in Management.

Y.V.Reddy, Developing Government Securities Market: Some Issues, Reserve Bank of India Bulletin, Reserve Bank of India, Bombay, February, 2000, Vol.LIV, No.2, p.173.

8.2 WEBILOGRAPHY

www.moneycontrol.com

https://www.bosch.in/our-company/shareholder-information/

https://sandhargroup.com/investors/annual-reports

http://www.mahascooters.com/

https://www.motherson.com/annual-reports.html

http://www.impal.net/investor.htm

https://www.icra.in/Rationale/ShowRationaleReport/?Id=81727

Particulars	FY15	FY16	FY17	FY18	FY19	FY20E	FY21E
ASSETS							
1. Non-current assets							
property ,plant and equiptment	980	1148.7	1319.4	1141.1	1010.8	1075.95	1043.375
Capital work-in progress	276	150.7	128.9	313.2	644.2	478.7	561.45
Investment properties	139.8	178.6	194.3	176.4	164.9	170.65	167.775
Investments in subsidiary and associate	17.5	17.5	17.5	17.5	17.5	17.5	17.5
Financial assets							
(i) Investments	3187.1	4431.9	3640.9	4293.9	3799.1	4046.5	3922.8
(ii) Loans	167	142.2	117.4	110	106.3	108.15	107.225
Deferred tax assets (net)	417.2	495.8	467.6	490.5	459.6	475.05	467.325
Other non-current assets	38.7	19.1	14.3	50.1	64	57.05	60.525
Total non-current assets	**5223.3**	**6584.5**	**5900.3**	**6592.7**	**6266.4**	**6429.55**	**6347.975**
2. Current assets							
Inventories	1272.3	1191.5	1180.4	1225.8	1444.3	1335.05	1389.675
Financial assets							
(i) Investments	286.6	0	268.1	928.9	237.1	240	238.55
(ii) Trade receivables	1198.4	1322.5	1186.2	1615.6	1567.5	1591.55	1579.525
(iii) Cash and cash equivalents	130.4	98.5	131.2	363.3	203.2	283.25	243.225
(iv) Bank balances other than (iii) above	1765.7	1733.1	1586.4	1524.5	1049.5	1287	1168.25
(v) Loans	229.8	282.6	320.5	364.7	458.7	411.7	435.2
(vi) Other financial assets	674.2	762.2	795.5	918.1	908.7	913.4	911.05
Other current assets	394.3	447.9	431.1	393.7	574.1	483.9	529
Total current assets	**5951.7**	**5838.3**	**5899.4**	**7334.6**	**6443.1**	**6545.85**	**6494.475**
Total assets (1+2)	**11175**	**12422.8**	**11799.7**	**13927.3**	**12709.5**	**12975.4**	**12842.45**
Equity and Liabilities							
1. Equity							
Equity share capital	31.4	31.4	30.5	30.5	29.5	29.5	29.5
Other equity							
(i) Reserves and surplus	7833.9	9050.2	8172.9	9229.8	8291.7	8760.75	8526.225
(ii) Other reserves	531.6	445.2	596.2	721	805	763	784
Total equity	**8396.9**	**9526.8**	**8799.6**	**9981.3**	**9126.2**	**9553.25**	**9339.725**
2. Liabilities							
Non-current liabilities							
Financial liabilities	54.2	14.9					
(i) Other financial liabilities	6.4	5	6	6.6	10.7	8.65	9.675
Provisions	430.2	377.5	364.2	420.4	341.6	381	361.3
Total non-current liabilities	**490.8**	**397.4**	**370.2**	**427**	**352.3**	**389.65**	**370.975**
Current liabilities							
Financial liabilities							
(i) Trade payables	1203.6	1308.8	1339.9	2023.1	0	0	0
Total outstanding dues to MSME	0	0	0	0	61.9	40	50.95
Total outstanding dues of creditors other than MSME	0	0	0	0	1526.6	1215	1370.8
(ii) Other financial liabilities	348.3	339.4	274.8	423.7	518.9	471.3	495.1
Provisions	515.8	617.6	754.3	745	717.5	731.25	724.375
Current tax liabilities (net)	63	76.2	65.1	90.6	15.8	53.2	34.5
Other current liabilities	146.4	158.5	195.9	236.7	390.4	313.55	351.975
Total current liabilities	**2277.1**	**2500.5**	**2630**	**3519.1**	**3231.1**	**2824.3**	**3027.7**
Total liabilities	**2767.9**	**2897.9**	**3000.2**	**3946.1**	**3583.4**	**3213.95**	**3398.675**
Total equity and liabilities (1+2)	**11164.8**	**12424.7**	**11799.8**	**13927.4**	**12709.6**	**12767.2**	**12738.4**

A study on Artificial Intelligence in Healthcare sector staffing with reference to Bangalore city.

Sarvesh KR [#1], Bhanumathi P[*2],

[1] Sarveshkr0605@gmail.com

[1] Ramaiah Institute of Management, Bengaluru, India

[2] bhanumathi@msrim.org

[2] Ramaiah Institute of Management, Bengaluru, India

Abstract— The emerging technologies in the market are shaping how business is conducted in various industries of late. What was once thought of as a future is now taking shape in reality? Artificial Intelligence, a concept identified 60 years earlier, is now taking a prominent role in various industries and creating a revolutionary change in multiple practices.

The staffing industry is also one such area witnessing a tremendous change like never before due to the implementation of Artificial Intelligence. Staffing professionals are looking at leveraging Artificial Intelligent systems to source and staff the candidates to improve the quality of their hires. Artificial Intelligence is now looked at as a sophisticated tool for staffing individuals, gradually gaining focus.

Therefore, the study attempts to understand the role of Artificial Intelligence specifically in staffing healthcare professionals in the Healthcare sector with reference to Bangalore city.

Keywords— Artificial Intelligence, Healthcare staffing, Healthcare sector, Recruitment, Selection

I. INTRODUCTION

The 21st century that we live in has witnessed various technological disruptions and novel innovations in multiple fields of the economy, each of such technological shifts bringing in new challenges, new opportunities, and a new way of life for businesses and individuals to evolve towards a better tomorrow. The mantra towards survival would be to "Innovate or Die" in a technologically disrupted economy. Artificial Intelligence, a concept that is in the limelight as the industries move towards a digital era, is one of the significant disruptions we have encountered. In a world where "data" is considered the most valued resource, experts believe that integrating Artificial Intelligence with the human touch will drive effective and efficient results for any industry.

There is evidence of the Healthcare sector utilizing Artificial Intelligence in various activities of day-to-day operations. One such area that Artificial Intelligence that has taken a prominent role in the Healthcare sector would be in Human Resources. With the current shortage of the required talent in the Healthcare sector, Artificial Intelligence is considered a sophisticated tool in staffing solutions. The demand for healthcare professionals will likely increase in the coming years, but the supply for the same is not sure to grow at a similar rate. Artificial Intelligence is considered one of the go-to options that can provide a helping hand to the talent acquisition team to source candidates for various positions with utmost accuracy and free from any human error or bias.

The study thus undertaken attempts to understand the role of integrating Artificial Intelligence in the Healthcare sector staffing with reference to Bangalore city being the specific location. As we understand the evolution of Artificial Intelligence today, it is evident that it is making a mark in every sector possible.

A J.P. Morgan's 2018 Healthcare Industry Outlook study provided data stating that 92% of the senior executives working in the Healthcare industry are worried about finding qualified and skilled candidates to fill the job positions. A study conducted by the Association of American Medical College predicts that about 40,800 to 1,04,900 is the shortage among professional doctors that the economy may face over a decade.

In the future, it would be challenging for Healthcare staffing managers and specialists to source and place candidates in the vacant job positions among Healthcare organizations. To stay competitive, the staffing experts have to take up a novel and innovative ways to tackle such situations. Artificial Intelligence empowered tools are the go-to options for the staffing experts in providing them a helping hand in such a scenario; Artificial Intelligence empowered systems shall offer them effective and efficient solutions in meeting the demands of staffing Healthcare professionals. Page Layout

II. LITERATURE REVIEW

Borisova, A. et al. 2020, research presented the technological solutions used to automate the functional areas of Human Recourses to attract applicants from the market and diagnose if the candidates are a good fit for the job role. The research also gives an overview of the technology and ultimately provides a new domestic market search algorithm to work with the target audience.

In their research paper, Upadhyay, A. K., & Khandelwal, K. (2018) studied the application of Artificial Intelligence and its implication in the field of Recruitment. The paper attempts to highlight the shift perceived in the hiring process due to the

adoption of one such technological disruption, i.e., Artificial Intelligence. It improves the efficiency and overall qualitative gains for clients and candidates.

Dijkkamp, J. (2019), in his Master's thesis, attempted to discover how the role of an HR professional would change in terms of their tasks and responsibilities, competencies, and activities of creating value with the increasing focus towards implementing Artificial Intelligence in the process of Recruitment and selection. Based on 19 semi-structured interviews and observations, Artificial Intelligence potentially transforms HR's role from mere sourcing and screening of candidates to a relationship builder and a stakeholder manager. Their role predominantly involves enabling positive candidate experience for the newly staffed employees.

Lal, P. (2015), in his study about Transforming HR in the digital era, provides an insight on how workforce analytics can be used as an aid by the Human Resource Management Specialist to be more effective in the digitally-driven business world. The study's findings reveal how analytical and AI-based tools have restructured or transformed the ways of managing diverse staff members within an organization and put HR in the epicenter of organizational decision-making. The study also indicates the social implication of such analytical tools in identifying the right people for the proper job role, ensuring appropriate learning and development, and staying with the organization for an extended period.

Boston-Fleischhauer, C. (2020) undertook research that helps in highlighting the aspect of Next-Generation Staffing Models take its role in the Healthcare sector. The paper talks about the chronic shortages among the nurses, increased complexity in terms of inpatient care, continued Healthcare staff turnover, and other such problems that may arise as years pass by. The study further highlights the Next-generation staffing models, which include techniques that significantly look forward to embracing new teams and novel technologies in primary nursing care. These models look at helping chief Healthcare professionals carefully analyze all the inputs such as cultural, organizational, professional norms and facilitate the staffing process.

Saville, C. E., Griffiths, P., Ball, J. E., & Monks, T. (2019) published a research paper that throws light on the aspect of a number of nurses required and to be staffed in a hospital to cater to the patient needs. The report looks at answering how many nurses are needed and tries to provide a solution by implementing modern techniques and operational research methodologies to staff the nurses. By using effective modern methods and functional research techniques, the staffing of nurses can be enhanced.

Jha, S. K., Jha, S., & Gupta, M. K. (2020) emphasized how a company can leverage Artificial Intelligence for effective recruitment and selection processes. The study makes a humble attempt to showcase how Recruitment and selection, one of the crucial aspects for a company, is disrupted due to the implementation of Artificial Intelligence. The study also examines how Artificial Intelligence-powered hiring is giving a new shape to the traditional methods of staffing candidates. Besides these factors, the authors have also discussed various concerns, issues, and challenges stakeholders have faced due to such disruption by using Artificial Intelligence.

III. RESEARCH METHODOLOGY

Statement of the problem:

The doctor-population ratio of 1:1,000 is as per the World Health Organization (WHO), but India's doctor-population ratio is at 1:1,456, which is against the recommendations of WHO. Also, according to the IBEF report of 2019-20, India will require 2.07 million more healthcare professionals by 2030. This data indicates the acute shortage of doctors in the present day. It is not just for the doctors, but there have been observations over the past few years showing a considerable deficit in the Human Resource aspect of the Healthcare industry in our country. Need in terms of nurses, assisting staff members at times of emergency, technicians, and administrative workers are few to name.

With such a shortage in the Healthcare staff currently at hand, the Human Resources team of the Healthcare sector requires a more sophisticated tool to meet the needs of the industry and plan the increase in the supply of Human Recourses with utmost effectiveness and efficiency.

The study thus aims to understand how integrating Artificial Intelligence can help the Healthcare sector in terms of staffing the suitable candidates for the right position and tackling one such problem of talent shortage prevailing in the industry.

Objectives of the study:

- To understand the role level of implementation of Artificial Intelligence in Healthcare staffing and assess the professionals' satisfaction level.
- To ascertain the difference in the acceptance levels towards adopting Artificial Intelligence in Healthcare staffing among various age groups of professionals.
- To study the effectiveness in sourcing and staffing candidates before and after integrating Artificial Intelligence in the Healthcare sector.

Scope of the study:

The primary focus of the study shall be on understanding the role of Artificial Intelligence in the staffing process of the Healthcare sector. Data was collected from the staffing team of the Healthcare sectors, which covers Doctors, Nurses, Healthcare Human Resource Managers, Talent Acquisition/

Sourcing and Staffing Specialist, Resource Management specialist, and other professionals. The study was restricted to the city of Bengaluru.

Hypothesis:

Null Hypothesis (H01)- There is no significant difference in the level of acceptance towards adopting Artificial Intelligence in Healthcare staffing among professionals belonging to different age groups.

Alternate Hypothesis (H11)- There is a significant difference in the level of acceptance towards adopting Artificial Intelligence in Healthcare staffing among professionals belonging to different age groups.

Null Hypothesis (H02)- There is no significant difference in sourcing and staffing candidates before and after implementing Artificial Intelligence in the Healthcare sector.

The study undertaken follows an applied research methodology. The nature of the survey goes by that of descriptive research. Bangalore is considered the sample unit for the study. A sample size of 130 respondents closely associated with Healthcare staffing was collected using the non-probability sampling technique, i.e., convenience sampling. The primary data by administering the structured questionnaire and conducting a few personal interviews. Secondary data through published research papers, articles, journals, and content on multiple websites.
One-way ANOVA and Paired sample T-test were the two statistical tools used in the data analysis part to test the framed hypothesis statement.

Alternate Hypothesis (H12)- There is a significant difference in effectiveness in sourcing and staffing candidates before and after implementing Artificial Intelligence in the Healthcare sector.

Limitations:
1.The study undertaken is limited to the city of Bangalore only.
2.It is limited to only one aspect of Human Resource Management, i.e., staffing.
3.The study is limited to healthcare sector.

IV. Discussion and Analysis

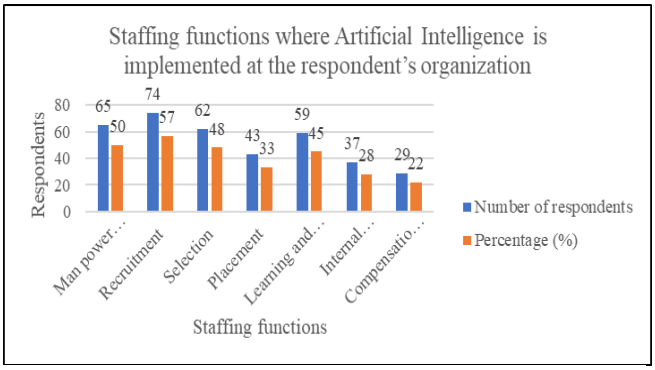
The data was collected among 130 respondents closely associated with Healthcare staffing practices. The primary aim was to understand and accomplish the objectives mentioned above in the research paper.

It was observed that most of these respondents fell in the age bracket of 31-40 years, and the few were from the age group of 61years and above. From the responses, it was evident that 50% of them follow a blended methodology (i.e., a mix of traditional and modern practices) of staffing Healthcare professionals. Almost 83% of the respondents affirm that it is the need of the hour for one to adapt to the contemporary staffing methods. Respondents felt the need to adopt the current methodologies due to the emerging technologies that are now taking over and the drawbacks in the traditional model of staffing candidates. Respondents viewed "time consumption" and "high cost in terms of staffing" as two prominent drawbacks of the conventional methodology.

When questioned about the awareness of the talent shortage in the Healthcare sector among the respondents, most of them had a clear picture of the same and were looking at practical solutions. Around 84% of the respondents stated they knew how AI is gaining prominence in Healthcare sector staffing. Still, the degree of awareness they carried was low to moderate.

The study found that most of them saw its application in the functional area of Man Power Planning, Recruitment, Selection, and its presence is less in Compensation Planning. The respondents believed that Artificial Intelligence would have a significant role to play when leveraged side-by-side with the human element. They saw its role in ensuring that job-related advertisements were targeted to the right audiences, deploying chatbots to help smooth the movement of digitized interviews, saving recruiters time, and improving the quality of hires.

Figure I: AI implementation in Healthcare staffing



The respondents second that Artificial Intelligence is taking a stance in their organization. Still, the level of integration that they see is at a low to moderate level. 48% of these respondents are satisfied with the integration. The acceptance level is low to moderate level. It is evident from the responses that even if there existed an association between the age and acceptance level towards Artificial Intelligence, the employees are looking at a perspective where age will not act as a significant criterion in terms of acceptance of Artificial Intelligence. It's somewhat the need of the hour one looks at currently.

TABLE II

One-way ANOVA					
Acceptance of AI depends on the age group					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.968	4	.742	1.123	.349
Within Groups	82.602	125	.661		
Total	85.569	129			

The One-way ANOVA test conducted on the SPSS software provides us with a resultant significance value of 0.349, greater than 0.05 or a 5% significance level. Therefore, the Null Hypothesis (H0) will be accepted, which means there is no significant difference in the level of acceptance towards adopting Artificial Intelligence in Healthcare staffing among professionals belonging to different age groups.

The respondents also look at Artificial Intelligence and its systems in the Healthcare staffing sector as a tool for improving the overall effectiveness and delivering better results.

The study attempts to collect opinions about the before and after effects of implementing Artificial Intelligence in Healthcare staffing practice. Before the implementation, most of them believed that the staffing practice was projecting a moderate level of effectiveness. But the opinions with respect to after the performance showed that employees believed the effectiveness in terms of lower degree reduced. There would be a moderate to high effectiveness for integrating Artificial Intelligence in staffing.

TABLE IIII: Acceptance of AI depends on the age group

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Degree of effectiveness in sourcing and staffing before implementing AI - Degree of effectiveness in sourcing and staffing after implementing AI	.39231	.69879	.06129	.27105	.51357	6.401	129	.000

The above-Paired Sample T-test conducted gives us a significance value of 0.000, which is less than 0.05 or 5% level of significance. Therefore, the Null Hypothesis (H0) will be rejected, which means there is a significant difference in effectiveness in sourcing and staffing candidates before and after implementing Artificial Intelligence in the Healthcare sector.

V. RECOMMENDATIONS

A few of the recommendations to promote the use of Artificial Intelligence in Human Resource Management practices of

sourcing and staffing candidates in the Healthcare sector are as under:

- Educate and inform about the emerging Artificial Intelligence tools and systems through various modes of communication and presentation to the Doctors, Nurses, Healthcare Human Resource personnel, etc.
- Highlight how such systems can revolutionize the sourcing and staffing process in Healthcare sectors by throwing light on various benefits the emerging technology can provide.
- Look out for those Artificial Intelligence systems or software among the available alternatives that have an easy-to-understand user interface to boost the employees' spirits to use the same.
- The Doctors and Nurses have a very hectic syllabus as a part of their education. Due tothis, they would not be exposed to such emerging technologies as engineers or those working in the Information Technology sector. Hence, special attention should be provided to those Doctors and nurses who would later be a part of the Healthcare staffing panel and use Artificial Intelligent systems for sourcing and staffing healthcare professionals.

VI. CONCLUSIONS

Though it has been over 60 years after the inception of the concept of Artificial Intelligence, the acceptance of this emerging technology in the domain of Healthcare has been comparatively slower than those of the other sectors. In recent years, one would have witnessed how Artificial Intelligence has happened to showcase its footprints in the Healthcare Industry.

The staffing function of Human Resources in the Healthcare industry is one such area that has not looked at changes over several years. Rigidity and being unsure and unaware of the modern staffing methodologies kept professionals away from adopting newer systems of staffing Healthcare workers. But in recent days, even these rigid areas seem to have changed. They have seen to open doors towards the modern methodologies as they learn about the benefits these emerging technologies provide.

Healthcare sourcing and staffing specialists, Doctors, Nurses, etc., are looking at Artificial Intelligence as a sophisticated tool to help them pool in quality hires during this period when there is an acute shortage in terms of talent in the industry.

The acceptance towards the implementation of Artificial Intelligence is now pacing up in the Healthcare staffing practices. Currently, the acceptance rate is seen at a low to moderate level. Still, experts signify that soon it will be accepted to a greater extent, thus enabling quality hiring and staffing systems to prevail in the Healthcare sector.

References

[1] J. Breckling, Ed., *The Analysis of Directional Time Series: Applications to Wind Speed and Direction*, ser. Lecture Notes in Statistics. Berlin, Germany: Springer, 1989, vol. 61.

[2] Borisova, A., Rakhimberdinova, M., Madiyarova, E., Riazantseva, I., & Mikidenko, N.,"Staffing search and recruitment of personnel on the basis of artificial intelligence technologies." *Entrepreneurship and Sustainability Issues*, 2020,*7*(3), 2456-2469.

[3] Upadhyay, A. K., & Khandelwal, K., "Applying artificial intelligence: implications for recruitment." *Strategic HR Review*, 2018.

[4] Dijkkamp, J., "The recruiter of the future, a qualitative study in AI supported recruitment process" (Master's thesis, University of Twente),2019.

[5] Lal, P.,"Transforming HR in the digital era". *Human Resource Management International Digest,2015*.

[6] Boston-Fleischhauer, C., Next-Generation Staffing Models: Are You Ready to Innovate? *JONA: The Journal of Nursing Administration*, 2020,*50*(1), 9-11.

[7] Saville, C. E., Griffiths, P., Ball, J. E., & Monks, T, How many nurses do we need? A review and discussion of operational research techniques applied to nurse staffing. *International journal of nursing studies*, 2019,*97*, 7-13.

[8] Jha, S. K., Jha, S., & Gupta, M. K., Leveraging Artificial Intelligence for Effective Recruitment and Selection Processes. In *International Conference on Communication, Computing and Electronics Systems*, Springer, Singapore, 2020,287-293.

Factor Structure of Skills Assessment in Aviation Maintenance Technicians using Principal Component Analysis

JV Sunil Kumar[#1], Sumati Sidharth[*2] ,Shobhanam Krishna[*3]

Department of Technology Management
Defence Institute of Advanced Technology, Pune
[1]sunilkumarjv67@rediffmail.com
[2]sumatisidharth@gmail.com
[1]shobhanam14@gmail.com

Abstract

Purpose -Aviation maintenance is a complex task in which skilled technicians have a significant role to cope with standard operating procedures and emerging technologies. Skill assessment framework in aviation maintenance should be designed in such a way that emphasis is laid on each domain to bridge the gap between training and job performance. The paper aims to highlight the factor structure of skill assessment in aviation maintenance using principal component analysis, primarily categorized under six components.

Design/methodology/approach **- The research methodology used in this study is based on the principal component analysis. The factors representing each of the components have been analyzed for their relevance and importance by assessors during skill assessment.**

Findings **– The paper has proposed a robust skill assessment framework for technicians so as to help in their career progression towards upgrading their skills and professional knowledge. An efficient and realistic competency mapping process helps an organization in identifying key competencies to ensure the right person is at the right position for the right job.**

Practical implications - The result of the study helps to bring out the need to develop and modify a skill assessment framework of aviation maintenance technicians to meet their needs of future skill sets.

Originality/value-**This study is the first of its kind to bring out the need to develop and modify a skill assessment framework of aviation maintenance technicians to meet their needs of future skill sets.**

KeyWords- **Professional Competency, Exploratory Factor Analysis, Rotated Component Matrix**

I.INTRODUCTION

A highly skilled human resource is a prerequisite towards mission preparedness and operational effectiveness in aviation. The Professional Competency (knowledge and skill) of an aircraft technician has a direct bearing on the quality of maintenance and flight safety. The technical competence of an aircraft technician is determined by his professional knowledge and skills along with his personal traits and morale acquired during the training and indoctrination process. An effective and efficient skill assessment framework of aircraft technicians, especially of the aviation trades, is instrumental in better competency mapping towards ensuring the right person for the right job and effective Human Resource Management.

Skill assessment of aviation tradesmen such as airframe, propulsion, electrical, radar, instrument, weapon, etc. is an important tool in identification and skill grading of aircraft technicians commensurate to their job/trade experience so as to further their career progression. During their professional career, aircraft technicians are equipped with the knowledge and skills that enable them to function effectively in a dynamic environment. Both, technical and personal competencies are equally important towards improving operational efficiency in aviation maintenance. The skill assessment framework

is considered significant in assessing their qualitative and quantitative skills. The skill grading system is designed to be commensurate with assessment tools in vogue across various aircraft fleets. A robust skill assessment framework is the basis to assess and award skill grades to aviation tradesmen in a transparent and unbiased manner. Assessors or examiners are the most important element in skill assessment. In this article, an attempt has been made to evaluate the factor structure skill assessment by interpreting the execution and judgment capacity of the assessor in a broader sense. In this way, an assessor's primary task performance has been taken as an index to evaluate the skill assessment framework.

A.Significance of Skill Assessment

Skill Assessment is the process of collating practical demonstrated data and making a judgment on the standard of a professional job of an individual towards meeting the performance criterion stipulated by the examining authority of an organization. Skill assessment is significant as it measures an aircraft technician's professional capability to logically analyze and apply knowledge, during a demonstration of dexterity and psychomotor skills, which enables them to undertake aircraft maintenance adhering to flight safety norms. A skilled assessor should evaluate the technician's knowledge and skill in a broader perspective to determine their performance in each trade. Therefore, an aircraft technician should be thorough in all relevant skill sets while appearing for a practical test during skill assessment. Therefore, the challenge of evaluating a factor structure of skill assessment model, that combines objective and effective assessment in skill gradation of technicians employed in aviation maintenance, led to this study involving the collection of data from respondents engaged in skill assessment of aircraft technicians.

II.METHOD OF STUDY

The method adopted for this study is based on the analysis of responses to a survey questionnaire. The questionnaire was prepared to keep in mind the objective of the study. These were designed to obtain feedback on aspects related to various relevant topics covering the skill assessment scheme. A total of 51 questions under 11 variables (constructs) were included in the questionnaire. Each question was assigned a unique item code. In addition, the questionnaire was also designed to capture independent control variables like Years of Service(Y1,Y2,Y3), Type of Fleet(F,T,H), and Trade/Branch(A,M,E) of the assessors. Responses to the questions (Items) were captured on a Likert Scale, graded 1 to 5, while '1' represents 'Strongly Disagree", '2'-'Disagree", '3'-'Neutral", '4'-'Agree", '5'-'Strongly Agree". All 51 questions were positive in nature. The questionnaire has been prepared to capture the data based on specific domains of skill assessment as depicted in the suggested preliminary factors model shown below:-

<<Insert Fig-1>>

A.Preliminary Factors

The model proposed for the study as shown in Fig-1 comprises of 11 preliminary skill factors with their unique codes as enumerated below:-

- **FS: Identify Flight Safety Hazards**
- **QP: Adherence to Quality Policies**
- **PI: Productivity and Innovation**
- **OS: Organisation's Strategies**
- **PS: Periodic Maintenance**
- **IG: Improvement Goals for Teams**
- **PM: Project Management Skills**
- **LS: Leadership Skills**
- **PD: Personal Development**
- **RM: Relationship Management**
- **HR: Human Resource Management**

B.Classification of Factors

Responses to each factor of the Skill Assessment were subjected to t-tests. For this, firstly, the data set consisting of 452 samples were classified based on the number of years of service put in by the assessor. Category 'Y1' consisted of assessors who had less than 20 years of service, 'Y2' consisted of assessors who had between 20 to 30 years and 'Y3' consisted of assessors with more than 30 years of service. The Mean and SD for each factor were also calculated. Similarly, Fleet wise categories are 'F'- Fighters fleet; 'T'-Transport fleet; 'H'-Helicopters fleet. Lastly, Trade/Branch wise broad categories are 'A'-Armament, 'M'-Mechanical, 'E'-Electrical.

C.Reliability Analysis

The validity and reliability of the questions for this study were checked through the reliability module of the SPSS version 21.0. In order to test the reliability of the questionnaire and the measure of internal consistency, a pilot study with a response from 100 assessors was collected. Cronbach's Alpha (CB) result for the pilot survey was 0.963, which signified that the questionnaire was reliable.

D.Statistical Analysis

Responses from 452 participants in the study were ported on to Microsoft excel sheet and subsequently transcribed on to the SPSS data view sheet. Thereafter the data were analyzed using SPSS software to determine the means, standard deviation, Reliability of data, dimension reduction, Principal Component Analysis, and Independent t-test. Data collected through the questionnaire survey has been analyzed at three different levels. Firstly, the reliability and validity of the questionnaire was established through Cronbach's alpha. Exploratory factor analysis was then carried out to reduce, re-arrange, and re-grouping of various items. Factors that emerged depending on regrouping were renamed. Factor loadings of individual items were considered for arriving at the overall objective of the study. Finally, the relationship between the factors and independent variables was established through correlation and independent sample 't-test'. A significance value of $p<0.05$ was considered for the study so as to achieve a confidence level of 95%.

E.Exploratory Factor Analysis (EFA)

The various steps used for the EFA included Data Suitability Test, Extraction of Factors, Use of Rotation Techniques, and Interpretation of the results. Exploratory Factor Analysis was carried out with the intent to:-

a. Resize a large number of variables (Items) into smaller factors

b. Review the structure or relationship between variables

c. Assess the validity of the preliminary model and address the issue of multi-collinearity of variables

F.Extraction of Factors.

Principal Component Analysis (PCA) method was used for the extraction of factors because there were more than 30 variables. The criteria used for factor extraction are Kaiser's criteria (eigenvalue > 1 rule), Scree test, and cumulative percent of the total variance. The orthogonal Varimax Rotation method was used for maximizing large-item loadings and minimizing small-item loadings, thereby resulting in an interpretable and abridged solution. This Rotation also produced factor structures that are uncorrelated.

G.Rotated Component Matrix (RCM)

By the end of six iterations of Rotated Component Matrices, only 28 items out of the initial 51 items remained which were suitable for the exploratory factor analysis needed for the study. The final RCM revealed the following factor loading as shown in Table-1 below:-

<<Insert Table-I>>

H.Regrouped & Renamed Factors

Based on the above EFA, the Items were reduced and new factors emerged. The new factors that emerged under six components along with their Scree plot are placed below:-

<<Insert Table-II>>

<<Insert Fig-2>>

I.Component-wise Regrouped Factors

- **Comp-I: Professional Capabilities& Ethics**
- **Comp-II: Maintenance Safety Knowledge**
- **Comp-III: Interpersonal Communication**
- **Comp-IV: Compliance to Quality Procedures**
- **Comp-V: Critical & Creative Thinking**
- **Comp-VI: Problem Solving &Value Addition**

<<Insert Table-III>>

III. SUMMARY OF OBSERVATIONS

Based on the analysis and deliberations, a summary of observations of the study are enumerated in the succeeding paragraphs:-

(a) From the study and feedback from assessors, it emerged that Critical skill sets are based on training content.

(b) The assessment standards in Armament Trade are more stringent when compared with that of Non-armament trades i.e. Mechanical & electrical trades in aviation.

(c) Assessors with more experience i.e. more than 30 years have a better appreciation of evaluation and appraisal of subordinates.

(d) Assessors with rich experience have a higher understanding of the need for platforms and tools to create opportunities for technicians for better ideas and skills to improve maintenance climate.

(e) The result of the t-test in 'Problem Solving & Value Addition' clearly brings out that the assessment domain is relatively standardized irrespective of Years of Service, Trade/Branch of assessor, and Type of Fleet trained or qualified.

IV. SIGNIFICANT HIGHLIGHTS OF STUDY

(a) The study involved visits to sampling units spread across the length and breadth of the country thus covering a wide range of participants dispersed geographically.

(b) A standard method was followed for the collection and compilation of data.

(c) A logical validation of the instruments was undertaken using exploratory factor analysis.

(d) The study involved detailed deliberations with policy making and implementing bodies.

(e) Interaction cum responses were collected from a wide range of assessors with varied experience.

(f) The questionnaire was formulated based on the evaluation of the skill assessment framework.

V. RECOMMENDATIONS

(a) Introduction of mandatory certification of qualification for assessors will provide an important tool for harmonizing and improving the quality of assessments and for improved monitoring of the continual professional development of the assessors.

(b) All skills assessment procedures followed by assessing bodies should be coherent to a single set of standards as per national occupational or competency standards so that common performance benchmarks are set.

(c) Improved communication mediums should be introduced so that assessing bodies can share information more effectively about revised skill assessment policies.

(d) Senior assessors need to be motivated to invest in grooming of junior assessors in skill evaluation techniques and philosophy to benefit both individuals and the organization.

(e) A new assessment model with a combination of proficiency dimensions and performance criteria may be instituted to map job skills to desired levels of proficiency.

ACKNOWLEDGMENTS

The authors wish to express their sincere gratitude to various authors and institutions on e-portals from which the information has been gathered and analyzed.

REFERENCES

1. Aaron Glassmann et al.(2015) "Validity, Knowledge, Skills, Abilities composite measures: An aviation industry pilot study; International Journal of Aviation, Aeronautics & Aerospace.

2. Balaraman et al; "Skill Gap analysis & Training needs in Indian Aerospace Industry"; Journal of Airlines & Airport Management; 2016.

3. Earnhardt, M. P., Newcomer, J. M., Watkins, D. V., & Marion, J. W. (2014). An inquiry into the aviation management education paradigm shift. International Journal of Aviation, Aeronautics, and Aerospace, 1(4). doi:10.15394/ijaaa.2014.1037

4. Iliaslappas, Kyriakos. I, Kourousis (2016) "Anticipating the need for skills for the future aerospace & aviation professionals"; Journal of aerospace tech & management.

5. Ison, D. C., Weiland, L., McAndrew, I. & Moran, K. (2015). Identification of air traffic management principles influential in the development of an airport arrival delay prediction model. Journal of Aviation/Aerospace Education & Research, 24(2), 39 – 53. doi:10.15394/jaaer.2015.1618.

6. Maddox, Michael (2005) "Human Factors guide for aviation maintenance & inspection"; Federal Aviation Administration.

7. Salt et al.(1997) "Evaluation of Skill Requirements"; Journal of Institution of Electrical Engineers.

8. Sadasivan, S. & Gramopadhye, A. K. (2009). Technology to support inspection in the general aviation industry: Specification and design. International Journal of Industrial Ergonomics, 39(4), 608–620. doi:10.1016/j.ergon.2008/09/002.

9. Suzuki, D. & Ohnishi, K. (2012) "A skill proficiency evaluation method of an individual based on accuracy & repeatability", Keio University, Journal of IEEE.

10. White, Charles (2000) "Aviation Maintenance Technical Training requirements for 21st century"; Federal Aviation Administration.

TABLE I: FACTOR LOADING IN RCM

Rotated Component Matrix[a]						
Factor	Component					
	1	2	3	4	5	6
PD94	.758					
RM101	.751					
RM103	.719					
HR112	.706					
HR113	.633					
PD93	.614					
PD91	.606					
FS13		.885				
FS14		.832				
FS11		.807				
FS12		.713				
FS15		.699				
RM102			.890			
RM105			.847			
HR111			.845			
HR115			.840			
QP26				.759		
QP24				.756		
QP25				.691		
QP22				.678		
PS62					.790	
PS61					.786	
PS63					.735	
IG52					.544	
PI34						.667
PI31						.634
OS43						.585
OS82						.571
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.[a]						
a. Rotation converged in 6 iterations.						

Table-II COMPONENT WISE FACTOR LOADING

Type	Item Codes	No. of items
Component-I	**PD, RM, HR**	**7 Items**
Component-II	**FS**	**5 items**
Component-III	**RM, HR**	**4 items**
Component-IV	**QP**	**4 items**
Component-V	**PS,IG**	**4 items**
Component-VI	**PI, OS**	**4 items**

Table-III : FACTOR LOADING IN RCM DESCRIPTION OF FACTORS(COMPONENT-WISE)

COMPONENT-I: PROFESSIONAL CAPABILITIES & ETHICS			
ITEM CODE	**FACTORS**	**MEAN**	**SD**
PD-94	Ability to Arrange job profiles as per objectives set by superiors	4.33	0.73
RM-101	Ability to lead workplace communication in effective strategies and mechanisms	4.27	0.74
RM-103	Influence organisational culture and motivate technicians to commit to organisation's core values	4.28	0.84
HR-112	Methods to provide feedback to subordinates in a positive and constructive manner	4.20	0.70
HR-113	Ability to plan and develop on-the-job training to enhance skills of technicians	4.35	0.81
PD-93	Ability to enhance core skills of airwarriors at trade jobs and contribute to their effectiveness as a supervisor	4.21	0.76
PD-91	Apply resilience techniques to manage one's own personal as well as organisation's challenges.	3.97	0.76

COMPONENT-II: MAINTENANCE SAFETY KNOWLEDGE			
ITEM CODE	**FACTORS**	**MEAN**	**SD**
FS-13	Assess the ability of a technician to identify flight safety hazards associated aircraft maintenance	3.51	0.87
FS-14	Identify unsafe maintenance practices by technicians while working on aircraft	3.42	0.96
FS-11	Assess the ability of technicians to identify common safety & health hazards at work place	3.69	0.86
FS-12	Assess the control measures adopted by the technician to enhance personal safety while working on the aircraft	4.03	0.67
FS-15	Identify unsafe maintenance practices by technician while working on aircraft and recommend corrective actions	3.75	0.81

COMPONENT-III: INTERPERSONAL COMMUNICATION			
ITEM CODE	**FACTOR**	**MEAN**	**SD**
RM-102	Evaluate gaps and barriers in workplace communication among technicians	4.11	1.03
RM-105	Platforms to create opportunities for technicians to contribute ideas and skills	4.19	0.96
HR-111	Knowledge and application skills in counseling , appraisal and evaluating subordinates	4.57	0.58
HR-115	During evaluation, follow efficient interpersonal communication	4.28	0.93

COMPONENT-IV: COMPLIANCE TO QUALITY PROCEDURES			
ITEM CODE	**FACTORS**	**MEAN**	**SD**
QP-26	Measure the ability to supervise, monitor and improve quality procedures	4.17	0.76
QP-24	Assess relevant quality standards and regulations at all levels	4.08	0.76
QP-25	Assess effective quality record keeping/documentation embedded in the servicing scheme	4.19	0.78
QP-22	Test the application of quality concepts in problem solving during skill assessment	4.19	0.79

COMPONENT-V: CRITICAL & CREATIVE THINKING			
ITEM CODE	**FACTORS**	**MEAN**	**SD**
PS-62	Enhance creative thinking among maintenance gang or team members	3.94	0.79
PS-61	Display Critical Thinking for problem-solving during maintenance	4.05	0.86
PS-63	Demonstrate Analytical skills for critical activities during maintenance activities	4.08	0.79
IG-52	Ability to identify the nature of jobs trade wise for servicing gangs/teams and technical infrastructure requirements	4.16	0.72

COMPONENT-VI: PROBLEM SOLVING & VALUE ADDITION			
ITEM CODE	**FACTORS**	**MEAN**	**SD**
PI-34	Assess the ability of a technician to utilise appropriate opportunities to strive for betterment of own skills and knowledge	4.25	0.82
PI-31	Identify suitable core team to resolve critical/repeated snags in accordance to organisational policies	3.98	0.98
OS-43	Identify and analyse non-value added steps and tasks in a maintenance activity	3.87	0.90
OS-82	Evaluate the intellectual response of individuals	3.71	1.04

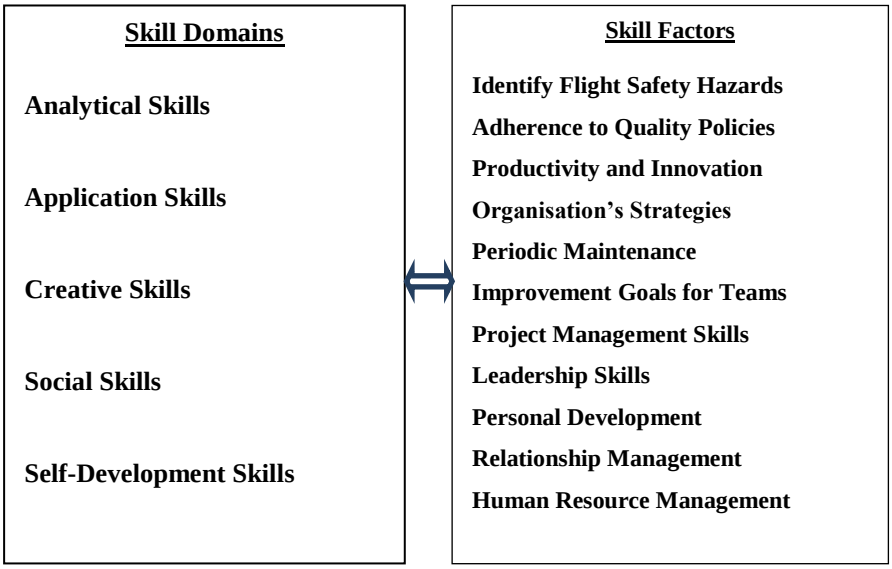


Fig-1: Preliminary Factors Model

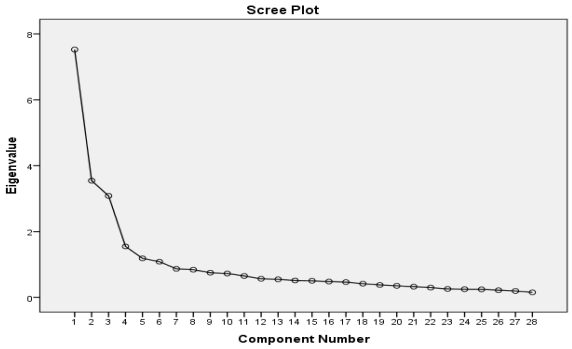


Fig-2 Scree Plot after final rotation

Study of Practical approach for Preparation of Drug Dosage Forms to accept Challenges in new Business Developments

Ms. Disha .D. Vidhate*[1]

Student [1], Arvind Gavali College of Pharmacy, Jaitapur, Satara.
[1]vidhatedisha84@gmail.com

***Abstract*— Business is an organization engaged in various activities such as commercial, industrial and professional. It is important to learn the business innovation by doing it. Now a days there is big opportunity in pharmaceutical industry to start our own business. To have a detailed understanding of some processes in the pharmaceutical sector it is important to study the fundamental practices in the concern field. The study of this sector cannot be started without patients, doctors and medicines. Relationship of patient and healthcare professional exists when they serves a patient's medical needs. Patient care is first priority for all healthcare professionals. In patient care, these professionals provide service to patients. It refers to prevention management of their illness, proper treatment and also for managing their physical as well as mental condition. In the process of providing services to patient's drug dosage forms plays vital role. There is need of drug dosage forms for human health. A pharmaceutical dosage form is the entity that is administered to patient so that they receive an effective dose of a drug in the form of solid, liquid, or gas that can be used in a particular way. Depending on constipation method there are different types of drug dosage forms. The main aim of this research paper is to study practical implementation of drug dosage in solid, liquid and semisolid forms to accept challenges in new business development.**

***Keywords*—Drug, Dosage, Solid, Liquid, Semi-solid, Patient Care, Health, Business.**

I. INTRODUCTION

Business ideas can be effectively developed by studying some existing practical approaches in the same field. It gives systematic step by step approach for development of product in any sector. In pharmaceutical sector, dosage forms are pharmaceutical drug product forms. They are mixture of active pharmaceutical ingredients (API) and excipients in proper configuration. Depending on the method of consumption of drug dosage form comes in several different types. They include solid, liquid or semisolid drug dosage forms. Commonly prescribed drugs by physician are tablets, capsule, syrups, powders, etc. In medical science patient is one of the most important person involved to whom physician prescribes suitable dosage for the health wellbeing. Why do we use dosage forms? Is there need for dosage form? Answer is Yes, dosage form are to maintain accuracy in dose. The actual and main need in dosage form is protection, drug safety as per age, sex, previous medical history. So patient care is one of the most important part for doctors as well as pharmacist too. So this paper focuses on practically studying different drug dosage forms for effective patient care and it gives idea for researcher how to develop or start business in the pharmaceutical sector.

II. DRUG DOSAGE FORMS

Dosage form is means of carrying drug molecule which is delivered to all sides of body which are in action. We have different drug dosage forms depending on the route of administration, i.e. Solid dosage form, Liquid dosage, semisolid dosage form. Dosage forms of medicine include = API (Active Pharmaceutical Ingredient) + Excipients. The unit doses i.e. Dosage forms which are marketed for use active ingredient i.e. API and inactive component i.e. Excipients in proper configuration they are pharmaceutical drug products. There is need for the drug dosage forms. Drug dosage form that covers the unpleasant taste and odour, drug safety or benefit, we can see accuracy in doses, and the main need is protection for example coated tablets.

III. STATEMENT OF PROBLEM

There is major impact of drug dosage forms on human health. Depending upon method of administration, drug dosages forms are classified into different types. But it is important to have a practical approach of the same to gain detailed understanding of designing different drug dosage forms. Having studied relevant literature, the researcher thought it would be best to conduct a laboratory research to understand the process of preparation of drug dosage forms for the Patient Care. So, researcher has selected the topic "Study of Practical approach for Preparation of Drug Dosage Forms to accept Challenges in new Business Developments".

.

IV. OBJECTIVES OF THE STUDY

1. To understand the process of business development.
2. To gain understanding of dosages forms for design of new products in pharmaceutical industry.
3. To study the need of drug dosage forms for human health.
4. To analyse practically the different drug dosage forms to accept challenges in new business development.

V. RESEARCH METHODOLOGY

For accomplishing the objectives of the study laboratory method has been adopted. Laboratory research is applied on three different type of drug dosages such as solid, liquid and semi-solid. For the present study of research we need different parameters which as used in required proportion to get the expected result.

Laboratory approach:
As our experiment is fully based on practical, we have performed these practicals in our college laboratory. We had a group of three students for performing the experiment. The main apparatus we need was weighing balance, without weighing balance we cannot get accuracy in any dosage form. The other equipment's used were scapula, ointment slab, ointment, spatula, measuring cylinder, porcelain dish, funnel, etc. Each experiment required approximately one hour or more than that too. We were having master formula for each chemical by calculation we got their working formula. And using working formula we performed the experiment as follows:

Laboratory process for preparation of ORS powder:
Apparatus Required- Morter pestle, Weighing balance and beaker.
Chemical Required - Sodium chloride, Glucose (anhydrous), Potassium chloride, and Trisodium Citrate dihydrate.
The master formula for prepetition of ORS powder is mentioned in the below table:
Master Formula:

Sr. no	Name of Ingredient	Master formula	Working Formula	Role
1	Sodium Chloride	2.6g	1.33g	Sodium Supplement
2	Anhydrous glucose	13.5g	6.9g	Sweetening Agent
3	Potassium Chloride	1.5g	0.76g	Potassium Supplement
4	Sodium Citrate dehydrate	2.9g	1.48g	As salt citrate supplement

Calculations:

(1) Sodium Chloride
20.5gm→2.6gm
10.5gm→X
X= 10.5x2.6/20.5
X=1.33gm

(2) Glucose
20.5gm→13.5gm
10.5gm→X
X= 13.5x10.5/20.5
X= 6.9gm

(3) Potassium Chloride
20.5gm→1.5gm
10.5gm→X
X=1.5x10.5/20.5
X=0.76gm

(4)Trisodium citrate dihydrate
20.5gm→2.9gm
10.5gm→X
X=2.9x10.5/20.5
X=1.4gm

Procedure:
Weigh accurately sodium chloride, glucose, potassium chloride, trisodium citrate, dry hydrides. Mix all the salts by adding them in a geometrical ratio. Store the powder in air tight container, label it and then submit.
Use: Dehydration in anionic condition.
Similarly we have performed experiments for liquid and semisolid dosage forms which are mentioned below in table as:

Different Types of drug dosage form	Experiment	Chemical and Apparatus	Effect on human Health
Liquid Dosage Form	Compound syrup of ferrous phosphate BPC	**Chemicals**- Iron, phosphoric acid, calcium carbonate, Potassium bicarbonate, Sodium phosphate, Cochincal, sucrose, orange flavor water and Purified water. **Apparatus**- Beaker, Spatula, glass rod, measuring cylinder, funnel.	Patient can take this drug, when he has deficiency of iron or calcium or as Iron supplement
Semisolid Dosage Form	Sulphur Ointment	**Chemicals**- Sulphur, wool fat, hard paraffin, cetosteryl alcohol and white soft paraffin. **Apparatus**- Weighing Balance, water bath, ointment slab, ointment spatula and porcelain dish	It is given by physician in treatment of scabies and acnes. Act as antiseptic agent.

VI. SCOPE OF STUDY

The scope of present study was restricted to drug dosage forms. In the study 3 major dosage forms like solid, liquid and semisolid drug dosage forms were studied practically. These three physical dosage forms were selected for patient care, especially for adults and children who cannot swallow hard forms.

VII. LIMITATIONS OF THE STUDY

Following are the major limitations of the study:

1 Our study is only based on drug dosage forms, so other forms of drug dosage are not included in present study.

2 As we have performed experiment in our college laboratory chemicals or other equipment's were little older. So the accuracy of the experiment is not as per industry standards.

VIII. FUTURE RESEARCH

1. As we have performed experiments of solid dosage form i.e ORS powder preparation, liquid (compound syrup) and semisolid (sulphur ointment) there are many other formations, so the further research can be done on othe formations.
2. As we find out the basic dosage forms, there should be more practical work to be done in future to have more accuracy in results.

IX. CONCLUSION

This study has given detailed understanding of design process of drug dosages forms. It has given overview of product process. According to literature survey these drug dosage forms are necessary and have very good effect on human health. As a student, I have observed that these drug dosage forms could be prepared in laboratory in short span of time. We can apply these processes more frequently to prepare more and more drugs to fulfil the need of patients.

REFERENCES

1. Briony J Oates , Researching Information Systems and Computing, South Asian Edition, 2006.
2. Dr. A.A Hajaree and Dr. D.A Bhagwat, A book of pharmaceutics-1, Nirali publication, 2017.
3. Ram I Mahato and Ajit S. Narang, Pharmaceutical Dosage Forms and Drug Delivery, second edition, CRC Press, 2017.
4. Dr.M.Ashalatha , Dr. B. Vasundara Devi , Dr. D. Padmavathi, "Drug Dosage Forms-Expanding Horizon", IOSR Journal of Dental and Medical Sciences (IOSR-JDMS), .Volume 15, Issue 1 Ver. VII, 2016.
5. https://www.pharmapproach.com/understanding-pharmaceutical-dosage-forms/
6. https://www.youtube.com/watch?v=0Q6e-BnhiMc
7. Heyam Saad Ali, Rasha Saad Suliman, Babiker M A Elhaj, Raina Suliman "Pharmaceutical Powder Dosage Forms: A Review", International Journal of Pharmaceutical and Clinical Research 2019; 11(1): 20-22, ISSN-0975 1556

Intelligent Decision Support System In Crop Cultivation: Some Successes And A Bright Future

Mr. Uttam A. Deshmukh[1], Prof. (Dr.) Arjun P. Ghatule[2]

[1] School of Computer Science,
Yashwantrao Chavan Maharashtra,
Open University Nashik, 422222 Maharashtra India.
uadeshmukh@hotmail.com
[2] Dean- Administration) & Professor- Emerging Technology,
S. P. Mandali's Prin. L. N. Welingkar Institute of
Management Development & Research (WeSchool)
Mumbai- 400 019 Maharashtra India
arjun1671@gmail.com

Abstract:

Decision Support Systems (DSS) technology and applications have improved significantly since the mid-1970s. This progress has been influenced by a number of technological and authoritative breakthroughs. DSS used to have more limited database, demonstrating, and UI functionality, but technological advancements have enabled undeniably more impressive DSS functionality. Individual decision-makers were initially helped by DSS, but later developments were extended to workgroups or groups, particularly virtual groups. The Web's arrival facilitated communication between hierarchical decision support systems and ushered in a slew of new applications of existing technology, as well as a slew of new decision-support innovations. Portable devices, portable e-administrations, and remote Internet conventions appear to be the most likely drivers of the next considerable set of DSS innovations. The purpose of this study is to analyze the successive DSS results in agriculture, as well as a look into the future of Decision Support Systems; DSS aids in business decisions, automation, defence, and farming, among other things.

Keywords; Future of DSS, Intelligent System, Crop Cultivation DSS, fuzzy logic, Naïve Bayes Classifier, FLCCDSS

I. INTRODUCTION

The idea of a decision support system arose primarily from theoretical studies of organizational decision making conducted at Carnegie Institute of Technology in the late 1950s and early 1960s, as well as practical work carried out in the 1960s.(Keen P. G., Decision support systems: An organizational perspective, Reading, 1978)[1] DSS developed its own field of study in the middle of the 1970s, before picking up steam in the 1980s. Executive Information Systems (EIS), Group Decision Support Systems (GDSS), and Organizational Decision Support Systems (ODSS) evolved from single user and model-oriented DSS in the middle and late 1980s. (1987, Sol) [2], the definition and scope of DSS have shifted over time: in the 1970s, DSS was defined as "a computer-based system to aid decision making"; in the late 1970s, the DSS movement began focusing on "interactive computer-based systems that help decision-makers use databases and models to solve ill-structured problems"; and in the 1980s, DSS should provide systems "using suitable and available technology to improve the effectiveness of managerial and professional decision-making"; in the 1990s, DSS was presented with a new difficulty in the design of intelligent workstations towards the end of the 1980s.(Sol, 1987)[2]. any current computer will not be able to solve an issue that the Decision Support System cannot solve. As previously said, it

accepts all sorts of data. A Decision Support System makes decisions based on rules. A DSS may be changed to simulate the logic of any computer method and is mostly effective in demonstrating the functions of a central processing unit (CPU) within a computer because to its simplicity. The term "universal DSS" refers to a DSS that can simulate any other DSS.

I.I Historical Development

Researchers began researching the use of computerized quantitative models to aid in decision making and planning in the 1960s. (Raymond, 1966)[3], (Turban E. , 1967)[4], (Urban, 1967)[5], (Holt & Huber, 1969)[6] published the first experimental investigation using a computer-aided decision system. They looked into an IBM 7094-based production scheduling application. A important historical turning moment was, in retrospect, (Morton, 1967)[7] Harvard University field study for a dissertation The goal of Scott Morton's research was to create, implement, and test an interactive, model-driven management decision system. Scott Morton originally articulated the concept of decision support systems in February 1964 in a basement office at Harvard Business School's Sherman Hall during a discussion concerning Scott Morton's dissertation, according to fellow Harvard PhD student Andrew McCosh. During the year 1967, (Morton, 1967) [7] Researchers looked into how computers and analytical models could assist managers in making a common company planning decision. He conducted a study in which managers used a Management Decision System to make decisions (MDS). An MDS was used by marketing and production managers to coordinate laundry equipment manufacturing plans. The MDS was shown on an IDI 21-inch CRT with a light pen connected to two Univac 494 systems through a 2400 bps modem. (Power, What is DSS, the on-line executive , 1997)[8]. George Dantzig, Douglas Engelbart, and Jay Forrester's groundbreaking work influenced the viability of developing computerized decision support systems. In 1952, Dantzig joined the Rand Corporation as a research mathematician, where he began implementing linear programming on the company's experimental computers. Engelbart and colleagues created the first hypermedia groupware system, NLS, in the mid-1960s (oNLine System). The National Library Service (NLS) aided in the establishment of digital libraries as well as the storage and retrieval of electronic documents using hypertext. NLS also enabled on-screen video teleconferencing and served as a precursor to group decision support systems. Forrester was a part of the North American SAGE (Semi-Automatic Ground Environment) air defense system, which was completed in 1962. SAGE is most likely the first data-driven DSS to be computerized. Professor Forrester also founded the System Dynamics program. Group at the Massachusetts Institute of Technology Sloan School. His work on corporate modeling led to programming DYNAMO, a general simulation compiler (Power, What is DSS, the on-line executive , 1997) [8In 1960, J.C.R. Licklider issued a paper titled Man-Computer Symbiosis in which he discussed his thoughts on the future role of multi-access interactive computing. He envisioned human-computer interaction as improving the quality and efficiency of human problem solving, and his paper laid the groundwork for decades of computer study. Licklider was the driving force behind MIT's Project MAC, which advanced the research of interactive computing. (Power, What is DSS, the on-line executive , 1997)[8]. By April 1964, the IBM System 360 and other more powerful mainframe computers had made developing Management Information Systems (MIS) for major corporations viable and cost-effective. (Davis, 1974)[9] Early management information systems (MIS) focused on providing managers with structured, periodic reports based on data primarily from accounting and transaction processing systems, but the systems did not provide interactive support to help managers make decisions. Around 1970, articles on management decision systems, strategic planning systems, and decision support systems began to appear in business journals. (Sprague & Watson, 1979)[10] In 1968, for example, Scott Morton and colleagues McCosh and Stephens published works on decision assistance. The term "decision support system" was first used in (Gorry & Scott, 1971)[11] Article from the Sloan Management Review. They stated that Management Information Systems were primarily concerned with structured decisions, and that Decision Support Systems should be used to describe supporting information systems for semi-structured and unstructured decisions.

I.II Theory Development

In the mid-to-late 1970s, academic conferences such as the American Institute for Decision Sciences meetings and the ACM SIGBDP Conference on Decision Support Systems in San Jose, CA in January 1977 discussed both practice and theory issues related to DSS (the proceeding were included in the journal Database). In 1981, Atlanta, Georgia hosted the first International Conference on Decision Support Systems. Academic conferences provided

forums for idea sharing, theory discussions and information exchange. (Power, What is DSS, the on-line executive , 1997)[8] Around the same time,(Keen & Morton, Decision support systems: An organizational perspective, 1978)[12] The first wide behavioral orientation to decision support system analysis, design, implementation, assessment, and development was presented. This influential text established a framework for business schools to teach DSS. (McCosh & Morton, 1978)[13].

Steven Alter's MIT doctoral dissertation results were published in an influential book in 1980. (Alter S. L., A study of computer aided decision making in organizations, 1975) [14] DSS foundation for thinking about business and management has been expanded. His case studies also served as a solid descriptive framework for decision support system instances. Many additional MIT dissertations from the late 1970s dealt with challenges surrounding the use of models for decision support.

Alter concluded from his research (1980) that decision support systems can be classified based on the generic operations that they can execute. These generic operations span a single axis and range from highly data-oriented to highly model-oriented. Alter conducted a field survey of 56 DSS, which he divided into seven categories. (Power, What is DSS, the on-line executive , 1997) [8] His seven types include:

- Access to data elements using file drawer systems.
- • Data analysis systems that allow computerized tools specialized to a specific task and situation, as well as more general tools and operators, to manipulate data.
- • Examining information systems that allow users to access a number of decision-oriented databases and tiny models.
- • Accounting and financial models that analyze the ramifications of various options.
- • Simulation models are used in representational models to evaluate the outcomes of activities. (Power, What is DSS, the on-line executive , 1997)[8]
- • Optimization models that generate an optimal solution consistent with a set of restrictions and provide actionable recommendations.
- • Suggestion models that do logical processing to arrive at a specific suggested decision for a task that is somewhat structured or well-understood. (Power, Decision support systems: A historical overview, 2009)[15]

II. CURRENT STATE AND FUTURE DIRECTIONS OF DSS RESEARCH

The field of DSSs has evolved from a strictly technological standpoint to one that encompasses the complete range of information and knowledge. (Courtney, 2001). Comprehending that information and knowledge must be acknowledged in a system is not the same as understanding how to do so, as Courtney points out.
Others have developed systems that combine decision support in a variety of domains outside of technologically based fields since this research was published. The list is lengthy, and only a few are included here for example purposes: management of water resources (Kolkman, Kok, & van der Veen, 2005) [16] (Mysiak, Guipponi, & Rosato, 2005) [17] environmental science (McIntosh, Jeffrey, Lemon, & Winder, 2005)[18] emergency management (Vaught, Mallett, Brnich, & Reinke, 2006) [19] (Wickramasinghe, Bali, & Naguib, Application of knowledge management and the intelligence continuum for medical emergencies and disaster scenarios, 2006) [20] (Wickramasinghe & Bali, Controlling chaos through the application of smart technologies and intelligent techniques, 2008) [21] and medicine (Richardson, Courtney, & Haynes, 2006) [22] We seek to present instances of several reference disciplines that are currently actively researching DSSs and explain how future research trends could draw on the history of DSSs research in the IS field, as it is difficult to even begin to track all of the domains into which DSSs research has now gone.

II.I Present Scenario

Communication-driven, data-driven, document-driven, model-driven, and knowledge-driven Decision Support Systems are examples today. In computer science theory, the Intelligent Decision Support System is an outstanding prediction model. In the theory of computational predictivity, the Decision Support System is used. The multi-level Decision Support System and Intelligent Decision Support System are part of the decision-making model for output-oriented computation.(Power, Decision support systems: A historical overview, 2009)[15]

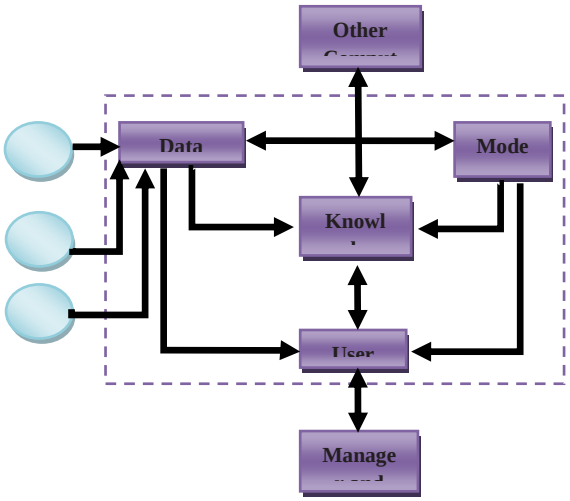


Fig 1 Decision Support System

A Decision Support System consists of:

I) **Input Data:** The input data contains all linear data such as weather conditions, APMC rates, and water dam levels. This information is collected as an input for the system.

II) **Data Management:** Data management refers to the process of gathering data from multiple sources, categorizing it by format, and saving it in various fields according to the settings. Data management is also linked to model management.

III) **Knowledge Management:** After managing the data, the key component of supplying intelligence to the system is to provide intelligence to the managed data, which means the data must be stored wisely and ready to provide intelligence after management. It will be solved by fuzzy logic, which will offer intelligence to it.

IV) User Interface: The User Interface (UI) is the most important aspect of the system; it is the mirror of any system; it is the region where everyone will evaluate the system and the system will reflect the efforts made, for example. Reacting the proper output from the system, the input (x + y = y) needs to be same as your expectation (Deshmukh & Ghatule, Crop Cultivation Intelligent Decision Support system Using Fuzzy Logic, 2020)[23]

III. FUTURE CHALLENGES IN IMPLEMENTATION OF DSS

The first is the interaction between the consultant and the customer, which is one of the most dangerous aspects of DSS implementation. (Gachet, 2000)[24]. Many factors play a role in this interaction, including managerial, environmental, and socio-political concerns. (Mora, Wang, & Gelman, 2013) [25] Second, because to its iterative nature, the implementation spans multiple cycles, and business processes are prone to alter over this time. Implementing a DSS tool is often seen as a high-risk, high-reward endeavor, and (Moss & Atre, 2003) [26] According to the study, up to 60% of all DSS projects fail due to poor planning, missed tasks, and poor project management. This subchapter will separate the challenges into two groups because it will present the general problems associated with a DSS implementation. Because a mere list of prior research's issues is insufficient to provide context, they will be provided within these categories. As presented by Human Challenges and Conceptual Challenges (Gachet, 2000) [24]

III.I Human challenges

The issues connected to the people involved in the DSS implementation, including users and decision-makers, are covered under the human component. This refers to the actors' personal reactions to the implementation of a new system. The creation of a distinct team for implementation is meant to act proactively and solve problems before they develop, but it comes with its own set of challenges. According to them, (Sprague R. H., framework for the development of decision support systems., 1980)[27], Adoption of a DSS is frequently driven by the user community rather than the organization's administration. The consultant normally communicates with the organization's finance director, although the person with technical expertise is placed farther down the hierarchy. (Sprague R. H., framework for the development of decision support systems., 1980)[27]. As a result, gathering enough good knowledge from the suitable person to supply the consultant with accurate information is a huge difficulty. Organizations that are unfamiliar with the notion of DSS are having a difficult time convincing users to use the DSS to its full potential. (Gachet, 2000)[24] If no one promotes the tool's usability and benefits to employees, it may not be used, which is especially likely in firms where the DSS has never been used before. (Marek & Roger, 1999)[28] When the consultant works with the customer, it's critical to create user profiles that are tailored to the demands of each type of user. When deciding on an implementation approach, it's crucial to consider what organizational roles will be included in the

application, and certain users who want decision help will be unable to benefit since it's not tailored to their needs. Mikael Persson 16 challenges of deploying decision support systems, as well as the same problem of users refusing to utilize the DSS occur. (Scholz, Schieder, Kurze, & Gluchowski, 2010) [29]

III.II Conceptual challenges

The conceptual element refers to issues with approaching the DSS from perspectives that aren't appropriate or feasible given the organization's structure. These issues happen when the improper development methodologies are used, such as when the phases prior to execution are not appropriate for the organization. These issues could include planning and business analysis, as well as issues with internal leadership. (Gachet, 2000)[24]. To make it easier to adapt such a system, the business must accept the new information architecture that a DSS provides. (Gangadharan & Swami, 2004)[30] (Sprague R. H., framework for the development of decision support systems., 1980)[27]. Suggest that the method to understanding the demands of managers in the organization is not well known, and that it is also dependent on a number of factors. Frequently, there is a problem with recognizing the relationship between system capabilities and managers' information needs to support business activities. (Gachet, 2000) [24] (Sprague R. H., framework for the development of decision support systems., 1980)[27]. This is reflected in the developer's understanding of the company as well as the user's ability to provide useful demand specifications. Even if the consultant provides the necessary external skills, a DSS deployment is hampered by a lack of internal leadership. (Fernandez & Rainey, 2006)[31] Strategic alignment extends on the challenge of encouraging employees to recognize its value in the context of leadership. (Mora, Wang, & Gelman, 2013)[25]. the strategic alignment establishes how closely the DSS strategic execution is linked to the company's overall business strategy and goals. (Mora, Wang, & Gelman, 2013)[25]. The project requires top-level sponsorship to convince users that the DSS is not just another system in a stack of other source systems, but a critical component in reducing burden.(Jarrar, Al-Mudimigh, & Zairi, 2000)[32] According to (Kraemer & Dedrick, 1997)[33] another difficulty with IT investment in smaller firms is that it's difficult to assess the return on an IT investment since the organization structure isn't conducive to measurement. Because the data quality previously collected was not enough, it is difficult to determine whether the organization achieved anything in the post-implementation context. (Scholz, Schieder, Kurze, & Gluchowski, 2010) [29]. Small businesses' lack of understanding of information systems, especially if the system has never been used before, is a major cause in IS implementation failure. (James Y. L. Thong, 1995) [34]. Many IT solutions fail because managers are unable to meet the information needs of future DSS application users, and as a result, the new system is at danger of producing faulty or raw data rather than usable information. (Kraemer & Dedrick, 1997)[33]. As a result, small businesses face challenges with IS deployment because their business processes and working methods do not support the application, and they must rely on the external expertise that a consultant can supply.

IV. FUTURE OF DSS AND THEIR APPLICATIONS

The above-mentioned innovative methodologies have allowed for the elicitation of trends and the construction of technical scenarios for decision support systems, as well as the visualization of their evolution. We have defined the important development topics of expert systems/DSS in particular. (Pereira, Quintana, & Funtowicz, 2005)[35], listed according to the relevance scores (first best) as follows:

• Recommenders in the field of e-commerce (excluding banking and finance) graphical (content-based) multimedia recommenders' 3D-e-commerce graphics (content-based) recommenders' Product portfolios can be judged by recommenders (constrained by its value)

• Intelligent intermediate agents for negotiations, partner matching, and collaboration • recommenders for security and commodity trading Most of the experts' recommendations for critical technologies, methodologies, and models to use in DSS included the following.

• GIS technologies, which can evaluate or elicit preferences for individual locations in a big region, make extensive use of visualization, and are linked to GPS, are capable of evaluating or eliciting preferences for individual sites in a vast territory. • Expert systems' cognitive properties, which allow one to avoid the negative effects of decisions made in haste or by an anxious decision-maker, for example. Some of the most important future DSS developments (through 2025) that have been discovered in (Pereira, Quintana, & Funtowicz,

2005)[35] and relate to the 3D-e-commerce applications, are listed below

• The class of decision problems considered numerically non-tractable will shrink, • the DSS (including and starting with recommenders) will converge with search engines and intelligent data mining agents; the latter will fill in missing data that might help in solving decision problems supplied to client's

Other than advancements in hardware and software technologies, the structure and development of DSS are expected to benefit from promising technologies such as data warehousing and mining, operator-based methodology, wise specialists, and venture asset arranging in the future. These tools will promote a more straightforward approach to more perplexing DSSs. Rural is expected to reap the biggest benefits from these as well as new technological breakthroughs such as showcasing, speculating, reenactments, and projections. Progress in framework demonstrating, along with increasing PC power, improvements in Remote Sensing, Geographical Information Systems, Precision Agriculture, new developments in data extraction, such as data warehousing and data mining, and new ideas for data trade over the Internet, should all contribute to increased utilization In the future, DSS will be used for trimming systems. Similarly, there has been a resurgence of interest in search engines that can take advantage of the Internet's rapidly expanding information base. These approaches may make subjective data more accessible to PC-based thinking systems, resulting in a new perspective on DSS innovative work..

V. CONCLUSION

The developments in the most recent decade will manage us in understanding the coming advancement of decision support technologies. Changes will happen in technologies and the usage condition-clients are turning out to be more advanced and additionally demanding, cultivation and harvesting related things are turning out to be more perplexing yet more spry and adaptable, and worldwide administrative and serious factors quickly change, influencing the plan and utilization of these apparatuses. The future will offer astonishments, no doubt, yet certain patterns can be watched.

In Crop Cultivation Decision Support System the predictions are based on weather, APMC and water dam levels and. Another area for further work is to use any real-time sensor for collecting weather data from each location. Also, future work includes predicting crop diseases and crop yield considering geographical area using world geographic information system for global harvest prediction.

ACKNOWLEDGEMENT

This research is supported by our Hon. Vice-Chancellor Prof. E. Vayunandan Yashwantrao Chavan Maharashtra Open University. I thank my esteemed supervisor Prof. (Dr.) Arjun P. Ghatule, who gave understanding and aptitude that significantly helped the research thoroughly.

REFERENCES

[1] Keen, P. G. (1978). Decision support systems: An organizational perspective, Reading. *MA: Addison-Wesley Publishing, Co, ISBN 0-201-03667-3,300.*

[2] Sol, H. G. (1987). *Expert systems and artificial intelligence in decision support systems.* Berlin: Proceedings of the Second Mini Euroconference, Lunteren, The Netherlands, Berlin: Springer, ISBN 90-277-2437-7.

[3] Raymond, R. C. (1966). Use of the time-sharing computer in business planning and budgeting. *Management Science, 12(8), B–363, DOI:10.1287/mnsc.12.8.B363* , 1-100.

[4] Turban, E. (1967). The use of mathematical models in plant maintenance decision making. *Management Science", 13(6), B–342. DOI:10.1287/mnsc.13.6.B342* , 180- 219.

[5] Urban, G. L. (1967). SPRINTER: "A tool for new products decision-makers. *Industrial Management Review", 8(2, spring)*, 43–54.

[6] Holt, C. C., & Huber, G. P. (1969). A computer-aided approach to employment service placement and counselling. *Management Science", 15(11), Doi:10.1287/mnsc.15.11.573*, 573–594.

[7] Morton, S. (1967). *Computer-driven visual display device their impact on the management decision-making process.* 1-100: Harvard Business School.

[8] Power, D. J. (1997). What is DSS, the on-line executive. *Journal for Data-Intensive Decision Support*

http://dssresources.com/papers/dssarticles.html, 223–232.

[9] Davis, G. (1974). *Management information systems: Conceptual foundations, structure.* New York: McGraw-Hill, Inc, ISBN: 978-0-07-015828-3.

[10] Sprague, R. H., & Watson, H. H. (1979). *Bit by bit: Toward decision support systems.* California: California Management Review, 22(1), DOI:10.2307/41164850.

[11] Gorry, A., & Scott, M. (1971). A framework for information systems. *Sloan Management Review, 13*, 56–79.

[12] Keen, P. G., & Morton, M. S. (1978). *Decision support systems: An organizational perspective.* Reading MA: Addison-Wesley, ISBN-13: 978-0201036671.

[13] McCosh, A. M., & Morton, S. (1978). *Management. Decision Support Systems.* London: Macmillan: DOI https://doi.org/10.1007/978-1-349-02764-4.

[14] Alter, S. L. (1975). *A study of computer-aided decision making in organizations.* Cambridge: MA: M.I.T. Press, ASIN: B0007AHXMQ, 1-66.

[15] Power, D. J. (2009). Decision support systems: A historical overview. In D. Mehdi Khosrow-Pour, *Encyclopedia of Information Science and Technology, Second Edition* (pp. 121–140). KwaZulu-Natal, South Africa: IGI Global.

[16] Mysiak, J., Guipponi, C., & Rosato, P. (2005). Towards the development of a decision support system for water resource management. *Environmental Modeling and Software, 20(2)*, 203-214.

[17] Kolkman, M. J., Kok, M., & van der Veen, A. (2005). Mental model mapping as a new tool to analyze the use of information in decision-making in integrated water management. *Physics and Chemistry of the Earth, 30(4-5)*, 317-332.

[18] McIntosh, B., Jeffrey, P., Lemon, M., & Winder, N. (2005). On the design of computer-based models for integrated environmental science. *Environmental Management, 35(6)*, 741-752.

[19] Vaught, C., Mallett, L., Brnich, M. J., & Reinke, D. (2006). Knowledge management and transfer for mine emergency response. *International Journal of Emergency Management, 3(2-3)*, 178-191.

[20] Wickramasinghe, N., Bali, R. K., & Naguib, R. N. (2006). Application of knowledge management and the intelligence continuum for medical emergencies and disaster scenarios. *Proceedings of the 28th Annual Meeting of the IEEE on Engineering in Medicine and Engineering in Medicine and Biology*, (pp. 5149-5152).

[21] Wickramasinghe, N., & Bali, R. K. (2008). Controlling chaos through the application of smart technologies and intelligent techniques. *International Journal of Risk Assessment and Management, 10(1-2)*, 172-182.

[22] Richardson, S., Courtney, J. F., & Haynes, J. (2006). Theoretical principles for knowledge management system design: Application to pediatric bipolar disorder. *Decision Support Systems, 42(3)*, 1321-1337.

[23] Deshmukh, U. A., & Ghatule, A. P. (2020). Crop Cultivation Intelligent Decision Support system Using Fuzzy Logic. *Our Heritage UGC Care listed Journal, ISSN: 0474-9030, Volume-78 Issue -15*, 7-14.

[24] Gachet, A. (2000). *A framework for developing distributed cooperative decision support systems.*

[25] Mora, M., Wang, F., & Gelman, O. (2013). A Comparative Study on the Implementation Inhibitors and Facilitators of Management Information Systems and Integrated Decision Support Systems A Perception of IT Practitioners in Mexico. *Information Technology for Development, 19(4)*, 319-346.

[26] Moss, L. T., & Atre, S. (2003). *Business intelligence roadmap: the complete project lifecycle for decision support applications.* Addison-Wesley Professional.

[27] Sprague, R. H. (1980). framework for the development of decision support systems. *MIS Quarterly, 1-26*.

[28] Marek, J. D., & Roger, R. F. (1999). Decision support systems. Encyclopedia of library and information science. A. Ken. *Marcel Dekker, Inc. Last Login*, 2010.

[29] Scholz, P., Schieder, C., Kurze, C., & Gluchowski, P. (2010). Benefits and Challenges of Business Intelligence Adoption in Small and Medium-Sized Enterprises. *Paper presented at the ECIS.*

[30] Gangadharan, G. R., & Swami, S. N. (2004). Business intelligence systems: design and implementation strategies. *Paper presented at the Information Technology Interfaces 26th International Conference on*.

[31] Fernandez, S., & Rainey, H. G. (2006). Managing successful organizational change in the public sector. *Public administration review, 66(2)*, 168-176.

[32] Jarrar, Y. F., Al-Mudimigh, A., & Zairi, M. (2000). ERP implementation critical success factors-the role and impact of business process management. *Paper presented at the Management of Innovation and Technology, 2000.* ICMIT 2000. Proceedings of 2000 I.

[33] Kraemer, K. L., & Dedrick, J. (1997). Computing and public organizations. *Journal of Public Administration Research and Theory, 7(1)*, 89-112.

[34] James Y. L. Thong, C.-S. Y. (1995). CEO characteristics, organizational characteristics and information technology adoption in small businesses. *Omega*, 429-442.

[35] Pereira, A. G., Quintana, S. C., & Funtowicz, S. (2005). New trends in decision support for groundwater governer issues. *Env Modell Software 20(2)*, 111-118.

Challenges to Knowledge Management In Armed Forces

Debajyoti Borah#[1], Sumati Sidharth#[2]
Department of Technology Management
Defence Institute of Advanced Technology, Pune
[1]debuborah@gmail.com, 9818720111
[2]sumatisidharth@gmail.com

Abstract*—This study has been carried out to identify influence factors which are acting as obstacles to the implementation of Knowledge Management in Indian Armed Forces. Grounded Theory (GT) has been chosen as the research methodology for the study. The study is founded on the conceptual framework developed by Holsapple and Joshi (2000). Several negative influences were identified and three major factors which have been found to influence KM implementation are managerial influences, resource influences, and environmental influences. Some of the major negative influences include lack of commitment by leadership; lack of technical infrastructure; challenges of technology evolution; a dearth of resources, particularly funding; adverse effects of organizational IT procedures, and the failure to demonstrate the importance to users and leaders. The study presents the effect of negative influences and how it begins with the inability to concisely describe KM, which leads to weak leadership support, lack of resources, inadequate systems, user dissatisfaction, and the inability to prove value. The practical application of this study for the military is that identification of the negative influences would be valuable in overcoming implementation barriers and, as a result, facilitate the implementation of a robust KM system in Indian Armed Forces.

***Keywords*—Knowledge Management (KM), Military organizations, KM barriers, KM framework, Grounded Theory, KM influences.**

I. INTRODUCTION

A. Knowledge Management

In this technological age, one of the major aspects that determines an organization's competitiveness is knowledge management (KM). After labor, land, and capital, it has become a key resource for any organisation. It aids in the planning, decision-making, evaluation, and assessment of an organization's resources in order to improve them.

The available knowledge of an organisation needs to be stored somewhere in some form or other for its future utilization. This storage can be in manuals, procedures, and routines on the bench or within an individual as his skill. The former is the explicit knowledge whereas the later is the tacit knowledge. Explicit knowledge is the one that can be articulated whereas tacit knowledge is the one that is difficult to articulate. The most difficult part of knowledge management is to capture this tacit knowledge that is residing in the individual.

B. Significance of KM in Armed Forces

Armed forces, in general, are huge in size, spread across the country, and highly complex in terms of their role and the wide variety of equipment used. Rapid technological changes taking place in the world affects the military field as well and that adds to the complexity. Being mission-oriented in nature armed forces relies heavily on the competencies of their human resources for the success of their missions. It is therefore important to have efficient KM system in armed forces to maintain a highly competent workforce.

II. LITERATURE REVIEW

KM in the armed forces involves an extensive process of utilizing the knowledge already available to an organization to achieve the mission goals. It involves identification, evaluating, retrieving, and sharing knowledge within the military setup. A preliminary requirement for this is to capture know-how and domain expertise.

A.Framework for Knowledge Management Influences

There is a requirement to use a framework that will act as a guide for the study to identify the causes that impede the implementation of KM in the defense forces. Holsapple and Joshi (2000) had formulated a descriptive framework that describes the various factors that influence the success of KM implementation. It was chosen for the study as it gives a comprehensive framework of the various influences. The framework presents three different factors that have an influence on the success of KM. Figure 1 shows the various kinds of forces that influence KM and the factors involved in each category.

B. Factors Influencing Knowledge Management

The three major factors which have been found to influence KM implementation are - managerial influences; resource influences; and environmental influences. A framework for identifying KM implementation barriers can be formed from this classification and is shown in Fig.1.

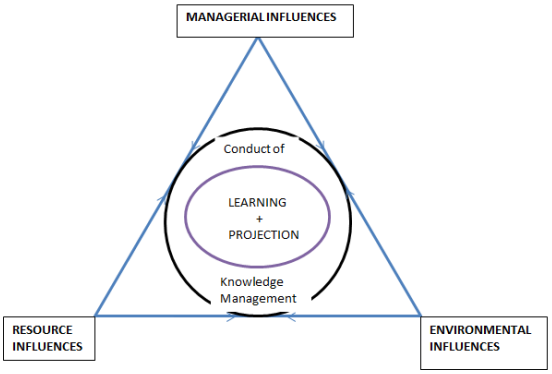


Fig.1 KM Influences Framework (Holsapple and Joshi 2000)

III. RESEARCH METHODOLOGY

The research objective is to find out how KM implementation in Indian Armed Forces is affected by managerial, resource, and environmental influences. The research methodology chosen to find out how these three influences impact KM implementation is Grounded Theory(GT). While carrying out a literature review on KM in the Indian Armed Forces, very little information was found in the public domain. Many research scholars choose GT as an effective and suitable research approach for subjects that are less researched and where information is scarce. In such a scenario, it is felt that GT would be the most appropriate methodology for the present study.

A. Participants Selection and Sampling

At the outset, nine respondents from IAF were interviewed. These people were from three different fields, namely operations, maintenance, and administration. Thereafter, theoretical sampling was carried out after initial data coding based on the different domains of the importance of the three primary fields. This involved interviewing additional personnel from different domains of IAF. This included the following:

- Flying, flight safety, and flying training in the field of operations
- First-line and second-line maintenance, Base Repair Depot (BRD) and Tettra Schools
- Different aspects of administration include security, work services, education, accounts, etc.

The author believes that most military organizations' objectives are nearly identical. Therefore, a study of an organization, like IAF, would produce findings that could be reasonably extrapolated to other organizations like Army and Navy. According to Bhal and Leekha (2008), a single industry aids in regulating the specification and balancing the respondents' familiarity with a given issue. Respondents from all levels of seniority and of both airmen and officer categories were selected for the study. Respondents with more than 12 years of experience were initially interviewed as it was felt that they would be able to provide more relevant and information-rich data for the study. The present study is not influenced by the demographic distribution of respondents. For security issues and protection of the respondents' identities, the names and other particulars are not mentioned in this study.

B. Data Collection

The main source of data collection was through interviews with the selected personnel and available data in the public domain. At the initial stage, a few questions were kept open-ended during the initial data coding to elicit new thoughts and information. It was informed that their identities would not be

disclosed. During the subsequent part of the study, based on the initial output, the questions were modified to have a more in-depth discussion on the relevant issues. The theoretical coding was based on interview questions that were detailed and more focused on the barriers that were faced in having a KM system in the different domains/departments of IAF. A total of 24 respondents from IAF were involved in the study. At the outset, six respondents were interviewed. These people were from three different fields, namely operations, maintenance, and administration. Thereafter, theoretical sampling was carried out based on the different domains of importance of the three primary fields. This involved interviewing 18 additional personnel from different domains of IAF. This included the following:

- Flying, flight safety and flying training in the field of operations (6 respondents)
- First line and second line maintenance, Base Repair Depot (BRD) and Tettra Schools (6 respondents)
- Different aspects of administration including security, work services, education, accounts, etc. (6 respondents)

C. Coding

For forming the provisional notions, the initial coding was carried out by thoroughly scrutinizing the data. During the initial coding, a careful examination was carried out of the components of the data such as words, segments, lines, and episodes for analytic value and were allotted codes. Consequently, to identify the starting codes which were most frequent and important, focused coding was carried out in order to sort and organize the huge amount of data that had been collected. To confirm that the understanding of their perspectives were aligned to that of the study, correlation, as well as clarifications on the views expressed during the interviews, were carried out frequently during the study.

IV FINDINGS

The study of the issues that act as challenges or impediments to the implantation of KM in the armed forces is founded on the conceptual framework developed by Holsapple and Joshi (2000). The data for the study was mainly collected through interviews and available data in the public domain. The three major categories of barriers to KM in the armed forces as per the study are discussed below:-

Managerial Influences

A. Leadership Factors

1) Commitment by Leadership: One of the most critical barriers to establishing KM in defense forces is a lack of leadership commitment specially at higher levels. This was a common finding amongst most of the participants. This acts as a major hurdle in an organization which is highly hierarchical in nature. A top-down approach for such an initiative is essential to create the correct empowering environment especially in terms of manpower and resources. Strong and visionary leadership support at levels close to the effort is a requirement for the evolution of KM.

2) Lack of reinforcing behaviors: According to the respondents, another concern is a lack of reinforcing behavior. For such a system to develop, measures such as a reward system, as well as a system to encourage culture change, has to be present. The mindset of military leadership to show short-term results, which in many cases is due to their frequent postings, is not conducive for long-term objectives such as KM.

B. Coordination Factors

Coordination with IT organization: A standout problem concerning KM implementation in IAF is coordination with IT organizations. Difficulties in bringing various KM projects across the branches together, securing approval for implementing new hardware or software, and overcoming the strict IT policies for implementation of KM technology were some of the coordination issues.

C. Control Factors

Effect of External Control Policies: Several issues related to control policies were identified as obstacles to KM in a military environment. The most critical issue is the restrictive effect caused by policies, especially with regard to Information Technology (IT). Such policies have a direct effect on the ability to develop and set up a robust KM system using the latest technology.

D. Measurement Factors

Measurements needed to gain leadership support: Some of the respondents stated that tangible results of a KM system were needed to gain support from higher authorities. The main problem for showing concrete results with regard to the benefits of the KM system is the lack of metrics or measures for proving the results to higher formations.

Resource Influences

A. Financial Resource Factors Almost all respondent noted the lack of funding as a major barrier to implementing KM. The restrictive military funding environment was inflexible and required long lead times that made it difficult to submit for and receive funds. KM activities were inevitably perceived as belonging to no particular domain making funding support through established functional channels very difficult.

B. Human Resource Factors

1) Lack of Manpower Availability: The shortage of manpower was another major barrier to KM that was addressed by all the respondents. Manpower shortage issues lead to a lack of manpower to implement, experiment, or even train external organizations about the KM system.

*2) Lack of KM Knowledge, Expertise, and Skill***:** The lack of manpower with appropriate KM knowledge, expertise, and skill was identified as a barrier by the respondents. Although the responses tended to concentrate on the attributes needed by the immediate KM staff, they were also extended to the recipient population. Finding KM-literate individuals in the general military population to staff the KM function would require special effort.

C. Material Resource Factors

*1) Technical infrastructure challenges***:** Technical infrastructure was cited as a significant challenge towards building a KM system. Several respondents reported technical infrastructure would have obstacles with existing IT setup specially because such a system would be technology-dependent. It is likely that to merge such a system would have challenges and would not find easy acceptability.

*2) Lack of KM hardware/software choices***:** Because of limited resources and imposed "standards" for software and hardware by the IT organization, most of the respondents, reported that there would be a lack of appropriate tools to support/build KM technical systems. Most of the free software provided by the IT organizations has limited capabilities and there would be a requirement of KM specific software with required security for such a system.

*3) Existing Systems Inadequate***:** A majority of respondents reported dissatisfaction with the existing KM systems. This dissatisfaction primarily stemmed from the fact that existing KM software/applications were not very user-friendly or intuitive.

D. Knowledge Resource Factors

1) Incompatible/Inaccessible Knowledge Stores: Personnel dealing with developing KM systems reported difficulty in accessing existing information/knowledge stores when trying to incorporate them into the KM systems. Most of the problems stemmed from incompatible data trapped in legacy systems. This in turn is due to the legacy systems procured from different countries that are still being used by the organization

2) Lack of a KM-supportive culture: Respondents believed that it would require the development and evolution of an organizational culture that encouraged knowledge-sharing and was based on knowledge management concepts for the KM system to be successful. Cultural changes needed to originate at the level of Air Headquarters or higher (Tri services).

Environmental Influences

The environmental influence category identifies influences external to the organization. Due to the large size of the military services, environmental influences for any specific organization were defined as both those external to the immediate organization (yet still within the service) and those external to the service itself.

A. External Climate Factors

1) Negative Impact of Politics: Local organization and service politics were reported by some respondents. Some respondents brought out disagreements between priorities and projects based on leadership whims and power plays associated with organization structure and hierarchy.

2) Increased Security Climate: According to respondents, network and information security issues had been a constant concern for Air Force. KM staff had to be excessively vigilant about how and what they were making available over their network-based systems.

B. Technology Factors

Negative Impact of Rapidly Changing Technology: The rapid changes in technology were recognized as a constant challenge for having a robust KM system according to many respondents. Not only will technology changes result in the requirement of rapid change for new hardware and software purchases, but they also require consistent re-strategizing about the most appropriate technology solutions and migration paths.

C. Time Factors

Lack of time: The respondent reported lack of time to develop and use a KM system effectively. For many respondents involved in KM, the KM effort was not their only job responsibility. The lack of human resources and the lack of funding were indirectly leading to the time factor which becomes a barrier to an effective KM system.

V. ANALYSIS

This study has focused on the identification of the influences that act as obstacles or impediments to KM implementation in the defense forces. All the factors were analysed under three major categories, managerial, resource, and environmental influences. Analysis on the linkages and criticality of all the factors reveals that amongst all the factors, few critical factors act as major impediments to KM implementation. The factors that emerged during the study were discussed with the respondents. They were asked to rate these factors as per their perception in a scale of five different categories, starting from critical (barrier considered most detrimental to KM implementation), important, moderate, not critical and not sure. Based on their perception of criticality, the ratings given by the respondents were tabulated. It was found that ratings of the respondents were similar to the findings of the study in terms of the linkages and criticality of the factors, thereby validating the study. The barriers to KM that were identified as critical factors were interlinked in order to amalgamate the findings and also establish a relationship between them. The model shown in Figure 2 depicts the process by which the critical factors combine to create barriers a KM system in the armed forces. The model attempts to describe what the researcher has observed in the process of the study. It is evident that some leaders across the military realize the importance and usefulness of KM to help their organizations solve their learning problems. However difficulties are faced to convince top leadership of the impact and the benefits of knowledge management without tangible results. It therefore becomes difficult to

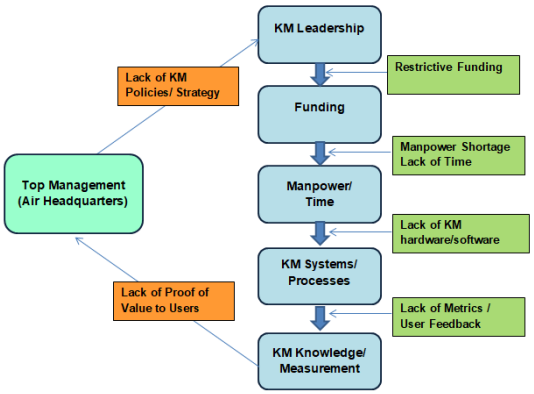


Figure 2. Linkages of the critical factors that are barriers a KM system

generate support at Air HQ level. This results in lack of a collective KM Policy encompassing the entire Air Force. This has a cascading effort. The lack of leadership support results in lesser financial resources being allotted for implementation of the system. This in turn results in reduced human resources and time given to develop and maintain such a system. The equipment and tools to support/build KM technical systems are also not made available in the absence of manpower and finance. This in turn hampers the development and usage of the KM system itself. Without adequate or sustainable resources the KM system that is made available to the users is not of the

required standard and will not generate their promised value to users. Often users and leaders become disenchanted because the proposed KM systems/processes fail to generate anything of value. This often ends with lack of positive feedback of the KM system which is very important to gain support from Air HQ. Ultimately, a vicious circle is created as represented in figure 2. To break this circle it is essential to have strong leadership support. Without leadership support in the military hierarchy, resources cannot be sustained and KM systems and projects cannot be successful.

VI. CONCLUSION

This study is an analysis of the factors that act as obstacles or impediments to KM implementation in the IAF. The findings of this study demonstrate that India's Armed Forces confront significant challenges in their efforts to improve KM. This study will provide useful insight regarding the several types of barriers to KM implementation in a military organization which in turn will help in better implementation of such a system. This study can be used as a guide for specific areas of knowledge management that can be addressed by military organizations. Because of the similarity in the role and structures of the other two military organizations, the findings of this study can be reasonably applied to Army and Navy.

REFERENCES

[1] Asher, D. and Popper, M. (2019), "Tacit knowledge as a multilayer phenomenon: the "onion" model",The Learning Organization, Vol. 26 No. 3, pp. 264-275.

[2] Af Ragab, M. and Arisha, A. (2013), "Knowledge management and measurement: a critical review",Journal of Knowledge Management, Vol. 17 No. 6, pp. 873-901.

[3] Anonymous. (2012). *Basic Doctrine of the Indian Air Force.* Delhi: Indian Air Force.

[4] AR 25-1 (2004) Headquarters, Department of the Army. (2004, March). *Army Knowledge Management and Information Technology Management.* Washington, DC: Department of the Army.

[5] Bartol, K. M., & Srivastava, A. (2002). Encouraging knowledge sharing: The role of organizational Reward Systems. *Journal of Leadership & Organizational Studies, 9(1), 64-77, 9*(1), 64-77.

[6] Bhal, K.T. and Leekha, N.D. (2008), "Exploring cognitive moral logics using grounded theory: the case of software piracy", Journal of Business Ethics, Vol. 81 No. 3, pp. 635-646.

[7] Birks, M. and Mills, J. (2015), Grounded Theory: A Practical Guide, Sage.

[8] Burnard, P. (1991), "A method of analysing interview transcripts in qualitative research", Nurse Education Today, Vol. 11 No. 6, pp. 461-466.

[9] Charmaz, K. (2008), "Constructionism and the grounded theory method", Handbook of Constructionist Research, Vol. 1, pp. 397-412.

[10] Chun Tie, Y., Birks, M. and Francis, K. (2019), "Grounded theory research: a design framework for novice researchers", SAGE Open Medicine, Vol. 7, 2050312118822927.

[11] Davenport, T. H., DeLong, D. W., & Beers, M. C. (1998). Successful Knowledge Management Projects. *Sloan Management Review, 39*(2), 43-57.

[12] Holsapple, C., & Joshi, K. D. (2000). An Investigation of Factors that Influence the Management of Knowledge in Organizations. *Journal of Strategic Information Systems, 9*, 235-261.

[13] Champoux, P., Costello, M.J. and Bourget, S. (2005), "The Canadian knowledge management system(KMS) within the land force command and control information systems (LFC2IS)", 10th International Command and Control Research and Technology Symposium (ICCRTS), June, Citeseer.

[14] Holsapple, C., & Joshi, K. D. (2000). An Investigation of Factors that Influence the Management of Knowledge in Organizations. *Journal of Strategic Information Systems, 9*, 235-261.

[15] Holsapple, C., & Joshi, K. D. (2002). Knowledge management: a three-fold framework. *The Information Society*, *18*, 47-64.

[16] Nonaka, I., & Takeuchi, H. (1995). *The Knowledge-Creating Company:how Japanese companies create the dynamics of innovation*. New York: Oxford University Press.

Adoption Of Smart Grid Technology By Residential Consumers - An Integrated Research Model On Tam Framework

Mathew K Abraham

mkabraham1959@gmail.com

Abstract: The emergence of smart grid technology(SGT) is being looked at positively to meet the challenges of increasing complexity of electric power grid, ever-growing demand for electricity, upgraded grid reliability, energy efficiency, environmental concerns, energy sustainability, and need for rejuvenating the electric grid.

To justify the huge capital deployed for infrastructure, and to extract its full potential, SGT, a socio-technical innovation, is to be integrated with electricity consumers. Meanwhile, the not-so-encouraging feedback and reports on participation by residential consumers highlight the need for effective research to understand the factors dissuading as well as stimulating the participation by consumers.

A review of relevant literature indicated a suitable modification of the Technology Adoption Model, incorporating relevant factors to fully explain the SGT adoption as the benefits of SGT are beyond the individual. Accordingly, Personal Norm, the variable to represent the individual's concern for society and sustainability, is added with TAM for better visibility. Similarly, the Risk associated with SGT adoption is also built into the research model. The electricity supply industry is under a regulatory regime and the regulations and policies are found to be influential and need to be reflected in research models. The influence of socio-economic conditions of a consumer is also to be examined with reference to the ability to adopt the technology.

As such, to comprehend all influencing factors, the TAM variables, Perceived Ease of Use and Perceived Usefulness along with other relevant factors, Personal Norm, Perceived Risk, Regulation/Policy on SGT, and Vulnerability of a residential consumer are integrated for a fruitful research model to analyze the adoption.

Keywords: Information and Communication Technology (ICT), Smart Grid Technology (SGT), Demand Response (DR), Sustainability, Technology Acceptance

1.0 Introduction

Since the first electricity supply system in history was built by Thomas Edison in 1982 at Manhattan Pearl Station in New York City, the electricity grid grew tremendously in its size to become the largest engineering installation ever built by man. The escalating complexity of the electric grid, combined with ever-increasing electricity demand and the thrust for superior efficiency and reliability of grid along with growing concerns on the sustainability of the environment and energy systems, underlines the need for a smarter electric grid.

1.1 Restructuring of Electricity Industry

Beginning in the late 1980s, globally, Governments introduced steps to restructure and deregulate the electric power industry. As a result of the unbundling, a series of regulations, structural modifications were incorporated in electric power systems across the countries, retaining transmission business under strict regulatory control and the generation and distribution functions unlocked for competition (**Joskow P L, 2012).**

1.2 Introduction of Smart Grid Technology

Leveraging the performance and integration ability of modern Information and Communication Technology (ICT) with mobile and broadband connectivity available worldwide, the groundwork for an ICT-enabled network is laid known as Smart Grid Technology (SGT), rejuvenating the whole electricity supply system. The Smart Grid represents the upgrading of the electricity supply system enabling it to monitor, protect and optimize the operation of its interrelated components from the generators, transmission grid and the distribution system to industrial consumers, automation systems of buildings, electricity storage facilities, electric vehicles, households and their appliances. (**EPRI, 2011a).**

1.3 Why SGT

Tuballa and Abundo (2016) appreciate that smart grids are more self-sufficient and improve the efficiency and effectiveness of electricity systems so that the energy utilities can use the present infrastructure more effectively, avoiding further investments. The modernization of the grid by transforming it to a smart grid enables the bidirectional transfer of power and data between the utility and consumer and will develop fresh market options, energy-related services, and social

progressions. **Rathnayaka et al (2012**), observe that in traditional grids, the consumer inertly consumes the energy to pay the bills, whereas, in a smart grid environment the consumer gets elevated to producer and supplier of electricity. The opportunity for Demand Response (DR) makes the consumer participative in grid operations by lowering or shifting the consumption of electricity during the needy hours of peak demand to become eligible for incentives **(Tuballa and Abundo (2016).**

For consumers, the benefit of the improvement in the system will be experienced through a reduction in system disturbance and blackouts **(Ratnayaka et al, 2012).** Further, smart grids deployed in local distribution systems offer benefits such as a reduction in operation and maintenance costs. With its feature of participating consumers with energy information, SGT supports shifting the loads in peak hours and thereby improves the operational efficiency of the system considerably. With multiple sources of distributed generation including renewables, an automated grid with sophisticated controls is essential to allow electricity generated to enter at multiple locations and be further despatched to the demand destinations (**Milchram et al, 2018)**.

2.0 Significance of Research on SGT Acceptance

Dantas et al (2018) explain that for the electricity sector, technology diffusion goes through the process of research and development activities in the beginning to resolve the technical problems and lower the cost of technology. Accordingly, with the characteristics of high stakes and extremely unpredicted results, normally through a demonstration stage, the feasibility of the new technology is verified and subsequently, the stages of development of the market and commercial distribution of the new technology happen. Smart Grid is something unfamiliar to the public and has serious concerns with cyber insecurity, possible hike in electricity rates, etc. hindering the acceptance of the new technology. Consumer Reactions to SGT have been mixed in places of its installation and globally in many cases, the consumer acceptance towards diffusion remained less than the anticipated level **(Global Smart Grid Federation (GSGF), 2012).** Along with other reasons, inadequate analyses and studies on acceptance by residential consumers turned out to be a significant cause for the slow diffusion of SGT **(Kranz et al, 2010).** There is an obvious need to know the mode in which the consumers react with SGT **(Sintov and Schultz, 2015).**

Research is essential to achieve a better understanding of the factors that make consumers accept or reject SGT so that the proper development and expansion of this critical technology along with its politically set goals can be achieved **(Toft et al, 2014).**

2.1 Research Gaps

Implementation of SGT is in advanced stages in developed countries and is expected to reach the rest of the world in the immediate future. As SGT is a socio-technical innovation, a paradigm shift is inevitable to bring technology to consumers. Engaging the consumer with SGT requires further study on the factors influencing the consumer for the adoption of SGT, as well as the factors deterring the engagement of consumers.

Several studies are undertaken to analyse the adoption of SGT by residential consumers. Many of the studies were based on the classical Technology Adoption Model (TAM) by **Davis (1989)** which analyses the technology adoption from the perspective of perceived ease of use and perceived usefulness of the new technology. However, the studies were not able to fully analyze the SGT adoption. Hence, it is important to design such an integrated research model accommodating all relevant factors to study the adoption of SGT by residential consumers of electricity to understand the key factors favoring and dissuading consumers.

3.0 Literature Review and Theoretical Framework

A review of literature analyses the theoretical framework of research works, research models, progressively developed by researchers to encompass all the relevant constructs, influencing residential electricity consumers to adopt SGT.

3.1 Relevance of Technology Acceptance Model(TAM) Framework

The most universally accepted and utilized TAM theory by **Davis (1989)** examines a potential user's intention to accept new technology through two determinants, Perceived Usefulness of that technology and Perceived Ease of Use of the technology. Understanding technology acceptance has been a priority for a couple of decades and numerous models have been proposed and developed, but TAM has turned out to be the most popular of all (**Chuttur, 2009). TAM** provides a basic framework to explain the effect of external variables on behavioral ideas **(Davis, 1989).** Contemporary research works in modern technology adoption areas of blockchain, digital economy, artificial intelligence, medical technologies, TAM framework with appropriate extensions are very effectively used.

3.2 Extended TAM for SGT

TAM by **Davis (1989)** is unable to bring out all the viewpoints of an individual as it restricts the factors influencing the acceptance to perceived ease of use and usefulness. The two factors indicate only private gains. Hence, the theory of TAM may not be able to explain the adoption of SGT fully as its societal and

environmental benefits are enjoyed by even non-users. Hence to understand the SGT adoption fully, a need for modification of TAM, incorporating relevant individual and social factors is necessary.

3. 3 Norm Activation Model (NAM)

The Norm Activation Model (NAM) by Schwartz, is based on the theory that moral self-expectation or Personal Norm drives an individual's performance of a behaviour that benefits the society or environment. A feeling of moral obligation to act in a specific way in a particular situation is termed as Personal Norm **(Schwartz SH,1977).** As indicated by **Energy Dong(2012),** since the anticipated financial benefits are not so large as to motivate households, other benefits such as societal and environmental benefits are to be reckoned as influential factors to accept the installation of SGT. Since the most significant benefits offered by SGT are more societal, such as preservation of natural resources and environmental protection, compared to private and individual benefits, the adoption of SGT may be observed as a pro-societal behaviour The modified model by **Toft et al (2014)** reflects the assessment of functional usability of the technology by a user and sense of moral responsibility of a dutiful citizen and the integrated model wherein an additional determinant, Personal Norm is added apart from Perceived Ease of Use and Usefulness and the new model is labeled as the **Responsible Technology Acceptance Model (RTAM).**

3.4 Risk Integrated Technology Acceptance Model (RITAM)

Bauer R A (1960) initiated the consideration of Perceived Risk for the analysis of consumer behaviour. Deviating from the risk origin of objective probability, Bauer redefines Perceived Risk as subjective risk. **Park et al,(2014)** in their study on consumer adoption of smart grids included the perceived risk while extending the existing TAM-based technology acceptance model. Revising the study as a Risk Integrated Technology Acceptance Model (RITAM), a new endogenous variable, Perceived Risk in Use is added by the authors, which influences the intention to use SGT. In their detailed study of risk-integrated TAM**, Park et al (2014)** projected that the TAM determinants, Perceived Ease of Use and Perceived Usefulness along with Perceived Risk influence the consumer's intention to accept SGT.

3.5 Regulation/Policy on SGT

Generation, transmission and distribution of Electricity are under the regulatory regime. The industry of this essential commodity for human wellbeing is controlled by policies and guidelines by respective governments and departments ensuring its development, as well as the protection of all stakeholders of electricity. Hence, techno-commercial changes in the system are subject to scrutiny by regulators and policymakers and therefore policies and regulatory interventions are of relevance to SGT also.

Energy policy generally makes an institutional and impersonal form of influence on human behavior **(Mesaric et al, 2017). Jegen & Philion (2017),** view the studies on policy as analytical efforts to examine the way issues are included in the policy agenda of governments, the process of transforming these agendas to public decisions and ultimately how far these decisions are getting implemented. They further observe that politics doesn't assure its response to the demand for a new technology, irrespective of its availability and demand for usage. In view of the above significant findings from the literature, the Regulation/Policy on SGT is also incorporated in the model as a variable, influencing the intention to use SGT by electricity consumers.

3.6 Effect of Vulnerability of Consumers

According to **Boughen et al (2013),** studies indicate that the socio-economic background of an individual does not reliably predict the values, beliefs and attitudes of an individual, rather it reflects the ability of the individual to take action. Further, the researchers clarify that similar to the general public, the low-income consumers also respect the significance of energy efficiency and environment and the only difference is their circumstantial limitations in taking appropriate actions matching their beliefs.

Since electricity is an essential and invisible commodity being consumed by all classes of the society, irrespective of socio-economic status, deployment of SGT necessarily and naturally demands specific studies in relation to the influence of the socio-economic environment of the consumer. For smart grids to be successful and sustainable, there is a need to include at an early stage an evaluation, at the societal level, of the uncertainties and externalities that future smart grids might present. Hence Vulnerability is also added as an influencing factor in the adoption of SGT.

4.0 Integrated Research Model

Review of Literature indicated that TAM remained the research model widely used for the study on the acceptance of SGT by electricity consumers. Observing the slow diffusion of technology, researchers explored further determinants such as Personal Norm and Perceived Risk and modified the research models accordingly.

Hence, integrating the Responsible Technology Acceptance Model (RTAM) by **Toft et al(2014)** and Risk Integrated Technology Acceptance Model (RITAM) by **Park et al (2014)**, a new integrated model is developed to study the adoption of SGT by residential consumers of electricity.

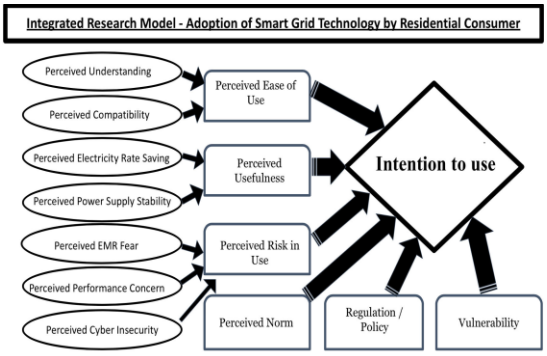
Further, as indicated in earlier chapters, being a regulated business the requirement of support and necessary modifications in the regulations along with consistent and supportive policies at the political level is found to be necessary inputs for the

propagation of SGT among residential consumers. Hence the construct, Policy/Regulation is also integrated with the model of study.

Similarly, various studies indicated that socio-economic conditions of residential consumers are an influencing variable in the adoption of SGT. Hence the determinant, vulnerability is also incorporated in the model to recognize its effect on adoption.

As such, the comprehensive model is developed by integrating the constructs of TAM, Perceived Ease of Use, Perceived Usefulness with Perceived Risk, Personal Norm, Regulation/Policy and Vulnerability. The integrated research model is in

FIG -1



Each variable of the research model with its influence on intention to use is discussed in detail below :

4.1 Exogenous Variables

In their study, **Park et al (2014)** maintained that Understanding of Smart Grid is a factor that facilitates the Ease of Use to influence the Intention to Use. Perceived compatibility indicates the degree to which the way of using the new technology is stable with the methods of existing technology, facilitating the users to effortlessly use the new technology **(Wu and Wang, 2005).** Perceived Understanding and compatibility of SGT determine the variable Perceived Ease of Use in this model.

To examine the role of economic considerations, **Kranz and Picot (2012)** include electricity rate saving which reflects the user's inclination towards a reduction in electricity bill, anticipating that consumers with such focus on reduction in electricity expenditure are more likely to perceive the usefulness of SGT. Reliability is the measure of the success of an electricity grid in providing the required service **(Tubulla and Abundo, 2016). Park et al (2014)** in their study consider the variables Perceived Electricity Rate Saving as well as Perceived Power Supply Reliability as indicators of Usefulness of SGT.

The main health concern of SGT is that the Advanced Metering Infrastructure (AMI) emits radio frequencies (RF). The exposure levels of AMI RF are much less than more commonly used technologies like cell phones, microwaves, and radios **(EPRI, 2011a).** Globally, concerns of consumers about leakage of data on electricity consumption is a deterring factor to the deployment of SGT. **(IEA, 2011**) Apprehensions of equipment failures and degradation of performance lead to Performance concerns **(Park et al, 2014).**

4.2 Endogenous Variables

Perceived Understanding, as well as Perceived Compatibility of SGT, are linked to the Perceived Ease of Use. Similarly, Perceived Electricity Rate Saving and Power Supply Reliability influence Perceived Usefulness**.** In their study, titled Risk Integrated TAM (RITAM), **Park et al (2014)** added an additional endogenous variable, Perceived Risk in Use. By adding the Norm Activated Model with TAM **(Toft et al,2014)** for technologies like SGT where societal benefits sometimes outweigh personal gains, the prediction of technology acceptance will be more accurate. Regulation/Policy on SGT is added to the research model to extend the TAM framework to examine the influence of the regulatory and policy environment on the adoption of SGT. Further, the variable vulnerability indicating the socio-economic status of the consumer is added to the model to derive its influence on the adoption of SGT.

4.3 Intention to Use

An intention to use is normally described as the acceptance of the technology, provided such an intention to use is conveyed against a request to use. **(Huijts, et al, 2014).** In this integrated research model, based on a review of literature, Perceived Risk in Use, Personal Norm, Regulation/Policy on SGT, and socio-economic condition or Vulnerability of the consumer are included as influencing variables in addition to TAM constructs, Perceived Ease of Use and Perceived Usefulness to make the model more meaningful to study the adoption of SGT.

5.0 Conclusion

The research model developed has broader factors, in addition to Perceived Ease of Use and Usefulness, constructs of TAM. Perceived Risk associated with the adoption of any ICT embedded technology is examined in this model for its cause and effect. The significance of Personal Norm, in technology adoption, where its benefits are less personal but largely beneficial to the society at large, is verifiable with this research model. Similarly, the effect of the Regulation/Policy framework on SGT is being analysed in this model to assess the political mandate which is of paramount significance with technologies of socio-economic implications. The vulnerability of target consumers in terms of their projected inability to extract benefits from SGT is incorporated to examine the adaptability of SGT by vulnerable sections to take appropriate protective measures to lessen the impact of SGT. The integrated research model on the TAM framework is expected to bring more clarity to the studies on consumer acceptance of SGT, which is of greater significance to technology managers and the

academic community as the technology has reached the doorsteps of residential consumers.

REFERENCES

1. Bauer RA (1960), Consumer Behavior as Risk Taking. In: Hancock R.W. (Ed), American Marketing Association.
2. Boughen N., Castro Z.C., Ashworth P. (2013), Understanding the Residential Customer Perspective to Emerging Electricity Technologies: Informing the CSIRO Future Grid Forum, Brisbane, Queensland: CSIRO. 2013
3. Chuttur M (2009), Overview of the Technology Acceptance Model: Origins, Developments and Future Directions, Sprout, Volume 9, p.9-37, 2009.
4. Dantas Guilherme de A, Castro Nivalde J. de , Dias Luís, Antunes Carlos Henggeler, Vardiero Pedro, Brandão, Rosental Roberto, Zamboni D Lucca (2018) , Public policies for smart grids in Brazil Renewable and Sustainable Energy Reviews 92 (2018) P 501–512
5. Davis FD (1989), Perceived Usefulness, Perceived Ease of Use and User Acceptance of Information Technology, MIS Quarterly, Volume 13, No.3, P 319-334,1989.
6. Electric Power Research Institute (EPRI), (2011a), Estimating the Cost and Benefits of the Smart Grid: A Preliminary Estimate of the Investment Requirements and Resultant Benefits of a Fully Functioning Smart Grid, Technical Report 1022519, EPRI, Palo Alto, CA.
7. Energy Dong (2012),Demand – The eFlex project, Denmark: Virum:2012.
8. Global Smart Grid Federation (GSGF), Global Smart Grid Federation Report, 2012.
9. Huijts NMA, Molin EJE, van Wee B, (2014) Hydrogen Fuel Station Acceptance: A Structural Equation Model Based on the Technology Acceptance Framework, Journal of Environmental Psychology,38, 2014, P 153-166
10. IEA (2011), Smart Grid - Smart Customer Policy Needs, International Energy agency,2011.
11. Jegen M. and Philion X D, (2017), Smart grid development in Quebec: A review and policy approach, Jegen, M., Renewable and Sustainable Energy Reviews (2017),
12. Joskow, Paul L (2012) Creating a Smarter U.S. Electricity Grid, Journal of Economic Perspectives, Volume 26, Number 1,Winter 2012, P 29–48
13. Kranz J, Gallenkamp J and Picot A (2010), Exploring the Role of Control - Smart Meter Acceptance of Residential Consumers, AMCIS 2010 Proceedings, Paper 315 (http://aisel.aisnet.org/amcis2010/315).
14. Kranz J and Picot A(2012), Is it Money or the Environment? An Empirical Analysis of Factors Influencing Consumers' Intention to Adopt the Smart Metering Technology, AMICS2012, Proceedings,Paper3.(http://aisel.aisnet.org/amics 2012/ proceedings/GreenIS/3)
15. .Meseric P, Dukec D, Krajkar S (2017), Exploring the Potential of Energy Consumers in Smart Grid Using Focus Group Methodology, Sustainability, 2017,9,1463.
16. Milchram C, van de Kaa g, Doorn N and Kunneke R (2018) Moral Values as Factors for Social Acceptance of Smart Grid Technologies, Sustainability,2018,10, 2703,P 1-23.
17. Park C K, Kim H J, Kim Y S (2014), A Study of Factors Enhancing Smart Grid Consumer Engagement, Energy Policy 72 , 2014, P 211-218.
18. Rathnayaka A.J.D, Potdar V, Ou, M.H. (2012) Prosumer Management in Socio-technical Smart Grid. In Proceedings of the CUBE International Information Technology Conference, Pune, India, 3–5 September 2012; P.483–489.
19. Schwartz SH(1977), Normative Influences on Altruism. In. Leonard B. Editor: Advances in Experimental Social Psychology, Academic Press,1977, P 221-279.
20. Sintov ND and Schultz PW (2015), Unlocking the Potential of Smart Grid Technologies with Behavioral Sciences, Frontiers in Psychology,410, P 1-8.
21. Thoft MB, Schuitema G and Thogersen J (2014), Responsible technology Acceptance: Model development and Application to Consumer Acceptance of Smart Grid Technology, Applied Energy,134,2014, P392-400.
22. Tuballa ML and Abundo ML (2016), A Review of the Development of Smart Grid Technologies, Reliable and Sustainable Energy Reviews 59, 2016, P 710-725.
23. Wu JH and Wang SC(2005), What Drives Mobile Consumers? An Empirical Evaluation of the Revised Technology Acceptance Model, Information Management 42,2005, P 719-729.

Effect Of Influencer Marketing On Consumers' Brand Inclination And Purchase Intention Of Millennials

Ms.Bushra Khan , Mr.Akhilesh Dhikale, Ms.Preksha Lodha
College: Ashoka Center For Business & Computer Studies
Affiliation: Savitribai Phule Pune University
bushra.bushra2013@gmail.com, heyitsakhilesh@gmail.com , prekshalodha2424@gmail.com

Abstract

The influencer marketing field has grown in popularity, as companies work with influencers to enhance their popularity and, ultimately, increase their market share. Influence marketing is working as a catalyst to increase revenue by emerging as well as established brands. The reason for this is that consumers' trust has shifted from brand ambassadors to someone they like and follow in their specialised genre. The research makes an attempt to objectify if influence marketing has an impact on brand awareness as well as to understand if popularity of an influencer can alter purchase intention. The researchers have reviewed literature to analyse if the fame of influencer engagement has an impact on consumer purchase decisions. Influencers play a large role in influencing consumer impulse buying behaviour based on existing research studies. These studies mainly delve into the development, pros, and cons, and factors of impulse buying behavior.The study aims to know the effectiveness of influencer on consumer brand inclination and purchase intention.

Keywords: influencer marketing, market share, brand awareness, consumer engagement, impulse buying, millennials, generation Z.

INTRODUCTION

In today's marketing campaigns, companies are using influencers to promote their products through social media platforms such as Instagram. An influencer is someone who has built a large following on a social media platform.(Sweden Report)

A brand will leverage influencer marketing in order to engage, reach, and sell more products or services, and improve engagement. Rather than focusing on a traditional social context, influencer marketing is geared towards a social context and executed professionally. Authentic brands build loyal customers by establishing trust and creating an authentic relationship with their audiences.
(Sudha M. and Sheena K ,2017)

Relation between influencer marketing and consumer behaviour

A consumer's behaviour can be defined as how they purchase, use, and dispose of goods. It encompasses all their activities related to purchasing, utilising, and disposing of goods. As a result, customers' buying decisions are influenced by their senses, attitudes, and preferences.(wikipedia)
New marketing regulations were developed in order to educate consumers about social media content which can be considered as a paid partnership. It has thus changed the perception of influencer marketing among consumers.(Philip Weide,2018.)

An organisation can collect unfiltered, rich data about consumers directly from consumers by establishing a clearinghouse of information. In order to meet consumer expectations, consumers cite their friends and celebrities as the most credible sources.. (Marta Rebelo,2017.)

Also with help of their content there is an alignment of promotions done by the influencers..

Followers must be able to access the fashion presented by influencers. In a successful collaboration, their followers are encouraged to purchase because of their authenticity. Also, through their own fashion styles, they often establish trends, which in turn spur consumption for a while.

The given data concludes that influencer marketing has a very drastic effect on millennials' attitudes regarding several reasons, which includes the alignment of promotions presented by an influencer, taking in consideration the degree of credibility and trustworthiness of the messages, as well as an influencer's change in style.

The Millennial Generation

The millennial generation refers to individuals who are born in between the early 1980s and 1990s, upto to the

early 2000s. One of the most popular generations in the modern past is also the generation of someone who has grown up in a technological world and arrived at an age at which the new millennium has come of age.

Characteristics of the millennial generation
People of Generation Y may share a variety of traits, in addition to having witnessed the advent of technological advances like e-mail, the internet, and virtual reality:

Values meaningful motivation
People who are driven by creativity, sharing their knowledge and creating an impact on people and within their communities may be described as self-motivated.

Gives significance to their bonds with superiors
With their careers, millennials are showing more and more preference for a supervisor or manager whom they can relate to as a guide. In order to advance their careers, this generation has learned to feel comfortable requesting for advice and seeking suggestions from their superiors.

Intuitive knowledge of technology
Millennials seem adept at adapting quickly to new technology and changing depending on its level of sophistication as it becomes available in the age of new innovations and technological advancements.

Flexible to change
As these industries continue to evolve, it seems these companies recognize that with the changing era methods of work within the modern workplace must take a revolutionary change .This generation has also adapted to an environment that keeps changing, allowing them to offer a diversification of services .

Prioritises significance on work rather than time
Instead of focusing on how many hours they can put in at their assigned work, this generation focuses on producing results.

Curiosity for enriching their knowledge
This generation exhibits a deep curiosity and a desire for learning what exactly is happening practically in the world,and accordingly develop their further skills and knowledge which helps them at their workplace.

Spontaneous to the feedback to improve themselves
They are open to continuous feedback on a timely basis from their seniors, and they value advice, guidance from their seniors.

Free-thinking and creative
Millennials may tend to think more imaginatively because of technological innovation. They enable themselves to come up with creative solutions to problems in the workplace.

Esprit De Corpse
Teamwork is very important for this generation.While working with a team, millennials are likely to collaborate on projects, solve problems from a unique angle, and come up with new and innovative approaches to their problems.

Objective

1. To study if influence marketing has enhanced brand awareness in millennials
2. To understand the most preferred product/service of millennials through influence marketing
3. To analyse if the fame of influencer engagement has an impact on consumer purchase decisions.
4. To study if millennials get affected with changing preference of their influencer.

Most preferred product/service of millennials through influence marketing
An analysis (Stefan Zak, 2020) showed that influencer marketing may be more beneficial for some products than others. Clothing, shoes, cosmetics, and surprising enough, even services can be influenced by influencers

The fame of influencer engagement has an impact on consumer purchase decisions
Ad blockers have contributed to influencer marketing's growth. Consumers block advertisements to healso ar from influencers.ght of these trends and numbers,In light it is pretty evident that user generated content and influencer marketing have a profound impact on customer behaviour and buying conclusion. And while superstars have a wide audience, small influencers have strength. (Cobain, 2020)

According to the Stefan Zak, it was coined out that:
The maximum trusted people were sportsmen (44.5%) as per the respondents

Moreover the research also stated that amongst others, 32.8% pondered about the goods which were of good quality.

At least 30% of respondents are assumed to purchase an article as it is recommended by the influencer of their choice, according to the research article. However, only 21.9% of respondents were deemed likely to purchase by the analysis.

The Consumer’s perception of influencers was impacted by the clothing of the influencers, which was one of the major findings in the research. While buying clothes, 45% of respondents were to be influenced, among which 12% strongly agree, 33% partly agree.

Consumers have become accustomed to the promotion of product & brands done by influencers ,being part of

their day to day activity according to the thesis. It is possible to find advertisements with influencers manier times in a day, mostly on social networks. A range of consumer goods are promoted by influencers including clothes, shoes, cosmetics, as well as services. Influencer marketing can be beneficial to a brand and impact its sales in many ways, most importantly by bringing in more customers.

Millennials get affected with changing preferences of their influencer.

Influencer marketing tends to revolve around trust a lot these days .Consumers are educated enough to understand that the commercials create superficial impact as stars are paid to promote the product and are not personally inclined towards it. However the researchers have concluded that the influencers have created their public image out of their passion or hobby and would not want to lose followers by endorsing the product they have not thoroughly researched . Their audience trusts them because of this.

An influencer is always expected to be loyal towards their followers by choosing the right brands for endorsing. They should always respect their audience and cater to the right and genuine feedback of distinguished brands to deliver real value and gain followers accordingly.

Influencers' recommendations carry a lot of weight with consumers, but why exactly? Researchers have concluded that expert status allows influencers to build and maintain trust of their followers. It is concluded that 39% of consumer purchase decisions depend on an influencer's brand inclination when determining the worth of their endorsement, according to a study by Olapic. Influencers leverage their expertise to influence consumer buying behaviour. The internet is awash with experts, but they have also become sources of influence (Wrontis & Anna , 2021)

It is observed that people sharing the same characteristics have an inclination towards each other and tend to trust the people of the same liking community . In real life more than a celebrity people trust people , also over a brand and marketers. However, the influencer community is real and genuine.

Influencer community has grown as a result of trust, presentation and attraction of people sharing the same likes and dislikes.influencer-generated content contributes to the shaping of buying behaviour. As well as the impact on audiences created by influencers, the difference in content they bring is something that regular marketing does not possess, thereby increasing the desire for a product.

It is observed that out of all the influencers , Social media has stood at the top in creating the most influencers, as consumers tend to put more trust in peer recommendations than in brand ads .A study has concluded that a product is accepted better if it works well in an affiliated market. (Barker, 2020)

Influence marketing has enhanced brand awareness in millennials

Only 37% of marketers say they manage influencer relationships across campaigns in the form of "always-on" relationships. For an authentic and engaging creator strategy to be implemented, long-term opportunities must be prioritised over moment-to-moment trends.56% say they work with the same influencers across campaigns.Throughout the complete customer lifecycle - from awareness and selection through to purchase and use - creators can see the needs of their followers. The study developed by the name Social Judgement theory (SJT) and Cognitive Dissonance (CD) provides an output for consumer behaviour , consumer intention, attitude towards certain specified behaviour and social norms (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975). Promotional messages can persuade consumers to change their attitudes to a certain degree by using ELM (Wathen & Burkell, 2002).It is been understood that instagram bloggers tend to promote products which are sponsored and it would be a prime area to be invested.Many researchers have studied its impact on advertising and over all marketing activities (Schumann, Kotowski, Ahn, & Haugtvedt, 2012). The ELM model caters valuable information about variations bought by the sources, messages , the recipient and the context of the content shared by the influencers on the media by their persuasive actions(Petty and Cacioppo, 1986) . It has concluded persuasions in two parts : a central or a peripheral one.

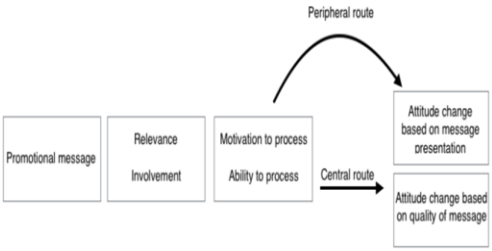


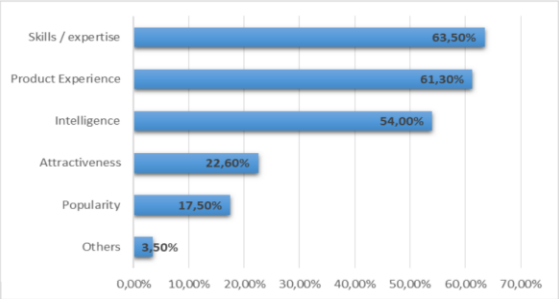
Figure 1: Elaboration Likelihood Model based on Petty and Cacioppo (1983, p.6).

Using Instagram or any other type of social media to post pictures and reviews about a product to promote it, an influencer is using influencer marketing.ELM must be applied to this situation in which consumers evaluate their motivations and capacities as well as the relevance of the message and degree of involvement (Schumann et al., 2012). It is also important to understand that an influencer'san influencer's inclination towards a brand can alter consumer decisions as the customer chooses to follow the influencer due to their personal interest or private

hobby. Accordingly, the shopper continues into having capacity and inspiration to process
The limited time message and the focal course for influence will be taken, which leads to an adjustment of mentality (Petty & Cacioppo, 1986).

Findings
1.The click through rate for traditional marketing was relatively low, however, influencer marketing increased the click through rate and also helped companies spread awareness of their brands.

2 We have also analysed that, companies can target their potential customers through various influencers



over brand ambassadors as they contain a niche audience which is more effective.

3.It was also observed that among all the areas in which influencers operate, respondents trust most to athletes and experts in the particular genre.

4. It is quite natural to assume that beauty and attractiveness are the key factors, but it resulted that users tend to give more importance on the expertise as well as the skills of the influencer, rightly shown in the figure above

5. It was noticed that Influencer-generated content contributes to the shaping of buying behaviour. As well as the impact on audiences created by influencers, the difference in content they bring is something that regular marketing does not possess, thereby increasing the desire for a product.

Conclusion
After studying the above data we analysed that, influencer marketing is affected by consumer's approach due to various reasons such as a collaboration between an influencer and a company must be recognised by the consumer, as well as of high interest and high involvement for the user to process it.

Influencers advertising products and brands have become part of users' lifestyles. There are many advertising campaigns that we spot on various social media platforms. Not only various services are promoted by influencers but also products, such as clothing, shoes, and cosmetics.

Many brands are being benefited using influencer marketing, which results in positive sales growth of its product. Although, buyers should not only be positively influenced, but also companies that choose to implement this strategy should be aware of the pros. & cons. involved in working with influencers.Society - influencers are a great way to generate brand excitement and engagement, drive sales, and generate leads for more potential clients. It's also an excellent way to work in brand promotion through partnerships.

A survey conducted by annalect found that Twitter users have reported a 5.2 times increase in purchase intent when exposed to promotional content from influencers and 49% of people say they rely on recommendations from influencers when making purchase decisions which contributes to the overall growth of the market.

Consumers- Manier times consumers find great emerging brands with surprisingly great products.Consumers are provided with more opportunities due to the well research of the companies done by the influencer's regarding the products that they would not have previously engaged with. Moreover, they can feel the marketplace and can compare the difference of products to make the choice more easier.

limitation
The study does not deal with some of the negative sides of influencer marketing, such as potential influencers inflating the size of their following and possible influencer fraud in general. Depending on how competent the influencer is, a variety of companies will approach the influencer for creating brand awareness. Also, it is not assured whether the influencer will consider your brand for promotion as he has many companies associated with him.

References
Stefan Zak , Maria Hasprova (2020), The role of influencers in the consumer decision-making process.

Janusz (2020), Analysis of the role of the digital influencers and their impact on the functioning of the contemporary online promotional system and its sustainable development.

Mgiba,Nyamande (2020), Persuasive Influencers and millennials : How their relationship affectsaffects brand value.

Stefan Zak (2020), The role of influencers on consumer decision making.

Johan Grafström , Linnéa Jakobsson & Philip Wiede (2018), A Qualitative Study on What Reasons Affect Millennials' Attitudes by Influencer Marketing in Sweden

Mishka Gupta (2021), Impact of Influencer Marketing on Consumer Purchase Behaviour during the Pandemic.

Lidija (2019), Impact of Influencer Marketing on Brand Loyalty towards Luxury Cosmetic Brands.

Marta Rebelo (2017), How Influencers Credibility on Instagram is Perceived by Consumers and Its Impact on Consumer Purchase Intention.

Sudha M. and Sheena K. (2017), Impact of Influencers in Consumer Decision Process: the Fashion Industry.

Graftrom (2018), The Impact of Influencer Marketing on Consumers' Attitude

Graftrom & Jenny (2018) , A Qualitative Study on What Reasons Affect Millennials' Attitudes by Influencer Marketing in Sweden.

Zdenka (2018) , Influencer marketing as a modern phenomenon creating a new frontier of virtual opportunities.

S. Arora, C. Bansal (2019), Measuring social media influencer index- insights from facebook, Twitter and Instagram. Journal of Retailing and Consumer Services.

Wrontis & Anna (2021), A systematic review, integrative framework and future research agenda.

PERFORMANCE BASED LOGISTICS: A PPP STRATEGY FOR A MORE RESPONSIVE DEFENCE OPERATION

Kaushik Ranjit Poddar [#1], Sumati Sidharth[*2], Shobhanam Krishna[#3]

M.Tech (Technology Management), Department of Technology Management DIAT (DU) PUNE 411025 India
kaushikpoddar44@gmail.com
sumatisidharth@gmail.com
shobhanam14@gmail.com

***Abstract*— Military logistics is the ability to plan, coordinate and conduct the mobilization as well as maintenance. Performance Based Logistics (PBL) is indeed an absolute requirement for tactical readiness as well as a sustainment strategy for a weapon system, as well as an essential means that can produce improved performance both for latest and traditional weapon systems by utilizing long-term performance-based accords and providing incentives on desired results. PBL support strategies that are successful constitute a win-win situation for defence enterprises and industry stakeholders. PBL is all about performance, and readiness. It is also about facilitating mission completion and making sure that the armed services have weapon systems which are accessible, reliable, as well as supportable when and where they are needed. PBL serves as a facilitator for the Public-Private Partnership (PPP) initiative. PBL continues to support practices that make better use of government and non - governmental capabilities through initiatives involving government and corporate collaboration. Accurate and specific measurable specifications or metrics are the foundation of an effective PBL. PBL may aid in lowering Life Cycle Costs (LCC). PBL provides an effective method for dealing with obsolescence throughout a product's life cycle. Unlike conventional methods to legacy system modernization, PBL handles the technical assistance of weapon systems, assemblies, sub-assemblies, and parts holistically. PBL is an extremely effective tool for avoiding obsolescence as well as achieving sustained modernization.**

Keywords-- Performance Based Logistics (PBL), Public Private Partnership (PPP), Life Cycle Costs (LCC), Defense Acquisition Guidebook (DAG), Private Finance Initiatives (PFI), Maximum Holding Period (MHP), Strategic Partner (SP), Indian Production Agency (IPA), Organizational Culture (OC).

I. INTRODUCTION

Combat force like ours, celebrating soon, its ninetieth year of formation is maturing with each passing year. We have had the unique distinction of operating possibly all types of military hardware from our chequered inventory, which has grown over the last eight decades. We also have yet another distinction of adopting NATO and non-NATO technologies that we have acquired as a part of the transfer of technique and transfer of technologies in the numerous defence acquisitions in the past. Some of our platforms are getting old, and we'll need to replace a lot of them in the near future. Our maintenance man hours and operational overheads will keep going up if we continue to operate on aging platforms. This might lead to a reduction in readiness and an increase in the cost of maintaining obsolete technologies. Therefore if we reverse the trend quickly, we could experience a cascade of events in which condensed readiness forces us to divert even more funds away from device modernization and put it into routine maintenance and operations, further trying to delay modernization. Overuse of aging machinery reduces operational serviceability and readiness while increasing maintenance and operations costs - a vicious circle.

Military logistics is the ability to plan, coordinate and conduct the mobilization as well as maintenance.[1]. In comparison to commercial logistics, military logistics encompasses all of the processes that enable deployed armed forces to sustain their mission preparedness on a constant basis. PBL is indeed a tactical readiness absolute requirement, sustainment strategy for a combat system, as well as an essential means that can produce improved performance both for the latest and traditional weapon systems by utilizing long-term performance-based accords and providing incentives on desired results. When such practices are implemented properly, the resulting outcomes will always be at a cheaper rate than would or else be accomplished through more conventional sustainment strategies. Successful PBL support approaches create a win-win situation for defence enterprises as well as industry partners.PBL, as a method to incorporate the procurement as well as sustainment of different systems, has been captured by one arm of our armed force in the recently concluded inter-governmental agreement for weapon platform

acquisition based on the merits of the concept.

II. AIM OF THE PAPER

The aim of the paper is to identify and appreciate issues and complexities in a PBL environment, identify factors for the deployment of PBL, suggest infrastructure-related changes for effective as well as efficient exploitation of PBL for a more responsive defence operation.

III. DEFINITION OF PBL

Definition of PBL as stated in the Defense Acquisition Guidebook, (DAG 2006, p. DAG-196), is put forth as "Performance-Based Logistics is the purchase of support as an integrated, affordable, performance package designed to optimize system readiness and meet performance goals for a weapon system through long-term support arrangements with clear lines of authority and responsibility. Application of Performance-Based Logistics may be at the system, subsystem, or major assembly-level depending on program unique circumstances and appropriate business case analysis".

First and foremost, PBL is all about performance, and readiness. It is also about facilitating mission completion and making sure that the armed services have weapon systems that are accessible, reliable, as well as supportable when and where they are needed. Performance-based logistics strategies improve overall system availability thereby reducing costs as well as logistics footprint. The core of PBL is purchasing performance outcomes in place of focusing on a conventional "spares and repairs" sustainment model. It is the acquisition of a capacity to withstand the warfighter as opposed to the acquisition of individual parts or actions for repair. PBL is concerned with outcomes instead of discrete transactions.

IV. PBL AS A PUBLIC-PRIVATE PARTNERING (PPP) INITIATIVE

PPP is an agreement between a government-owned entity on one side as well as a private sector entity on the other. It is frequently used for the utilization of government assets or services over a set period of time through investments and/or management by a private sector entity. The risk allocation between the private and public sectors is very well defined. The private entity selected through open competitive bidding receives payments based on performance linkage that conforms or is standardized to stipulated and determined before performance standards that are observable by the public entity or its representative.

The PPP spectrum can be categorized into three parts. The first and most notable is termed as Private Finance Initiatives (PFI), wherein the public/defense sector enters into long-term contracts to buy goods or services. This involves activities wherein the private enterprise presumes responsibility in providing services like construction, maintenance, as well as traditional sustainment/replenishment both for the novel as well as traditional weapon systems. The second category involves bringing a private-sector collaboration into a state-owned military industry enterprise by the use of a strategic partner, generally with a minority stake. The third collaboration arrangement involves the use of private sector expertise as well as financial resources to maximize the commercial viability of military assets.

Through initiatives involving government and industry collaboration, PBL encourages strategies that make better use of government and non - governmental capabilities. PBL is a powerful device for lowering life cycle costs. If implemented appropriately, with cautiously constructed as well as completely understood metrics, incentive scheme, financial build, as well as contracting strategy, PBL can help optimize performance as well as cost targets in the course of tactical development of various forms of Government-Industry partnerships. [2].

PBL can be tailored to the specific requirements of each program. The core idea of purchasing performance outcomes is shared by all PBL arrangements; however, the strategy for PBL for a certain program must be customized towards the operational as well as support needs of the end items. PBL does not believe in solutions that are one size and fit in all. Similarly, no framework appears to exist for support sources in PBL techniques. Almost all armed forces' support system comes from a blend of public and private sources. Similar provisions are outlined in the recently completed inter-governmental agreement for weapon platform acquisition.

PBL emphasizes the best value, but that's not always restricted to the least contract amount. The best value determinations of inherent capabilities which are best provided by the Original Equipment Manufacturer are used to identify the right mix of support sources. This procedure would then decide the best support strategy for PBL inside the product support range, which can vary from primary support to an OEM-provided complete system support package. The idea of a best value support solution tends to vary by program, but it is always allied by means of a cost pool. It will also contain a certain amalgamation of performance, capacity, expertise, infrastructural facilities, flexibility, quality, reliability, integration, as well as ease of maintenance, among many other crucial or imperative components. The metrics as well as incentives recognized inside the PBL product support strategy, that must be managed to capture inside the product support clauses of the acquisition contract, play a prominent part in achieving these best value results.

Certain common threads arise from numerous PBL definitions. The three major themes are: procurement as well as logistics assimilation for overall system life-cycle, incentives, as well as performance targets. The OEM / contract agency aims to improve performance in certain substantial way all through the life of a weapon system without trying to dictate the specific techniques of performance. Furthermore, the service arm/beneficiary is inclined to just provide incentive schemes to the vendor to congregate these performance objectives. PBL assimilation eradicates the practice of trying to describe particular ways of operating by trying to describe required outcomes as well as employing incentives to promote success.

Under the auspices of PBL, an extended joint venture among the government and the private sector is created near the beginning of the development of a system or else product. The government receives an advantage in a lot of formats during the execution stage of PBL, including increased immediate access to commercial practices that would offer logistical support, added incentives it offers for industry performance, cost savings, and prospective increases in system efficacy. The benefits of the industry, however, include the prospective to broaden the scope of business as well as the timeframe of a given program, the ability to try to enter novel business areas, plus improved freedom to implement novel methods in the development of product when government support is provided. [3].

V. DRIVERS FOR PBL

Nowadays, the Ministry of Defence focuses on innovative programs that improve performance while lowering the overall cost of the system over the entire existence of a weapon system. Numerous RFIs and RFPs that have been floated since 2011 have sought the inclusion of PBL package proposals from the OEM. The OEM along with Strategic Partner (SP) / Indian Production Agency (IPA) is required to propose a PBL package for a weapon platform availability of 75% with a minimum average operational effort per platform per year for a period of ten or twenty years. Issues like warranty, obsolescence management plan, and comprehensive cost estimates inclusive of PBL costs have been stipulated to be provided by the OEM. The PBL action plan emerged from the MoD's urge to alter the way it conducts its business.

The primary factors responsible for drivers of PBL have been collated after pertinent literature review and in house discussions. Each of these drivers for PBL is based on the perception, as well as the actual fact, that weapon systems, as well as platforms, are costly to run, complicated to upgrade with cutting-edge technology, and take a while to reach the ground. That is also true for the upkeep and repair of both novel as well as legacy systems that have been deployed. The drivers for PBL focus on altering the entire atmosphere by suggesting tactical future directions are outlined in the following subparagraphs:

A. Increasing maintenance, operations, as well as support costs for both new and legacy systems

B. Longer wait times for customers

C. Improved flexibility as well as agility required in the novel as well as the largely impulsive military environment

D. Tightening budget constraints

E. Need for solutions to weapon obsolescence problems

F. Need for modernization of weapon systems to improve combat capability

The traditional approach to sustainment focused on fixed or variable quantities of spares, tools, testers, special maintenance equipment, and so on, depending on past trends in demand, asset reliability, and anticipated consumer uses. The armed forces had to estimate and calculate their requirements, after which acquire and store them in conformance with the exploitation pattern. This strategy tended to produce large inventories as a consequence of an increase in the "whiplash demand effect" exacerbated by a "supply push." Predicting, ordering as well as managing inventory, storage of goods, obsolescence management, transportation, reliability tests, configuration management, & field engineering were all risks and costs borne by the user. This strategy encouraged OEMs as well as vendors to supply enough spares while stimulating advancements in quality and durability to be integrated into the "succeeding" generation of equipment, resulting in weapon systems with low accessibility. [4].

The notion of PBL has emerged as a popular technique of weapon system support and maintenance in a lot of nations, with the United States leading the way with several measures, standards, as well as training programs. The method is known as Performance Based-Life-Cycle, product support has been attributed with providing improved readiness as well as cutting the cost of supporting platforms, electronic systems, and devices, etc. This has been aptly demonstrated over a decade and a half during the Multi Nation Forces (MNF) campaigns in West Asia right from Iraq to Afghanistan.

VI. PBL METRICS FOR PERFORMANCE MEASUREMENT

Accurate and specific quantifiable specifications or metrics are the foundation of an effective PBL. The following outcomes should be supported by PBL metrics.

A. Operational Availability -The percentage of time a weapon system is available for use in a mission or its ability to maintain operations.

B. Operational Reliability- The effectiveness of a weapon system in achieving mission success aims. A mission goal could be a sortie, tour, launch, destination reached, capability, and so forth, depending on the weapon system. The emphasis must be on maximizing inherent reliability, which would be the best that can be attained in all conditions.

C. Cost per Unit Usage -Total operational costs divided by the appropriate measurement unit for a given weapon system, which can be a flight hrs, a steaming hrs, a launch, a mile driven, and so forth.

D. Logistics Footprint - The presence of government/contractor logistics support required to deploy, maintain, as well as move a weapon system. Tangible elements include inventory, equipment, personnel, amenities, transportation assets, as well as real estate.

E. Logistics Response Time - It is the amount of time in between the transmission of a logistics demand signal as well as the fulfillment of its logistics demand. (Wynne, 2004).

A critical component of the PBL program is customizing the measures to the operational role of the system[7]. Performance metrics must reflect the preferred operational results. As these results differ from one area of sustainability to the next (maritime, aerospace, land, and electronic), so will the typical performance metrics used will also vary.

VII. ASPECTS OF PBL ENVIRONMENT TRANSITION

Performance-based agreements are a new revolution, and as Macfarlan and Mansir put it, "the agreement recognizes what's required, but the contractor defines how to fulfill the requirement." PBL contracting must foster new and improved methods of managing spare parts inventory, reducing administration costs, negotiating deals, and allocating resources. Having the right parts in the right place at the right time is vital to economic success in PBL. By concentrating more on determining the required levels as well as delivering spare parts and repair functionality all through the network of support, OEMs can further efficaciously price PBL agreements as well as cut the levels of risk and uncertainty they face when trying to execute the resulting agreement.

Adopting practices more common in commercial enterprises is a key challenge for converting the military forces to a PBL environment. To achieve the PBL objectives, both the government and industry should agree on business practices so as to maximize value for all parties. A transition to PBL necessitates several infrastructure changes. At the strategic level, there is a need for cultural change in the implementing organization. Organizational Culture (OC) is a system of shared beliefs and expectations between members of an organization. (Hellriegel, Slocum, & Woodman, 1986). The behavior of the organization's members is determined by these shared beliefs and expectations. Evolving OC is compounded by the notion that people often seem to encircle themselves with all those who share their beliefs as well as expectations, bolstering their prevalent beliefs and expectations. Before PBL implementation, OCs must be addressed because the large percentage of these a tradition or faith which is not appreciative of Implementation of PBL. In the management literature, there are many models for successful change management (Camm, Drezner, Lachman, & Resetar, 2001). There are already great instances of government success in changing the culture of a particular organization.

PBL could aid in lowering Life Cycle Costs (LCC). Long-term contracts are indeed the primary way for Implementation of PBL because they guarantee that the contract is in place for a long period, making sure an acceptable return on investment. Additionally, unlike the government, a contractor can distribute the purchase of essential materials such as titanium, aluminum, steel, and so forth above a longer time frame. As per govt, industry, as well as academic studies, PBL contracts frequently improve availability by 20-40percentage points as well as cut prices by 15-20 percentage points (Miller, 2008). PBL is worth the money even though there are risks, according to the UK National Audit Office.

The maintenance ideology is based on the spares system which accounts for various maintenance levels. Maintenance procurement is indeed the exact computation of demand based on predicting the anticipated utilization of spares during entire operating hours to be finished mostly during the Maximum Holding Period (MHP). The above prediction is done by relating the consumption/spares well over the previous 12 months to operational hours attained by the weapon platform during the same time period and afterward trying to portray them towards the upcoming MHP. Performance-based management is a move in the correct direction in trying to address the ongoing issues of a skilled labor shortage as well as erratic spare - parts supply. By maintaining the required levels of serviceability, device

effectiveness can be assured all through the life span. To ensure that the agreement reached underneath a performance-based model is accomplished, the collaboration should be that of a buyer and seller, as well as a stakeholder in the effectiveness of the devices. A pricing scheme for long-term spare-parts supply is also required.

PBL provides an effective method for dealing with obsolescence during a product's life cycle. In contrast to traditional strategies for legacy system modernization, PBL handles the product support of weapon systems, assemblies, subassemblies, as well as components holistically. PBL is a powerful tool for reducing obsolescence and enabling prolonged modernization of existing weapon systems, assemblies, subassemblies, and components. "During crises and joint operations, PBL uses supply chain processes and systems to provide versatile as well as prompt material support response" (DAG, 2006, p. DAG-184). A supply chain management approach is essential to the accomplishment of any PBL initiative. Material support is a key link in the supportability of weapons systems. Spare part distribution, asset visibility, and obsolescence mitigation are all part of supply chain management. Transportation as well as visibility of assets have a major impact on high-level metrics from the perspective of a warfighter and therefore should be highlighted in the PBL tactic. (DAU, 2005a, pp. 3-7, 3-8) [7].

VIII. CONCLUSION

The PBL approach benefits both the government as well as the defence industrial base, plus it has tremendous opportunities for aligning customer-supplier incentives as well as effectiveness across a sophisticated supply chain. PBL significantly improves performance while lowering operating costs across the entire life cycle. PBL is about weapon system performance, not just operators on the battlefield or outsourcing. It all comes down to preparedness, best value outcomes, potential, as well as supplying the armed forces with efficient & effective support. PBL represents a significant shift in weapon system support, ensuring that they are reliable, sustainable, and, perhaps the most notable, accessible where and when the fighting arm requires them at the lowest possible cost.

Based on the experiences of several countries, logistics transition via a performance-based strategy has demonstrated to be an excellent method of improving the efficacy of weapon systems and platforms in the face of shrinking defence spending and an ambiguous surveillance climate. It is widely regarded as providing "value for money." [8].

ACKNOWLEDGMENT

The authors wish to acknowledge and thank Group Captain (Retd) Vinay Kaushal VSM, Shobhana Joshi, Bill Kobren, for reference and casual production of their support work.

REFERENCES

[1] Andreas Glas, Erik Hofmann, Michael Eßig (2011) Performance-based logistics: a portfolio for contracting military supply; International Journal of Physical Distribution & Logistics Management Vol. 43 No. 2, 2013 pp. 97-115 q Emerald Group Publishing Limited 0960-0035 DOI 10.1108/IJPDLM-12-2011-0229

[2] Bill Kobren (2009), “What Performance Based Logistics is and what it is not—and what it cannot do”, DAU

[3] Charles O. Coogan and C.P.L. Fellow, “Performance Based Logistics: What it Takes.”

[4] Jacques Gansler, William Lucyshyn “Evaluation of PBL”, 2006

[5] Frost and Sullivan, “Performance Based Logistics: A Global Trend in the Aerospace and Defence Sector”

[6] Ira Lewis (2005), “Public Management and Performance-based Logistics in the US Department of Defense”

[7] Defense Acquisition Review Journal. Volume 11, Number 3, December 2004-March 2005

[8] Dr. David Berkowitz, Dr. Jatinder N. D. Gupta, Dr. James T Simpson, and Joan A Mcwilliams (Mar 2005) Defining And Implementing Performance-Based Logistics In Government

[9] DEFENCE ACQUISITION International Best Practices. Edited by Laxman Kumar Behera Group Captain (Retd) Vinay Kaushal. INSTITUTE FOR DEFENCE STUDIES & ANALYSES NEW DELHI. ISBN 978-81-8274-711-1. Shobhana Joshi (2013), Perspectives on PBL, pp. 187, Published by PENTAGON PRESS

Effectiveness Of Online Classes on Students Learning Process

Dr. Anita Dsouza
Department of Commerce
TSWRDCW – Warangal East
Email id – annudsouza13@gmail.com

Abstract

The sudden outbreak of a deadly Virus (SARS-CoV-2) shook the entire world and it was named as COVID19. This led to the drastic shift in the education system which resulted in the shift to online mode of teaching. So therefore, one of the dominant roles of technology is in the field of education. For most of us, we may feel that teaching is same what it was years ago. In the pre- technological era, the only mode of teaching was a teacher coming and taking a lecture and then giving the students some homework to complete. The tools for teaching were only a chalk and board. Though this method has its own advantages, a need was felt to take teaching to the next level and make the class more interactive and interesting. Technology hasn't only changed the way teachers deliver their lessons and how students learn; it has also made education in general more accessible to millions of students through online classes and online resources. This has resulted into the teaching getting transformed from teacher centric teaching to student centric teaching where students are made to analyse in different ways and come up with the suitable solution. The present study is about 262 students who are studying graduation in private colleges in Hyderabad. A structured questionnaire was prepared and was forwarded through google form to seek their responses. The student's response will be analysed using Chi-Square with the help of SPSS software. It's found that initially students were very hesitant to opt for online classes as the only mode of classes, slowly they had accepted it as the only way of classes. But as every aspect has its own advantages and limitations, network issues, no face-to-face teaching were known to be the barriers.

Keywords: Education, Blackboard and Chalk, Online mode, Internet, ICT, Technology.

INTRODUCTION:

Technology plays a very essential part in building up the economy. The role of technology is seen in almost all the areas of commerce and business and most significantly in the field of education. In this 21st century, the relevance of technology plays an essential role as the teaching process is not the same as it was earlier, It is seen that there is a shift from the basic teaching tools to the advanced teaching tools as students have become very much alert about the latest trends that are happening in the economy. It is seen that the use of modern tools of technology have made learning more creative and interesting among the student community. The transfer of knowledge and information becomes very easy with minimum or zero errors. The relevance of technology in the education field has made the work of teachers and students more reliable. In the past 2 years, the impact of COVID was very much visible in the field of education where in transformation was done from physical or offline classes to online classes. It was tough for both teachers and students to embrace technology related classrooms. But gradually, there was acceptance of

technology in the education field and it was a welcome move.

ADVANTAGES OF TECHNOLOGY BASED LEARNING (ONLINE CLASSES)

1.As internet is everywhere, students can find it very easy to get solutions to the various doubts, tutorials and other assisted needing material which will ultimately help them in improving their learning.

2.It proved to be cost effective as students can be at their own convenient location and attend their online classes

3. Internet has become very affordable

4. The learning material is available by the tutor all the time in the form of notes and videos. The teachers used various tools to explain the topic like PowerPoint slides, animations and images, which gave the students a bird's eye view of the entire topic.

5. Exchange of experience is also seen where students are seen interacting with various eminent personalities on Blogs, YouTube channels, etc

6. As globalisation concept is gaining momentum, it is seen that the usage of technology, many universities and colleges are reaching out to students of all ages around the world.

7.In the present scenario, students are looking for flexible studying programs. So therefore, the education is becoming global using the technology. Many universities and schools are offering online courses.

LIMITATIONS OF TECHNOLOGY BASED LEARNING (ONLINE CLASSES)

1. Technology can distract students and they may become less social because there is less face to face interaction with the teacher and the student.
2. E-Learning requires self - motivation which everyone may not have. The students are not always possessed with good management skills.
3. Though internet is everywhere, still internet is a dream come true for few students.
4. Smartphones are expensive
5. There are internet connectivity issues most of the time.
6. Insufficient data as the classes are day-long.

OBJECTIVES OF THE STUDY:

1. To understand the relevance and emergence of online learning and its impact on students
2. To analyse the pros and cons of online learning from students' point of view
3. To suggest various ways to encourage and build a technology related environment in the academic institutions.

LIMITATIONS OF THE STUDY:

1.The study is limited to the students who are studying in private colleges in Hyderabad

2. Only Under-graduate students have been selected for the sample

3. All the students have smartphones with internet connectivity.

4. Out of 310 respondents, only 262 respondents gave complete responses for the questionnaires given.

RESEARCH METHODOLOGY:

DATA COLLECTION: The data collection was undertaken from the primary and secondary sources. The primary sources of data collection include a questionnaire and face to face interview taken by the researcher during the study. The secondary data includes the data available in business magazines, newspapers, research papers, etc.

RESEARCH DESIGN: The research design adopted in the present study is Descriptive research design, which implies that with the help of a structured questionnaire, the information is generated.

SAMPLE SIZE: The sample size is 262 under-graduate students who are studying in private colleges in Hyderabad. The students were from BA, BCom (General), B.Com (Computers), B.Com (Honors) , BSc and BBA.

LITERATURE REVIEW:

Asta Kybartaite in their paper on "lmpact of Modern Educational Technologies on Learning Outcome" published in Tampereen Teknillinen Yliopisto Tampere University Of Technology concluded that the measures for quality control of E-courses is having large variation. The author is of the view that the system is not to develop new quality concepts, but to adapt already existing ones. Learning has become more mobile as it is seen many students are enrolling for online courses. Thr concept of E.Learning has become successful as students do not have to move from one place to another to learn any new course or degree. When it comes to the teachers, initially it was very difficult but later they also have developed and are providing the material for preparation through PowerPoint slides. The students are encouraged to give presentations. E.Learning will help in transfer of information from teacher to the student in the best possible way. It is felt that there is a need for establishing a virtual laboratory where students can learn theory of the concept and apply it in the practical way in their day to day life.

In the words of Shivangi Dhawan, in his paper on Online Learning: A Panacea in the Time of COVID-19 Crisis
Publisher in Journal of education system interpreted that this sudden emergence of technology is teaching us that future is uncertain and we should be ready to face such uncertainties in future too. Planning is very much needed as planning gives us en edge to face such emergency situations. We should set priorities and come up with step by step planning. This pandemic has proved us that the students should be dynamic and they should have problem solving skills with skill solving ability. The educational systems should keep all these points in mind and implement these skills into their students with the help of various plans.

As per the World Economic Forum, pandemic has changed the way the education is being imparted. There is a need to find out the solutions to the problems of technology. There is a inequality gap in the world of technology. According to them, teachers have become very much used to the conventional mode of teaching and are findijg it difficult to accept any change. But in this present situation, we should remember to be dynamic and should accept any change that is coming our way as a positive change and should move ahead. At the same time, we should also keep in mind the students who are deprived of the online courses due to the unavailability of smartphones. Other reasons for the unavailability of mobile phones is the students may not have internet facility at home.
In words of (Todorova & Bjorn-Andersen, 2011), we are forced to adopt online learning. The pandemic has surely increased the applicability of online learning. Most of the educational institutions and offices were closed because of the COVID pandemic. There were various applications that were used for online classes. Example – ZOOM, Google meet, etc are having innovative features like conducting online classes with the help of web conferencing, webinars, video chats and live meetings.

DATA ANALYSIS AND INTERPRETATION:

1. H_O – There is no relation between impact of online classes and students' ability in understanding the concept.

H_1 - There is a relation between impact of online classes and students' ability in understanding the concept.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	76.175[a]	12	.000
Likelihood Ratio	53.601	12	.000
Linear-by-Linear Association	3.343	1	.067
N of Valid Cases	262		

INFERENCE:

The above table shows that the Chi-Square value for relation between impact of online classes and students' ability in understanding the concept is 76.175 and the corresponding significant value is 0.000. As the calculated significant value is less than 0.05, the alternate hypothesis is accepted and the null hypothesis is rejected. Hence it can be concluded that there is a relation between impact of online classes and students' ability in understanding the concept.

2. H_O - There is no significant relation between student's interest in giving online presentations and their effectiveness in presentations using ICT

H_1- There is a significant relation between student's interest in giving online presentations and their effectiveness in presentations using ICT

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	33.865[a]	6	.000
Likelihood Ratio	32.027	6	.000
Linear-by-Linear Association	10.166	1	.001
N of Valid Cases	262		

INFERENCE:

The above table shows that the Chi-Square value for significant relation between student's interest in giving online presentations and their effectiveness in presentations using ICT is 33.865 and the corresponding significant value is 0.000. As the calculated significant value is less than 0.05, the alternate hypothesis is accepted and the null hypothesis is rejected. Hence it can be concluded that there is a relation between student's interest in giving online presentations and their effectiveness in presentations using ICT

3. H_O – There is no relation between difference in perception of students' response in online classes and perception of student's response in offline classes.

H_1 – There is no relation between difference in perception of student's 'response in online classes and perception of student's response in offline classes

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	97.608[a]	35	.000
Likelihood Ratio	88.195	35	.000
Linear-by-Linear Association	.780	1	.377
N of Valid Cases	262		

INFERENCE:

The above table shows that the Chi-Square value for significant relation between the difference in perception of students' response in online classes and perception of student's response in offline classes is 97.608 and the corresponding significant value is 0.000. As the calculated significant value is less than 0.05, the alternate hypothesis is accepted and the null hypothesis is rejected. Hence it can be concluded that there is a relation between the difference in perception of students' response in online classes and perception of student's response in offline classes.

FINDINGS :

1. Earlier, it was found that students were very hesitant to opt for online mode of education. This is mostly

because students were fully used to traditional mode of learning.

2. It is found that online and offline classes share few similarities. For example – students are still required to attend the classes as per the allotted time, understand the subject, answer the questions asked by their teachers, submit their assignments, etc. Its just that the there is no direct face to face interaction between the teachers and students
3. It is found that the 97% students are preferring quality education or classes in the online teaching.
4. 82% of the students are of the opinion that the retention of data or knowledge is more in online teaching as online mode has become a very interactive mode of learning. They can share their opinion and thoughts and arrive at conclusions.
5. 76% of the students are of the opinion that online classes have saved their time and effort, making it cost effective as they don't have to travel to their respective colleges, In the pandemic environment, travelling proves costly and same is eating out (Breakfast/Lunch) with friends
6. According to 73% of the students, the interaction is very limited as there is no teachers and peers having face to face interaction. Most of the time students are diverted. This will ultimately lead to lack of inter-personal and intra-personal communication among the students
7. The role of a teacher is getting widened here as teachers cannot supervise the students properly. Especially the time when internal assessment and external assessment is done, the teachers are unable to monitor the students constantly.
8. 32% of the students are of the opinion that one of the reasons of students not attending online classes because they are unable to possess a smartphone
9. According to the findings, it's found that 64% students are not satisfied with the online classes. Reasons include no internet connectivity, insufficient mobile data, etc.
10. 26% of the students are unable to clear doubts and 69% of the students are of the opinion that more screentime is resulting in health issues like fatigue, eye sight problems, stress, etc.
11. 56% of the students are of the opinion that the one-hour duration for the class is insufficient as the classes are not started at the allotted time because of network issues.
12. All the students are of the opinion that technology will help them to prepare for a better future and will make them more tech-savvy.

SUGGESTIONS:

The following suggestions can be given based on the above findings:

- The student should be encouraged to attend online classes. Their mindset regarding the barriers of online classes should be wiped off by giving them proper guidance
- The online classes should be taken a convenient time of the student and the faculty such that the at the time of classes, the students are possessing smartphones with them.
- The class duration should not be too long as it will be very difficult to manage the interest of the student. Last 10 minutes should be allocated for the any doubts clearance.
- The material of the class should be given a day before to the students so that the students can be ready for the class the next day.
- There should be two-way interaction in the online classes where students also should be given

time to give their opinion about the class being taken.

- The faculty should divide the syllabus content into smaller units so that the student doesn't lose the focus on the subject
- As body language, facial expressions, teachers' voice modulation play an essential role in the traditional mode of teaching, the same way the voice plays an essential role in the online classes. The teachers should slow down their speech to allow the students to capture

CONCLUSION:

It can be concluded that online education is here to stay and is evolving and growing rapidly. Online classes are offering students the latest ways to study and learn. Online teaching's effectiveness depends on the student – teacher interaction. As teachers have less control over students in the online classes, the teachers should try to create interest among the student community to attend classes. The teachers can use various ways to change the assignments and assessment exams given to the students so that the students active learning ability may be monitored more productively. As the present era is dominated by the technology and its related tools, combined online learning and offline self-learning effectively should be followed and implemented.

BIBLIOGRAPHY:

1.Jones I and Blankenship D (2017). Students' perception of online courses. Journal of Research in Higher Education. vol. 32

2.Lao, T., & Gonzales, C. (2005). Understanding online learning through a qualitative description of professors and students' experiences. Journal of Technology and Teacher Education, 133, 459–474.

3. Li, Y., Wu, S., Yao, Q., & Zhu, Y. (2013). Research on college students' online learning behavior. *e-Education Research*, **34**(11), 59– 65.

4.researchgate.net/publication/310503884_Online_Education_and_Its_Effective_Practice_A_Research_Review/link/5dea533d299bf10bc3452ad4/download

5. UNESCO. (2020, Match 13). *COVID-19 educational disruption and response*. Retrieved from https://en.unesco.org/themes/education-emergencies/coronavirus-school-closures

6.https://journals.sagepub.com/doi/full/10.1177/0047239520934018

7.file:///C:/Users/lenovo/Downloads/JITEv15ResearchP157-190Sun2138.pdf

 ISBN 978-81-927230-0-10

Packaging Improvement For Parts Receiving High Damage Claims

Prof. Gangadhar D Dukare[1st], Mr.Sumit Borhade[2nd]
International Institute of Management Science Chinchwad, Pune
gangadhardukare@gmail.com ,sumitborhade78@gmail.com

Abstract— In this research topic the relation between packaging cost and the damage done to a product. It is an important relation which we can use in cost analysis. For Various alternatives and we determine the packaging cost and the percentage of damage through simulated laboratory testing for draw compression& some of the actual practical observation. Then we plot the graph of the total cost of versus percentage damage. This can be used in determining the cost versus damage percentage when deciding on the best packing material. The final result on the improvement in packaging in receiving parts.The research at Mahindra cie chakan

Keywords: - Packaging ,Product failure, Cause and effect,

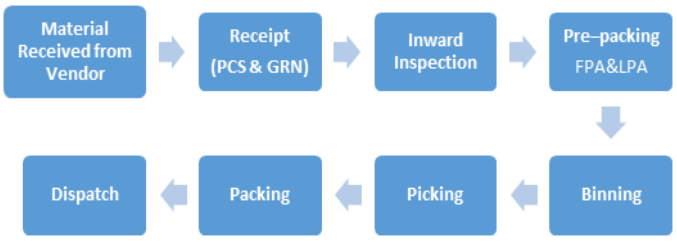
INTRODUCTION

The packaging improvement & Like certification, another important emerging function is total life cycle management. Green packaging is one of the components of the total life cycle. The use of resources to convert raw materials into packaging materials throughout the life cycle affects the environment. This packaging material is then loaded into a container, transported and finally disposed of. So how much energy is used, how much air is polluted due to all the components and processes in the life cycle is analysed. IIP is opening of a cell where all these studies will be carried out. As far as the Green Revolution is concerned, we have conducted a national survey on environmental friendliness that can be applicable to the packaging industry. And we've also come up with guidelines on what materials should be used in Europe and other developed countries, and at what cost. For eco-friendly materials, the tax is very low. Germany is very strict, they will not accept any material if it is not eco-friendly. Other countries accept wooden box, but the tax is higher. Because they either have to recycle the waste, or reuse that material. The condition is that you do it at your own expense or we will do it at your cost. So this is how indexes are worked. That's why we provide guidelines - if you're shipping to this country, your packaging material is classified into these indices. Due to multinational companies, global trade, many trends are coming in India regarding environment friendliness. In Japan you cannot use cello tape but only paper tape. Paper is eco-friendly whereas cello tape is not. Also corrugated boxes are allowed, thermocol is not. Now in the entire electronic zone, they get all the guidelines from the importing countries and those guidelines are definitely adopted, due to which the Green Revolution is imposed on us. If I were to tell you, you would say no - first let's talk about the cost. If I use paper tape it increases my cost. If I say don't use polythene, just use paper tape, no one will look at me. This is our national problem and my corporate problem.

Brief Description of the Problem:

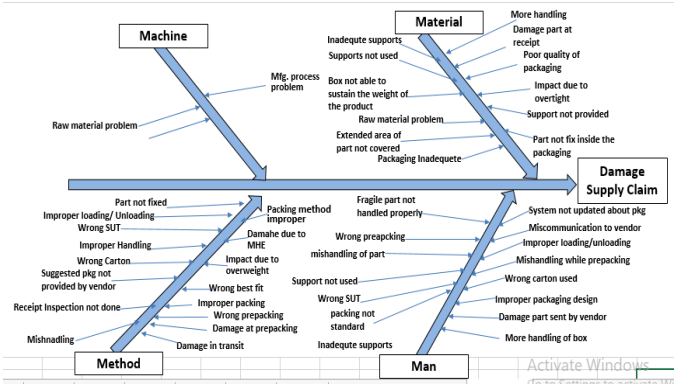
Damage supply-Damage part supply to customer against the invoice or ordered part no.Customer place the order for FFR, VOR/Accidental & commercial cases & then customer received the Damage part against the invoice then vehicle stand still till the correct / Ok condition part received.This will lead to higher customer dissatisfaction.Due to increase in Damage supply it increases the warehouse claim PPM & company performance is degraded.Also company risks financial losses & NVA activities.

Observation of the Process:

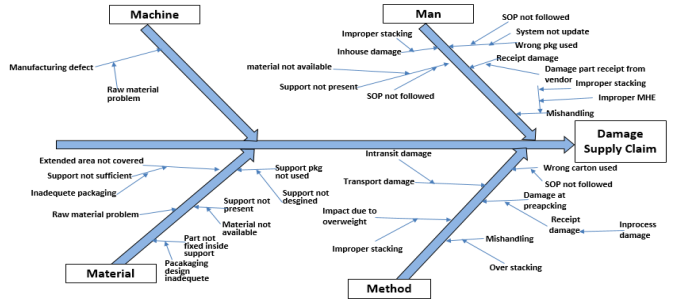


RESEARCH METHODOLOGY

 ISBN 978-81-927230-0-10



Cause and Effect Diagram



Revised Cause Effect Diagram (Based on Why-Why Analysis)

Brief Description of the Problem:

1.1 Damage supply-Damage part supply to customer against the invoice or ordered part no.

Customer place the order for FFR, VOR/Accidental & commercial cases & then customer received the Damage part against the invoice then vehicle stand still till the correct / Ok condition part received.

This will lead to higher customer dissatisfaction.

Due to increase in Damage supply it increases the warehouse claim PPM & company performance is degraded.

Also company risks financial losses & NVA activities.

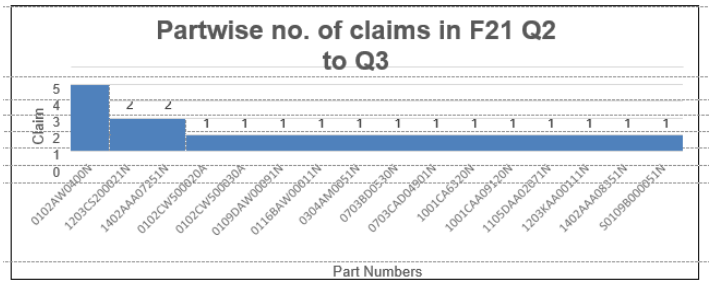
Some parts are pre-packed at vendor end & some parts are in-house pre-packed.

QC Story Steps	1	2	3	4	5	6	7	8	9
Planned Week No.	WK 1	WK 2	WK 3	WK 4	WK 5	WK 6	WK 7	WK 8	WK9
Actual Week No.	WK 39	WK 40	WK 41	WK 42	WK 43	WK 44	WK 45	WK 46	WK49

History of the Problem:

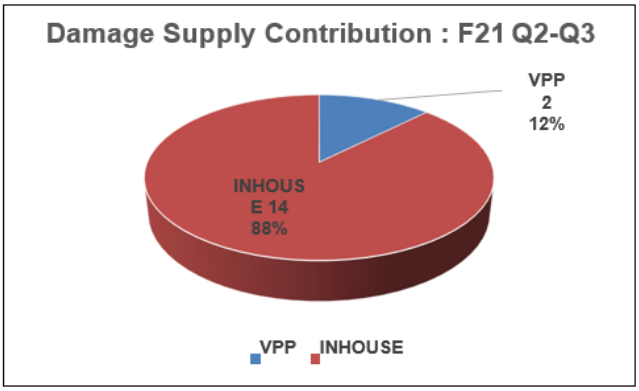
Data for Q2 to Q3 F21 for problems in WH Kanhe (A016 & A045) AD

High damage supply claim contribution partwise in F20 Q2 to Q3

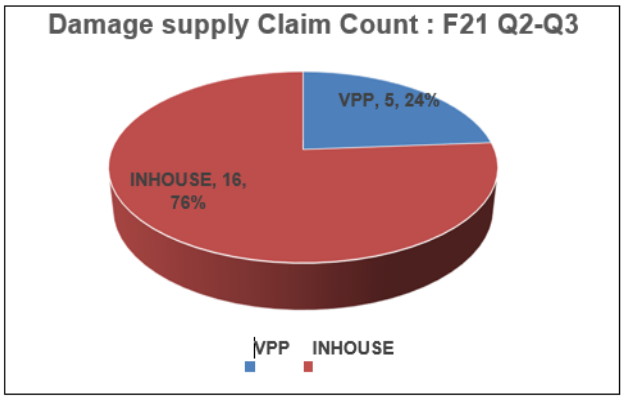


Part no.	Description	Claim Count
0102AW0400N	Assembly Front End Carrier	4
1203CS200021N	AHU AUTO	2
1402AAA07251N	ALTERNATOR ASSY WITH OVERRUN PULLEY	2
0102CW500020A	FENDER ASSY RH CED	1
0102CW500030A	FENDER ASSY LH CED	1
0109DAW00091N	MIRROR ASSY ELECT OUTER RH LX	1
0116BAW00011N	WIPER LINKAGE AND MOTOR ASSY RHD	1
0304AM0051N	RADIATOR ASSLY EAGLE W201	1
0703BD0530N	REAR HOUSING 4WD NGT520	1
0703CAD04901N	SEMI REMOTE SHIFTER ASSY	1
1001CA6320N	Fuel Line Assy Main Underbody	1
1001CAA09120N	MAIN LINE FILTER TO FIP BSIV	1
1105DAA02071N	CLOCK SPRING	1
1203KAA00111N	ASSY REAR AC AHU W201	1
1402AAA08351N	ALTERNATOR 110A	1
S0109B000051N	MIRROR SUB ASSEMBLY RH	1

Below pie chart shows damage supply contribution for in-house pre-packed parts and vendor pre-packed parts



Below pie chart shows damage supply claims count received in F21 Q2 to Q3 contribution for in-house pre-packed parts and vendor pre-packed parts



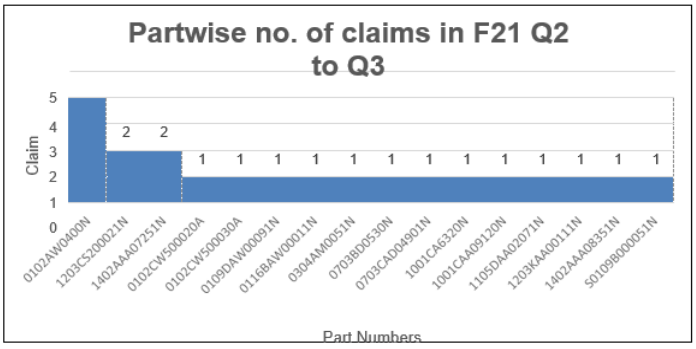
2.1 Contentment action taken:

In case of Damage part claims:

1. When damage claim is received, analysis of damage claim is started immediately along with CFT by checking warehouse stock and packaging of part.
2. Claim is accepted/rejected based on analysis and root cause is found by this analysis, necessary action plan is decided on part to part basis.
3. After accepting claim, customer is asked to return the damage part.Credit note is issued against accepted damage supply claim after receipt of the material.

Understand Current Situation:

Below graph shows the current trend of damage supply claim count for F21 Q2 to Q3.



Observation of the Process (Go along the process and arrive at common understanding)

Observation of Symptoms:

a) Symptom is defined as outward evidence of the problem.

b) What are the symptoms of the undesirable result. Give Sketches and photographs, if possible

c) Also give Concentration Diagram, if possible

Problem Identification Images:

Front End Carrier

Claim no- Aug 21/31761/1 Customer name- PRESIDENT MOTORS

AHU AUTO- Part dispatch in only Vendor box

Claim no- Dec 21/35252/1 Customer name- PRESIDENT MOTORS.

Clock Spring-

Claim no- Aug21/31629 Customer name- Rex Auto Parts India, Hyderabad.

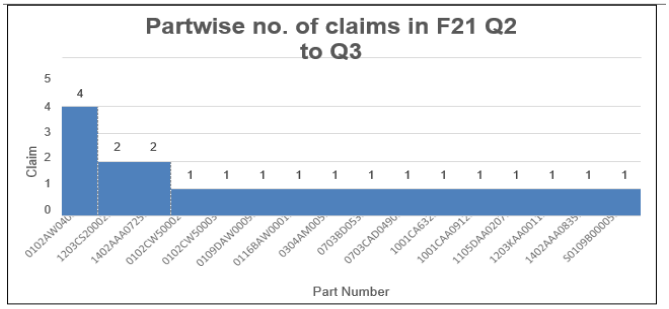
Alternator – Inadequate packaging

Claim no- Jun 21/30360/1 Customer name- ERAM MOTORS PVT. LTD, Calicut.

Observation of Variation (Discover **variation** in observations)

Commodity	Claim
count Front End Carrier	4
AHU AUTO	3
Alternator	3
Fender	2
Fuel line	2
Clock spring	1
Housing	1
Mirror assy	1
Mirror sub assy	1
Radiator assy	1
Remote shifter	1
Wiper linkage	1

Partwise damage claim contribution:



ANALYSIS:

Possible Causes:

- Damage by transporter : Method
- Damage in transit : Method
- Damage due to more handling of boxes : Man & Method
- Damage due to in house handling : Man, Material
- Mishandling of the part : Man, Method,
- Damage at receipt stage : Man, Method
- Damage at pre packing stage : Man, Method
- Damage part sent by vendor : Man, Method, Material
- Inadequate support packaging : Man, Material & Method
- Vendor did not provide suggested packaging : Man, Material, Method
- Support packaging not used while pre packing of part : Man, Material, Method
- Packaging design improper : Man, Method
- Wrong pre packing done in house : Man, Material
- Vendor did not use specified pre packing : Man, Material
- Packaging quality poor : Machine, Method
- Primary carton wrong : Man, Method
- Raw material of part not up to quality standards : Machine, Man, Method
- Faulty manufacturing processes : Man, Method, Machine
- Fragile part not handled properly : Man, Method
- Mishandling while packing the part for dispatch : Man, Method
- Stacking not proper : Method, Man
- Improper SUT used : Man, Machine,
- Wrong best fit : Man, Method
- Impact on box due to overweight : Method, Material
- Box not able to sustain the weight of the part in SUT : Material,
- Improper loading/unloading practices : Man, Method
- Boxes thrown on pallet while unloading : Method, Man
- Damage due to impact of MHE : Man, Machine, Method
- Part not fixed in inside supports : Material, Method, Man
- Extended area of parts not covered in support packaging : Method, Man, Material
- Packing method not proper: Method, Man
- Packing not as per specified packaging : Man, Material
- Support not provided : Material, Man, Method
- Support not present : Material, Method, Man
- Packaging design inadequate : Man, Material
- Heavy part kept on upper side: Method
- Improper stacking method : Method
- Miscommunication to vendor : Man
- System not updated about packaging : Man

To be arrived at from Possible Causes, based on Observation of process, failed sample analysis, variation study and also based on Experience and Knowledge of Team Members. These will be the last in the Why – Why chain.

Support packaging not adequate
Packaging design not sufficient
Damage material receipt from vendor
Packaging SOP not followed by operators
Damage due to in-house mishandling
Damage in transits

Testing of Hypothesis:

To be done for Probable cause – One by one
The following methods to be used in Testing -
a) Analysis of Past Data – Generated out of earlier inspection
b) Study of current operations – Collect data out of Current inspection
c) Cutting New Windows – Creation of new inspection points
d) Part Interchange method
e) Design and Conduct of experiments

Results of Good Product Test

Good product test means "Confirming that the probable root causes are absent in the Good product but they are present in the bad product. It also means that by introducing probable Root cause, the Good product becomes Bad product. However by eliminating probable Root Cause, Bad product becomes Good product."

It's quite possible that the Good product test is evident in hypothesis testing itself and in that case no separate Good product test is necessary. However clearly mention as to how this test was done in hypothesis testing.

Final Validated Root Causes:

FEC:

Support packaging not proper.

Damaged parts coming from vendor.

AHU AUTO:

Packaging design not sufficient Vendor box used for shipment.

Damaged parts coming from vendor.

Alternator:

Support packaging not sufficient.

Fender:

Inadequate packaging.

Fuel Line:

Inadequate packaging.

Damaged parts coming from vendor.

Clock Spring:

Support packaging not proper.

Housing:

Inadequate packaging.

Mirror Assay:

Packaging SOP not followed by operators

Mirror Sub Assay:

Support packaging not proper.

Radiator Assay:

Packaging SOP not followed by operators

Remote Shifter:

Inadequate packaging.

Support packaging not proper

Wiper linkage:

Packaging SOP not followed by operators

Result Identification Images:

Alternator - IMS-SOP-KAN-PKG-285 00 30.11.2021

Remote Shifter Assay- IMS-SOP-KAN-PKG-214

AHU AUTO –

Clock Spring-

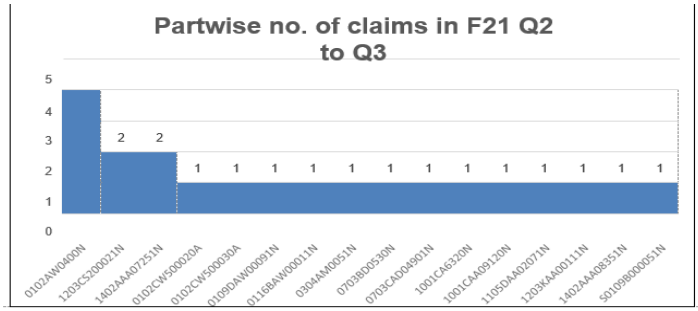
Housing-

Method of Standardization:

1) SOP prepared for this 12 category parts
2)New developed packaging code updated in SAP.
3)SOP Demonstration given to Prepacking team
4) Bulletin prepared
5) Kaizen done
6) Change request format filled

Conclusion & Final Result:

Compare the result obtained with target set:



Comparison: Before & After

For the 16 parts in Pareto analysis of step 5 Claim qty Before Vs After

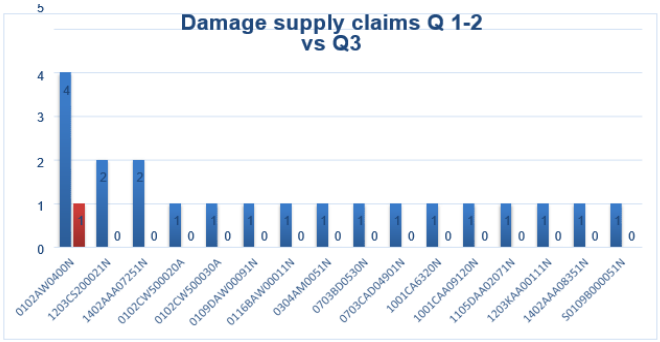
Before: 1st April 2021 – 30st September 2021

After: 1st October 21 – 31st December 2021

The final result survey at **Mahindra cie plant chakan** as quality has increased of packaging components and reduce the chanceless of claim by using problem analysis techniques

Result finding point:

•New design conveyed to vendor. Hence time saved for in house pre packing.
•Team is now expert for daily analysis of damage claims.
•Team spirit developed.
•CFTs introduced resulting in awareness in many departments.



Inference:

Refer the above graph showing Reduction in Damage supply claims of specific part, 21 claims in F21 Q1 to Q2 to only 01 claims in F21 Q3. We have achieved 95 % reduction in damage supply.

Reference:

1. V Nguyen, N Nguyen, B Schumacher, T Tran - Applied Sciences. Practical application of plan–do–check–act cycle for quality improvement of sustainable packaging: a case study-2020
2. Nathan Dube Evaluate Damages to Packaging and Products in Shipping on August 18th, 2020
3. Gene Bodenheimer mitigating packaging damage in the supply chain Nov 11, 2019
4. Rob Kaszubowski ways package damage claims are the tip of the iceberg Apr 06, 2017
5. H Pålsson, D Hellström - International Journal of Logistics, Taylor & Francis Packaging logistics in supply chain practice–current state, trade-offs and improvement 2016
6. Alberto Regattieri and Giulia Santarelli the Important Role of Packaging in Operations Management March 13th, 2013
7. JA Spack, VE Board, LM Crighton Journal of Nature, Taylor & Francis It's Easy Being Green: The Effects of Argument and Imagery on Consumer Responses to Green Product Packaging 07 Mar -2012

8. Jonathan Ward Damage still half of claims for inbound and aftermarket supply 01 October 2012
9. FTS Chan, HK Chan, KL Choy - The International Journal of Advanced Springer A systematic approach to manufacturing packaging logistics-2006
10. J Garcla-Arca, JC Prado-Prado - Packaging Technology and- Wiley Online Library. Logistics improvement through packaging rationalization: A practical experience -2006
11. Lou Cortese Reducing the Risk of Damage, Loss and Claims November 01, 2003
12.CC Kuta, DG Koch, CC Hildebrandt conservation and recycling, Elsevier Improvement of products and packaging through the use of life cycle analysis -1995

 ISBN 978-81-927230-0-10

Knowledge Discovery in Databases (KDD) and Data Mining Applications

Swati Narkhede
MCA Dept. Assistant Professor
Dr. D. Y. Patil Institute of Management and Research
Pune, India
narkhedeswati37@gmail.com

Rupali Kalekar
MCA Dept. Assistant Professor
Dr. D. Y. Patil Institute of Management and Research
Pune, India
joshi.rups@gmail.com

Amit Shrivastava
MCA Dept. Assistant Professor
Dr. D. Y. Patil Institute of Management and Research
Pune, India
amit.shrivastava@dypvp.edu.in

***Abstract*— Data mining is a process that finds useful patterns from a huge amount of data and retrieves some useful information using many techniques. This paper gives information about Introduction to Data Mining, Knowledge Discovery in Databases (KDD), various data mining applications. This paper also provides insights on the usages of these applications in processing the data.**

Keywords*— *ETL, Integration, KDD, Preprocessing, Transformation.

I. INTRODUCTION

Data Mining - Data mining is a process which finds useful patterns from large amount of data [3]. Data Mining is a process of analyzing data from different perspectives and summarizing it into useful information which is also known as Knowledge Discovery in Databases (KDD).

Knowledge Discovery in Databases (KDD) - KDD is defined as the non-trivial process on Identifying useful patterns in data which is used in Machine Learning, Artificial Intelligence, Database Management and pattern recognition. First Operational Data collected at Single location is been shown in below figure 1. A central location where all the consolidated data from multiple locations (DB) are stored is also called as Data Warehouse or Data Mart. The Operational data is updated by every second. Before we place the data into Data Warehouse we apply Extraction, Transformation and Loading (ETL) process into it. Also Online Analytical Processing operations can be performed on the data wherever required. KDD is a good paradigm for data analysis.

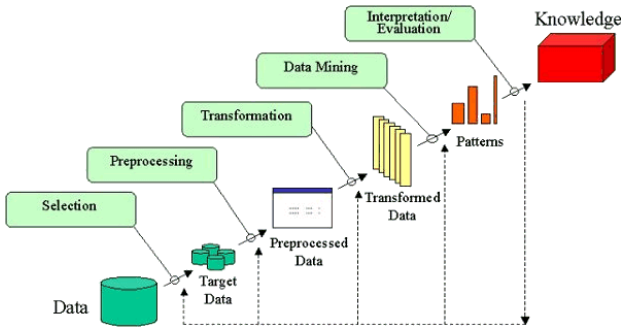


Fig. 1. Knowledge Discovery in Databases
Source: www.google.com

- *Data Preprocessing*- This is a preliminary process where we have to prepare the data and filter it. A set of Data objects/Records can be used for large datasets. Data is incomplete, noisy and inconsistent and there is no quality of data. So, need to process Data Preprocessing. Data warehouses hold both detailed and summary data. Detailed data is used for pattern analysis, where summarized data may hold the results of previous analyses. Data warehouses also contain historical data whereas operational data is usually current [5].
- *Data Objects and Attributes:* Data Objects are described by its attributes. Attribute has various types like Nominal, Binary, Ordinal, and Numeric: Interval and Ratio, Discrete and Continuous etc. Basic statistical descriptions of data include Symmetric and Skewed data. Positively and Negatively Skewed data identified using Mean, Median, and Mode. If Mean=Median=Mode then data is Symmetric. If Most of the data is present on right side then data is Positively Skewed/Right-Skewed and If Most of the data is present on left side then data is Positively Skewed/Left-Skewed.
  - *Data Cleaning*- To handle missing data, Noisy data with Smoothing techniques, Binning methods, Clustering, Regression, etc.
  - *Data Transformation*- To make data in more organized way Data Transformation is used. In this we have to transform Unstructured data into Structured data. Smoothing for removing noise from data, Aggregation.
  - *Data Mining*- Data Mining is the extraction of interesting knowledge (non-trivial, implicit, previously unknown and potentially useful) that algorithmically detects specific patterns, trends in the data and rules mechanisms (associations between seemingly unconnected data) [1] Data mining and KDD are often used interchangeably because data mining is the key part of the KDD process [2]
  - *Data Integration*- Combine all the data from multiple resources and store into one location. Data Integration is used to handle redundant data. Schema integration is used to integrate metadata from various sources. Entity identification problem is also involved in Schema Integration. Smoothing which removes noise from the data, Aggregation

which includes summarization and data cube construction, Generalization : Concept of Hierarchy binding, Data Normalization: has 3 types- Min-Max normalization, Z-Score normalization, normalization by decimal scaling.

- *Data Reduction*- This technique is to reduce representation of data set in much smaller volume and produce analytical results. Data cube aggregation, Dimensionality reduction like feature selection, Data Compression, Numerosity reduction to reduce volume of the data , Discretization which divide the range of a continuous attribute into intervals are some strategies for Data Reduction in Data Mining. Wavelet Transforms and Principal Component Analysis are some Data Compression methods that can be used in Data reduction. Histograms are used for dividing the data into buckets and store information in it. Clustering algorithms also can be used to partition the data into clusters (groups).
  - *Interpretation/ Evaluation* - Interpreting the patterns into knowledge by removing redundant or irrelevant patterns; translating the useful patterns into terms that human understandable [6].

KDD Process aims to produce Knowledge in the data after performing all the operation and finding the patterns using various algorithms and data mining techniques such as Classification, Clustering, Decision Trees, Genetic Algorithm, Nearest Neighbor method, Regression, Association rules, etc.

II. DATA MINING APPLICATIONS

Various fields use data mining technologies because of fast access of data and valuable information from vast amount of data [2]

Data mining applications are available in almost each sector. But researcher of this paper has focused only on few of it. The focused applications are as explain below:

- *Data Mining Applications in Healthcare*

Data mining applications in health can have marvelous prospective and effectiveness.

- *Data mining is used for market basket analysis*

This technique can be used when customer want to purchase any products.

In such a case this technique helps us to discover the relations between different items that the customer place in their shopping buckets. The retailers can use this data mining technique to identify buying pattern of customers. This technique will help to enhance the profit margin of the business and also helps to purchase the correlated items.

- *The data mining in the Education System*

Data mining applications for education system can help bridging knowledge gap in this system. Data mining is well known for finding hidden patterns, associations, and anomalies. If we apply this in education system educational data can improve decision making processes. This improvement ultimately helps to increase efficiency of education system, increase passing ratio and student's retention. And similarly it will result into student's success, learning outcome and many such processes.

- *Data mining in Manufacturing*

Data retrieved from manufacturing system is used by its customers for different purposes like to find errors, to generate quality data, to support decision making etc. But most of times the data can be first analyzed then after find the hidden patterns which will be control the manufacturing process which will further enhance the quality of the products. From the literature review researcher has observed importance of data mining in manufacturing has evidently increased.

- *Standard Life Mutual Financial Services Companies*

Develop a remortgage model which could be deployed on the group Web site to examine the profitability of the mortgage business being accepted by Standard Life Bank.

III. CONCLUSION AND FUTURE SCOPE

In this paper researcher has discussed about Knowledge Discovery in databases (KDD). The implementation of data mining techniques will allow stakeholders to retrieve meaningful information from virtually integrated data stored on various locations.

REFERENCES

[1] Luis C Borges, Viriato Marques, Jorge Bernardino, 2013,"Comparison of Data Mining techniques and tools for data classification" DOI: 10.1145/2494444.2494451 July 2013

[2] S.D.Gheware, A.S.Kejkar, S.M.Tondare, 2014, "Data Mining: Task, Tools, TechNiques and Applications", International Journal of Advanced Research in Computer and Communication Engineering Vol. 3, Issue 10, October 2014, ISSN (Online) : 2278- 1021

[3] Mrs. Bharati M. Ramageri, "DATA MINING TECHNIQUES AND APPLICATIONS", Indian Journal of Computer Science and Engineering Vol. 1 No. 4 301-305, ISSN : 0976-5166

[4] Jiawei Han and Micheline Kamber (2006), Data Mining Concepts and Techniques, published by Morgan Kauffman, 2nd ed.

[5] Susan P. Imberman, "EFFECTIVE USE OF THE KDD PROCESS AND DATA MINING FOR COMPUTER PERFORMANCE PROFESSIONA"

[6] Heena Agrawal, Pratik Agrawal, 2014, "Review on Data Mining Tools", IJISET - International Journal of Innovative Science, Engineering & Technology, Vol. 1 Issue 2, April 2014.

[7] Application of Data Mining Techniques for Medical Data Classification: A Review Saima Anwar Lashari1, Rosziati Ibrahim, Norhalina Senan1 and N. S. A. M. Taujuddin, MATEC Web of Conferences 150, 06003 (2018)

[8] Neelamadhab Padhy , Dr. Pragnyaban Mishra , and Rasmita Panigrahi,2012, "The Survey of Data Mining Applications And Feature Scope", International Journal of Computer Science, Engineering and Information Technology (IJCSEIT), Vol.2, No.3, June 2

 ISBN 978-81-927230-0-10

A Comparative Study of Student's Behaviour While Adopting Digitalization In Education In Rural and Urban Areas .

Mitali Gupta (Student)[#]1, Nikhil Kumar(Student)*2,
Sakina Mulla(Student)[#]3, Dr. Manisha Sandip,*4.

mittu090502@gmail.com
kbdnikhilkumar2412@gmail.com
nisha.ahire@gmail.com

***Abstract* -Technology is a vital part of the lives of today's generation. They have been acquainted with it since birth. However, Digital education has been an unchartered territory for many. This was rectified by the emergence of the Covid-19 pandemic. Schools and colleges were forced to shift to the digital platform for their curriculum. This was an abrupt change for both students and teachers. The transition from offline medium to online medium was smooth for some whereas challenging for others. In this study, we shall see how different students from urban as well as rural areas have dealt with this transition, and the difficulties and challenges faced by them for the same. The efficiency of digital education has been a topic of debate for over a decade, even though it's use was scarce. Now, as it is being used so widely, there are ample of sources through which this can be discussed. Different individuals have different opinions for the use of online medium as a primary source of education and we have interviewed them and recorded their responses pertaining to the recent conditions created by the Covid-19 pandemic. This can help different managements to design their curriculums after the compulsion of digitalization has been eradicated.**

Key words- Digitalization, Covid-19 pandemic, Education, Technology, Curriculum, Digital Education.

I. INTRODUCTION

"Education is the most powerful weapon which you can use to change the world"- Nelson Mandela. It can enable a person to conquer the world. It provides knowledge and expertise, which if used wisely can lead to definite success. Human beings are constantly evolving. From the stone age to today's technological generation, we have come a long way. Similarly, there has been constant development in the field of education. From the ancient gurukul system to the digitalization in education in current times, there has been a major shift in the mode of learning. Although, technology was inculcated in education in some ways with the help of

Projectors, smart boards, etc., the Covid-19 pandemic led to a sudden shift that no one was prepared was. Schools and colleges were carried on a completely online basis wherever possible. Instead of traditional sources, power point presentations, e-books, audio visual clippings became the new normal. This was a challenge for the education system but also led to the emergence of new and creative ways of learning with the help of technology and animations. Knowledge gaining and doubt solving became available at a single click. This has led to many discussions and debates owing to the pros and cons of digitalization in education.

II. MEANING AND IMPORTANCE

Digitalization is the process of using information technology to change and update a system in order to create more opportunities for progress and increase its value through new technologies.

Digitalization in education refers to switching the study medium to online with the help of information technology. Students take the help of mobile phones, laptops, etc. And refer to various digital platforms as a means of gathering study material.

E-books, online MCQ tests, digital universities, etc. are some examples of digitalization in education.

Digital learning has acquired a vital role in today's crisis. It offers a variety of newfound opportunities to students and hence holds importance in education system. The first and foremost advantage is that it is very convenient for the teacher as well as the learner as sessions can be conducted in any place at any time. One of the most monumental aspects of digital learning is that it offers more tools and technologies for students that make them smarter and more knowledgeable. Students are able to access more information on various topics that they are curious about and can gain extra knowledge about the same. Their critical thinking capabilities increase noticeably and they have resources to solve all of their doubts. Another benefit that digital education offers is that it increases the involvement of parents in their child's learning process which in turn enables them to keep a watch and make sure that their children are getting proper information. It also ensures a child's overall development as the internet opens up portals for extracurricular activities like gaming, coding, graphic designs, etc. Getting involved in such activities

contributes to the development of self-confidence, communication skills, as well as increases familiarity with various technologies. All of the courses pursued through digital learning can be done from any university around the globe while staying in one's hometown which creates a great ease in the education system.

III. LITERATURE REVIEW

As per Journal of Contemporary Issues in Business and Government. Vol 27, No. 1, 2021, digital education is a silver lining for both students and teachers as it offers ample of advantages over traditional learning which makes students proficient in many ways. Hence the research paper stresses that digitalization should be implemented in education in as many ways as possible.

As per the International Journal of Advanced Research in Commerce, Management & Social Science, Volume 04, No. 02(II), April - June, 2021, while digital education is certainly a boon, its implementation should be very careful and strategic so that students are not corrupted by the ill-effects of technology and are not led to dangerous aspects of the internet. Therefore, digitalization should be to a limited necessary extent and should go hand-in-hand with traditional education.

As per the Anveshana's International Journal of Research in Regional studies, law, social sciences, journalism and Management Practices Volume 2, Issue 3 (2017, March), Digitalization in India requires the availability of proper infrastructure, which is lacking in most of the rural and some urban areas of the country. Facilities like strong internet connectivity, trained teachers, adequate funds, maintenance and upgradation of digital equipment, etc. are a must to provide proper digital education but India is lacking in the same. Hence in order to inculcate digitalization in the country, efforts must be taken by the government to develop these factors.

As per the International Journal of Research and Analytical Reviews, Volume 6, Issue 1, Jan- March 2019, it is an undeniable fact that digitalization is a must needed aspect that should be inculcated in India, but at the same time, utmost care should be taken in its implementation so that the youth of the country is not exposed to its ill-effects. It should be applied in a way that combines the traditional and modern modes of education, preserving the interests of both students and teachers.

As per the International Journal of Information Management, Volume 55, December 2020, the Covid-19 pandemic led to a drastic change in the medium of education which was convenient for some students while very challenging for some others. As a positive effect of it, it brought out some really creative and effective ways of learning. In the wake of the pandemic, initiative should be taken for a digital transformation so as to schools, teachers and students while taking the advantage of technology. At the same time, efforts are needed to help those who could not adjust with the shift well to ensure overall development.

IV. RESEARCH METHODOLOGY

Research type	Descriptive
Scope of research	A comparative study of urban and rural students' behaviours towards adapting digital technologies in education w.r.t Nashik.
Data Collection	Primary source: Questionnaire-In this method google form with approx. 14 questions has been prepared and shared with students and teachers to get response. Secondary Source: Published or unpublished data, books, magazines, newspaper, trade journals
Population	Nashik and nearby areas
Sample Size	204
Sampling Techniques	Stratified Simple random
Data analysis tools	Pie chart, Bar graphs & chi square test

Table 1: Research Methodology

V. OBJECTIVES OF STUDY

To study rural and urban school students' behavior/response towards adopting Digital technologies in their education.

To understand the Digital technologies used in education.

3. To study the effectiveness of digitalization

VI. DATA ANALYSIS AND INTERPRETATION

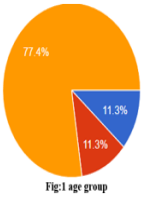


Fig:1 age group

Demographic analysis

Through the responses, we gathered that 77.4% of the respondents belonged to the age group 18-21yrs while 11.3% of them were of the ages12-14yrs and 15-17yrs respectively.
Around 74.2% of the urban respondents were residents of Nashik city while others resided in other surrounding areas. The people who responded from the rural areas were the residents of localities like Ojhar, Pimpalgaon,Phalse, Shinde, Chandsi, Sinnar, etc.

Comparative study of urban and rural students

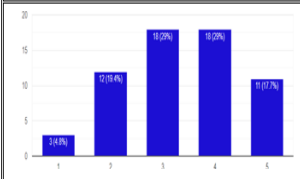
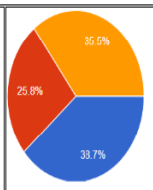
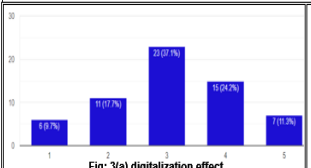
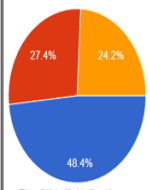
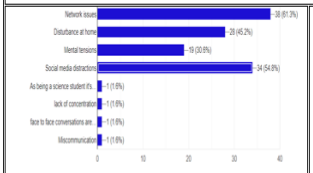
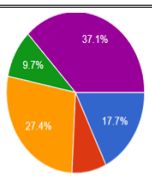
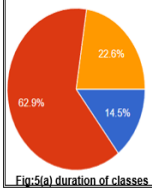
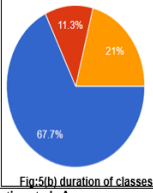
Urban students	Rural students
1. Comfort level of online classes	
 Fig: 2(a) comfort From the observation we found that 24.2% percent of students were not comfortable in attending online classes while 46.7% were comfortable, and 29% of them wereneutral about the change.	 Fig: 2(b) comfort From the observation we found that 25.8% percent of students were not comfortable in attending online classes while 38.7% were comfortable, and 35.5% of them were neutral about the change.
2. Digitalization effect on academic performance	
 Fig: 3(a) digitalization effect From the data collected 27.4% of the students reported that they did not see any effect on their studies owing to digitalization while 37.1% of them reported a noticeable effect, 35.5% of the students experienced a major effect ontheir performance due to digitalization.	 Fig: 3(b) digitalization effect As per our responses 48.4% of the students experienced a definite effect on their performance while 27.4% of them did not see a noticeable effect. 24.2% of them were uncertain about the change.
3. Difficulties faced	
 Fig: 4(a) difficulties According to the responses received the main difficulties were network issue, disturbance at home, mental tensions, social media distraction in online classes amounting to 61.3%, 45.2%, 30.6%, 54.8% of the responses respectively. The other underlying difficulties were lack of one-to-one connection, concentration and miscommunication.	 Fig: 4(b) difficulties According to the responses received the difficulties were lack of technological equipment, knowledge, interest, family support, distractions in online classes amounting to 17.7%, 8.1%, 27.4%, 9.7% and 37.1% of the responsesrespectively.
4. Duration of the online lectures	
 Fig:5(a) duration of classes As per our responses the most common duration for online classes was 4 hours applying to 62.9% of the students. 22.6% of them were attending the classes for less than 4 hours while 14.5% of them were attending it for more than 4 hours.	 Fig:5(b) duration of classes As per our responses 67.7% of the students were attending online classes on alternate days while 11.3% of them were attending daily, average time being 2 to 3 hours. 21% of the students were not attending online classes at all.

Table 2: comparative study A

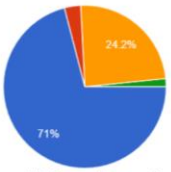


Fig:6 parents' support

Parents support for rural students: -

As per our responses 71% of students reported that their parents were supportive for digital education while 3.2% of the students said otherwise 25.8% of the students said that their family supportwas neutral.

Hobbies to keep up with digitalization: -

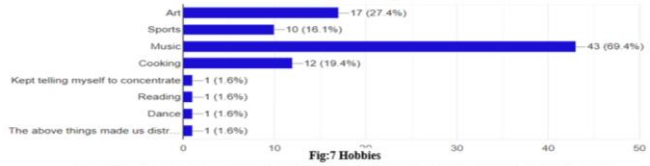


Fig:7 Hobbies

According to our responses the activities that most people turned towards as a hobby to keep up with digital education were arts, sports, music, cooking, amounting to 27.4%, 16.1%, 69.4%, 19.4% respectively. Some other hobbies were reading, dance etc.

Digital techniques used for studies: -

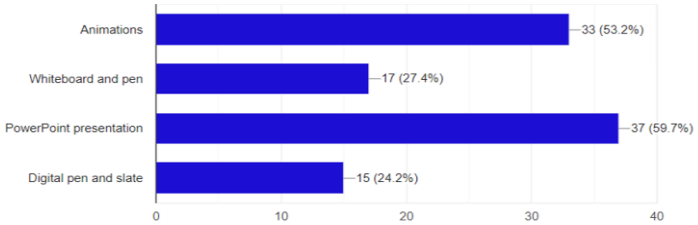


Fig:8 digital techniques

As per data collected most commonly used digital techniques were animations, whiteboard & pen, power point presentation, digital pen and slate amounting to 53.2%, 27.4%, 59.7% and 24.2% respectively.

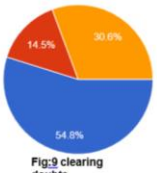
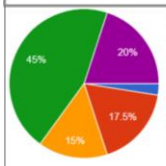
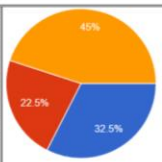
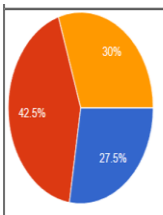
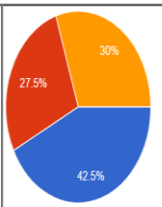


Fig:9 clearing doubts

Preferred modes for clearing doubts: -

From the data collected majority with 54.8% of the students preferred getting their doubts cleared during the online lectures while 30.6% preferred to go through online material and rest 14.5% of students post the query in a discussion forum of their class and gethelp from their peers.

Comparative study of urban and rural teachers

Urban teachers	Rural teachers
1. Extent of support from family: -	
 Fig:10(a) support As per our survey 65% of the parents extended their support to their children with respect to digitalization while 20% of them were not as supportive, 15% of the parents maintained a neutralstand.	 Fig:10(b) support As per our survey 32.5% of the parents extended their support to their children with respect to digitalization while 22.5% of them were not assupportive, 45% of the parents maintained a neutral stand.
2. Seriousness of students during the pandemic: -	
 Fig:11(a) seriousness of students In the accordance to the data collected, 27.5% of the teachers felt that the students took their education seriously while a majority of 42.5% teachers said otherwise. On the other hand, 30% of the teachers held an unsure opinion.	 Fig:11(b) seriousness of students In the accordance to the data collected majority of 42.5% teachers felt that the students took their education seriously while 27.5% teachers said otherwise. On the other hand, 30% of the teachers held an unsure opinion.
3. Difficulties faced: -	

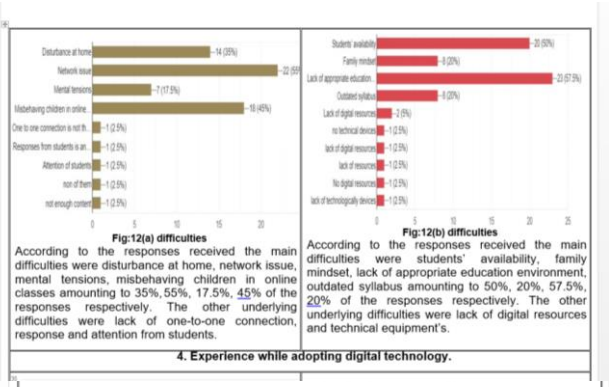


Fig:12(a) difficulties

Fig:12(b) difficulties

According to the responses received the main difficulties were disturbance at home, network issue, mental tensions, misbehaving children in online classes amounting to 35%, 55%, 17.5%, 45% of the responses respectively. The other underlying difficulties were lack of one-to-one connection, response and attention from students.

According to the responses received the main difficulties were students' availability, family mindset, lack of appropriate education environment, outdated syllabus amounting to 50%, 20%, 57.5%, 20% of the responses respectively. The other underlying difficulties were lack of digital resources and technical equipment's.

4. Experience while adopting digital technology.

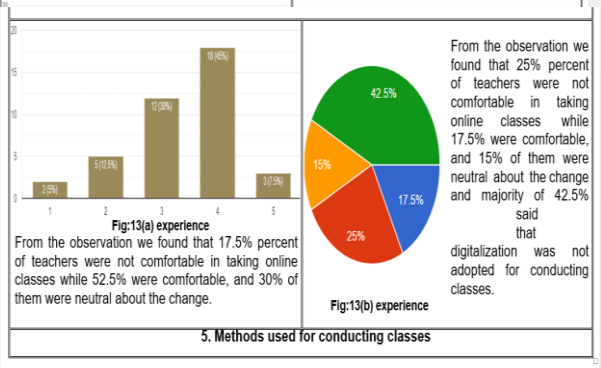


Fig:13(a) experience

From the observation we found that 17.5% percent of teachers were not comfortable in taking online classes while 52.5% were comfortable, and 30% of them were neutral about the change.

Fig:13(b) experience

From the observation we found that 25% percent of teachers were not comfortable in taking online classes while 17.5% were comfortable, and 15% of them were neutral about the change and majority of 42.5% said that digitalization was not adopted for conducting classes.

5. Methods used for conducting classes

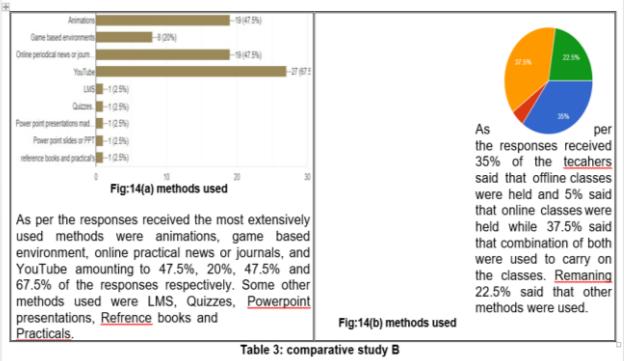


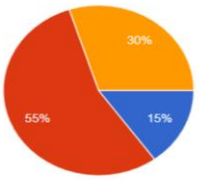
Fig:14(a) methods used

As per the responses received the most extensively used methods were animations, game based environment, online practical news or journals, and YouTube amounting to 47.5%, 20%, 47.5% and 67.5% of the responses respectively. Some other methods used were LMS, Quizzes, Powerpoint presentations, Refrence books and Practicals.

Fig:14(b) methods used

As per the responses received 35% of the tecahers said that offline classes were held and 5% said that online classes were held while 37.5% said that combination of both were used to carry on the classes. Remaning 22.5% said that other methods were used.

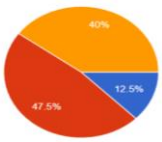
Table 3: comparative study B



Government support in rural area

In the rural segment a major 55% of the teachers said that there was no support from the government while 30% were not sure about the support, and 15% said that there was support from the government.

Fig:15 government support



Help from outsiders to promote education in ruralareas

From the responses received we found that 47.5% teachers said that there was not support from the outsiders while 40% of the teachers were not sure about the help and remaining 12.5% said that there was support from the outsiders to promote education.

Fig:16 help from outsiders

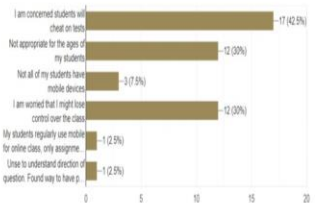


Fig:17 teachers view

Teachers' view about the constant use of technology of by their students of urban areas:

-

As per our responses 42.5%, 30%, 30% and 2.5% of the teachers were concerned about the technology use of their students owing to the reasons of cheating, inappropriate activities, lack of control and their understanding respectively.

7.5% of teachers reported that their students did not have the appropriate technology.

HYPOTHESIS TESTING-1

H0-There is no significant effect of digitalization of Education on students academic performance.

H1-There is significant effect of digitalization of Education on students academic performance.

	Yes	No	Row Totals
Urban Students	34 (35.50) [0.06]	28 (26.50) [0.08]	62
Rural Students	37 (35.50) [0.06]	25 (26.50) [0.08]	62
Column Totals	71	53	124 (Grand Total)

Calculated Chi square value=0.2966

Table Chi square value =3.841

Table 4: Hypothesis testing 1

	Yes	No	Row Totals
Urban Teachers	24 (23.50) [0.01]	16 (16.50) [0.02]	40
Rural Teachers	23 (23.50) [0.01]	17 (16.50) [0.02]	40
Column Totals	47	33	80 (Grand Total)

Table 5: Hypothesis testing 2

HYPOTHESIS TESTING-2

Hence calculated value of chi square test is less than table value of chi square so hence Null hypothesis is accepted.

H1- There is no significant effect of digital Education on students' serious behavior towards learning.

Calculated Chi square value=0.0516

Table Chi square value =3.841

Hence calculated value of chi square test is less than table value of chi square so hence Null hypothesis is accepted.

VII. FINDING

As per the survey carried out, we gathered the following information-

Most of the respondents were falling under the age group of 18-21.

A maximum percentage of urban students were comfortable with the shift from offline to online, while the rural students did not find the transition smooth.

Both the student and teacher respondents voiced the opinion that digitalization significantly affected the sincerity and academic performance of the students.

Various difficulties like network issues, disturbance at home, social media distractions, mental tensions, etc. were faced in urban areas while people in the rural areas faced difficulties like lack of resources, knowledge, interest, family support, making the conduction of online classes challenging.

Methods used for teaching online in urban areas were animations, PowerPoint presentation, YouTube videos, Online quizzes, etc. whereas in the rural areas used the combination of online and offline lectures to conduct their classes.

VIII. SUGGESTIONS

As India is a developing country a lot of its regions are still not as acquainted with technology and modern means of learning as others owing to this the Government of India needs to take initiative to make sure that correct technological knowledge is provided to these people so that. In the coming future. India can look forward to implement digitalization in a much more effective way, all over the country.

Currently in India, a good number of teachers belong to older generations making them strangers to newly evolved technology as compared to their students who are experts in that area. This needs to be rectified as the teaching faculty needs to be competent enough to engage the students' interest in online teaching through the means of seminars campaigns etc.

A major issue for digitalization in India was the issue of network connectivity for both students' and teachers. This can be changed due to public-private partnerships for improving the broadband facilities.

Due to the lower standard of living of people in some areas of India the resources needed for digitalization are not easily affordable to help with this situation subscription facilities for such devices could be provided for students and teachers.

IX. CONCLUSION

To conclude, digitalization plays a vital role in today's human life. Although in education sector, digitalization in true sense was adopted during the COVID-19 pandemic. Digitalization comes with many advantages such as saving time, removing geographical barriers, 24*7 availability; on the other hand, it also has disadvantages like mental and physical stress, lack of resources, inappropriate content and others.

While adapting digitalization, approach differed from urban to rural area. As every aspect has its own curse and booms similar approach was been observed in both regions. It was observed that digital education in urban area provides learning opportunities, increase in visualization ability, creative thinking and problem solving meanwhile challenges faced were lack of seriousness, connectivity issues, social media distractions, lack of socializing and others.

Whereas, it was noticed that in rural areas for some student's digitalization was profitable since they were able to manage their studies and work simultaneously while for some it was unfavorable depending on their family support, availability of resources, connectivity issues. Some students were forced to quit their education considering their financial conditions. Bringing all dots together, digitalization can be an aid to education sector or vice-versa.

X. REFRENCES

(1) MR.MANISH KUMAR(2021). Impact of Covid-19 Pandemic on Education in India: A Case Study. Contemporary Issues in Business and Government. Vol 27, issue No. 3, page no.645-650. Retrieved from https://cibgp.com/issue_156_313_Volume+27%2C+Issue+3%2C+Winter++and+Spring+2021.html

(2) Dr. Rajiv Kumar Agarwal(2021). DIGITAL EDUCATION IN INDIA: SCOPE AND CHALLENGES. International Journal of Advanced Research in Commerce, Management & Social Science, Volume 04, No. 02(II), April - June, 2021, page no.99-104. Retrieved from https://www.inspirajournals.com/IJARCMSS

(3) MR. RAMPRAVESH GOND., & DR. RASHI GUPTA(2017). A Study On Digital Education In India: Scope And Challenges Of An Indian Society.Avishan's International Journal of Research in Regional studies, law, social sciences, journalism and Management Practices Volume 2, Issue 3 (2017, March) Retrieved from http://publications.anveshanaindia.com/aijrrlsjm/aijrrlsjm-vol-3-issue-3/

(4) Ms. S.V. Mohana Sujana., & Dr. M. Eswari.Impact of Digital learning among students. Jornal of Maharaja Sayajirao University of Baroda.ISSN 0025-0422. Vol.55, Issue 3, Page(105-110)

(5) Wikramanayake G.N. (2003), "eLearning: Changes in Teaching and Learning Styles", Proc. CSSL. Proceedings of 22nd Nat. IT Conf., Computer Society of Sri Lanka, pp. 118-124

 ISBN 978-81-927230-0-10

Big Data Applications

Dr. Nilesh V. Patil
Faculty of Management,
Balaji College of Arts, Commerce & Science, Pune-33

Abstract: Big data has become a frequently used term these days. There are many sources of big data in our day today life which we could hardly understand. There are numerous applications of big data around us in our daily life. At the same time there are many applications of the big data too around us which again we fail to foresee. But what actually big data is? Why is it called big? Why is it garnering increasing importance? Where is it created? How is it put to use? These are some questions one need to think and answer. This paper attempts to explore answers to all these questions related to big data with focus on application of big data in various key sectors.

Keywords: Big Data, Big Data Analytics, Big data applications

Introduction:

We often come across the claim of data being oil of 21st century. With advent in technology, it is now possible to systematically store and process data in all walks of life in meaningful ways. This data is ever growing in volume at greater pace or velocity, variety and veracity with focus on visualisations adding value what is also called as 7 V's or characteristics of big data.

This paper is an attempt to explore big data applications in various areas with special focus on consumer behaviour which is increasingly becoming complex in digital era.

What is Big Data?

Investopedia defines big data as large, diverse sets of information that grow at ever-increasing rate. These diverse data sets are voluminous in size as well as variety or type making it impossible to easily capture, manage, process and retrieve the data.

The size of such data is now measured in a unit called Zettabyte (ZB) and moving towards Yottabytes (YB). For us these ZB and YB really sounds unfamiliar. So how big really this data is? As we know one bit of data contains the binary value i.e. either 0 or 1. Eight such bits make a byte of data. Further it keeps increasing in the tune of Kilobytes (1024 Bytes), to Petabytes (1024 TB) and it goes on till Yottabytes the highest ever know unit of data size measurement till date.

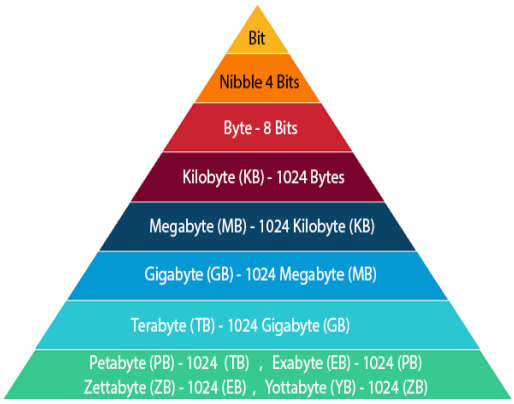


Fig. 01: Data Size Measurement Units Illustration

Types of Big Data:

The types of big data includes: Unstructured Data, Structured Data and Semi-structured Data

The ***unstructured data*** is one that does not fit into tabular databases or spreadsheet like format. Various types of audio and video files, images, likes/dislikes, shares etc mainly across social media platform, surveillance gadgets like CCTV, media coverage is in unstructured data format. It is very difficult to search and analyse this type of data which is qualitative in nature.

The ***structured data*** on the other hand is that data which simply can be stored in tables of rows and columns or spreadsheet format and mostly expressed in numbers. The structured data examples may include demographic characteristics like name, gender, birth date, address, credit card or identification number, geolocation, and more.

The ***semi-structured data*** however is a type of data that lies midway between structured and unstructured data. It doesn't have a specific relational or tabular data model but includes tags and semantic markers that scale data into records and fields in a dataset structure. Common examples of semi-structured data are JSON which defines an object with some properties like name, age, gender etc where each property has a value.

The big data can also be classified based on its sources as follows:

1. *Social data* is the data which is available in abundance includes individual's searches, likes or dislikes, shares, subscriptions etc. All these things put together helps to understand consumer behaviour in meaningful way. The best part of social data is real time insights into consumer sentiment.

2. *Machine Data*: Machine data is an output of various types of machines like automobiles, numerous electronic gadgets including mobile devices and other connected objects. Machine data reveals the insights into actual human behaviours.

3. *Transactional data:* It is the information captured from online and offline transactions and records. It is usually captured at the time of buying or selling at the point of sale and includes time, place, quantity, payment method and discounts etc. This type of data is very much useful to gain insights into consumer behaviour but since it is captures time, it may lose relevance afterwards.

Applications of Big Data: Big data has numerous applications in the modern world in all walks of life including key sectors like E-commerce, Finance, Retail, Healthcare, Media and Entertainment, Supply Chain Management, Hospitality and Telecom sector.

1. *E-commerce sector* is one of the pioneers to collect analyse and use big data. Big data application helps to enhance customer experience by anticipating customer expectations in well advance from her earlier interactions or preferences. The modern time E-commerce giants like Amazon and Flipkart put big data in use to enhance their customer satisfaction this way and also reducing the delivery time by aligning their supply chains to procure the products in demand as well as near future possible demand. Big data can also be used in communication customisation or personalisation to enhance success rate in terms of sales. Big data can also help to track competition, government regulations and trends in industry to keep pricing competitive and dynamic on real time basis.
2. In *finance sector* it was a big challenge to deploy technology and concentrate on data collection and analysis. With digital technologies advancement in the past few years, big data in finance has led to significant technological innovations. Big data analysis in finance helps not only to gain real time stock market insights and analysis but also can now take into account political and social trends that may affect the stock market in real time. Fraud detection and prevention is one of the important area of big data application in finance. Further it also helps in accurate risk analysis as big financial decisions like investments and loans now rely on unbiased machine learning. Calculated decisions based on predictive analytics take into account everything from the economy, customer segmentation, and business capital to identify potential risks like bad investments or payers. Financial firms now also use big data for generating new revenue streams through data-driven offers, delivering personalized recommendations to customers, creating more efficiency to drive competitive advantages, and providing strengthened security and better services to customers. It further helps to automate manual processes, save IT staff work hours, and offer insights into the daily transactions of customers. Big data can also be used to integrate the information from various departments, such as finance, marketing, warehousing and supply chains in real time reporting and swift decision making. Big data analysis has life easier for multi-location, multi-branch/business unit companies in terms of financial performance analysis and growth control at finger tips with unified and real time reporting. It boosts the productivity, and allow business users to access and analyze critical insights easily.
3. In *retail sector*, retailers gather huge data about their consumers from social media platforms, in-store visits and loyalty programs. The analysis of such data in retail industry helps to design better consumer engagement programs, maintain supply and demand balance and product portfolio as well as tracking the seasonal variations in real time mode.
4. In *healthcare sector*, big data analysis helps to quickly detect diseases in early stages making treatment easier and effective. The COVID-19 pandemic has really generated mammoth data of number of people across the globe infected by it, preventive measures such vaccination and treatment related to the same. All this data is still being analysed and is helping to effectively controlling the pandemic. The big data analysis helps pharmaceutical companies to reduce the time and identify most appropriate individuals for clinical trials and even predicting the possible side effects even before they occur.
5. For Media and Entertainment *sector* the user's access to various digital gadgets and exposure to social media has resulted in generation of huge data. It in turn presents many opportunities to commercially use this data in media and entertainment industry in multiple ways. It includes on-demand scheduling of media streams in digital media distribution platforms, predicting audience interests, getting insights from customer reviews and effective targeting of the advertisements. The new age media and entertainment giants like *Netflix* decisively uses big data to increase its revenue across the globe in dozens of languages, hundreds of nations for different generations with all possible genres.
6. Big data analysis is proving game changer for global *supply chain management sector* by reducing the complexity and uncertainties many fold. It helps to improve customer service and demand fulfilment with utmost accuracy and highest possible quality. It also helps to respond swiftly and accurately for supply chain issues on continuing basis. Further it facilitates the integration and optimisation of supply chains which have increasingly became multi-modal, multi-location spanning continents with varied weather as well eco-political terrain. Also big data application helps to improve customer –supplier relationship and shortening order to delivery cycle times. In customer-centric business environment, traceability is dramatically improved with big data applications in supply chain management to fast process the claims and arrest possible delays in deliveries to end users.
7. Even though the *hospitality sector* (which covers food, hoteling, travel and tourism) have taken a major setback due to COVID-19 pandemic for more 2 years now, big data has promising applications to

improve the bottom line for this industry too. The big data application in hospitality industry had made it easy to better manage revenue by more accurately anticipating the levels of demand for various services like dining, hotel room and traveling booking across locations. In the globalisation era, the big data applications make the target marketing more accurate, relevant and timely for varied demographic as time is the most crucial element in hospitality. It further helps in improving customer experience by spotting the significant trends early from customer opinions. Hospitality industry can also identify additional services apart from current one offered to best serve their customers by analysing the data collected through continuous interaction with current as well as potential customers. It includes partnering with local partners like artisans, performers for regular shows in multi star hotels, organising local sight-seeing, providing facilities like gym and swimming pools, sale of souvenirs at hotels etc. It also helps to keep track of competition.

8. *Telecom sector* which is now has become inseparable part of our lives benefits greatly from big data applications. These applications includes but not limited to areas like Anomaly Detection or outlier analysis for better network security, Co-Occurrence Data Modelling ,Consumer Feedback ,Customer Satisfaction and Retention, Network Accessibility ,Social Networks as well effective traffic data storage, analysis and retrieval. Big data applications also help in accurately predicting the most substantial network usage periods, and then further targeting steps to relieve congestion, identifying the customers facing the problems in paying bills and targeting steps to improve the recovery of payments as well as analyzing the root cause of the problem to prevent customer churn. The big data analytics based applications are also effectively detecting the frauds like illegal access, fake profiles, authorization, cloning, behavioural fraud, etc. in real time. It also helps in addressing the customer churn which is one of the biggest problem telecom sectors players keep facing on regular basis. The important measure of revenue like average revenue per user (ARPU) improvement as well as customer life time value prediction have become easier with big data applications. Further effective customer segmentation, price optimization, customer sentiments analysis and new product/service development are some more areas of applications of big data in telecom.

   Apart from these sectors there are many more applications of big data in others sectors like education, agriculture, government, weather analysis, disaster management as cyber security and intelligence as well as national security.

Conclusion:

To conclude big data analysis and its application has made it possible to dig into huge data and put it to use to make business and life easier and adding new meaning to it.

Bibliography/References:

1. Sunagar, P. (2020). Big Data Application. In R. Hanumantharaju, K. G. Srinivasa, G. M. Siddesh, & A. Kanavalli (Eds.), Hybrid Computational Intelligence: Challenges and Applications (pp. 25–47). Academia Press. https://doi.org/10.1016/B978-0-12-818699-2.00002-0
2. Ghorui, K. (2019, August 26). Applications of Big Data. GeeksforGeeks. Retrieved February 9, 2022, from https://www.geeksforgeeks.org/applications-of-big-data/
3. Scot, E. (2019, November 13). Understanding the 7 V's of Big Data [Blog]. BigDataPath. https://bigdatapath.wordpress.com/2019/11/13/understanding-the-7-vs-of-big-data/
4. Kaplan, N. (2019, September 5). Big Data, Consumer Behavior And The Consumer Packaged Goods Blindspot. Forbes. Retrieved February 9, 2022, from https://www.forbes.com/sites/forbestechcouncil/2019/09/05/big-data-consumer-behavior-and-the-consumer-packaged-goods-blindspot/?sh=2046fff46ce5
5. Top 15 Big Data Applications Across Industries. (2022). TechVidvan. Retrieved February 10, 2022, from https://techvidvan.com/tutorials/big-data-applications-across-industries/
6. Big Data Applications – A manifestation of the hottest buzzword. (n.d.). DataFlair. Retrieved February 10, 2022, from https://data-flair.training/blogs/big-data-applications/
7. Role of Big Data in Telecom Industry with Case Studies. (n.d.). TechVidvan. Retrieved February 10, 2022, from https://techvidvan.com/tutorials/big-data-in-telecommunication/
8. 5 Ways Big Data Can Help Those in the Hospitality Industry. (n.d.). RevFine. Retrieved February 9, 2022, from https://www.revfine.com/big-data-hospitality-industry/#:~:text=Big%20data%20is%20a%20key,experience%20that%20is%20being%20delivered.
9. Parmar, D. (2022, March 25). 4 applications of big data in Supply Chain Management. BIGDATAMADESIMPLE. Retrieved February 9, 2022, from https://bigdata-madesimple.com/4-applications-of-big-data-in-supply-chain-management/
10. Wagener, A. (2021, February 23). How does data science work? [Illustration]. Https://Www.Mcg.Dk/Post/How-Does-Data-Science-Work. https://www.mcg.dk/post/how-does-data-science-work

A Study Of Using The Sharp Index Model To Construct An Optimal Liquid Fund Portfolio

Prof. Swati Bhalerao and Mr. Onkar Balasaheb Chavare
Yashaswi's International Institute of Management science chinchwad, pune
swatibhalerao.pune@gmail.com, 20106@iims.ac.in

ABSTRACT

Investors will diversify their portfolios to mitigate risk because they prefer lower risk and higher returns. Diversification is defined as the combination of two or more assets that results in the lowest risk and highest return. A portfolio is a grouping of two or more assets. For the purposes of portfolio construction, risk and return are two fundamental and important factors. When putting together a portfolio, every investor's goal is to reduce risk while increasing return. The portfolio with the lowest risk and highest return is referred to as an optimal portfolio. The best and most perfect model for constructing an optimal portfolio is Sharpe's Index Model (SIM). Using Sharpe's Index Model (SIM), this study attempts to construct an optimal portfolio. The Sharpe index model is used to assess and rank the performance of various mutual funds in India. The best performing mutual fund is the SBI Liquid Fund, followed by the UTI Liquid Fund and PGMI Liquid Fund, and the worst performing mutual fund is the NIPPON INDIA Liquid Fund.

Keyword:- Mutual funds, Liquid Mutual Funds, Portfolio management, Sharpe Index Model

INTRODUCTION

Risk and return are two of the most important factors to consider when putting together a portfolio. In portfolio management, every investor's main goal is to minimise risk while maximising return. The optimal portfolio has the lowest risk and highest return. Portfolio selection refers to the process of determining the best possible portfolio. Several researchers have attempted to uncover the empirical relationship between return and risk and how this relationship can be used to build a better portfolio. These research result in two theories: Portfolio Theory and Capital Market Theory. Harry Markowitz's Portfolio Theory (1952, 1959) is concerned with portfolio selection that maximises expected returns while remaining within an individual investor's risk tolerance. Sharpe and others developed the Capital Market Theory, which links investment decisions to security prices. When combined, Portfolio Theory and Capital Market Theory provide a framework for defining and measuring risk and its relationship to return.

In today's rapidly changing business environment, investment options are constantly changing. As a participant in the capital market, the Mutual Fund Industry is quickly adapting to changes. Depending on general economic growth and global conditions, the number of mutual fund houses has grown over time and will persist in the future. The future is expected to be bright, with numerous global mutual funds establishing funds in India and the industry witnessing several mergers and acquisitions. Researchers are encouraged to investigate the market's potential and drawbacks. In this regard, the study justifies the attempt to analyse the mutual fund industry's growth pattern in conjunction with private and public sector mutual fund schemes, as well as the performance evaluation of the top ten public and

private sector mutual fund schemes using the Sharpe index model to analyse NAV and returns. Furthermore, the study's findings will increase ordinary investors' trust in mutual fund schemes and justify their participation in them.

Sharpe's Index Model (SIM) is based on the idea that a security's return can be considered linearly linked to a single market index, meaning that all securities are affected by the stock's movement. The concept is that the stock market's movement affects all shares. When the stock market rises, the prices of most stocks rise, and when the stock market falls, the prices of most stocks fall. However, all of the shares' prices may not move at the same time. The sensitivity of a security's price to a change in the market varies depending on the security. This model is also known as the single index model because it was first presented by Sharpe (1963, 1969).

LIQUID FUND –

"Liquid funds invest in bonds with a three-month maturity." They're ideal for storing money set aside for unexpected expenses or surplus funds for a few weeks to a year. You can expect higher returns than you would from putting your money in a bank account. Liquid funds are mutual funds that invest in securities that have a residual maturity of less than 91 days. Because liquid funds do not have a lock-in period, assets are not held for an extended period.

Although these funds have a low risk of losing money, they do not guarantee returns or capital protection. There have been a few instances of liquid funds losing money, but they are rare.

Remember that these funds are only meant to outperform your bank account by a small margin. They offer consistent but low returns and are not suitable for building long-term wealth.

Liquid funds are intended to provide investors with a high level of liquidity as well as capital protection. As a result, the fund manager invests in 91-day-maturity high-yield debt instruments. The allocations are determined by the fund's investment objective. The portfolio's average maturity will be three months, according to the fund manager. This makes liquid funds less vulnerable to interest rate movements by reducing the sensitivity of fund returns to interest rate movements.

The fund's value does not fluctuate much. Furthermore, the underlying securities' maturities are matched with the portfolio's maturity. It aids in the production of higher returns. Liquid funds are a great place to put your spare cash. These are low-risk havens that pay out more than a traditional savings account. Liquid funds attempt to replicate the liquidity of a savings account.

Capital gains

- If mutual fund units are sold after three years from the date of purchase, gains are taxed at a rate of 20% after inflation indexation is taken into account.
- If mutual fund units are sold within three years of purchase, the entire gain is included in the investor's income and taxed at the appropriate slab rate
- As long as you keep the units, you won't have to pay any taxes.

Dividends

- Dividends are included in an investor's income and taxed in accordance with their tax bracket. In addition, if an investor's dividend income exceeds Rs. 5,000 in a financial year, the fund house deducts a 10% TDS before distributing the dividend.

LITERATURE REVIEW

Making decisions under uncertainty is the most challenging task for investors. One solution proposed by Harry Markowitz in 1952 was for

investors to invest in different amounts depending on their wealth, with large amounts in more conservative sectors (Elton et al., 2014). The mean (average) and variance (variant) approaches are used in Markowitz's Portfolio Theory. The mean represents the rate of return, while the variant represents the level of risk. Markowitz's portfolio theory, also known as the mean-variance model, focuses on maximising expected return (mean) while minimising uncertainty/risk (variant) to select and build the best portfolio.

Sivabagyam, Vidya, Suganya, and Sandhiya (2019) conducted research on risk-return analysis of selected growth option mutual fund schemes in India. The studies sought to determine whether mutual funds provide adequate returns while posing the least amount of risk to investors among the various growth schemes. To calculate the appropriate result, statistical tools such as BETA, Sharpe Ratio, Treynor Ratio, and Jensen's Alpha Ratio are used. According to the findings, the SBI Banking and PSU Debt Fund and Axis Banking and PSU Debt Fund securities outperformed. In contrast, the UTI Core Equity Fund and SBI Contra Fund securities underperformed.

Choudhary, Nigam, and Ahmed Sayyed (2020) conducted a comparative study of mutual fund schemes. The tools and parameters used are total returns, average maturity, yield to maturity, and Sharpe's ratio. The study goes over the various parameters that can be used to determine which scheme is better for which parameter, so investors can understand the scheme's risk adjusted performance.

Das and Samyabrata (2020) investigated the impact of the COVID-19 pandemic on the Indian mutual fund industry. The researchers focused on the impact of COVID-19 on the Mutual Funds Industry's Assets Under Management (AUM) and the return generated by mutual funds. According to the findings, the total AUM of the Indian mutual fund industry fell by 9.82% between December 2019 and April 2020 as a result of the COVID-19 effect. In all periods, pre-COVID returns were higher than post-COVID returns, with the exception of pharmaceutical funds.

Rohatgi, Kavidayal, Bhushan, Singh, and Dixit (2020) investigated the research on Validation of Mutual Funds Schemes Selection Techniques in India. The researchers wanted to validate mutual fund selection techniques in India based on return and risk frontiers, as well as the selection of all mutual fund schemes based on net asset and ranking. Statistical tools such as standard deviation, beta, and mean, average returns, Sharpe, and Treynor ratios are used to generate appropriate results for the research. According to the findings, Axis Long Term Equity Fund - Direct Plan has the highest ranking from both evaluating ranking methods using the ratios, followed by ICICI Prudential BlueChip Fund.

RESEARCH METHODOLOGY

Research Design:

In this study, the researcher used a Descriptive Research Design because the researcher has very specific objectives and data requirements.

Data Collection:

Secondary data was primarily used by the researcher in this study for data collection. Secondary data will be gathered from websites such as www.amfiindia.com, www.rrfinance.com, and www.mutualfundindia.com, as well as manuals, annual reports and journals, company periodicals, the stock exchange, and other sources. Monthly returns and net present value were collected for a year, from January to December 2021.

SCOPE OF THE STUDY

The study's goal is to create the best Liquid Mutual Fund portfolio possible in order to minimise risk and maximise profits. The risk and return of those funds should be evaluated based on their historical performance, and the top liquid mutual fund should be chosen for portfolio construction.

SAMPLE OF THE STUDY

Only ten mutual funds were chosen for the study using convenient sampling techniques in this paper, which covers Liquid Mutual Fund. The following are the liquid mutual funds that have been chosen. The following is a description of a liquid mutual fund that was chosen.

Table1:- Description of the Liquid Mutual Fund

Name of the Mutual Fund Company	**Description of the Liquid Mutual Fund**
SBI LIQUID FUND	Mr. R. Arun manages this fund, which was established in 2007 to provide investment opportunities in a wide range of debt and money market securities with a residual maturity of up to 91 days.
PGIM INDIA LIQUID FUND	Mr. Jumaresh Ramakrishnan is the manager of this fund. This fund was established in 2007. The scheme's investment objective is to generate consistent returns while maintaining high liquidity by investing in a portfolio of short-term, high-quality money market and debt securities.
UTI LIQUID CASH FUND	Amandeep S Chopra is the manager of this fund. By investing in money market securities and high-quality debt, this fund was established in 2003 with the goal of generating consistent, low-risk income with a high level of liquidity.
ICICI PRUDENTIAL LIQUID FUND	Mr. Rahul Goswami manages this fund, which was founded in 2003 and invests in debt funds and money market securities for up to 91 days.
AXIS LIQUID FUND	Mr. Devang Shaa manages this fund, which was established in 2009 to provide high level liquid with reasonable returns while balancing low risk.
ABSL LIQUID FUND	Sunaina da Cunha has been in charge of this fund. This fund was established in 2013. Its goal is to provide reasonable returns while maintaining a high level of safety and liquidity by investing wisely in high-quality debt and money market instruments.
KOTAK LIQUID FUND	Mr. Harish Krishna is the fund's manager. This open-ended fund, which launched in 2014, invests in equity arbitrage and debt.
TATA LIQUID FUND	Mr. Amit Somani manages this fund, which was established in 2004. Its investment objective is to provide reasonable returns to unit holders while maintaining a high level of liquidity.
HDFC LIQUID FUND	Mr. Anupam Joshi has been in charge of these funds. This fund was established in 2000. The scheme's investment objective of generating income through a portfolio of money market and debt instruments is not guaranteed to be realised.
NIPPON INDIA LIQUID FUND	Mr. Anju Chhajer, the fund's manager, launched the fund in 2003 with the goal of generating optimal returns while maintaining a moderate level of risk and high liquidity.

TOOLS FOR ANALYSIS

Statistical tools such as the standard deviation, expected return, and Sharpe Model were used in this study.

OBJECTIVES OF THE STUDY

1. To Construct an optimal liquid mutual fund portfolio from the selected fund using the Sharpe Single Index Model to maximise the return on each individual liquid mutual fund.
2. Using the Sharpe Model to select the best liquid mutual fund and build a portfolio, assisting investors in making risk-free investments.

DATA ANALYSIS

Sharpe's performance index compares the performance of different funds or portfolios by focusing on a single value. It evaluates the risk premium of the portfolio in relation to the total amount of risk in the portfolio. This model can be used to evaluate a portfolio's performance over a set period of time. This performance indicator (Sharpe Index) is notable for taking portfolio risk into account and assigning the highest values to assets that have the best risk adjusted average rate of return. The risk premium is the distinction between the portfolio's average rate of return and the riskless rate of return. To use the Sharpe Index, you'll need three things:

1. The return on your portfolio
2. The risk-free rate of return
3. The portfolio's standard deviation

A government bond or note's average return (over time) can be used to calculate the risk-free rate of return. The standard deviation of a portfolio measures its systematic risk, revealing both the portfolio's risk and strength. Some Sharpe Index Model Statistics

Sharpe Index

$$= \frac{\text{Portfolio average return} - \text{Risk free rate of return}}{\text{Standard Deviation of the Portfolio}}$$

$$St = \frac{Rp - Rf}{\sigma p}$$

St = Sharpe Index

Rp = Portfolio average return

Rf = Risk free rate of return

σp = Standard Deviation of the portfolio

Standard Deviation

$$\sigma p = \sqrt{\frac{\sum(X-\bar{X})^2}{N}}$$

X = monthly return

$\bar{X}$ = average monthly return

N = total numbers of periods

S.D = Standard Deviation

St = Sharpe index value

EVALUATION OF LIQUID MUTUAL FUNDS SCHEMES THROUGH SHARPE INDEX MODEL

Table 2:- Liquid Mutual Fund wise Sharpe Index Model

S No.	Name of the Mutual Fund	Average Return %	S.D	St
1	ICICI PRUDENTIAL LIQUID FUND	3.1791%	0.2181	5.86
2	HDFC LIQUID FUND	3.1675%	0.2777	4.92
3	SBI LIQUID FUND	3.2725%	0.2266	6.41
4	ABSL LIQUID FUND	3.215%	0.2685	5.20
5	NIPPON INDIA LIQUID FUND	3.1775%	0.2939	4.65
6	KOTAK LIQUID FUND	3.1816%	0.267	5.17
7	AXIS LIQUID FUND	3.235%	0.2525	5.56
8	UTI LIQUID CASH FUND	3.235%	0.2324	6.02
10	TATA LIQUID FUND	3.1808%	0.2756	4.97

S.D = Standard Deviation St = Sharpe index value

The value of 'St' for all mutual funds is positive, according to the table above. The highest value in the Sharpe Index indicates the best performance, while the lowest value indicates the worst performance. SBI Mutual Fund has the highest St Value of 6.41 among India's 10 liquid mutual funds. As a result of the Sharpe Index, it is the most popular mutual fund these days. As a result, an investor is advised to include this fund in his portfolio.

FINDINGS OF THE STUDY

Table 3: Liquid Mutual Funds Ranking From Best To Worst Based On Sharpe Index Value

Name of the Liquid Mutual Fund Company	Rank
SBI LIQUID FUND	1
PGIM INDIA LIQUID FUND	2
UTI LIQUID CASH FUND	3
ICICI PRUDENTIAL LIQUID FUND	4
AXIS LIQUID FUND	5
ABSL LIQUID FUND	6
KOTAK LIQUID FUND	7
TATA LIQUID FUND	8
HDFC LIQUID FUND	9
NIPPON INDIA LIQUID FUND	10

The table above shows the mutual fund rankings from best to worst. For investment, one can select the best mutual fund scheme. As a result, for better profits and lower risk, an investor should select the best performing mutual funds scheme in his portfolio.

According to data from the previous year, the SBI Liquid Fund is the best performing mutual fund, followed by the UTI Liquid Fund and PGMI Liquid Fund, and the NIPPON India Liquid Fund is the worst-performing mutual fund.

The study mentioned above can provide a wealth of information about the performance of one's portfolio's funds. The performance of various mutual funds can easily be compared and contrasted. The following recommendation is feasible.

1. The shape index approach can be used to quickly assess mutual fund performance. The fund with the lowest "St" value has a poor performance, while the fund with the highest "St" value has a good performance. It also exemplifies the Sharpe index method's usefulness.
2. With so many mutual fund schemes to choose from, it can be difficult for investors to find the right one. This paper provides a necessary and sufficient result to aid in determining the best portfolio for maximising return while minimising risk.
3. Standard deviation and mean are very useful statistical tools for arriving at a valuable conclusion. Without the use of average and standard deviation, the Sharpe index approach cannot be used.

CONCLUSIONS AND SUGGESTIONS

Mutual funds are widely recognised as the most popular and secure way for an investor to invest these days. When looking at the current and future aspects of mutual funds in India, it's easy to conclude that this market will be sufficient for a long time. The Sharpe index is an easy-to-understand concept that can help investors figure out which mutual funds are performing well and which are not. It also

contains crucial information about the risk and return of the fund. The standard deviation of the portfolio indicates the level of risk. Choosing a portfolio will be simple if the investor has sufficient knowledge of the fund's return and risk.

The Sharpe index model lets you compare multiple mutual fund strategies as well as all relevant data. The Sharpe value is used to rank the results after the comparison. The fund with the lowest 'St' value has a poor performance, while the fund with the highest 'St' value has a good performance. It can help an investor figure out which mutual funds are the best and worst performers. Investors must also take into account the companies' goodwill, as well as market factors such as government policies, sales economics, and industry trends.

Given the growing economy and awareness of regular investors, as well as the immense potential of mutual funds, the industry has a bright future if the government, the RBI, and SEBI take prompt and effective bold moves along the lines outlined above.

Since the majority of mutual fund investors began their investment careers with MFs, it is critical for MF promoters to be more transparent and honest in their performance advertising in order to build a long-term relationship with their investors. To broaden their base and differentiate themselves from other institutions, MF promoters should also advise and focus on retail investors, particularly in rural and underserved areas. Financial performance, manager's profile, distribution expenditures, proportion of SEBI fees charged, overall expense ratio, disclosure portfolio turnover, and associated transaction costs must all be detailed.

SEBI's primary responsibility is to ensure that monthly mutual fund portfolios, as well as more precise guidelines and updated laws and regulations, are published in national news publications in a variety of languages to increase social awareness. To protect investors' interests, SEBI must take action against late trading activities and implement guidelines to monitor quick trading practises, which is necessary for social trust and confidence to grow. Mutual funds should be required by SEBI to publish how many investors own more than 10%, 20%, and 25% of the NAV on a regular basis.

SEBI should make it mandatory for intermediaries to disclose that they are agents for certain mutual funds and the fee rate they receive in order to protect investors' interests. To discourage unethical behaviour and manage Mutual Funds, SEBI must take a "regulator-and-investor" approach. The government must empower the SEBI with the authority to prosecute wrongdoers. It must also use the media to publicly expose defaulters.

REFERENCES

- Isha Roy Choudhary, P. P. (2020). Performance Analysis of Indian Mutual Fund Schemes - A Comparative Study. International Journal for Research in Applied Science & Engineering Technology.
- Mr. K.R. Sivabagyam, Mrs. Shruthi. P, Mr. Vidya. M, Mrs. Suganya. P, Mrs. Sandhiya. V (2019). A Research on Risk Return Analysis of Selected Growth Option Mutual Fund Schemes in India. International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, Volume-8 Issue-12S.
- Mr. Sachin Kumar Rohatgi, Prof. P.C. Kavidayal, Mr. Bhakti Bhushan Mishra, Dr. Krishna Kumar Singh, Dr. Anjali Dixit(2020). Validation of Selection Techniques of Mutual

Fund Schemes in India. International Journal of Recent Technology and Engineering (IJRTE)

- Mr. Sourav Kumar Das, Dr. Samyabrata Das (2020). Impact of Pandemic COVID-19 on Indian Mutual Fund Industry - An Analytical Study. Journal of Critical Reviews VOL 7, ISSUE 16, 2020.
- Punithavathy Padian (2007), "Security Analysis and Portfolio Management", New Delhi: Vikas Publishing House Pvt Ltd.
- V.K Bhalla(2007), "Investment Management"
- www.amfiindia.com
- www.mutualfundsindia.com
- www.rbi.org.in
- www.rrfinance.com
- www.sebi.gov.in

 ISBN 978-81-927230-0-10

Strategies, Innovation in management and the role of informational technology to change the residential consumer behaviour in imminent markets of Solar Renewable Energy

Shalaka Patil[#1], Shabana Memon[*2]

Bharati Vidyapeeth (Deemed to be University), Institute of Management Kolhapur, Maharashtra, India

[1]shalakapatil87@gmail.com

[2]shabana.memon@bharatividyapeeth.edu

***Abstract*— As the scarcity of conventional energy sources are increasing and most of the sources causing the environmental problems, use of natural resources is growing in the recent years. One of the examples of the renewable sources is use of the solar renewable energy. India is running one of the largest and most ambitious solar renewable capacity expansion programs. Solar energy is one of the key elements of socio-economic development and also responsible for sustainable jobs creation but still there is less awareness about going green in the society. In this report will do the detailed study about the limiting factor of solar renewable sector and how we can overcome this factor also the various strategies and use of the information technology to enhance the residential consumer behaviour towards going green.**

***Keywords*— Renewable energy, Solar, Residential, Information technology, Barriers**

I. INTRODUCTION

Renewable energy is generated from the natural process and It's available continuously for usage. Solar energy used the energy comes from sun. Solar Panels made up of solar cells are one of the key components to convert the sunlight into electricity. The basic components of the solar power plant are Solar Panel, Inverter, AC, DC protection devices, cables and earthing, lighting protection.

The oil crisis in the 1970s′ was a welcome shock for the Government as it pushed the focus from coal to renewables. This coupled with the early 1990s' financial crisis and engagement of the private sector in industrial development, brought about by the liberalization and industrialization of the Indian economy in 1991 triggered a growth of the renewable energy sector [38].

As of September 2021, India had 101.53 GW of renewable energy capacity and represents ~38% of the overall installed power capacity. The country is targeting about 450 Gigawatt (GW) of installed renewable energy capacity by 2030 – about 280 GW (over 60%) is expected from solar [15].

II. METHOD

In this study, we have conducted the systematic literature review of the various publications on the present status, barrier of the solar energy in India and role of the informational technology in solar energy. The Fig.1. shows the steps we have used in the research process.

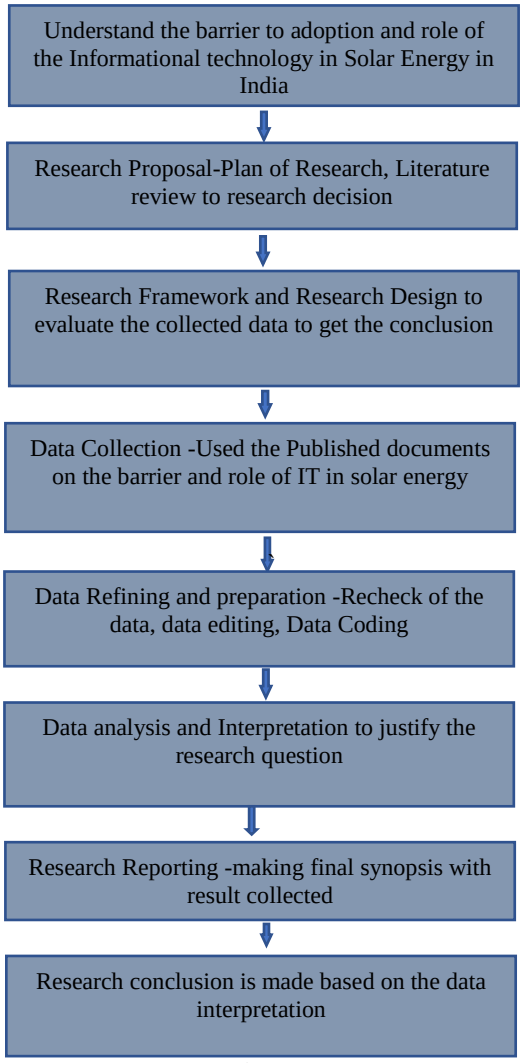


Fig.1.Flowchart of the research process.

III. Result and Discussion

The review of the selected 46 publications covers the some of the state of the India and various country.

Based on the analysis of selected publications, we have analyzed the various limiting factors. Major factors are listed out in the Fig.2.

Fig. 2. Limiting Factors to adoption of solar energy

A. *Limiting Factor to solar residential sector*

Although PV technology has advanced tremendously, many of the selected publications show that there are still several barriers to adoption.

1) *Less awareness and traditional approach*

There is less awareness about the renewable energy among the society. The perspective towards; what is solar energy, how its work, what are benefits, what will be the ROI, which model is suitable is not yet clear.

In many regions of the state, there is no public awareness of the importance of renewable energy systems. Mainly for households, renewable energy has not had much impact, which leads to the use of more reliable coal and other fossil fuels [2]. General information and awareness in relation to new technologies and understanding the practical problems in implementing and maintaining solar projects are limited [5].

The main concerns with respect to public understanding are: insufficient information regarding ecological and financial benefits, inadequate awareness of renewable energy technologies and uncertainties about the financial feasibility of RE installation projects [14]. The renewable plants require vast area of land required to produce an amount of energy equivalent to that which can be produced from a small coal fire power plant [14].

2) *Management barrier*

Inappropriate management is one of the main limiting factors while adopting the technology while targeting economies in rural and urban area [39]. When a PV system is utilized to supply electricity access in rural areas in low-income economies, different business strategies should be implemented compared with the high-income economies [39]. Weak and neglected after-sales service has also been shown to be a barrier to the diffusion of PV systems in rural areas. Because of the remoteness of the areas where PV systems are being used for rural electrification, the adopters lack access to information, knowledge, communication channels, technical assistance, and other infrastructure. This emphasizes the need for a functioning service to continue monitoring and maintenance, even after the customers have already bought the systems [39].

3) *Fear*

Still there is fear in mind about the weather system will work fine, investment should not go waste, is the system is really reliable than conventional energy source. There is always the fear of emanating from of yields due to environment changes and non-working of the system [9].

4) *Financing process*

The market for in India can be classified into four segments: Government market: where the government buys the output of the projects as a consumer, often providing budgetary support second is Government driven market: where the government pursues the use of RE in establishments outside its control for social reasons, often providing budgetary support or fiscal incentives for the same. For example, the government promotes the use of solar applications in schools, malls and hospitals Third is Loan market: where people take loans to finance RE based applications since self-financing is limited and forth is Cash market: where High Net worth Individuals can buy RE based applications for meeting personal energy needs India is currently at an initial stage of the first two segments. The Government of India is not focusing on promoting the third and fourth categories of RE, which may offer high potential for renewable energy-based applications [5].

5) *Government policies*

Over the years, the Government of India through the Ministry of New and Renewable Energy (MNRE) and Ministry of Finance (MoF), and the State Governments have used a number of policy instruments towards promotion of RE. Regulatory measures have mainly taken two forms: Renewable Purchase Obligation (RPO) and Feed-in Tariffs [5]. in many states policies have only created uncertainty for investments in renewable energy [5]. The regulatory framework and procedures are different for every state because they define the respective RPOs (Renewable Purchase Obligations) and this creates a higher risk of investments in this sector. Additionally, the policies are applicable for just 5 years, and the generated risk for investments in this sector is apparent. The biomass sector does not have an established framework [41].

Solar PV is recognized as serving a market that is very important in developing countries—electrification of rural and preurban areas that do not yet have access to the electric grid [13]. the point of grid parity has not yet been reached in many parts of the country; solar generating stations need some form of financial incentive to compete for the supply of electricity. Many states have introduced such incentives to support the deployment of solar power stations [17].

Policies instituted by the government have not supported the profitable exploitation of renewable energy resources for any intending investors. High supports in the form of subsidies are given to encourage energy generation from conventional energy sources leading to a fall in their prices and thereby

creating an unfair competitive environment for solar energy exploitation; this has led to a slow in the growth demand for solar energy devices [2].

6) Initial cost

RE projects tend to have little or no fuel costs and low operation and maintenance costs but their initial unit capital costs tend to be much higher than fossil generation systems. The higher ratios of capital cost to O&M cost are significant because they indicate that these projects carry a disproportionately heavy initial burden that must be financed over the life of the project. This makes exposure to risk a long-term challenge The high initial cost reflects high risk perception of the investors [5]

B. Steps to overcome the limiting factors

1) Regular consistent awareness

The large-scale implementation is possible only when society is aware about the advantage of going green and this can be achieved with continuous awareness. Tools can be used such as radio, seminars, advertisement and personal meetings with builders and associates [26],[40].

2) Developing models and strategies targeting various market segment

While targeting the urban, rural area and the low, middle and high-level economies different strategies and business models are required to be used. Understanding the requirement and providing the cost-effective solution with quality is more important [27].

3) Consumer friendly government policies

Favourable policies are fundamental to long-term sustainability of solar energy development [40]. The MNRE should provide a comprehensive action plan or policy for the promotion of the renewable sector in its regulatory framework for renewables energy. The action plan can be prepared in consultation with SERCs of the country within a fixed timeframe and execution of the policy/action plan. The central and state government should include a "Must run status" in their policy and follow it strictly to make use of renewable power [41].

4) Providing various financial options of payment

The government should provide enough budget for the clean energy sector. The government should concentrate on R&D and provide a surplus fund for R&D. Banks should allow an interest rebate on housing loans if the owner is installing renewable applications such as solar lights, solar water heaters, and PV panels in his house. Banks should provide the loans at lower rate of interest [41].

5) Innovative approach to target the consumer

Companies should use the strategies and business model to attract the customers as well make them aware about the renewable energy, this can be achieved with giving discounts, providing the free solar related product after installing the system or provide some percentage on the reference and taking feedback of the install system on regular basis.

IV. THE ROLE OF THE INFORMATION TECHNOLOGY

The advance information and communication technologies act as the enabling technologies for other sectors as enumerated in subsequent paragraphs. Thus, ICT can not only become smart itself, but also help other sectors in becoming smarter and thus energy efficient [42]. Solar monitoring system monitor the real time data of the power plant and one can monitor the generation and fault in the system can be identified in the system which can be removed immediately so the maintenance time of the system reduced which helps to increase the overall generation of the system [44,45].

There are software and websites are available where consumer can understand the how much solar capacity is required, tentative cost and even can make the comparison with different available product in the market.

The with the help of the various software like AutoCAD, solid works etc... designer can design the solar power plant this helps to find the installation capacity, cable length and positioning of the devices in the layout can be determined before the work start so cost of the system can be minimized. The one can give the various command like system turn off like command through then mobile. With the help of the available monitoring data system working can be analyzed. PV Syst. Helios software give tentative idea about the generation of the solar power plant before installation of the solar power plant, so require changes can be done before.

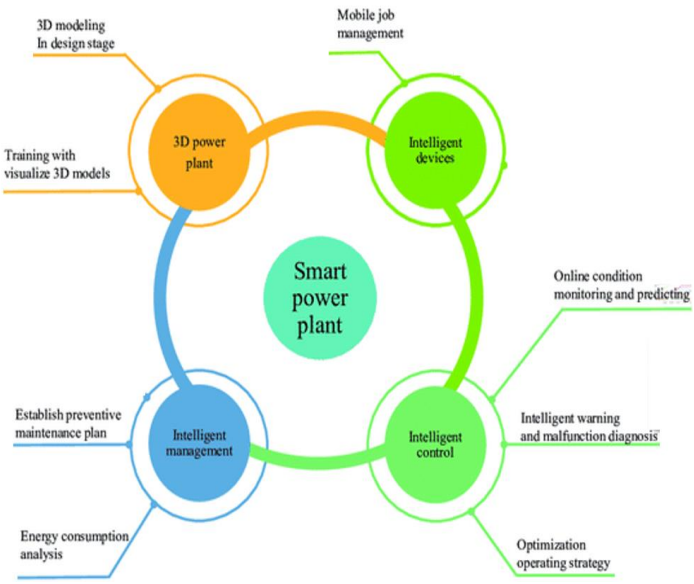


Fig.3. Functions of ICT [46]

V. CONCLUSIONS

Even though several studies shows that solar renewable energy is becoming widely used alternative source for conventional energy still there are several limitations in adoption of the solar energy but we can try to minimize this barrier so perspective of society towards going green will change, the information technology will play the important role in this.

The study shows that as economic point of view the cost of the system is still generally perceived as high. Apart from this there are several barriers in adopting the solar energy in the society like less awareness, government policies, financing process, weak management, fear towards adopting new technology and high initial investment cost. We can try to minimize this limiting factors. Spreading the awareness and healthy consumer perspective government policies and different financial models helps to minimize barrier.

The information technology plays the major role in the solar power plant like from the design, operation & maintenance and monitoring of the system.

ACKNOWLEDGMENT

We would like to thank the International Institute of Management Science (IIMS) for giving us opportunity for paper submission. We thank the Michael Shell and other contributors for developing and maintaining the IEEE LaTeX style files which have been used in the preparation report. We also thank the all the authors for their work and all publications for publishing the useful papers.

REFERENCES

[1] Heather P. Bedi ""*Lead the district into the light": Solar energy infrastructure injustices in Kerala, India*"

[2] Raj Vikram Madurai Elavarasan, Leoponraj Selvamanohar, Kannadasan Raju, Raghavendra Rajan Vijayaraghavan, Ramkumar Subburaj, *Holistic Review of the Present and Future Drivers of the Renewable Energy Mix in Maharashtra, State of India*

[3] Report by IREF Addressing Barriers to Scaling Up Renewable Energy Through Industry Involvement

[4] Suprava Chakraborty, Pradip Kumar Sadhu, Utpal *Goswami Barriers in the Advancement of Solar Energy in Developing Countries like India* Problems of Sustainable Development 2016, vol. 11, no 2, 75-80

[5] Discussion by Infrastructure Development Finance Company Ltd. *Barriers to development of renewable energy in India & proposed recommendations*

[6] Shreemat Pandey, Vijai Shanker Singh, Naresh Pal Gangwar, M.M. Vijayvergia, Chandra Prakash, Deep Narayan Pandey Determinants of success for promoting solar energy in Rajasthan, India doi: 10.1016/j.rser.2012.03.012

[7] Hooman Peimani *Financial Barriers to Development Of Renewable And Green Energy Projects In Asia*

[8] Elisa Asmelash and Gayathri Prakash *Future of Solar Photovoltaic Deployment, investment, technology, grid integration and socio-economic aspects*

[9] Shuaib Kamili, under the guidance of Ashish Kulkarni and Yuvaraj Dinesh Babu Nithyanandam. *Identifying barriers for rooftop solar uptake in MSMEs and development of a mitigating financial framework*

[10] Report by *Esmap Report On Barriers For Solar Power Development In India 2010* South Asia Energy Unit Sustainable Development Department the World

[11] Batzelis, Efstratios, Zakir Hussain Rather, John Barton, Bonu Ramesh Naidu, Billy Wu, Firdous Ul Nazir, Onyema Sunday Nduka, et al. 2021. "*Solar Integration in the UK and India: Technical Barriers and Future Directions*". Loughborough University. https://doi.org/10.17028/rd.lboro.14453133.v1

[12] Radhey Shyam Meena, Deepa Sharma, Ritam Rathore *the Most Promising Solar Hot Spots in India Development and Policy: The Thar Desert of Rajasthan*

[13] Rahul Choudhary, Pradip Kumar Sadhu, Suprava Chakraborty *Eminent Economic Policies & Dominant Barriers of Solar Energy in India* IJERTV3IS031521

[14] Seetharaman, Krishna Moorthy, Nitin Patwa, Saravanan, Yash Gupta *Breaking barriers in deployment of renewable energy*

[15] *Indian Renewable Energy Industry Report*

[16] Aashish Jaiswal, Garima Sikka *Future Scope and Potential of Solar Energy in India* an Overview ISSN: 2319-6386, Volume-4 Issue-10, April 2017

[17] Ashok Upadhyay, Arnab Chowdhury *Solar Energy Fundamentals and Challenges in Indian restructured power sector* International Journal of Scientific and Research Publications, Volume 4, Issue 10, October 2014 1 ISSN 2250-3153

[18] *Different Financing Models for Solar Roof Top Projects Indigo Solar Article*

[19] Yatish Joshi and Zillur Rahman Factors Affecting *Green Purchase Behaviour and Future Research Directions* doi.org/10.1016/j.ism.2015.04.001 Volume 3, Issues 1–2, June–December 2015, Pages 128-143

[20] Md. Masood Ahmad, Amit Kumar and Raushan Ranjan *Current Trends in Renewable Energy: An Overview* E-ISSN: 2454-6135 Volume.4, Issue 5 May-2018

[21] Mitali Yadav & Geetika Mishra S*tatus of Conventional Energy Sources and Solar Energy in India: A Review* ISSN-2349-5162

[22] Nirmal M Menon and I Sujatha Influence of *Rogers' theory of innovation of diffusion on customer's purchase intention – a case study of solar photovoltaic panels* IOP Conf. Ser.: Mater. Sci. Eng. 1114 012059

[23] Kawaljeet Kaur Kapoor *Sustainable Consumption from the Consumer's Perspective: Antecedents of Solar Innovation Adoption* com/science/article/pii/S0959378018301894

[24] Atul Sharma *A comprehensive study of solar power in India and world* 1364-0321/$ – see front matter © 2011 Elsevier Ltd. All rights reserved. doi: 10.1016/j.rser.2010.12.017

[25] Shah Rukh Shakeel and Arto Rajala *Factors Influencing Households' Intention to Adopt Solar PV: A Systematic Review* J. I. Kantola et al. (Eds.): AHFE 2020, AISC 1209, pp. 282–289, 2020.

[26] *Renewable energy: An assessment of public awareness Article* in International Journal of Ambient Energy · July 2010 DOI: 10.1080/01430750.2010.9675112

[27] Ramiar Sadegh-Vaziri *Entrepreneurship and Innovation in Energy and Environmental Technologies; Barriers and Opportunities Master of Science* Thesis Stockholm, Sweden 2013

[28] Klaus Topfer, Tim Wirth *Entrepreneurship and Innovation in Energy and Environment* ISBN: 92-807-2163-I

[29] Ramana Nanda (HBS), Ken Younge (Purdue) and Lee Fleming (UC Berkeley) *Innovation and Entrepreneurship in Renewable Energy* This chapter was prepared for an NBER conference volume, "The Changing Frontier: Rethinking Science and Innovation Policy".

[30] Sahar Cheraghi, Shahla Choobchain, Enayat Abbasi *Investigation of Entrepreneurship Development Barriers in The Field of Renewable Energies Technologies in Developing Countries:* A Case of Iran ISSN 2277-8616

[31] Charles Rajesh Kumar. J and M. A. Majid *Renewable energy for sustainable development in India: current status, future prospects, challenges, employment, and investment opportunities* doi.org/10.1186/s13705-019-0232-1

[32] Adam Sulich, Adam Grudziński *The Analysis Of Strategy Types Of The Renewable Energy Sector Acta Universitatis Agriculture Et Silviculture Mendelianae Brunensis* Volume 67 146 Number 6, 2019 Accepted: 6. 9. 2019

[33] Renewable Energy *Strategy to promote an enhanced investment climate for renewable energy technologies for submission to national and regional authorities in participating CIS countries* Article UNECE

[34] Christian Schlenker, Senior Consultant, Tefen Germany *Go-to-Market Strategies for Renewable Energy Market* Article on Tefen

[35] Sumant Sinha, Chairman and Managing Director, ReNew *Power A 5-point plan to maximize India's renewable energy potential* Article on World economic forum

[36] Indrajith.P *A Study on Customer's Satisfaction on Solar Energy Products with Special Reference to Coimbatore City* ISSN: 2455-7838

[37] Liping Ding, Yin Shi, Qiyao Dai, Zumeng Zhangjiajie Li, Ling Zhou *Does Beneficiaries' Satisfaction Enhance Their Trust in State Grid for Solar PV Adoption?* – An Evidence from PAPs in Rural China doi.org/10.21203/rs.3.rs-364467/v1 April 19th, 2021

[38] Gautam Raina and Sunanda Sinha *Outlook on the Indian scenario of solar energy strategies: Policies and challenges* doi.org/10.1016/j.esr.2019.04.005

[39] Emrah Karakaya, Pranpreya Sriwannawit *Barriers to the adoption of photovoltaic systems: The state-of-the-art* http://dx.doi.org/10.1016/j.rser.2015.04.058 1364-0321/& 2015

[40] Olayinka S. Ohunakin, Muyiwa S. Adaramola, Olanrewaju. M. Oyewola, Richard O. Fagbenle *Solar energy applications and development in Nigeria: Drivers and barriers*

[41] Renewable energy for sustainable development in India: *current status, future prospects, challenges, employment, and investment*

[42] *The Role of ICT In Energy Efficiency Management Household Sector* | 2018-World Energy Council

[43] Faran Ahmed, Muhammad Naeem, Muhammad Iqbal *ICT and renewable energy: a way forward to the next generation telecom base stations*

[44] Isha M. Shirbhate, Sunita S. Barve Solar panel monitoring and energy prediction for smart solar system Vol. 8, No. 2, June 2019, pp. 136~142 ISSN: 2252-8814, DOI: 10.11591/ijaas. v8. i2. pp136-14

[45] Tanuja Ganu, Mayuri Ejgar, Dr. Bashirahamad Momin *Intelligent Monitoring and Maintenance of Solar Plants using Real-time Data Analysis*

[46] Yongping Yang, Chengzhou Li, Zhiping Yang *Progress and prospects of innovative coal-fired power plants within the energy internet*

Impact of Stock split in the stock price of specific companies in the Covid -19 Pandemic.

Prof. Mahesh Mahankal[#]1 Ms. Trupti Kokane*2 Mr. Sagar Walekar*3

Assistant Professor, Yashaswi Education Society's IIMS- Chinchwad.
Savitribai Phule Pune University, Pune.
169/A,Station Road, Opp. Elpro International, Chinchwad, Pune, Maharashtra 411033 (India)
mahesh.mahankal@gmail.com

Student, MBA in Financial Management at Yashaswi Education Society's IIMS- Chinchwad.
Savitribai Phule Pune University, Pune.
dipzkokane30@gmail.com

Student, MBA in Financial Management at Yashaswi Education Society's IIMS- Chinchwad.
Savitribai Phule Pune University, Pune.
walekarsagar@gmail.com

ABSTRACT:

Share split is one of the strategic decisions that can be taken by the top-level management of the company. With the help of share split companies can increase or decrease the number of shares that are traded in the stock market. Most of the time share split would help to decrease the current share price of the company. Covid-19 pandemic has affect the overall world and all industries across the world. It has a positive as well as negative impact on the Indian share market. to understand the share spilt during the pandemic the data has been collected from the secondary sources that is internet. The data has been collected from the news articles as well as other websites. Analytical research technique has been used to study the collected data. For this research inductive research approach has been considered. Companies can attract more consumers to the company's shares with the use of a share split. Share splits do not always result in a drop in the company's share price; in certain cases, the value of the stock rises. Customer expectations, market conditions, and capital requirements are all elements that the organisation must evaluate both internally and outside.

KEYWORDS:

Share split, analytical research technique, inductive research

1.0 INTRODUCTION:

1.1 MEANING OF THE SHARE SPLIT:

Share split deals is one action that can be taken by the management in respect to shares that are trading in the stock market in simple words stock spilt means company can increase the number of shares by issuing more shares to the people who are holding company's shares. Stock share would help to increase the trading liquidity of shares. This action makes the stock more affordable to the investors. With the help of share split company would able to decrease the share price of the company with no change in the company's value. Reverse stock is the decisions taken by the company in which company can reduce the number of shares that are currently trading in the market. This action would help to increase the market price of the share. With the help of share split company can manage the demand and supply of the shares.

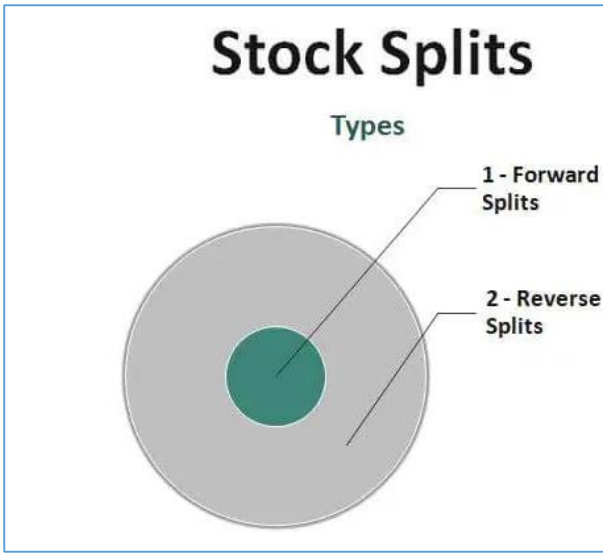


Figure 1types of share split

Source: WallStreetMojo. 2022

There are mainly two types of shares split which includes forward share split and reverse share split. In forward share split company would issue the more share to the existing shareholders and this strategy would help to reduce the market price of the share. Another type is reverse stock split which means company would reduce the number of shares that are currently traded in the stock market. This strategy would help to increase the market price of the shares that are currently traded in the stock market.

Covid-19 is one of the pandemics that affected the whole world during the year of 2020 and 2021. Covid-19 pandemic has great impact on the stock markets across the world. This pandemic has influenced each sector of the economy including share market, big companies and other sectors. This research paper will help to understand the concept of share split along with effects of Covid-19 pandemic on the Indian share market. There are some companies that took share split decision during the covid-19 pandemic. This report will study the effects of share split on the company's share price.

2.0 OBJECTIVES:

1. To study the concept of share split.
2. To understand the effect of covid-19 on the stock market of India.
3. To study the share split during the pandemic covid-19 (2020).
4. To study the effects of share split on the company's share price.

3.0 RESEARCH METHODOLOGY:

This research is based on the secondary research. The data has been collected from internet, along with company's official websites, financial reports and other portals. However, the annual reports published by companies, as well as quarterly reports for the current year detailing their performance in the current market context, are the primary sources of information.

3.1 RESEARCH APPROACH:

The research approach deals with the plans along with procedures as well as assumptions that are followed by the researcher while collecting the data for the research. Research approach is completely depending upon the research objectives along with nature of the research. For this research paper ***inductive research approach*** has been used in which researcher would try to achieve objectives of the research. In this research objectives would try to achieve with the help of analysis of secondary data that is available on the internet. Due to the time constraints as well as lack of resources preparation of primary data was not possible for this research.

3.2 SCOPE OF THE RESEARCH:

1. This research will be useful for the investors who are planning to invest in the stock market.
2. Study was carried out only for the companies who has taken share split decision during the pandemic covid-19.
3. The Indian share market considered for this research.

3.3RESEARCH TECHNIQUE:

For this research paper ***analytical research*** has been used. Analytical research is one of the research techniques in which researcher needs to use critical thinking skills and knowledge as well as experience while conducting the research. With the help of analytical research, the researcher would find critical details regarding the research topic or question.

4. Review of Literature

"Saraswathi Thirunellai (2014)": The aim of the current empirical paper investigates the impact of political events and stock market with reference BSE in stock market. Therefore the objective of this paper the price behavior on the political event in BSE. The mainly stock market impact on different macro and micro economic factors in a society. How they impact this paper will be explained EMH (Efficient Market Hypothesis) according to the prices of Securities reflect the macroeconomic information. The EMH study was inception by both practioners and academicians. The security prices unbiased estimation of fundamental values of financial assets. The main aim of this paper is to investigate the price behavior in BSE listed companies in Indian context of the society. This paper depends upon the secondary sources. The objective of this paper examine the reaction of Indian benchmark of the currency demonetization,

the data has been collected 2015 to 2016 only. The taking stock split event window -30 to +30 and - 15 to +15 the calculating SD of this event window the post and presplit event stock period.

"Mitesh Patel (2016)" : This paper explain about the stock price and liquidity effects of stock split. The stock split information is available in stock market and prices immediately respond to the available information in stock exchange. The stock market share price in any financial market estimate the value of the investment companies. The present study examines the volume reaction with respect information of the stock split announcement in share market. This paper studies the stock split announcement of the 34 companies in the year of 2016. It's calculating the ARRs, CAARs and abnormal returns of the companies. These are estimating the performance levels of the companies. Te stock split even t is a negative impact on the stock returns in stock market. The stock split decision taken by the company board of director they issuing the number of share with low price to the shareholders of the company it is a great opportunity for the existing share holders purchasing the shares low price in a company. The increase share price of the company then automatically the company growth will be increased. This paper explain the event window is is no significant difference in considered as -20 to +20 the calculate the alpha and beta value of the 20 day stock split event date. The capital marker is indicator or predictor of the economy. The stock price volume ratio is decrease after stock split announcement.

"Asha Nadig (2015)" : This paper explained the stock split event in Indian context. The stock split is a procedure that increase or decrease a company's shares suppose they split 1 share is divide into two shares the automatically will be increased the shares of the company's. It is an interest of the existing share holders of the companies. The most companies are prefer to the announcement the stock split event it is accessible to as many investors as possible it's not increase the company's overall value it will be divide the forms shares to the affordable prices of the shares in a sock market. These empirical studies have documented market price reactions. The market reactions can be bullish or bearish or neutral it is depending on the significance of the stock prices information these are the 3 types of reactions it will be creates negative or positive results in a stock market. The present study is based on the secondary data relating to the share prices, stock split announcement dates this paper analyze the 14 stock split companies data listed in BSE the paper will be explained the -30 to +30 stock split event time period.

"EI Ansary (2017)": This research aims to study the two types of corporate companies actions stock split and stock dividend on shares prices. Te research provides the taking effective decision making of the investors for the current share prices in a share market the share prices are fluctuating the investor observe they taking the improve the decision making process. The main objective of this paper the two events are independently have a Egyptian stock exchange companies the both events are allowing the shareholders to receive new shares without any bearing charges. The corporate actions could have positive impact on share prices abut different circumstances. The both events are not affecting the operation performance of corporate and there is no change the ownership structure. This paper calculates the AAR and CAARS, ARS of the selected companies. The taking samples of this study the collecting the data during the period from 1997-2014 by companies listed on the EGX. This paper explains the 30days of the before and after event date.

"Parkas Pinto (2016)": This paper studies impact on the two events stock split and right issue announcement on the stock returns of the companies in stock exchange market. It's explains performance of the listed companies in BSE that the current stock prices reflects all the public information about the security in present market conditions in share market. The main objective of this paper examines the abnormal returns surrounding the stock split. This study based on secondary data collection method. The period of study 2011-2014 companies' data in BSE listed companies. The final sample collection this study is consists of 90 companies for stock splits and 29 companies of the right issues. The event window is -30 to +30 day before and after stock split the calculating the AAE and CAAR for the two events for the stock split. The sample companies are showing the positive and negative returns of the companies. Based on these returns the investor taking the decision making for the investing is not. This study using the t-test statistics. The two events are the content of the impounded in the prices of the stocks in a stock market that they do not get an opportunity to earn returns from the stock for new investors of the companies.

"Dr.S.Sathya Narayana (2017)": This paper mainly explains about the stock split event. The research believes the stock split announces for the future earnings of the company and its positive reaction for the raise funds at a higher price after the split. The stock split announcing increasing the liquidity of their stocks of the companies. The fundamentals of the previous share price movements indicate for the 5-days, 10-days, 30-days, 60-days, 360-days. The existing shareholders continue to hold the same percentage of the holding before and after stock split. The company stock split announce for the net positive impact of the company future performance after slit the shares the new investors very much

interested of the buying shares for the lower price they getting returns also a stock split prices depends upon the fundamentals of the company. Suppose the company fundamentals are strong then the stock split event will be more effective. This paper study focused on company listed on the NSE. The collecting data of the 2002-2013 companies data only. This data compared with the price and liquidity increase or decrease split event of the NSE companies. The taking post and presplit event time period on stock split event study.

Jijo et al., (2002) investigated the effects of stock splits on market valuation and trading pattern around split announcement and ex –date of BSE30(Bombay Stock Exchange)stocks of India. It is found that there is abnormal return of 7.14 per cent around the stock splits announcements. The study also finds that there is no liquidity after stock splits. The abnormal returns are statistically significant around the ex -split date.

Budhraja et al., (2003) undertook a study of BSE30(Bombay Stock Exchange) stocks of India and argued that the announcement of a split sets off the following chain of events like increase in the daily number of transactions which in turn increases the noise-ness of the security return process. The increase in noise raises the tax option value of the stock and it is this value that generates the announcement effect of stock splits. The effect of stock splits on stock price, return, volatility and trading volume around the split ex-dates for a sample of stock splits was undertaken in the Spanish market during 1998-1999. The evidence suggests that there is negative effect on price and 169 return of stock splits and the presence of a positive effect on volatility and trading volume. Finally, the paper concludes that signalling hypothesis and irrelevance hypothesis does not hold good during the period of study (Juan, 2003).

Ranjan et al., (2003) tried to study the reasons for firms offering equity subsequent to stock splits. They have found no difference in returns between firms issuing equity after stock splits and non-stock split firms during the issue period. Since investors react positively to stock split announcements, firms issuing stocks will sell their new issue at a higher price and raise more funds. The authors have also found that firms split stocks to make their subsequent equity offerings more marketable to the investors who are attracted by the low priced shares.

Savitri et al., (2005) examined the impact of stock split and reverse split on stock return and trading volume on Jakarta Stock Exchange between 2001-2005. The study has analysed abnormal returns and volume during the period around the split and has related stock returns to profitability, leverage and volume. It is concluded that there are significant abnormal returns on the date of split on the fifth day before split. Trading volume and return on asset have significant influence on market-adjusted returns.

Katerina et al., (2006) indicated that the market reaction to stock split announcements is positive, which implies the managers and investors perceive the stock split as a good news event regarding the company. The results are consistent with trading range and liquidity hypothesis.

Farinos et al., (2006) investigated the robustness of the results obtained for the possible motivation for listed firms in the Spanish Market 170 to execute a stock split using different methodologies. Surveys from executives emphasize the use of stock splits as a way to increase liquidity of shares; the empirical evidence is not conclusive. The authors have used models such as logit regression, Cox regression which all have supported signalling and optimum range hypotheses.

Gupta (2007) provided evidence that there is no announcement effect associated with stock splits in India though there does exist a pronounced ex- day effect. Also found no evidence for the trading range hypothesis as a possible explanation for stock splits in India, as majority of shares that underwent split were trading at low market prices. It appears that reasons for a stock split by low priced companies could be the neglected firm hypothesis-, which appears to be valid for the Indian stock market.

Harish (2007), in his study the author has taken a close look at stock split as an event to study the efficiency of the Indian market. He has studied the cumulative abnormal returns of stocks, which have gone for stock splits for the period of study undertaken. The results have shown that the abnormal returns during pre and post stock splits are statistically not significant leading to the conclusion that semi strong form of efficiency do not exist in the Indian stock market.

Dhar et al., (2006) have examined the effects of stock splits and bonus issue on the Indian stock market. Also, the study has also studied the nature of efficiency of Indian stock market. The results have shown that both the events are associated with significantly positive announcement effect. For the stock splits, the abnormal returns are 0.8 per cent and the paper has found semi-strong 171 form efficiency in the Indian stock market.

5. Hypothesis

H0: There is a significance effect on stock split on the share price in the Covid-19 pandemic

6.0 DATA ANALYSIS AND INTERPRETATION:

Company	Old FV	New FV	Split Dat
Starlineps Ent.	10	5	22-12-202
APL Apollo	10	2	15-12-202
Continent Petro	10	5	05-11-202
Som Distillerie	10	5	15-10-202
Shangar Decor	10	5	12-10-202
Shrenik	2	1	08-10-202
Guj Amb Exports	2	1	01-10-202
Laurus Labs	10	2	29-09-202
Polyspin Export	10	5	07-09-202
HKG	10	2	03-09-202
Morganite India	10	5	31-08-202
Eicher Motors	10	1	24-08-202
Oswal Overseas	10	5	13-08-202
Axis Gold ETF	100	1	23-07-202
Kuantum Papers	10	1	14-07-202
KBC Global	10	2	02-07-202
Motor and Gen F	10	5	19-06-202
Sinclairs Hotel	10	2	17-06-202
Madhav Infra Pr	10	1	27-04-202
Sadhana Nitro	5	1	03-04-202
Ircon Internati	10	2	03-04-202
Bajaj Steel	10	5	24-03-202
Arnold Holdings	2	10	18-03-202
Suncare Traders	10	2	06-03-202
RSD Finance	10	5	11-02-202
RSD Finance Lim	10	5	11-02-202
THINKINK PICTUR	1	5	06-02-202
Vinati Organics	2	1	05-02-202
SIS	10	5	15-01-202
Swadeshi Polyte	10	1	09-01-202

Source: Moneycontrol.com. 2022

4.1 INTERPRETATION:

As per the available data it is found that there almost 30 companies have taken share split decision during the year of 2020. Companies would be able to decrease the value of the share up to the half of the original market price of the share. This strategy would help to attract small investors towards the share of the company. From the above data it is found that Starlineps Ent., APL Apollo, Continent Petro, Som Distillerie, Shangar Décor, Shrenik, Guj Amb Exports, Laurus, Labs, Polyspin Export, HKG, Morganite India, Eicher Motors, Oswal Overseas, RSD Finance, RSD Finance Lim and SIS would able to reduce the cost of the share up to the half of the price of the share. The face value of Axis Gold ETF and Kuantum Papers has decreased up to the 100% of its current stock value. Apart from that decrease of share's face value is not always possible sometime share price of the company would increase. From the analysis of above data, it is seen that share price of Arnold Holdings and THINKINK PICTUR has been increased after the share split of the company.

5.0 FINDINGS AND SUGGESTIONS:

5.1 FINDINGS:

1. From the above analysis it is found that after the share split the value of the share would decrease.
2. Share split would help to attract the small investors towards the company's shares.
3. After the share split the value of the share is not always decrease.
4. The share value of Arnold Holdings and THINKINK PICTUR has increased after the share split.
5. The face value of Axis Gold ETF and Kuantum Papers has decreased up to the 100 percent of its share value.

5.2 SUGGESTIONS:

1. It is suggested that company needs to understand various other factors like market conditions as well as capital requirements and objectives of the company before taking share split decision.
2. The company needs to select appropriate share split types as per the requirements because that plays very important role in the success of the company.

6.0 CONCLUSION:

From the above analysis it can be concluded that share split is one of the important strategic decisions that can be taken by the company to achieve organisational objectives. In the Indian stock market, there are almost 30 companies who has done share split of their stock during the year of 2020. The covid-19 pandemic has great impact on the Indian share market. Share split strategic decision would help to decrease the price of the share. With the help of share split companies can attract more customers towards the shares of the company. Share split is not always help to decrease the share price of the company sometimes value of the share would increase. The company needs to consider internal as well as external factors like customer expectations, market condition as well as capital requirement.

REFERENCES:

1. WallStreetMojo. 2022. Stock Splits. [online] Available at: <https://www.wallstreetmojo.com/stock-splits-share/#:~:text=%20Significance%20of%20Share%20Splits%20for%20Investors%20,are%20no%20tax%20implications%20due%20to...%20More%20> [Accessed 12 February 2022].
2. Moneycontrol.com. 2022. Company Splits, Company Splits Stocks, Company Splits Shares, List Of Company Splits. [online] Available at: <https://www.moneycontrol.com/stocks/marketinfo/splits/index.php> [Accessed 12 February 2022].
3. Ruzbeh J.Bodhanwala, 2015, Study of Behavior of price return, volume and trading activity around the dividends, SIBM Pune Research Journal, 1 to 8PP, ISSN : 2249-1880
4. Osama Abd Eikhalek EI Ansary 2017, The Impact of Stock Dividends and Stock Splits

on shares prices : Evidence from Egypt, Accounting and Finance Research, 96 to 114PP, ISSN : 1927-5986
5. Saraswathi Thirunellai 2014, Stock Splits : Reasons and valuation effects, Drishtikon : A Management Journal, 1 to 24PP.
6. Prakash Pinto 2016, Impact of Stock Splits and Rights Issue Announcements on Market Price:Evidence from India, A Management Journal, 1 to 16PP.
7. S.Sathya Narayana 2017, The Impact of policy Announcement on Stock Market Volatility: Evidence from currency Demonetization in India, IOSR Journal of Business and Management, 47 to 63PP, ISSN : 2319-7668
8. Asha Nadig 2015, A Empirical study of Stock Split Announcements of select , SOMIMD Journal of Management , 1 to 12PP, ISSN : 0976-0652 Mitesh Patel 2016, Stock split and Liquidity effect of stock Split : Evidence from Indian stock Market, International Journal of Management Research and Review, 1030 to 1039PP, ISSN : 2249-7196
9. Avner, A., & Gene, S. (1993). The role of information in stock split announcements. Quarterly Journal of Business and Economics, 14-21.
10. Budhraja, I., Parekh, P., & Singh, T. (2003). Empirical study 181 on market reaction around the bonus and the stock split. Mudra SIGFI IIML Journal of Finance, 2, 21-35.
11. Christopher, L. P., & Perry. (1987).The market reaction to stock splits. The Journal of Finance, XLJI, 1347-1369.
12. Desai, H., & Prem, C. J. (1997).Long run common stock returns following stock splits and reverse splits. Journal of Business, 70, 409-420. Jose, F.,
13. Jose, G., & Maria, R. Z. (2006).Does methodology determine the identification of stock split motivation?-evidence from Spain. University of Valencia. 1- 33.
14. Grinblatt, M., Masulis, R. W., & Titman, S. (1984). The valuation effects of stock splits and stock dividends. Journal of Financial Economics, 13, 461–490.
15. Jaduda, A., Omollo, J., & Caroline, C. (2010). Market reaction to stock splits-empiricalevidence from the Nairobi stock exchange. African Journal of Business and Management, 1, 165-184.
16. Juan, C. R. (2003). How is the market reaction to stock splits. Applied Financial Economics, 5, 1-10.
17. Kadapakkam, P. R., Krishnamurthy, S., & Tse, Y. (2005). Stock splits, broker promotion and decimalisation. Journal of Financial and Quantitative Analysis, 40(4), 873.
18. Kent, B., & Gary, P. (1993). Further evidence on managerial 182 motives for stock splits. Quarterly Journal of Business and Economics, 32, 20-31.
19. Khan, A., & Walayet. (2004). Are stock splits credible signals - evidence from Singapore market. The Singapore Economic Review, 49(2), 163-177.
20. McNichols, M., & Dravid, A. (1990). Stock dividends, Stock splits and signalling. The Journal of Finance, 45(3), 857- 879

Leveraging Marketing Mix : A value added approach in Residential Real Estate Sector

Dr. (Mrs.) Sadhana D. Singh Ms. Veena Naik
Vivekanand Education Society's College of Arts, Science & Commerce, Sindhi Society, Chembur, Mumbai.
sadhana.singh@ves.ac.in, veena@veenaservices.com

ABSTRACT
In this modern environment whereby consumers' markets are purely heterogeneous and fragmented in nature, there is a need to revamp the marketing mix theory even in the real estate industry. By leveraging the marketing mix theory to sell property, realtors can determine a brand's offering resulting in equity and develop a more effective property dwelling marketing strategy. By creating a property marketing strategy that considers various elements that can influence a client's buying decisions, resulting in assuring that the marketing dollars are being spent wisely and delivering the required returns leading to the ultimate result in the final P and that is Profit. The real estate marketing mix has established itself in recent years as one of the best tools to diagnose the business opportunities for a real estate developer. The present research paper is an attempt to identify the expectations of the customers and derived benefits in relation with the variables of marketing mix to be applied in the city of Mumbai for building a value-added inclination towards the residential property investments.
Key words: Marketing mix, Marketing Strategy, Value addition, Residential Property

1. INTRODUCTION

Mumbai, the financial capital of the country, is always being the dream destination for individuals, job seekers, professionals and migrants across the region. This makes it an imperative requirement to search for affordable housing if not in the islands of Mumbai than at least in suburbs and satellite towns of Mumbai where residences are quite affordable and in the reach of an aspirant.

Further with the hybrid model of work environment, wherein one does not have to go to office everyday and Work from Home being a reality, the demand for large homes in satellite cities of Mumbai is the need established for all residing at this city of Dreams.
Self sustained and integrated township approach from top class developers in Mumbai has led to the demand from the investors changing their lifestyles with self sustained primary requirements of their residents with amenities for leisure and open spaces. Residents are willing to pay premium prices to match the Quality lifestyle standards set by them with group A developers.
The present paper is an attempt to understand the significance of marketing mix elements in bringing value additions in the growth and development of real estate sectors in Mumbai. The paper tries to analyze the factors contributing to the buying decisions of investors residing in Mumbai. Further an attempt is made to understand the ecological compliance and environmental concerns of the residential investors.

2. STATEMENT OF THE PROBLEM:

The research paper aims to probe into the significance of marketing mix towards gaining the advantage or strategic contribution towards real estate growth. The researcher has tried to analyze the opinions of the customer visiting the residential inventory places towards their experiences and preferences of their visits. To understand in an elaborative way about the investment pattern and preferences of all the P's, variables of marketing mix with respect to real estates are also highlighted in the present study.

3. OBJECTIVE OF THE STUDY:

The present study aims to examine the significance and value additions due to marketing mix strategy used for the growth of real industry development. In this broader framework, an attempt is made to achieve the following specific objectives:

- To identify the preferred location of investment in Mumbai.
- To examine the Prominent factors contributing to the decision of buying the property.
- To describe the significance of the pricing factors that affect the buying decisions for the property investments
- To examine source of information while choosing a real estate agent/ developer/ owner of house
- To understand the importance of value addition elements in the residential property.

4. **SCOPE OF THE STUDY**

To influence and persuade the investors towards the residential real estate sector marketing mix is a value addition which may offer competitive advantage by increasing the volume of visitors at the property locations. Leveraging marketing mix approaches would influence the investors to take corrective decisions for the investments in real estate markets. Additionally, On site

visits at residential properties by customers depend on certain elements identified by the visitors. The present paper is an attempt to understand the Prominent factors contributing to the decision of buying the property in the city of Mumbai

5. LIMITATIONS OF THE STUDY:

1. From among the total number of prospect property investors 125 sample respondents are approached with open and close ended questionnaires. Whereby only 112 responses are found as the valid ones.
2. The primary data has been collected through a structured questionnaire and as the sample size is limited so it cannot depict the preference and choice of all investors across.
3. Only Mumbai city among the states of Maharashtra is considered for the study.

6. **REVIEW OF LITERATURE**

Gupta, This paper investigates this aphorism. It argues that both affordability and housing design have several different meanings and identities. Transplanting standard housing design across the board suggests a rather elementary confluence of priorities and policies that is capable of producing a range of alternative scenarios, which may not necessarily align with the goal of 'affordable housing for all.

Kartika et.al, This paper is a case study of Diamond regency, one of the middle class housing in East Surabaya area that has the potential to compete with its class if maximized in development and marketing. The results obtained through this study is that the marketing mix variables can have a strong and influential relationship to the progress and development of middle class housing.

Singh, The paper is an exploratory case study using the primary sources of information. The paper aims to study the marketing strategies adopted by Morpheus : A real estate company. It highlights the actual studying of every portion of the project, aligning it against prevalent and future market requirements, developing marketing mix and marketing funds in an effective manner. It is an exploratory case study using the primary sources of information.

7. **METHODOLOGY & DATA:**

SOURCES OF DATA COLLECTION:

1. Primary data

The study is based on primary and secondary data. In order to achieve objectives of the study and to test the hypothesis, moreover, 300 sample respondents are contacted and interviewed.

2. The secondary data

The data is gathered from relevant research journals, websites, published and unpublished sources etc. Some data has been furnished from the websites of the government of India and Maharashtra, as well as the Ministry of Housing and Urban Affairs. Some ideas have been taken from the Maharashtra Real Estate Authority Regulatory of India.

RESULTS & ANALYSIS:

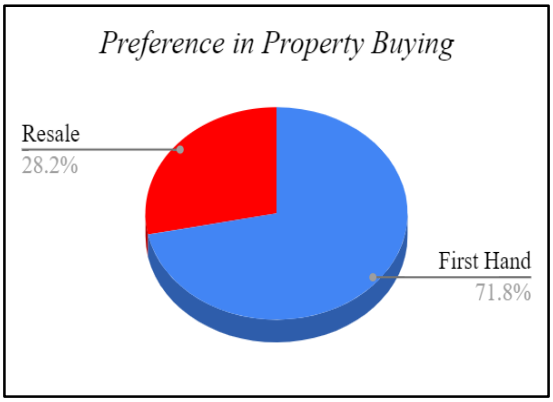
The opinions of respondents have been analyzed in terms of:

- Preferred location of investment
- Prominent factors affecting the decision to invest in the residential property
- The pricing factors that affect buying decisions for the property investments,
- Source of information while choosing the property
- Expected qualities in the property manager / owner / agent
- Ambience with respect to protection of environment needed to celebrate the joy of living

ANALYSIS & INTERPRETATION

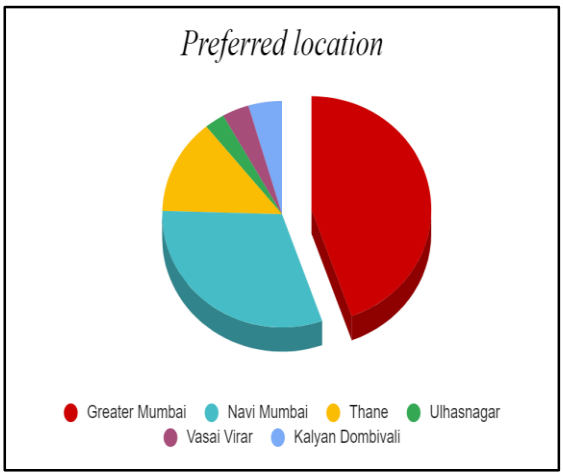
8.1 Preference in Property Buying

The above figure illustrates that the majority of investors/ buyers prefer to buy first hand property. There can be various reasons like less maintenance,



new infrastructure with advanced technology, less property rates compared to resale for the same. where, in resale the previous owner expects more return then invested.

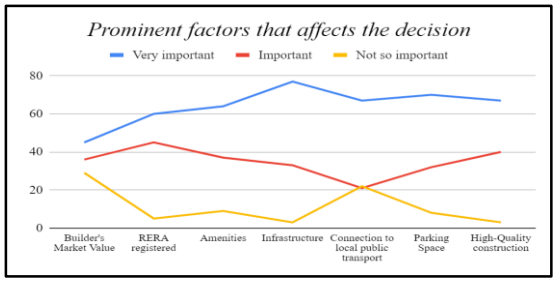
8.2 Preferred Location



Mumbai residents are used to what is called matchbox dwellings. Size is not important, but the location is. Though the houses are quite small in Greater Mumbai, but the other localities are too far from the heart of Mumbai city, which makes Greater Mumbai the most preferred option for the investors

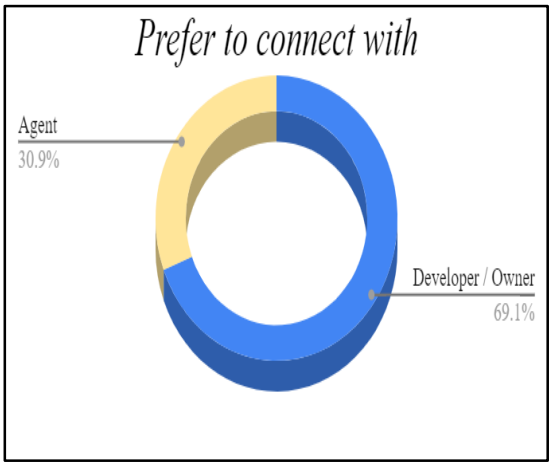
followed by Navi Mumbai as the second highest preferred area to live in and further Thane as the next option in the queue.

8.3 Prominent factors that affects the decision



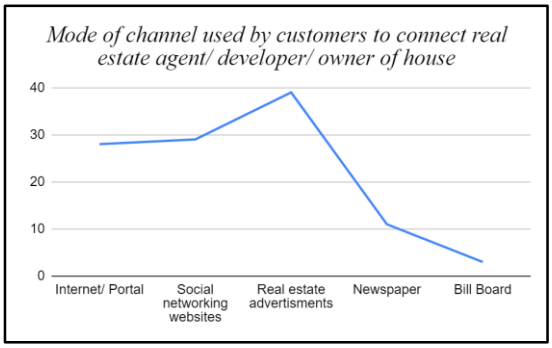
Above given diagram justifies the factors that affect the buying decision. Where Infrastructure is ranked with the most important factor and seconded by parking space. Amenities, high-quality construction, connectivity & proximity to public transport is also in the zone of highly important factors. We can see a slight high rise in demand for parking space, this reflects that the people prefer to travel with their private vehicles instead of using public transport. The chart also shows that builder's market value has whimsical review where for some builder's market value is very important & for some not so important.

8.3 Prefer to connect with



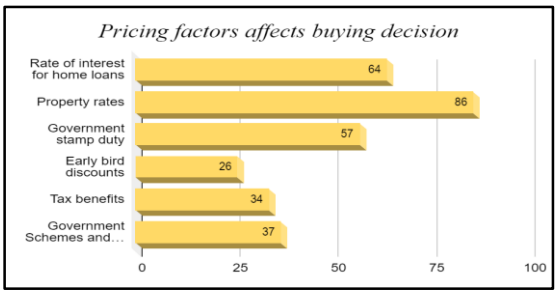
The above figure illustrates that Majority of the investors believe in connecting directly with developers rather than agents, due to the reality that it is the least complex buying-selling structure in real estate which includes involvement of only two parties i.e. buyer and seller. Purchasing a property directly from the seller removes communication gap and leaves a very little scope of deviation from promises made to the buyer. Simultaneously the fact that the reputed developers across the country have brought their projects online whereby customers can access to all the information about the project with just a click and refer to the reviews given.

8.4 Mode of channel used by customers to connect real estate agent/ developer



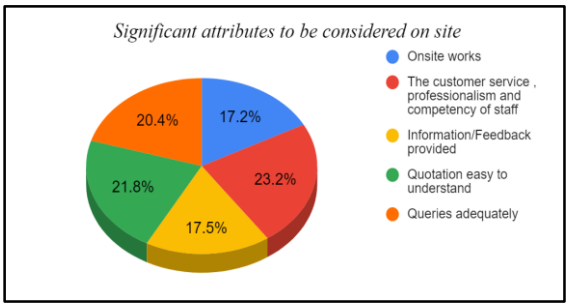
Around 35% of the respondents do refer to real estate advertisements as the source of information while choosing the property followed by around 27% opting for social networking sites. Newspaper and Billboard are being considered as the conventional method of promotion as they do not create much impression on the investors' decisions to buy the property.

8.5 Pricing factors



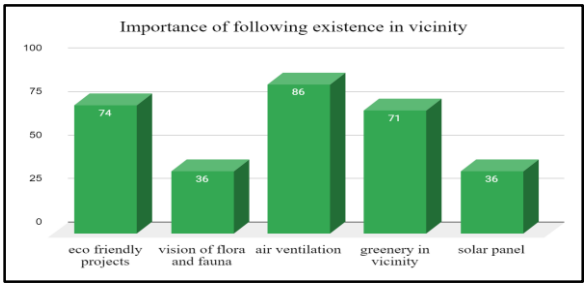
With the overall view, the majority of respondents agrees that property rates are one of the most crucial factors to be considered for buying decisions followed by rate of interest for home loans and government stamp duty also contributing for the change in the decision making towards property investments. Government assistance as well as tax benefits are some of the subsidiary factors also influencing the buying decisions.

8.6 Significant attributes to be considered on site



Above are the attributes rated with their importance of existence on the site. The highly important element is customer service & professionalism with 23.2%, (pricing) quotation easy to understand is the second most important element with 21.8%.

8.7 Importance of following existence in vicinity



Air Ventilation and eco-friendly projects are the most significant factors to be considered in the residential property. Environmental considerations are also given lots of importance demanding greenery in the project vicinity with almost least but equal weightage to the solar panel and vision of flora and fauna in the surroundings.

9. FINDINGS & CONCLUSION

9.1 FINDINGS:

On the basis of responses received in the open-ended question asked to the respondent investors, following aspects towards property dwelling are assessed:

- In the fast paced lives in Metropolitan cities, peace and tranquillity have become important factors while buying a property.
- Amenities such as sports clubs, swimming pools, charging points for electric vehicles, etc.
- Nature, Greenery, Pure Air, More light, better surroundings, Free space around the complex
- A residential property which is closer to nature yet not too far from the main city with zero waste.
- Affordable pricing with complete ambience.
- European and Indian standard, Vastu, standard of vicinity, class of neighbourhood along with Greenery, air flow, Sun rays, garden terrace. Many more.
- Ensuring hygiene and basic requirements considering urban visitors.

9.2 SUGGESTIONS:

In consideration with the marketing variables to derive the value additions in the performance of real estate sector following suggestions are recommended with each element of marketing mix resulting in win-win situation for investors (Satisfaction) as well as the developers (Profit).

Product & Physical evidence:

- To improve the quality of the housing, the manager and the developer should build the supporting facilities, amenities, concepts such as senior living and Vastu elements then be used as the appeal of residential sales.
- Maximize with good housing development so as to synergize with the strategic location
- Developing alternative residential designs that suit the market tastes and prices of the middle class.

❖ Maximize marketing through mix marketing techniques to attract broader market interests.

❖ Developers should experiment with strategies, using virtual reality, augmented reality and machine learning, and catering to a smart and frictionless workforce.

Price :

❖ While RERA has addressed the issue of right usage of funds, the sector certainly needs a single-window clearance system to streamline and fasten the approval mechanism.

❖ With the objective of gaining the competitive edge, price is a distinguishing factor that can make consumers decide to buy a residential property.

Place:

❖ Accessibility provides easy access for visitors or residents of housing to go in and meet all their needs. This accessibility can be demonstrated by road function, road conditions, traffic conditions and public transport

❖ Proximity to Strategic residential location, close to the place of fulfillment of necessities can increase the value and interest of the community to choose the nunian as a place of residence. The closeness will be illustrated with proximity to educational sites, retail / CBD, hospitals, tourist attractions and competitor housing.

Promotion:

❖ Promotion In the face of competition among middle-class housing developers, especially in this case attract consumers to buy occupancy more strict. Attractive promotional strategies Such as advertising, sales promotion offers as well as creating good ambience is the need of hour.

Planet:

❖ It is also essential to incentivise developers building affordable and green homes. Eco-friendly construction and green concept building norms need to be standardized.

❖ **Use of renewable energy**, such as solar energy, Pollution and waste reduction measures, the enabling of re-use and recycling, Good indoor environmental air quality. and use of materials that are non-toxic, ethical and sustainable.

People

❖ Managers are staff who are sensitive and friendly and understand the property needs and expectations of the consumers. Empathy is the value addition always looked forward by the investors among the employees involved in demonstrating the property.

Process

❖ The process involves communicating the significance of property with complete transparency to the clients, showing feedback, sharing data for the property reviews on web portal. Ease and Convenience for the property process is always expected from good developers.

9.3 CONCLUSION:

Real estate properties are the most expensive and admired property to be sold out throughout the country and require lots of choices, preferences and investigations as per the target markets. This research paper is an analysis of demand and supply of real estate properties and expectations and the perceived elements of marketing mix variables to the investors with certain suggestions to be implemented in the near future to bridge the gap existing between the services offered by real estate developers.

References:

❖ Manan Mehta, Mr. Anish Shah "Marketing Strategies adopted by Real Estate developers in Ahmedabad and Mumbai, India https://www.researchgate.net/publication/327176497_Marketing_Strategies_adopted_by_Real_Estate_developers_in_Ahmedabad_and_Mumbai_India

❖ Drestanti Inggar Kartika and Dewi Septanti "Residential Estate Marketing Optimisation with Swot and Marketing Mix Methods (A Case Study: Diamond RegencySurabaya)"https://www.ijert.org/research/residential-estate-marketing-optimalisation-with-swot-and-marketing-mix-methods-a-case-study-diamond-regency-surabaya-IJERTV6IS120139.pdf

❖ Urmi Sengupta, "Affordable housing development in India: A real deal for low income people?"https://www.academia.edu/23771598/Affordable_housing_development_in_India_A_real_deal_for_low_income_people

❖ Dr. Surbhi Singh (2015), "A Study on the marketing strategies of Morpheus: A real estate company"https://www.academia.edu/24057885/A_STUDY_ON_THE_MARKETING_STRATEGIES_OF_MORPHEUS_A_REAL_ESTATE_COMPANY

❖ https://economictimes.indiatimes.com/wealth/personal-finance-news/simpler-green-norms-for-real-estate-environment-ministry-looking-to-decentralise-approval-powers/articleshow/50400277.cms?from=mdr

❖ https://www.business-standard.com/content/specials/mumbai-real-estate-showing-signs-of-resurgence-121070701441_1.html

❖ https://www.moneycontrol.com/news/business/real-estate/the-rising-tide-of-real-estate-in-mumbai-6647161.html

Impact Of 'Covid-19' Pandemic On 'Digital Transformation' Under Paradigm Of The Indian Judicial System

PROF. (DR.) MOHAMMAD SHARIF[1st], Dr. UPENDRA NATH [2nd] ,
Patna Law College, Patna University, Patna-800006, Bihar, (India)
mohammadsharif97@rediffmail.com[1st], : unath46@yahoo.com[2nd]

ABSTRACT

During the recent era of 1920s, world's human civilization encountered with an unprecedented natural calamity in the guise of 'covid-19' coronavirus pandemic that had stalled the inclusive activities across the world at large. Close proximity amongst the people either in the public or the private spaces was regarded medically as the key vector that contributes to the transmission of 'covid-19' coronavirus pandemic worldwide. Preventive measures, either statutory or advisory, in the form of 'Lockdown', social distancing, Isolation and alike were enforced in the target nations severely affected by it. Somehow or rather this pandemic reflects the negative aspect of any scientific research and developments since the 'Wuhan Lab' in China for viral studies and research is considered as the origin of this viral pandemic. Egregiously the Indian Judicial system too suffered immensely owing to it. Judicial ethics invariably warrants that 'justice ought to be delivered to the target populace under any circumstances'. The judicial institutions ranging from the lowest to those of the higher ones in most of the Indian states were also advised to remain closed till the situation becomes normal and becomes stabilized for the public at large. However, panacea comes in the form of 'digital transformation' in the domain of Indian judicial system which demonstrates the accomplishments of the research and development in science and technology and its application in the nation's socio-economic and legal fields as well. With the advanced equipment of telecommunication, networking and other related technologies, in the form of smart phones, computers and alike that find its accesses amongst the public and governmental vis-à-vis judicial institutions; the virtual era of doing businesses in the target arena finds remarkable achievements by the concerned. It is indeed remarkably an innovating practice in the realm of Indian Judicial institutions that the later widely resorts to digital technological mode towards coping with the ever-increasing burden of cases pending in the court for being disposed of. Significantly, deviating from its normal practice of physical sittings; Court starts its activities and other judicial functions through on-line virtual mode. 'Digital transformation' could be given credit for abetting the Judicial system in India to adhere to its ethical norms of trust and dignity amongst the target populace even in the state of calm owing to the impact of 'covid-19' coronavirus pandemic on humanity across the world.

Keywords: Digital transformation, judicial ethics, humanity, virtual technology, pandemic, covid-19

INTRODUCTION

In the recent era of 1920s, world's human civilization witnessed and faced with an unprecedented traumatic scenario of natural calamity in the form of 'Covid-19 pandemic' that had egregiously taken not only a huge tall of human lives but also reduced millions of them either orphaned or destitute being left to sustain and survive themselves at the mercy of pragmatic vis-à-vis philanthropic welfare policies and liabilities of the concerned states towards its target populaces. However, the pandemic, amidst such shattered and gloomy scenario, galvanized the humane aspect of cooperation amongst the comity of nations under the aegis of 'global village doctrine' countering its adverse impact on the inclusive interests of the nations across the world. Towards mitigating and eliminate the menaces of the 'Covid-19 pandemic'; the affected nations adopted a well regulated statutory and restrictive policies in the form of enforcing statutory 'Covid-19 pandemic guidelines' that include measures like those of 'Lock-Down' which enforces a curfew like scenario in guise restricting the movements of public, either total or partial closure of businesses establishment, educational institutions and socio-cultural public places like those of recreational clubs, restaurants and hotels, gymnasiums, market complexes, tourists places,

Courts and so on. Its avowed aim was to restrict social gatherings in both the government institutions and public establishments.

The most significant impact of the 'covid-19' pandemic was visible when the humanity get deprived of their inclusive human rights of lives and livelihood; dignity; sustenance and survivability; education; justice; healthcare and alike. Most often if we concentrate on the impact of 'covid-19' pandemic in the legal field and studies, then invariably, we may zeroed on that aspect of the issue when the appropriate designated courts, ranging from lower to higher ones, decided to abandon physical hearing of both the civil and criminal cases in order to ensure protection of both the lawyers and judges from getting either fatally or partially infected with the corona virus. Such decisions may be construed rational or reasonable to address the natural calamity that is visible in 'covid-19 pandemic'. However, imperativeness of 'digital transformation' become evident when its technological instruments, comprising those of Cloud, Internet-of-Things (IoT), Blockchain (BC), Artificial Intelligence (AI), and Machine Learning (ML) and alike, proves being boon abetting the judicial institution to resume its court activities and other functions through virtual and remote mode deciding the civil and criminal cases both fresh and pending ones. Invariably, 'digital transformation' virtually endeavored to protect one's statutory vis-à-vis fundamental rights to justices, liberty and alike.

MEANING OF 'DIGITAL TRANSFORMATION'

'Digital transformation' may be construed as an integration of digital technology into all the domains of state's activities thereby fundamentally changing the method of operation towards ensuring and deliver values to the target populace. In other words, it may also be regarded as such socio-cultural and strategic changes that require organizations to continually challenge the status quo, experiments and even get comfortable with failure in the positive backdrop of improving over the setbacks in the future endeavors over the same. Common goals for its implementation are to improve efficiency, value and innovation.[1]

IMPERATIVENESS OF 'DIGITAL TRANSFORMATION' IN THE LEGAL SECTOR DURING 'COVID-19' PANDEMIC

It is scientifically proven and established that the dreaded 'covid-19' coronavirus transmits, spread vis-à-vis proliferate itself more often through an individual's respiratory system. Prescribed safeguard and prevention from it include strictly adhering to the 'covid-19' coronavirus statutory guidelines issued by the government along with maintaining 'social-distancing' in any of the public or private gatherings as well. The statutory institutions of legal justices are prone to transmission of these 'covid-19' coronavirus owing to the close proximity of the stakeholders thereat. The latter include judges, supervising judicial authorities, lawyers, clients or the petitioners and alike. In fact, in the closet of the judicial chambers, the parties present therein seeking judicial reliefs in accordance to the rule of law provided are prone and highly at risk of contracting and infected with this dreaded viruses. Gory instances of judges, advocates, along with the concerned staffs getting fatally infected with the menaces of 'covid-19' coronavirus pandemic shows its severity on humanity.

However, measures against coronavirus could not be practically enforced in its totality. Since the nuances of judicial ethics warrant that the 'justice ought not to be delayed in detrimental to the protection of inclusive human rights of the concerned; it becomes worthy using an alternate measures that could be convenient enough to address the judicial processes, procedures and concerns safeguarding the overall interests of the target populaces. 'Digital transformation', with its technologies such as Cloud, Internet-of-Things (IoT), Blockchain (BC), Artificial Intelligence (AI), and Machine Learning (ML), proved being an appropriate and effective measures aimed to solve the said issues in the larger interests of the humanity. Significantly virtual courts, through the scientific advancements in the arena of information technology and internet on specific media platforms, succeed continuing its judicial duties and related activities without coming in the physical person to person contact and deliberations with the concerned. In fact, the reality of virtual courts could be ascribed to the impact of 'covid-19' pandemic.

We do believe that technologies has the great potential towards ensuring vis-à-vis abetting human thrive and accomplish any of their avowed objectives that once seem impossible. 'Digital transformation' ensured that the nation's socio-political, economic and legal dynamism continue unhindered during the period of 'covid-19' pandemic.

MECHANISM OF DIGITAL TRANSFORMATION IN THE INDIAN JUDICIAL SYSTEM

[1] Schmarzo, Bill –"what Is digital transformation?'

Digital transformation, in the form of e-Court Integrated Mission Mode Project based on the "National Policy and Action Plan for Implementation of Information and Communication Technology in the Indian Judiciary" is in vogue since 2007 itself, whereby many Courts, across the country, have been computerized with software compatibility and interoperability for the same. Invariably, the indispensability of these in the arena of Indian judiciary was witnessed, during the restraints periods of covid-19 pandemic, to protect the judicial interests of the nation's target populace. In this respect, some of its target areas of significance can be mentioned as follows:

i) Wide Area Network (WAN) Connectivity:

It is aimed at connecting all District and Subordinate court complexes, spread across the country using various technologies like OFC, RF, VSAT. So far, in the year 2020, out of 2992 sites, 2931 (98%) have been commissioned with 10 Mbps to 100 Mbps bandwidth speed.[2] This forms the backbone for the e-Courts project ensuring data connectivity in Courts across the country. A committee has been set up by the Department of Justice (DoJ) to develop a special operation procedure (SOP) for lodging complaints and capacity up-gradation of the WAN bandwidth to ensure seamless data transmission in view of the enhanced load during the COVID-19 pandemic.

ii) National Judicial Data Grid:

Case Information Software (CIS) which forms the basis for the e-Court services is based on customized Free and Open Source Software (FOSS) which has been developed by NIC. Currently CIS National Core Version 3.2 and the CIS National Core Version 1.0 is being implemented respectively in District Courts and the High Courts. Every case has been provided a Unique Identification code which is called CNR number and QR Code. This has led to the development of National Judicial Data Grid (NJDG) as a new communication pipeline for judicial data transmission.

In fact, using NJDG developed under the e-Courts Project, with elastic search technology, lawyers and litigants can have access to all of the information relating to their case status, the orders/judgments along with other details of Court registration, cause list, daily orders and final judgments. Now, access has also been provided to data of all High Courts and District Courts in the country. This is an important tool to identify, manage and reduce case pendency. Recently a feature for showing the reason for delay in disposal of the case has also been added. In consonance with the National Data Sharing and Accessibility Policy (NDSAP) announced by the Government of India, Open Application Programming Interface (API) has been provided to the Central & State Government to allow easy access to the NJDG data using a departmental ID and access key. This will allow the institutional litigants to access the NJDG data for their evaluation and monitoring purposes.

iii) Virtual Courts:

These have been set up to try traffic offences. The concept is aimed at reducing the footfalls in the court by eliminating the presence of the violator or advocate in the Court. Virtual court can be managed by a virtual judge (which is not a person but an algorithm) whose jurisdiction can be extended to the entire state and working hours can be 24 X 7. As on 08.12.2020, these courts have handled 35,02,896 cases and realized Rs.130.72 Cr in fines.[3] Besides being environmentally friendly, as cases are adjudicated in a paperless manner, it has led to saving of judicial manpower and added to convenience of citizens amidst the restrictions of 'covid-19 pandemic across the country.

iv) V
ideo Conferencing:

These emerged as the mainstay of the Courts during the Covid lockdown period as physical hearings and normal Court proceedings in the congregational mode were not possible. Since, Covid lockdown started, the District courts heard 35,93,831 cases while the High Court heard 13,74,048 cases (totaling to 49.67 lakh) till 28.10.2020 using video conferencing only. The Supreme Court had nearly30,000 hearings during the lockdown period.[4] Also, to bring about uniformity and standardization in the conduct of VC, an overarching order was passed by the Hon'ble Supreme Court of India on 6th April 2020 which gave legal sanctity and validity to the court hearings done through VC. Further, VC rules were also framed by a 5 judge committee which was circulated to all the HCs for adoption after local contextualization.
An upgraded cloud-based VC infrastructure with latest features and robust security is also being

[2] Ministry of Law and Justice, Government of India - Department of Justice: Year End Review-2020

[3] Ministry of Law and Justice, Government of India - Department of Justice: Year End Review-2020

[4] ibid

developed by the NIC. As part of the "Atma Nirbhar App Challenge", some of the indigenous Indian made Video Conferencing Apps has also been shortlisted and undergoing tests for use as Video Conferencing platforms. The VC facilities are in existence between many of the Court complexes and corresponding jails as well.

Moreover, Live Streaming of video conferencing of proceedings has also been started in some of the states like those of Kerala, Bombay and Delhi thus allowing media and other interested persons to join the proceedings. The e-Committee of the Supreme Court has also set up a Committee to draw SOP for Live Streaming and also to ensure scanning, storage, retrieval and preservation of legacy data of courts.

v) E filing:

An e filing system (version 1.0) has been rolled out for the electronic filing of legal papers that allows the lawyers to access and upload documents related to the cases from any location 24X7 which makes coming to the Court for filing of papers unnecessary. Further the details of the case entered in the e-filing application are consumed in the CIS software and hence chances of mistakes are minimized. An upgraded version 2.0 & 3.0 have also been prepared which are more user friendly and with upgraded features like Advocates portfolio, Advocate clerk entry module, calendar and integration with social media platforms which is currently undergoing test. Draft e-Filing rules have also been formulated and circulated to the HCs for adoption. Supreme Court of India has also developed upgraded e-Filing version 3.0 which has now been introduced on a pilot basis and undergoing final security audit.

It may be ascertained that there has been a surge in the number of lawyers and litigants registering for the e-filing during the COVID-19 pandemic. To promote e-filing, all Central & State Government departments including the PSUs have been requested to use e-filing in all commercial disputes coming up in the commercial Courts.

In the same vein, E-Sewa Kendras have also been rolled out to bridge the digital divide by providing e-filing services to lawyers and litigants covering all High Courts and many other District court complexes across the nation. Basically, these E-Sewa Kendras have been set up at the entry point of the court complexes with the intention of facilitating the lawyer or litigant who needs any kind of assistance ranging from information to facilitation and e-filing as well.

vi) E Payments:

E-Filing of cases requires facilities for e-Payments of Court Fees which includes court fees, fines and penalties which are directly payable to the Consolidated Fund. Online payment of court fees, fines, penalties and judicial deposits has been initiated through the government's website https://pay.ecourts.gov.in. To ensure introduction of electronic collection of court fees and other civil payments, many of the State Governments have amended its existing Court Fees Act besides opening a bank account in a Nationalized Bank or in other bank suitable to receive, hold and disburse such payments electronically.

vii) E-Court Services:

As part of e-Court project, platforms have also been created to provide real time information on case status, cause lists, judgments etc. to the concerned lawyers/Litigants through SMS Push and Pull, E-mail, multilingual and tactile e-Courts services Portal, JSC (Judicial Service Centres) and Info Kiosks. Also, it is estimated that the National e-Taal, the e-Courts services portal has recorded scores of transactions during the year making it the lead Mission Mode Project in the arena of Indian Judicial systm. In addition, Electronic Case Management Tools (ECMT) has also been created with Mobile App for lawyers and Just IS App for the Judges as well.

viii) National Service and Tracking of Electronic Processes (NSTEP):

It has been launched for technology enabled process serving and issuing of summons. A GPS enabled device is given to the Bailiff for the service of summons leading to greater transparency and speedy delivery of processes. It provides real time status update of service of summons besides tracking of geographical coordinates of the process server at the time of serving.

ix) Covid-19 Software Patch:

Software patch and court user manual for COVID-19 management has also been developed. This tool will help the stakeholders in smart scheduling of cases thereby enabling judicial officers to retain urgent cases and adjourn those cases which are not urgent on cause list.

x) Justice Clocks:

To make effective use of database created through National Judicial Data Grid (NJDG) and also to make the information available to public, LED Display Message Sign Board System called Justice Clocks have been installed in 18 High Courts across the

country. It aimed to bring awareness to the public about justice sector, advertising the various schemes of the department and to give status of various fields to the public at large.

xi) IEC Campaign:

A website has been launched exclusively for the e-Committee that disseminates the e-Courts Project related information to all of the stakeholders. Provision has also been made for the High Courts to upload their achievements and their best practices. The e-committee website has also been linked to the website of the Government's Department of Justice (DoJ).

Towards creating awareness and familiarization of e-Filing amongst lawyers, Webinars on e-Filing for Tamil Nadu, Goa, Maharashtra and Delhi Bar Council was organized during June 2020 which had more than 19000 viewers. A Manual on e-Filing entitled as "Step by Step Guide for e-Filing" and "How to register for e-Filing" has also been prepared and made available on the e-Filing portal, in both English and Hindi and also in 11 regional languages for the use of advocates and litigants.

Moreover, as part of awareness raising campaign and programme, a YouTube Channel has also been created in the name of e-Courts Services where video tutorials on e-Filing have been made available for larger outreach to stakeholders. The said videos are available in the e-filing portal help desk and also in the social media through the e-Committee YouTube channel.

xii) Vision Document for e-Court Phase-III:

A Committee has also been constituted for ideating on the Vision Document for Phase III of the e-Courts project which includes domain experts besides the Judiciary and Technical members.

It may be well acknowledged that the impact of digital transformation was widely observed in the arena of nation's Judicial machinery during the chronic periods of 'covid-19 pandemic.

APPLICATION OF 'DIGITAL TRANSFORMATION' IN THEINDIAN JUDICIAL INSTITUTIONS

Owing to the impact of dreaded 'covid-19' pandemic on 'digital transformation' and the resultant restrictions imposed by the state on both the private and public sectors, most of the target populace resort taking to the internet and internet based services to communicate, interact and continue with their job responsibilities from home itself. In the same vein, as mentioned above, Courts too resort its usual judicial functions through the online digital mode. In this respect, it is worth mentioning that the internet services have seen rises in usage rom 40% to 100% compared to pre 'covid-19' pandemic levels. Video-conferencing services like Zoom, Google meet, Cisco-Webex, Teams and alike too have seen its significant rises which indicates a positive signs and features of 'digital transformation' as an impact of 'covid-19' pandemic on the concerned. Most of the institutions imparting education in legal studies have shifted entirely to the on-line mode with the exception of sessions that require a physical presence. In Bihar (India), some of these include Chanakya National Law University (CNLU), prestigious premiere Patna Law College under the aegis of Patna University (P.U.).

CONSTRAINTS OF 'DIGITAL TRANSFORMATION' IN THE LEGAL FIELD

Viewed pragmatically, it may be ascertained that owing to the constraints of data availability and internet Broadband connectivity in the remote rural areas or even the fluctuating competitive service charges so levied by the digital service providers, students pursuing their legal studies in an on-line mode of digital transformations could not be said to be fully equipped for their technology rich future in the arena of legal studies. The similar is the issue that is persistently being encountered by the professional and legal practitioner in the field as well. Various kinds of digital divides still prevail amidst our progressive and developmental socio-economic and strategic ecosystem.

It may also be argued that the 'covid-19' pandemic has suddenly and abruptly placed the target populaces in such a scenario of digital transformation that invariably involved procurement of sophisticated devices of telecommunication or even devising the same which could somehow or rather meet their requisite demand to cope with the issues of technological divides in these arenas of digital transformation itself.

Further, the streaming sessions of the live Court Cases requires broadband connectivity for consistent and uninterrupted interactions between the Hon'ble Judges and the learned Lawyers, appearing on behalf of the petitioner, to get their cases deliberated properly and adequately in the interest of the judicial system. However, any interruptions owing to the issues of broadband connectivity put the entire court proceedings in shambles and the inclusive judicial interests and rights of the concerned suffer.

CONCLUSION AND SUGGESTIONS

Calamity tests one's patience, potential and caliber to counter its daunting challenges through devising effective measures for the same. It is indeed an un-denying fact worth being acknowledged that the pandemic in its peak form can have severe consequences including those of changing the socio-political contour of the world, destroying mighty empires, and creating nations. Significantly for the 'covid-19' pandemic, we envisaged a dramatic shift in digital usages with its impact being witnessed on all aspects of work and life.

We maintain that the digital divide and transformations cannot merely be considered as related about access or use of digital technology. Rather, it construe being able to integrate digital technologies vis-à-vis transformation into the meaningful socio-legal practices and gain considerable benefits out of it. It is equally important that the lawyers, from their formative stage in the institutions of legal studies itself, ought to gain skill and competences to innovate, design, program, make and build digital technology through digital transformations so that the same could be used by the courts as well towards ensuring speedy disposal of cases in an efficient and effective manner. The latter would certainly abet safeguarding the overall judicial interests of the concerned and humanity as well. It is submitted that any of the most brilliant innovations remain irrelevant if the lawyers lack the requisite skills to use it. In fact, to release the potential of 'digital transformation' in the legal sector, it warrants that the concerned must think about investing in talent and people who can make that technology viable and useful for the target populace.

In fact, inertia and resistance can be considered as significant barriers in digital transformation. Others may include existing resources and capabilities along with factors such as technology, culture, practices, people's skill and competencies as well as their values, attitudes, identities and mindset. However, the exigencies of 'covid-19 pandemic emphatically bring out the significance of digital transformation towards making the varied sectors of the date in a dynamic mode ensuring thereby accomplishments of its varied societal interests, tasks and functions.

Albeit the impact of 'covid-19' pandemic on 'digital transformation' in the domain of judicial mechanism is positively acknowledged, yet speculation remains about the security of sensitive data from the phishing attacks, intrusion and security breaches by the unscrupulous vested interests and elements. It may be submitted that covid-19 pandemic has brought about a situation, before the humanity across the world, where internet access seem to have become necessary for the intellectual enrichment and survival as well. Pragmatically viewed, the pandemic can be acknowledged as a key factor that has brought the world to a situation where those not connected to the internet are believed to be facing total exclusion from the issues of their interests and concern. However, the Telecom Regulatory Authority of India (TRAI) decided to allow waiving charges for data and voice for certain websites related to covid-19- such as those of WHO and ministry of health and family welfare and alike. The principal aim being to allow people, across all socio-economic levels, access to covid-19 related information.

Invariably, during the 'covid-19' pandemic, 'digital transformation' has demonstrated the might of technological advancements in the domain of digital arena abetting humanity to overcome constraints of any nature towards dynamically ensuring their sustenance, survivability and socio-cultural coexistence and inclusive development as well.

 ISBN 978-81-927230-0-10

Implementation of Cloud Intrusion Detection System: Security Enhancement Framework Using FC - ANN

Avinash Appasha Chormale
School of Computer Science, Yashwantrao Chavan Maharashtra Open University Nashik (MS), India.
mr.avinash.ycmou@gmail.com

Prof. (Dr.) Arjun P. Ghatule
Dean- Welingkar Institute of Management Development & Research, Mumbai (MS), India.
arjun1671@gmail.com

Abstract. When suspicious actions are detected in systems, an intrusion detection system (IDS) is used to detect them and issue notifications. Artificial Neural Networks (ANN) can be used to detect system infiltration, however they have a few flaws, such as detection precision for low-frequency attacks and detection stability. As a result, we chose to use the FC-ANN strategy to solve the problem, which is based on fuzzy clusters and artificial neural networks. FC-main ANN's process is as follows: distinct training subsets are generated using a fuzzy clustering technique first. Following that, distinct ANN models are trained to provide different base models using different training subsets. Then, the results are combined using a meta-learner with a fuzzy aggregation module. We'll also add a restore point, which will allow you to restore registry keys, system files, installed programmes, and the project data base, among other things.

Keywords: Intrusion detection, Cloud computing, fuzzy clusters, artificial neural network, fuzzy aggregation, uX-Model, sX-Model, cloud instance monitor, heterogeneous log handler, audit log processor.

1. Introduction

As there is a rapid growth of the cloud applications, new kinds of network attacks are emerging endlessly. So, it is crucial to protect the networks from attackers, and it is necessary that this security concern must be articulate right from the beginning of the network design and deployment. Cloud computing is quickly becoming a crucial driver in meeting all of today's on-demand IT needs[1]. In comparison to any of its early competitors, it presents the next-generation computing paradigm by demonstrating the potential of appropriate resource sharing, real elasticity, and maximum resource usage. Furthermore, the enticing tag of a "pay-as-you-use" business model has piqued the interest of corporations [2]. Despite its advantages, many businesses, from small to large, are hesitant to adopt this computing paradigm due to security concerns. Because today's commercial computing world revolves entirely around clients and their data, sophisticated procedures to secure it against theft and misuse are required. As a result, due to the public and multi-tenancy characteristics of cloud computing, security vulnerabilities and the speed with which they manifest themselves are greater in cloud computing than in on-premises computing. This study proposes "CloudIDS – A security enhancement framework for cloud computing environments," a new security solution based on hybrid two-tier expert Models, namely uX-Model (tier-1) and sX-Model (tier-2) [1]. CloudIDS is a prototype hybrid security system that uses artificial intelligence and machine learning to monitor user activity and sound warnings on intrusions from both internal and outside sources (both supervisedand unsupervised). The top three state-of-the-art cloud computing security categories, such as logical storage segregation and multi-tenancy security concerns, may be mitigated with CloudIDS.

2. Experimental Setup

The entire experiment is run on a setup that includes VisualStudio 4.5, 64-bit 2017 Community edition as the platform and Windows 10 as the operating system, CloudStack 3.0.0 [4] as the cloud infrastructure, XenServer 6.0.2 [5] as virtualization hosts, and all computers with static IP addresses. The CloudIDS architecture was implemented in phases due to its size and computational complexity. A few VMs with varied requirements were produced after the successful deployment of Cloud (IaaS) infrastructure utilising CloudStack 3.0.0 and Citrix XenServer 6.0 hypervisor. Windows 10 64-bit LTS edition was installed on one of the Cloud VMs (henceforth referred as Instance- M). Later, Instance-M was set up with a model Java programme and a few MySQL database tables. This Instance-M cloud VM has been used.

2.1 Phase-I Experimentation

The very first phase's goal was to use unsupervised machine learning to implement the proof-of-concept (POC) of CloudIDS's uX-Model prototype. The most basic component of any computing system is its real-time monitoring process, which is manifested in the form of raw data known as system logs. System logs are a valuable source of information on the status of systems, goods, and even the whys and wherefores of problems, among other things. In every discipline of computing, log files are created; the characteristics of these log files, particularly their structure, context, and language, vary depending on the system. The CloudIDS CIM subsystem is meant to recognise the user's actions on the machine or instances. Considering log files as the primary source of information about activities

Zeitgeist is a service that logs the user's activities and events (files opened, websites visited, conversations held with other people, and so on) and makes the necessary information available to other apps in the Windows Operating System. It is the Windows Operating System's default logger. The log files were located and logically used for the implementation using the Zeitgeist service. The system generated log files that were parsed during Phase-I of this inquiry are listed below. :

- syslog - /var/log/syslog
- daemon.log - /var/log/daemon.log
- auth.log - /var/log/auth.log
- recently-used.xbel - /.local/share/recently-used.xbel

Only the above four logs were subjected to implementation on Instance-M because this experimentation was intended to be a prototype proof-of-concept (POC). The syslog maintains track of and records system/kernel-level events. Similarly, daemon.log defines services such as USB devices, Bluetooth devices, MySQL databases,

and other services that operate on a user's workstation and are turned on or off by the user. When a user logs in to Instance-M for the first time or after the screen has been locked, the activity is recorded in the auth.log file. The authentication of the logged-in user can be deduced from this. The recently-used.xbel file keeps track of all the files that have been accessed, updated, or browsed recently, as well as all the activities related to them.

Depending on the configuration established at the system level, the log files that were evaluated differed in format, structure, and data included inside them. Rather than altering the kernel file configurations (in each OS/platform), a standardised method for extracting only the required information was discovered. The Audit Log Preprocessor module was created as a result of this, and it basically preprocesses log files for subsequent processing. Depending on the configuration established at the system level, the log files that were evaluated differed in format, structure, and data included inside them. Rather than altering the kernel file configurations (in each OS/platform), a standardised method for extracting only the required information was discovered. The Audit Log Preprocessor module was created as a result of this, and it basically preprocesses log files for postprocessing.

Because the processed output would be handed to both the uX-Model and the sX-Model of CloudIDS, much care was taken in selecting the needed fields for extraction from these log files in ALP. A concept known as 'Feature Extraction,' which is the backbone of Artificial Intelligence practise, was preferred for extracting data from log files. Feature extraction reduces the number of resources required to accurately represent a huge quantity of data. It was crucial for the experiment since it provides a smaller number of features as an input to the unsupervised technique.

It is understood that a log is created, updated, and maintained for each and every activity that occurs in Instance-M. While designing a security system, the log file contains various fields that may or may not be important to identifying an anomalous behaviour. Fields including kind of access, time of access, user name, system name, message, and others were chosen as candidates for extraction because they would aid in the successful identification of the intrusion that happened in Instance-M.

The most important aspects of the system logs differed slightly from conventional textual data. Despite the fact that they are written in natural language, they do not follow grammatical rules and differ in structure and context. Furthermore, because they were gathered from a variety of sources, they are clearly diverse in nature. As a result, a technique that takes into account particular terminology, heterogeneous, and multi-source log file formats was necessary for implementation. The ability to extract characteristics from these logs and assess them for a patterned result was also a critical difficulty.

2.1.1 Selection Criteria for uX-Model's Unsupervised MachineLearning Algorithm

For tackling this very same sort of problem, there exists a variety of algorithms and systems, each with its own set of performance characteristics. There has been no systematic comparing and estimation of various machine learning algorithms, and the performance of current systems has not been critically compared with other approaches up to this point. However, there are a few rules to follow in order to make the best judgement possible about the type of algorithm to choose.

K-means clustering [6], Self-Organizing Maps (SOM) [7], Growing Hierarchical SOM (GHSOM) [120], and others are trustworthy unsupervised machine learning methods for detecting anomalies and uncommon patterns. SOM has been identified as a common candidate

for an unsupervised machine learning techniques based on a literature review. Because of its ability to extract topological structure buried indata, the Self-Organizing Map (SOM) is unique from the perspective of data analysis. The detection should be done by the Self-OrganizingMap (SOM) algorithm for two reasons.

1. The user does not required to provide feedback for this neuralnetwork approach.

2. SOM maps can be used to see why a state was labelled asanomalous.

[8] uses the SOM algorithm to construct a topological map of known assaults for forensic analysis of suspicious network data. SOM is used to abstract the assaults while still maintaining the topological relationships. SOM is utilised both as a post-mortem technique for analysing known assaults and as a tool for identifying and analysing novel attacks in this case.

2.1.2 uX-Model Experimentation with SOM

SOM uses vectors (numerically converted logs) as an input and instructs the system to learn how to build clusters.

The SOM Algorithm

For n-dimensional input space and m output neurons:

1. Choose random weight vector wi for neuron i, i=1,….m
2. Choose random input x
3. Determine winner neuron k:
i. ||Wk – X || = mini || Wi – X|| (Euclidean distance)
4. Update all weight vectors of all neurons I in the neighborhood ofneuron k:
Wi := Wi + σ * η (i, k)) * (X – Wi) (Wi is shifted towards X)
5. If convergence criterion met, STOP. Otherwise, narrow neighborhood function η and learning parameter σ and go to (2).

ISBN 978-81-927230-0-10

In CloudIDS Tier-1 uX-Model, the SOM algorithm takes the input shown in Figure 1.

0 10 50 01 3 3 4.86 0.0 1 2

0 10 56 27 2 3 4.14 0.0 1 1

0 10 56 41 1 2 3.696 3.4 2 1

0 10 40 01 3 2 3.344 0.0 1 2

0 10 41 30 1 2 3.696 0.2 1 1

0 10 41 34 1 2 3.344 0.0 4 1

0 10 41 54 2 3 3.78 1.4 2 1

0 10 43 09 2 3 4.86 13.17 4 1

0 09 32 43 3 1 0.0 0.0 1 2

0 09 32 48 3 1 0.0 0.0 1 2

0 09 32 53 3 1 0.0 0.0 1 4

0 10 41 34 1 2 3.344 0.0 4 1

0 10 41 54 2 3 3.78 1.4 2 1

0 10 43 09 2 3 4.86 13.17 4 1

0 10 50 01 3 3 4.86 0.0 1 2

0 10 50 01 3 3 4.86 0.0 1 2

0 10 50 01 3 3 4.86 0.0 1 2

0 10 50 01 3 3 4.86 0.0 1 4

0 10 50 01 3 3 4.86 0.0 1 2

Figure 1 Input given to SOM Algorithm of CloudIDS Tier-1 uX-Model

Figures 2 are the representation of clusters in the vector format as well as the visualization of the same in a patterned color format.

Figure 2 CloudIDS Tier-1 uX-Model SOM's Resultant Numerical Clusters Representation

The clusters are identified from the above-visualized data and evaluated from the log files using SOM uX-Model learning data. uX-Model then determines whether the data supplied is Normal Behavioror not. When CloudIDS Tier-1 determines that the studied log falls under the category of Normal Behavior, it transmits it to the Standard

Audit Repository (SAR). Otherwise, it will be used in future CloudIDS phases. The procedures in SOM for determining the typeof behaviour are as follows.

- Cluster extraction from SOM learning
- Identifying each cluster's Mean Vector
- Threshold determination for each cluster

In section 5.3 of this chapter, the results of the uX-Modelexperimentation are discussed.

2.2. Phase-II Experimentation

The Phase-I examination offered a firm foundation for developing a more stable and promising system, paving the path for further research into AI. The unsupervised machine learning utilised in CloudIDS' Tier-1 uX-Model was focused on recognising standard activities of stakeholders and accounting them in the Standard Audit Repository. The CloudIDS system must be able to distinguish between common activities, intrusions, and foreign log entries. As a result, the system must already be taught to recognise these incursions. The experimentation was continued from Phase I to Phase II for this reason, with the goal of implementing the POC of CloudIDS's sX- Model prototype utilising supervised machine learning techniques.

2.2.1 Selection Criteria for SVM

Support Vector Machine (SVM) is a modern and powerful approach for n-class classification among supervised machine learning models. SVM is a commonly used classifier in both academic and industrial research, but getting the best results from it requires a detailed understanding of how it works and how accuracy may be improved.

Thorough research on supervised learning algorithms using SVM wasmade and analyzed for the applicability of the same in real time applications. In the work done by Liu & Zhu [12], multi-category SVMs and BP algorithm were used for comparison of the images. In [13], particular set of input patterns were focused, color segmentation and moment invariants with SVM were used. A robust model for traffic sign recognition based on Support Vector Machines (SVM) was proposed by Shi, Wu, and Fleyeh for Swedish traffic signs [14]. The experiment has shown satisfying results and SVM was proved to be robust.

[14] suggested Tchebichef Moments and Support Vector Machine. The RGB images captured by the camera were transformed into HSV colour space using this method. These photos were then used to construct a recognition system. Experiments with SVM using the Zernike moments method in [15] yielded positive results. To increaserecognition quality, the GFD algorithm [16] and SVM were chosen for research in [17]. SVM is capable of extracting features from any algorithm, as can be seen.

Training phase involves taking into account the known features and making the system to learn and make patterns out of it. In testing phasethe data is kept aside from the training phase; but exclusively used to test the trained system. In the CloudIDS sPhase-II experimentation, SVM modeling is realized using LIBSVM tool [21], which is a popular library for Support Vector Machines.

In comparison to Phase I, the SVM experiment in Phase II was on a greater level. Four log files were tested in Phase I, and the results were positive. Only two (auth.log and deamon.log) of the previous four logs were kept in order to go on to investigate other (heterogeneous) forms of application logs, and Database Logs also were considered for Phase-II POC. In a typical business scenario, if a database server is to be

configured in a cloud environment, it should be kept in a distinct VM. As a result, monitoring database activity within the VM is a critical requirement that must not be overlooked. By building an Instance-M VM with a MySQL database hosted on it, an effort was made in Phase-II to track and assess database level logs. ALP employed an adapted version of parsing logic to preprocess the auth.log and daemon.log files in Phase-II. The ALP checks the system level logs dameon.log and auth.log at predetermined intervals, similar to Phase-I.

2.2.2 Auth Log Preprocessing

The auth.log parser was created in Phase-II to extract the fields below from the log file monitored by CIM at /var/log/auth.log.

Sudo, su, gdm-session-worker, and gnome-screensaver-dialog were all important fields to consider when parsing auth.log. CIM monitors all operations conducted with these instructions at regular intervals (i.e. 10 seconds) and then preprocesses them via ALP Subsystem. The auth.log file from CIM to ALP Subsystem for the sX-Model of Phase-II is shown in Figure 3. Figure 4 shows the myauthlog.log file, which is the final log file formed after preprocessing by ALP and H-log-H Subsystems.

Figure 3 Input auth.log File for ALP Subsystem in Phase-II

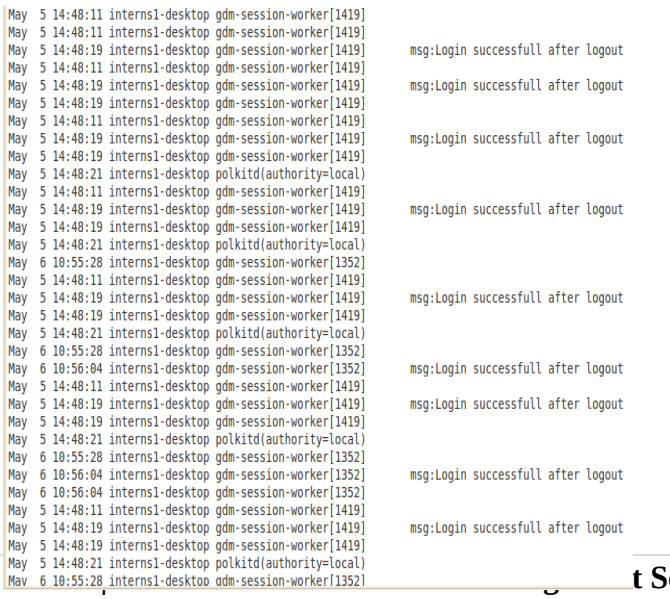


Figure 4 ALP Preprocessed myauthlog.log File

2.2.3 Database Log Preprocessing

While developing a prototype for database log monitoring, a real-world scenario was created where a Cloud Consumer (user of cloud services) required security for a database hosted in a virtual machine.Most databases have their own log files that record their own events and activities. MySQL logs, for example, are saved under the
/var/log/mysql.log directory in the Windows Operating System. However, monitoring this file, preparing it, and analysing it with CloudIDS appears to be comparable to the treatment of auth.log and other files in Phase-I. Because it simply records activities such as problems encountered in starting/stopping MySQL server (Error Log), updating the data, and so on, A real-world scenario was developed when designing a prototype for database log monitoring, in which a Cloud Consumer (user of cloud services) wanted security for a database hosted in a virtual machine. Most databases keep trackof their own events and activities in their own log files. MySQL logs,for example, are recorded in the Windows Operating System's
/var/log/mysql.log directory. However, the treatment of auth.log and other files in Phase-I appears to be analogous to monitoring, creating,and analysing this file using CloudIDS. The mysql.log file generated may not be sufficient for developing a complete intrusion detection system because it just records actions such as issues with starting/stopping the MySQL server (Error Log), updating the data, and so forth. The resulting mysql.log file might not be enough to build a complete intrusion detection system. Database incursions should be documented, including who user logged in to which sub- database, what the person did, and so on. At a higher level, intrusionsat the database table level can be recorded, as can intrusions at the column or row level with respect to the corresponding insert/update/delete values.

During Phase II of CIM installation, MySQL table, row, and column activity is monitored. In real-world applications, this table, row, and column monitoring would be quite beneficial. Consider the situation of a user who owns an e-commerce site and wants to ensure that no unauthorised transaction data is altered in the cloud database. In this case, one of the choices is to use triggers.

A trigger is invoked when SQL Insert, Update, or Delete statements are used to modify a table in a database. It's frequently used as a tablevalidation tool or a database security mechanism for tracking changes.These triggers can be used on tables, and they are generated whenever a database modification occurs, such as an insertion, update, or deletion, and the relevant log is written in a custom SQL log file.

A database table level monitor was built as a trigger in CIM, and a logwas written every time a row level action was executed.

A prototype trigger for a student table with the schema Roll Number, Name, and Marks was created in the MySQL database. This trigger is automatically executed before any update action in the student table isperformed. For each entry, the previous values of roll number, name, and marks, as well as the date of trigger execution, are retrieved. These values are logged by CIM Subsystem in a particular log file. The file contains the timestamp, module, and message fields.

2.2.4 Phase-II of Numerical Conversion

The numerical conversion component of the ALP module for Phase-II was the final section. The alphanumeric fields in the system log files and database custom log files that were tested included Serial No., Date, Start Time, Severity, Message, Stop Time, and Frequency. According to machine learning theory, the technique and functioning of SVM are fully dependent on numerical features. The created log

file must be converted to a numerical representation, with significant reasoning included in the process.

The ALP Subsystem would create the final numerically converted vector file utilising all of the ALP Numerical Conversion encoding techniques, Figure 5 illustrates this.

```
1 1:2 2:191550 3:2 4:4 5:3 6:2 7:1 8:1 9:12497
0 1:2 2:191550 3:2 4:4 5:3 6:8 7:3 8:3 9:0
0 1:2 2:191621 3:2 4:4 5:3 6:8 7:3 8:3 9:0
0 1:2 2:193239 3:2 4:6 5:3 6:8 7:3 8:3 9:0
1 1:1 2:102732 3:2 4:2 5:3 6:8 7:3 8:3 9:3573
0 1:1 2:110022 3:2 4:6 5:3 6:8 7:3 8:3 9:0
1 1:1 2:110022 3:2 4:2 5:3 6:8 7:3 8:3 9:3573
0 1:1 2:110445 3:2 4:6 5:3 6:8 7:3 8:3 9:0
0 1:1 2:110507 3:2 4:6 5:3 6:8 7:3 8:3 9:0
0 1:1 2:110507 3:2 4:6 5:3 6:8 7:3 8:3 9:0
0 1:1 2:110512 3:2 4:6 5:3 6:8 7:3 8:3 9:0
0 1:1 2:110515 3:2 4:6 5:3 6:8 7:3 8:3 9:0
1 1:1 2:110623 3:2 4:4 5:3 6:2 7:1 8:1 9:9022
0 1:1 2:110623 3:2 4:4 5:3 6:8 7:3 8:3 9:0
0 1:1 2:110652 3:2 4:4 5:3 6:8 7:3 8:3 9:0
1 1:1 2:110844 3:2 4:4 5:3 6:2 7:1 8:1 9:9930
0 1:1 2:110844 3:2 4:4 5:3 6:8 7:3 8:3 9:0
0 1:1 2:110913 3:2 4:4 5:3 6:8 7:3 8:3 9:0
1 1:1 2:113059 3:2 4:2 5:3 6:8 7:3 8:3 9:3573
1 1:1 2:120017 3:2 4:2 5:3 6:8 7:3 8:3 9:3573
1 1:1 2:120040 3:2 4:4 5:3 6:2 7:1 8:1 9:9358
0 1:1 2:120040 3:2 4:4 5:3 6:8 7:3 8:3 9:0
0 1:1 2:120104 3:2 4:4 5:3 6:8 7:3 8:3 9:0
1 1:1 2:120132 3:2 4:4 5:3 6:1 7:1 8:1 9:8134
0 1:1 2:120132 3:2 4:4 5:3 6:8 7:3 8:3 9:0
0 1:1 2:120941 3:2 4:4 5:3 6:8 7:3 8:3 9:0
0 1:1 2:124226 3:2 4:2 5:3 6:8 7:3 8:3 9:3573
1 1:1 2:133513 3:2 4:2 5:3 6:8 7:3 8:3 9:3573
1 1:1 2:144029 3:2 4:2 5:3 6:8 7:3 8:3 9:3573
1 1:1 2:144223 3:2 4:4 5:3 6:1 7:1 8:1 9:8134
0 1:1 2:144223 3:2 4:4 5:3 6:8 7:3 8:3 9:0
0 1:1 2:144251 3:2 4:4 5:3 6:8 7:3 8:3 9:0
1 1:1 2:154442 3:2 4:2 5:3 6:8 7:3 8:3 9:3573
```

Figure 5: The ALP module's numerical conversion component for Phase-II was the final piece. Serial No., Date, Start Time, Severity, Message, Stop Time, and Frequency were among the alphanumeric fields tested in system log files and database custom log files. The technique and operation of SVM are entirely based on numerical features, according to machine learning theory. The produced log file must be transformed to a numerical representation, which must incorporate important reasoning.

The ALP Subsystem would create the final numerically converted vector file using all of the encoding techniques required for ALP Numerical Conversion, as shown in Figure 5. ALP Subsystem mylog file that has been numerically converted

2.2.5 The sX-Model Training Phase of CloudIDS uses SVM in Phase II.

For each entity in the LIBSVM training set, there is one "target value" (i.e. the class labels) and multiple "attributes" (i.e. the characteristics or factors noticed). The goal of SVM is to build a model (based on the training data) that can predict the target values of the test data given just the test data features. The final output of ALP after numerical conversion serves as the SVM's training data. After the data set has been trained, a "Model File" is created. This model file is used as a basic input file throughout the testing phase and during the real run because it contains all of the patterns learned by SVM in native format.

The Acute Audit Repository in CloudIDS must be populated once the system is deployed by the client at the CSP's site, along with the setting of sX-Model. The AAR would be filled in based on the client's dry run of incursion history, which would contain behaviours such as,

- Historical attacks
- History of cybercrime
- Users who are not authorised
- Unauthorized access to locations, logins, and remote access, and so on.

On a trial run with all these incursions, distinct severity levels must be defined in the Warning Level Generator (WLG) Subsystem for each intrusion defined, and the associated action to be taken must be definedin the Alert System. Unauthorized access to a file in the root directory, for example, is considered an intrusion. This would be discovered as an incursion pattern on a dry run and documented in the Acute Audit Repository with a class label. Different security levels must be defined in the Warning Level Generator for this intrusion, as well as the associated action in the Alert System. Unauthorized access to a restricted directory by an admin user, for example, may be of lower severity than unauthorised access to a restricted directory by a normal user, which may be of medium or high severity. WLG can establish these security levels, and the Alert System can define the actions that should be conducted in response. In the scenario used, unauthorised access with low priority would result in an email being sent to the CloudIDS admin, while unlawful access with medium severity would result in the user being temporarily blocked and reported to both the admin and the client.

As a result of this dry run, the AAR will have a comprehensive set of intrusion repository that the system will be able to classify and recognise from the start in CSP. The following intrusions were evaluated in Phase-II implementation, and a dry run was done to establish patterns and severity levels were assigned to them in the WLG Subsystem.

All of the patterns generated were given class labels after a dry run intraining the system. For prototyping, severity ratings ranging from 1 to 5 are assigned to each of these patterns, with 1 being the least severe.

The severity levels, as well as the pattern's data, were recorded in anXML file by the Warning Level Generator Subsystem. The XML file that defines the severities is shown in Figure 5.6.

Error in Figure! There is no text in the page that matches the requested style. Each pattern in an XML file has one severity defined for it. The following would be completed as a result of the trial run:

- Patterns are labelled with a class designation
- For known intrusions, a severity level has been established.

```
        </sudo>
        <sudo>
                <msg>Login successful after sudo command</msg>
                <user>root</user>
                <command>/usr/bin/nano</command>
                <severity>4</severity>
        </sudo>
        <su>
                <msg>Login failed after su command</msg>
                <severity>5</severity>
        </su>
        <gdm-session-worker>
                <msg>Login successful after logout</msg>
                <starttime>122436</starttime>
                <endtime>131015</endtime>
                <severity>5</severity>
        </gdm-session-worker>
        <gdm-session-worker>
                <msg>Unknown User</msg>
                <severity>5</severity>
        </gdm-session-worker>
        <gnome-screensaver-dialog>
                <msg>Login failed after screenlock</msg>
                <severity>3</severity>
        </gnome-screensaver-dialog>
        <gnome-screensaver-dialog>
                <msg>Login successful after screen lock</msg>
                <starttime>122436</starttime>
                <endtime>131015</endtime>
                <severity>4</severity>
        </gnome-screensaver-dialog>
</root>
```

ISBN 978-81-927230-0-10

- Training Model File created by SVM

The model file created as a result of the SVM model's training phase is used to improve the learnability of the SVM by specifying the patterns and expected outputs associated with it. The LIBSVM tool, a well-integrated and simple-to-use Support Vector Classification tool, was used to create the SVM model. Because LIBSVM allows multi-class classification, it was chosen for Phase-II sX-Model experimentation where many classes must be classified. The resulting model file following the LIBSVM training step in sX-Model is shown in Figure 5.7. In the future, the SVM will be able to discriminate between attack and normal data by checking into this file whenever it sees the exact pattern match or a similar pattern. As a result, this model file will be used in both the testing and deployment phases of SVM.

```
svm_type c_svc
kernel_type rbf
gamma 2
nr_class 2
total_sv 2634
rho -49.156
label 0 1
nr_sv 1264 1370
SV
8192 1:1 2:0.380417 4:0.2 5:1 6:0.714286 7:-1 9:-0.240244
8192 1:1 2:0.380417 4:0.2 5:1 6:0.714286 7:-1 9:-0.240244
8192 1:1 2:0.380509 4:0.2 5:1 6:0.714286 7:-1 9:-0.281032
8192 1:1 2:0.380417 4:0.2 5:1 6:0.714286 7:-1 9:-0.240244
8192 1:1 2:0.380509 4:0.2 5:1 6:0.714286 7:-1 9:-0.281032
8192 1:1 2:0.380417 4:0.2 5:1 6:0.714286 7:-1 9:-0.240244
8192 1:1 2:0.380509 4:0.2 5:1 6:0.714286 7:-1 9:-0.281032
8192 1:1 2:0.380417 4:0.2 5:1 6:0.714286 7:-1 9:-0.240244
8192 1:1 2:0.380509 4:0.2 5:1 6:0.714286 7:-1 9:-0.281032
8192 1:1 2:0.380417 4:0.2 5:1 6:0.714286 7:-1 9:-0.240244
8192 1:1 2:0.380509 4:0.2 5:1 6:0.714286 7:-1 9:-0.281032
8192 1:1 2:0.380417 4:0.2 5:1 6:0.714286 7:-1 9:-0.240244
8192 1:1 2:0.380509 4:0.2 5:1 6:0.714286 7:-1 9:-0.281032
8192 1:1 2:0.380417 4:0.2 5:1 6:0.714286 7:-1 9:-0.240244
8192 1:1 2:0.380509 4:0.2 5:1 6:0.714286 7:-1 9:-0.281032
8192 1:1 2:0.380417 4:0.2 5:1 6:0.714286 7:-1 9:-0.240244
8192 1:1 2:0.380509 4:0.2 5:1 6:0.714286 7:-1 9:-0.281032
8192 1:1 2:0.380417 4:0.2 5:1 6:0.714286 7:-1 9:-0.240244
8192 1:1 2:0.380509 4:0.2 5:1 6:0.714286 7:-1 9:-0.281032
8192 1:1 2:0.380417 4:0.2 5:1 6:0.714286 7:-1 9:-0.240244
8192 1:1 2:0.380509 4:0.2 5:1 6:0.714286 7:-1 9:-0.281032
```

Error in Figure! There is no text in the page that matches the requested style. Model Files Generated as a Result of the sX- Model Training Phase

2.2.6 Phase-II of CloudIDS: sX-Model Testing Using SVM

In the Phase-II experimentation, the testing phase was crucial because it was here that the training phase's success factor would be assessed. As testing data for the SVM, some random logs with unusual patterns were chosen. Any new entry in the log file is checked to see if it's an attack. The sX-Model Subsystem does this by logically searching for a match with the SVM training data if one exists (i.e. Model File).

Any log file that is exposed to SVM testing in sX-Model is first transformed to numerical form. This conversion is carried out similarly to the one carried out by ALP Subsystem. This becomes the testing data for the SVM's next phase. The LIBSVM classifies the pattern to a predetermined class label in the testing phase, using the testing data received after numerical conversion and the model file generated during the training phase. The output of the LIBSVM testing phase is shown in Figure 5.8.

Finally, using the training data provided to the SVM, the correctness of the sX-Model can be determined by analysing the difference between expected and actual output.

2.2.7 Analyzing SVM for sX-Model Performance andOperational Efficiency

Because LIBSVM was utilised to implement the SVM model in CloudIDS Tier-2 sX-Model Phase-II testing, numerous parameters and configurations are accessible in LIBSVM to optimise the sX- classification Model's capacity. By sending the Training File via theScaler Process, which is detailed later, the Training File can be optimised. In both the Training and Testing Phases, the Scaler Process must be followed. It can't be used in just one phase.

Various LIBSVM pre-configurations must be made in CloudIDS C3 so that the data used for training and testing at sX-Model is optimisedfor optimal efficiency.

Scale the Training and Testing Data in a Simple Way

To fine tune the data as a subject, scaling is highly important before applying SVM. The fundamental benefit of scaling is that it prevents qualities with larger numeric ranges from dominating attributes with lower numeric ranges. Another benefit is that the calculation is free of numerical complications. Scaling is usually done in the range [-1, +1]or [0, 1] for each characteristic. For both training and testing data, thesame scaling factor is employed.

Taking into account the RBF Kernel

0 0 1 0 0 0 1 0 1 1 0 0 1 0 0 0 0 0 0 1 0 0 0 0 1 0 0 0 0

Even though there are just four common kernels, the one to use must be picked first, followed by the penalty parameter C and kernel parameters. Unlike the linear kernel, the RBF kernel nonlinearly translates samples into a higher-dimensional space, allowing it to handle cases where the relationship between class labels and attributes is nonlinear. The RBF kernel also has less numerical issues. As a result, RBF Kernel was approved for Phase-II implementation.

Technique of Cross Validation

C and gamma are the two parameters that make up an RBF kernel. It's impossible to predict which C and gamma values are best for a specific scenario. As a result, some sort of model selection (parameter search) is required. The goal is to find good (C, gamma) so that the classifier can predict unknown data reliably (i.e. testing data). Separating the data set into two portions, one of which is unknown, is a typical method. The performance on classifying an independent data set is more accurately reflected by the prediction accuracy achieved from the "unknown" collection. Cross-validation is an upgraded variant of this process. To use v-fold cross-validation, divide the training set into v equal-sized subgroups. Using the classifier trained on the remaining v – 1 subset, one subset is tested sequentially. As a result, each entity in the whole training set is predicted just once, and the cross-validation accuracy is the proportion of correctly categorised data. Using cross-validation, the "grid-search" was applied to C and gamma. For optimising the LIBSVM accuracy of CloudIDS sX-Model, many pairs of (C, gamma) values were evaluated, and the one with the best cross-validation accuracy was chosen. Figure 5.10 shows the various C and gamma probabilities that were tested during the experiment. Each record's Accuracy Rate can also be found in the last column.

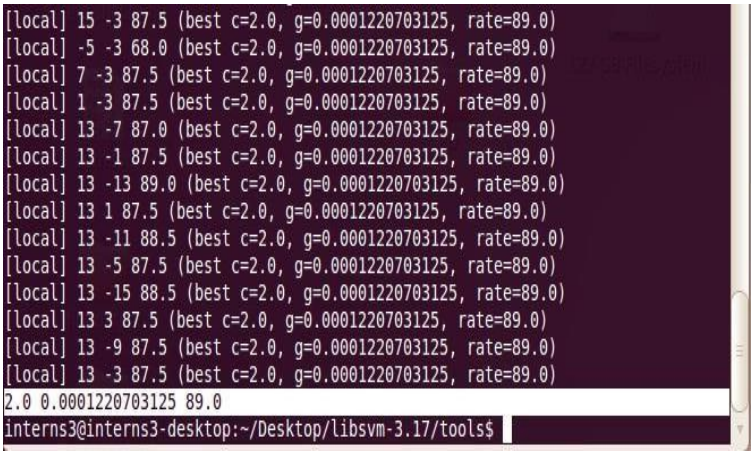


Figure 5.7 Error! The document contains no text in the chosen style. Based on the Dry Run, 10 people were chosen as the best pair of (C, gamma)

The model was trained on the training set using various combinations of parameter values obtained during the cross validation stage. Figure 5.7 depicts the model file created as a result of the Training step. The testing data will be classified using this model file.

Scale the testing data according to the same guidelines as the training data. When scaling the training data, the parameters used to scale the training data are kept, and the same parameters are retrieved when scaling the testing data.

The impact of SVM parameters on the classifier, as well as how to choose suitable values for those parameters, data normalisation, and factors that affect training time, are all issues that must be considered. Regardless, if SVM fails to perform adequately, the data has non-regularity, i.e. the data is not evenly distributed or has an uncertain distribution.

3. Discussion of the Findings

In addition to the Instance-M virtual machine, three other virtual machines, Instance-M1, Instance-M2, and Instance-M3, were set up for a more accurate study of the prototype and to verify the system's efficiency. All of the learning, training, and testing phases of CloudIDS's uX-Model and sX-Model were performed on these three virtual machines. Each of these virtual machines was equipped with a real-time VisualStudio programme as well as a database server. This entire VM arrangement served as the foundation for the three VMs that would work as a real-time simulation model. Logs were uniformly gathered from all three systems for ten continuous days with random actions performed on each VM for the goal of a dry run and monitoring the activities of these three VMs. As a result, the logs from these three VMs were gathered under multiple timestamps and variations for the CloudIDS accuracy test, accounting for a total run of thirty days. This section also discusses the experimentation findings and the correctness of CloudIDS Security Framework's uX-Model and sX-Model.

3.1 Results of the uX-Model Phase I

Manual activities (both normal and pathological) were done with different test cases on Instance-M as part of the experimentation dry-run described in Section 5.3. Those logs were later acquired and put to SOM testing.

The study of the data shows that the uX-Model was able to detect intrusion in situations where the user was performing typical tasks. This accounts for 11% of the total and could be attributable to a lack of enough learning records to define normal behaviour. When injectedinto the system, it was also discovered that a small percentage of logs

(almost 4%) were not detected as intrusions. In general, these intrusions were actions that were too similar to the uX-taught Model'susual behaviour.

Detection Rate	False Negative Rate	False Positive Rate
85%	4%	11%

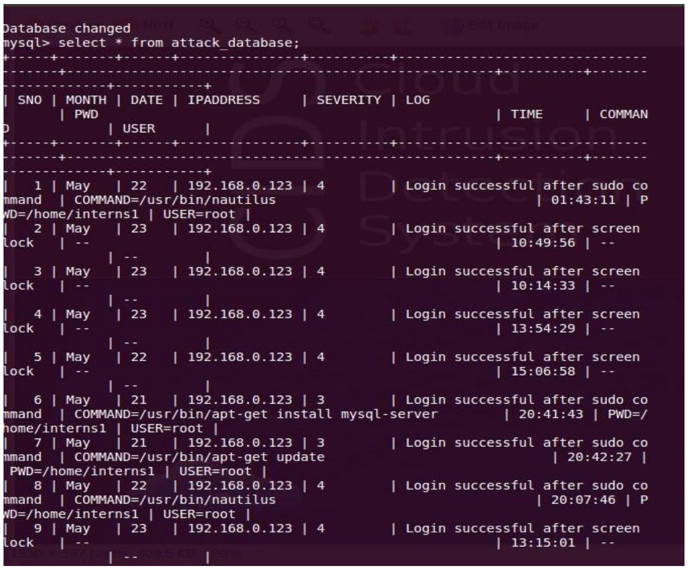
Table 1 Implementation Performance of CloudIDS Tier-1 uX-ModelSOM

Furthermore, the developed SOM uX-Model has an 85 percent detection performance rate, which is impressive for an unsupervised machine learning implementation. Although the system finds anomalies, it has been observed in some experimental runs to producefalse negatives and false positives.

3.2 Results of the sX-Model Phase II

- After an exhaustive trialling examination of various test instances, the accuracy of 90.3 percent was reached.
- The corpus of log data created from a 30-day run with the VMs Instance-M1, Instance-M2, and Instance-M3 reinforcedsX-learning Model's base.
- Prior to the trial procedure, the proper kernel was chosen, which intuitively aided in increasing the correctness of the sX-Model.
- Several probabilistic and combinational trials using the values of C and gamma during the Cross Validation procedure resulted in an optimum value pair with a 90.3 percent accuracy.

An interactive Graphical User Interface was used to try to actualize thePhase-II implementation. The concerned individual can log in to the system and monitor the actions taking place in Instance-M. After SVM has completed the prediction of attacks, the output is in binary digits,
i.e. 0's and 1's. We can establish if the behaviour captured in the log file is an attack or not based on this output value. These activity patterns that have been identified as assaults are now compared to the severity level specified in the XML file. Each entry that is determined to be an attack is given a severity rating. All entries illustrating the attack are persisted in the database, which represents a tiny Acute Audit Repository, after the severity is appended. Figure 5.11 shows the result of a SELECT query on the attack database table in a MySQLdatabase.



```
Database changed
mysql> select * from attack_database;
+-----+-------+------+---------------+----------+------------------------------
-------+--------------------------------------------------------+----------+------
------------+-----------+
| SNO | MONTH | DATE | IPADDRESS     | SEVERITY | LOG
      | PWD                                                    | TIME     | COMMAN
D           | USER      |
+-----+-------+------+---------------+----------+------------------------------
-------+--------------------------------------------------------+----------+------
------------+-----------+
|   1 | May   | 22   | 192.168.0.123 | 4        | Login successful after sudo co
mmand  | COMMAND=/usr/bin/nautilus                             | 01:43:11 | P
WD=/home/interns1 | USER=root |
|   2 | May   | 23   | 192.168.0.123 | 4        | Login successful after screen
lock   | --                                                     | 10:49:56 | --
            | --        |
|   3 | May   | 23   | 192.168.0.123 | 4        | Login successful after screen
lock   | --                                                     | 10:14:33 | --
            | --        |
|   4 | May   | 23   | 192.168.0.123 | 4        | Login successful after screen
lock   | --                                                     | 13:54:29 | --
            | --        |
|   5 | May   | 22   | 192.168.0.123 | 4        | Login successful after screen
lock   | --                                                     | 15:06:58 | --
            | --        |
|   6 | May   | 21   | 192.168.0.123 | 3        | Login successful after sudo co
mmand  | COMMAND=/usr/bin/apt-get install mysql-server         | 20:41:43 | PWD=/
home/interns1 | USER=root |
|   7 | May   | 21   | 192.168.0.123 | 3        | Login successful after sudo co
mmand  | COMMAND=/usr/bin/apt-get update                              | 20:42:27 |
 PWD=/home/interns1 | USER=root |
|   8 | May   | 22   | 192.168.0.123 | 4        | Login successful after sudo co
mmand  | COMMAND=/usr/bin/nautilus                             | 20:07:46 | P
WD=/home/interns1 | USER=root |
|   9 | May   | 23   | 192.168.0.123 | 4        | Login successful after screen
lock   | --                                                     | 13:15:01 | --
            | --        |
```

FIGURE ERROR! THERE IS NO TEXT IN THE PAGE THAT MATCHES THE REQUESTED STYLE. 11 SELECT QUERY ON A TABLE WITH PERSISTED ATTACK INFORMATION.

The user can log in to the simulated environment and see all of the attacks that happened on the Instance-M VM. The specifics can be viewed by selecting the month, severity, or date. For example, if a user wants to see all the assaults that occurred in May with a severity of 5, they can do so by selecting the appropriate numbers from the drop down box, and the programme will generate a tabular report. The table will show the day, month, and time of the attacks, as well as the user, IP address, parent working directory, command, log message, and severity. Figure 5.12 shows the view logs by month, date, and severity selection panel.

Month May Date -select- Severity 4 Generate

Date	Month	Time	IP Address	User	Parent Working Directory	Command	Message	Severity
22	May	01:43:11	192.168.0.123	USER=root	COMMAND=/usr/bin/nautilus	PWD=/home/interns1	Login successful after sudo command	4
23	May	10:49:56	192.168.0.123	--	--	--	Login successful after screen lock	4
23	May	10:14:33	192.168.0.123	--	--	--	Login successful after screen lock	4
23	May	13:54:29	192.168.0.123	--	--	--	Login successful after screen lock	4
22	May	15:06:58	192.168.0.123	--	--	--	Login successful after screen lock	4
22	May	20:07:46	192.168.0.123	USER=root	COMMAND=/usr/bin/nautilus	PWD=/home/interns1	Login successful after sudo command	4
23	May	13:15:01	192.168.0.123	--	--	--	Login successful after screen lock	4
22	May	14:09:00	192.168.0.123	USER=root	COMMAND=/usr/bin/nautilus	PWD=/home/interns1	Login successful after sudo command	4
22	May	20:05:36	192.168.0.123	--	--	--	Login successful after screen lock	4
22	May	17:51:12	192.168.0.123	--	--	--	Login successful after screen lock	4
21	May	23:49:45	192.168.0.123	--	--	--	Login successful after screen lock	4
21	May	20:32:01	192.168.0.123	USER=root	COMMAND=/usr/bin/nano /etc/avahi/avahi-daemon.conf	PWD=/home/interns1	Login successful after sudo command	4
22	May	00:42:43	192.168.0.123	--	--	--	Login successful after screen lock	4
22	May	21:04:05	192.168.0.123	USER=root	COMMAND=/usr/bin/nautilus	PWD=/home/interns1	Login successful after sudo command	4
22	May	01:43:11	192.168.0.123	USER=root	COMMAND=/usr/bin/nautilus	PWD=/home/interns1	Login successful after sudo command	4
21	May	21:43:22	192.168.0.123	--	--	--	Login successful after screen lock	4

Figure Error! There is no text in the page that matches the requested style. 12 CloudIDS Detailed Report GUI on Attacks Occurred on User VM

When a new type of assault is discovered during the experimentation run that is not in the Acute Audit Repository, the programme adds capability to notify the user via a pop-up dialogue prompt based on the severity level. Extending this functionality, if the attack is of a high severity, such as 5, the alert can be sent to the admin, CSP, and user. The notification could come in the form of an SMS, an email, or a phone call with a prerecorded message. The screen can also be blocked, preventing the invader from harming Instance-M further. In a similar vein, we can deal with low-severity attacks by informing the appropriate personnel and taking appropriate action.

1. Conclusion

The use of soft computing techniques in the CloudIDS experiments, both Phase-I and Phase-II, has the advantage that even if the attack signature has not been described in the profile, the system will be ableto predict whether it is an attack or not. The uX-Model

experimentation accuracy was 85 percent, while the sX-Model experimentation accuracy was 90.3 percent, which is rather good. This effectively demonstrates that CloudIDS Security Framework can monitor the activities occurring on the VM (Instance-M), resolving the most difficult top three state-of-the-art cloud computing security taxonomies such as logical storage segregation & multi-tenancy security issues, identity management issues, insider attacks, and a fewother cloud security issues.

References:

[1] Madhan Kumar Srinivasan, K Sarukesi and Paul Rodrigues, "State-of-the-art Cloud Computing Security Taxonomies A classification of security challenges in the present cloud computing environment", International Conference on Advances in Computing, Communications and Informatics, 2012, pp. 470-476.

[2] Cloud Computing and Sustainability – Whitepaper [Online]. Available: "https://download.microsoft.com/download/A/F/F/AFFEB671-FA27-45CF-9373 0655247751CF/Cloud%20Computing%20and%20Sustainability%20- %20Whitepaper%20-%20Nov%202010.pdf ".

[3] Cloud Security Alliance- Security Guidance For Critical Areas Of Focus In Cloud Computing V3.0 [Online]. Available:"http://www.cloudsecurityalliance.org/guidance/csaguide.v3.0.pdf".

[4] Vikas Singh, Amit Kumar and Prof. Devender Kumar, "An Advanced Hybrid Intrusion Detection System in Cloud Computing Environment",.IJRASET, Vol. 2 Issue VI, June 2014, pp. 302-309.

[5] Gang Wang a,b, Jinxing Hao b, Jian Mab, and Lihua Huang, "A new approach to intrusion detection using Artificial Neural Networks and fuzzy clustering", Expert Systems with Applications-Elsevier, 2010, pp. 1-8.

[6] Hartigan J.A. and Wong M.A., "Algorithm AS 136: A K-Means Clustering Algorithm", Journal of the Royal Statistical Society, Series C (Applied Statistics), 2012, 28(1), pp. 100 – 108.

[7] Patole, V.A., Pachghare, V. K. and Kulkarni, P., Self-Organizing Maps to Build Intrusion Detection System. International Journal of Computer Applications, USA, DOI: 10.5120/191-328, 2010, pp. 1 – 4.

[8] Kayacik H.G., Zincir-Heywood A.N. and Heywood M.I., "A Hierarchical SOM based Intrusion Detection System", Journal of Engineering Applications of Artificial Intelligence, ACM, New York, USA, DOI: 10.1016/j.engappai.2006.09.005, 2007, pp.439 – 451.

[9] Labib K. and Vemuri R., NSOM – "A Real-Time Network-Based Intrusion Detection System Using Self-Organizing Maps. Research paper, Networks and Security", University of California, Davis, California, USA, DOI: 10.1.1.135.9256, 2002, pp. 1 – 6.

[10] Zanero S., "Improving Self-organizing Map Performance for Network Intrusion Detection", Proc. of the Workshop on Clustering High Dimensional Data and its Applications SDM 2005, California, USA, DOI: 10.1.1.60.2627, 2005, pp. 1 – 8.

[11] Bivens A., Palagiri C., Smith R., Szymanski B. and Embrechts M., "Network-based Intrusion Detection using Neural Networks. Proc. of the Intelligent Engineering Systems through Artificial Neural Networks", ANNIE-2002, New York, USA, DOI: 10.1.1.11.5250, 2002, 12, 579 – 584.

[12] Lanlan L. and Shuangdong Zhu, "Research of Intelligence Classifier for Traffic Sign Recognition", Proc. of the 6th International Conference on ITS Telecommunications, Chengdu, China, ISBN: 0-7803-9587-5, DOI: 10.1109/ITST.2006.288784, 2006, pp.78 – 81.

[13] Sajjad H.M., Mahmudul H.M., Ameer A.M., Humayun K. Md. And Shawkat A. A.B.M., "Automatic Detection and Recognition of Traffic Signs", Proc. of IEEE Conference Robotics Automation and Mechatronics (RAM), Singapore, DOI: 10.1109/RAMECH.2010.5513177, ISBN: 978-1-4244-6503-3, 2010, pp. 286 – 291.

[14] Min S., Haifeng W. and Hasan F., "A Robust Model for Traffic Signs recognition based on Support Vector Machines", Proc. of the 2008 Congress on Image and Signal Processing CISP '08, IEEE Computer Society, Washington, DC, USA, DOI: 10.1109/CISP.2008.307, 2008, pp. 516 – 524.

[15] Lunbo L., Jun L. and Jianhong S., "Traffic Sign Classification based on Support Vector Machines Moments", Computational Intelligence and Software Engineering, IEEE Computer Society, Wuhan, China, DOI: 10.1109/CISE.2009.5362879, ISBN: 978-1-4244- 4507-3, 2009, pp. 1 – 4.

[16] Madhan K.S., and Sarukesi K., “Implementation of Next-generation Traffic Sign Recognition System with Two-tier Classifier Architecture”, ACM, DOI: 10.1145/2345396.2345476, 2012, pp. 481 – 487.

[17] Zhang D., Lu G., “Generic Fourier Descriptor for Shape-based Image Retrieval. Proc. of IEEE International Conference on Multimedia and Expo, Switzerland, DOI: 10.1109/ICME.2002.1035809, ISBN: 0-7803- 7304-9, 2002, pp. 425 – 428.

[18] Madhan K.S., Sarukesi K., “iReSign – Implementation of Nextgeneration Two-tier Identity Classifier-based Traffic Sign Recognition System Architecture using Hybrid Region-based Shape Representation Techniques. Chapter in the book ‘Recent Trends in Computer Networks and Distributed Systems Security’ ”, Springer CCIS, Springer, USA, DOI: 10.1007/978-3-642-34135-9_40, Vol. 335, 2012, pp.408 – 421.

[19] SVM - Support Vector Machines. Technical report, DTREG Documentation,USA, 2014, pp. 1 – 9.

[20] Zisserman A., The SVM classifier. Lecture notes, University of Oxford, UK, 2013, pp. 1 – 18.

[21] Chih-Chung Chang and Chih-Jen Lin, LIBSVM – “A Library for Support Vector Machines.” Technical report, National Science Council of Taiwan, 2004, pp. 1 – 5.

[22] V. P. V. K. a. K. P. Patole, "Self-Organizing Maps to Build Intrusion Detection System," International Journal of Computer Applications, USA, DOI: 10.5120/191-328, pp. 1-4, 2010.

[23] Z. A., The SVM and SOM classifier, UK: University of Oxford, 2013.

[24] S. Z. Z. J. a. W. X. Fangjun Kuang, "A novel SVM by combining kernel principal component analysis and improved chaotic particle swarm optimization for intrusion detection," Soft Comput., p. 1187–1199, 2015.

[25] F. B. a. C. G. G. Carlos A. Cataniaa, "An Autonomous Labeling approach to Support Vector Machines Algorithms for Network Traffic Anomaly Detection," Expert Systems with Applications, pp. 1-23, 2010.

[26] C.-C. C. a. C.-J. Lin, "LIBSVM – “A Library for Support Vector Machines," Technical report, National Science Council, Taiwan, 2004.

[27] J. L. a. J. S. Lunbo L., "Traffic Sign Classification based on Support Vector Machines Moments," in Computational Intelligence and Software Engineering, IEEE Computer Society, Wuhan, China, 2009.

[28] S. -. S. V. Machines, Technical report, DTREG Documentation, USA, 2014.

[29] S. Axelsson, "Intrusion Detection Systems," [Online]. Available: https://www.researchgate.net/publication/2943853_Intrusion_Detection_Systems.

[30] A. D. A. E. H. a. A. A. Heba F. Eid, "Principle Components Analysis and Support Vector Machine based Intrusion Detection System," Aboul Ella Hassanien Research Gate, pp. 363-367, 2010.

[31] P. C. S. R. S. B. a. E. M. Bivens A., "Network-based Intrusion Detection using Neural Networks. Proc. of the Intelligent Engineering Systems through Artificial Neural Networks," ANNIE,DOI: 10.1.1.11.5250, p. 579 – 584.

[32] M. K. Srinivasan, K. Sarukesi and P. Rodrigues, "State-of-the-art Cloud Computing Security Taxonomies A classification of security challenges in the present cloud computing environment," in International Conference on Advances in Computing, Communications and Informatics, 2012.

[33] B. Butler, "PaaS Primer: What is platform as a service and why does it matter?," Network World, 2013.

[34] Y.-P. Z. a. J.-A. Fang, "Research on Neuro-Fuzzy Inference System in Hierarchical Intrusion Detection," in International Conference on Information Technology and Computer Science, 2009.

[35] K. S. K. a. R. P. Madhan, "Design Roadmap for the Phase-I Implementation of Cloud VM/Instance Monitor (CIM-PI) Subsystem of eCloudIDS Security Framework," Elsevier, ISBN: 978-93- 5107-149-5, Vol. 1, p. 520 – 526, 2013.

[36] AWS, "Microsoft SQL Server on AWS," [Online]. Available: https://aws.amazon.com/sql/?&trk=ps_a131L0000084hmvQAA&trkCampaign=pac-edm-2019-windows-webpage-product_page&sc_channel=ps&sc_campaign=pac-edm-2020-windows-g_search-awareness-prosp-rsa-india&sc_outcome=Enterprise_Digital_Marketing&sc_geo=APAC&sc_country=I.

[37] O. W. Paper-, "SaaS Data Architecture," [Online]. Available: https://www.oracle.com/partners/en/knowledge-zone/database/saas-data-architecture-whitepaper-302654.pdf.

[38] C. L. Y. Z. B. S. M. F. a. H. W. Xiaohui Lin, "Selecting Feature Subsets Based on SVM-RFE and the Overlapping Ratio with Applications in Bioinformatics,"Molecules MDPI, pp. 1-10, 2017.

[39] Intel, "Intel IT Center's survey," [Online]. Available: https://www.intel.in/content/dam/www/public/us/en/documents/reports/whats-holding- back-the-cloud-peer-research-report2.pdf.

[40] P. Y. a. A. K. S. Ganapathy, "Intelligent Agent-Based Intrusion Detection System Using Enhanced Multiclass SVM," Hindawi Publishing Corporation Computational Intelligence and Neuroscience Volume 2012, Article ID 850259, pp. 1-10, 2012,.

[41] S. F. ,. E. W. a. H. M. Shareeful Islam, "A Risk Management Framework for Cloud Migration Decision Support," Journal Risk Financial Management, pp. 1-24,2017.

[42] S. M. a. M. S. O. Neeraj Kumar, "Collaborative Learning Automata-BasedRouting for Rescue Operations in Dense Urban Regions Using Vehicular Sensor Networks," IEEE SYSTEMS JOURNAL, pp. 1-10, 2014.

Avinash A. Chormale he has completed his M.Tech. (CSE) form JNTU, Hyderabad, India. He was assistant lecturer in Greenfingers College of Computer and Technology, affiliated to Solapur University Solapur. At present perusing Ph.D. in Computer Science, Yashwantrao Chavan Maharashtra Open University, Nashik. His research topic is *'Development of Cloud based IDS: A security enhancement framework using FC-ANN'.*

Prof. (Dr.) Arjun P. Ghatule he has completed his Ph.D., MCA, MBA(HR), M.Sc.(Elex.), DCS,DBM, MDP(IIM, Ahmedabad). He is approved faculty for MCM & MCA of Shivaji University and Bharati Vidyapeeth Deemed Universit. He is approved Director for MCA of Solapur University, Solapur. He has served tenure post as Controller of Examination of Yashwantrao Chavan Open University, Nashik, India.

Also served his tenure post of Director of Exam in University of Mumbai Appointed by Higher and Technical Education, Government of Maharashtra on recommendations of Hon'ble Chancellor/Governor of Maharashtra.

Dr. Ghatule has a member of various professional bodies such as ISTE, IACSIT, IEDRC. SCIEI,UACEE, IAENG, CBEES, ISOC Etc. He is Editor-in-Chief for International Journal of Research in Computer Science and Information Technology.

Under his guidance 12 M.Phil/Ph.D. students perusing their M.Phil/Ph.D., also 6 students completed their M.Phil/Ph.D.

A Study of Critical Factors affecting material Management with special reference to Garware Wall Rope

Mr.Santosh jadhvar
Students,IIMS,Chinchwad
Dr.Sachin Misal
Assistant Professor
IIMS,Chinchwad ,Pune,India.
misal.sachin@gmail.com

1. INTRODUCTION:

In the modern times, business men have shown growing responsiveness of the requirement for precession in the field of inventory control. Previously, inventories were an indication of wealth; even through inventories are kept in the liquidity has directed business man to hold cash and securities. There had been solid tendency towards holding the means of purchase goods rather than the goods themselves. Inventory management and supply chain management are the back bone of any business operations. Inventory management has undergone revolutionary changes with increasing in development of technology and availability of process driven software's. In any business or organization all functions are interlinked and connected to each other and are often overlapping. Some key aspects like supply chain management, logistics and inventory form the backbone of the business operations.

Inventory management is the entire process of managing inventories from raw materials to finished products. It tries to efficiently streamline inventories to avoid both gluts and shortage. Its role is to maintain a desired stock level of specific products or items and helps companies to identify which and how much stock to order at what time. Inventory management is vital to a company's health because it helps make sure there is rarely too much or too little stock on hand, limiting the risk of stock outs and inaccurate records. Inventory Management requires constant and careful evaluation of external and internal factors and control through planning and review.

2. IMPORTANCE AND SIGNIFICANCE OF STUDY:

Inventory management helps companies identify which and how much stock to order at what time. It tracks the inventory from purchase to the sale of goods.The practice identifies and responds to trends to ensure there's always enough stock to fulfil customer orders and proper warning of shortage.Inventory management is vital to a company's health because it helps make sure there is rarely too much to little stock on hand, limiting the risk of stock outs and inaccurate records.

Transportation strategy is concern with the inbound flow of goods.The inbound flow refers to the inflow of raw materials and semi-finished products while the outbound flow refers to the distribution of the finished products to business and end consumers. The significance of this research is based on the benefits that can be obtained by identifying the Critical Factors affecting material Management with special reference to Garware Wall Rope.

3. OBJECTIVE OF THE STUDY:

For the present study the following objectives has been formulated.

1) To understand and study the present keeping Material Management Systems.

2) To identify problems faced by the Material Management system.

2) To Study and analysis the process of minimizing inventory cost i.e. replacement cost and shortage cost to maximize the efficiency of organization.

3) To identify the key factors affecting Duplication in material Management.

4. HYPOTHESES:

H_0) the organization performance is dependent effective material management system.

Ho: Effectiveness of material management department is depend on different types controlling techniques.

5. Research Methodology:

Inventory management is an important area of manufacturing industry. If company fails to manage inventory, they will face failure. It is a challenge to the company to maintain fair inventory. Research is an

organized, systematic, data based, critical, objective scientific enquiry into specific problem, undertaken with the purpose of finding solutions to it. The research provides the needed information that guides managers to take informed decisions to successfully deal with the problem.

This study covers:

- Management technique used for inventory management and control.
- The popularly used inventory management Technique. i.e., ABC Analysis where the consumable tools are categorized into A-B-C category.
- And inventory control technique by calculating and defining the values Minimum Stock Level, Maximum Stock Level, Reorder Level and Safety Stock Quantity.
- By, defining these values the excess inventory will not take place and indirectly we can reduce cost on inventory.
- Collection of data.

6. EXPECTED CONTRIBUTION:

Inventory management is responsible for ordering and tracking stock as it arrives at the warehouse. Order management is the process of receiving and tracking orders. The inventory management tracks stock receipt, picking, packing and shipping. The some inventory management techniques use formulas and analysis of stock. The techniques a company uses depend on its needs and stock.

ABC Analysis: This method works by identifying the most and least popular types of stock.

Bulk shipments: It involves buying, storing and shipping inventory in bulk.

Demand forecasting: This form of predictive analytics helps predict customer demand.

- FIFO and LIFO: The oldest stock issue first in FIFO. Last in, first out in LIFO considers that prices always rise.
- JIT: Companies use this method in an effort to maintain the lowest stock levels possible before a refill.
- MRP: This system handles planning, scheduling and inventory control for manufacturing.
- Reorder level: In this we have to define the min-max levels of stocks as per the consumption of that materials.

References:

1. L. Ling, Supply chain management: concepts, techniques and practices enhancing the value through collaboration. NJ: World Scientific, 2007. 372 p.
2. M. Leseure, Key Concepts in Operations Management, 2010.
3. Plinere, L. Aleksejeva, “Agent system application as a tool for inventory management improvement,” in 8th Int. Conf. on Soft Computing, Computing with Words and Perceptions in System Analysis, Decision and Control, 3–4 Sep., 2015. Antalya, Turkey, pp. 157–166.
4. D.S. Plinere, A.N. Borisov, L. Ya. Aleksejeva, “Interaction of Software Agents in the Problem of Coordinating Orders,” Automatic Control and Computer Sciences, 2015, vol. 49, no. 5, pp. 268–276. http://dx.doi.org/10.3103/S0146411615050089
   D.C.U. Cadavid, C.C. Zuluaga, “A framework for decision support system in inventory management area,”
5. Ninth LACCEI Latin American and Caribbean Conf., LACCEI’2011, Aug. 3–5, 2011, Medellin, Colombia.
6. D. Dhoka, Y.L. Choudary “ABC Classification for Inventory Optimization,” IOSR Journal of Business and Management, vol. 15, Issue 1, Nov. – Dec. 2013, pp. 38–41. http://dx.doi.org/10.9790/487X- 1513841
7. Life cycle engineering [Online] Available: http://www.lce.com/pdf/ abcclassification.pdf [Accessed: Sept. 25, 2015]
8. ABC analysis (Inventory) By Joffrey Collignon, Joannes Vermorel, Feb. 2012 [Online] Available: http://www.lokad.com/abc-analysis- (inventory)-definition [Accessed: Sept. 25, 2015]
9. ABC Inventory Analysis using Excel. Posted on October 1st, 2014. [Online] Available: http://chandoo.org/wp/2014/10/01/abc-inventory-analysis-using-excel [Accessed: Sept. 25, 2015]
10. ABC analysis. [Online] Available: https://www.brookes.ac.uk/ Documents/Students/Upgrade/ABC-analysis [Accessed: Sept. 25, 2015

Design and Development of Decision Support Systems for Crop Planning for Better Price Assurance

Sagar S. Managave[1], Dr. R. D. Kumbhar[2]

1. *Assistant Professor, GFGC, Dharwad And Research Student Rayat Institute Of Research And Development*
2. *HOD IT Dept., K B Patil Institute of Management & Business Research, Satara, Maharashtra*.

ABSTRACT

The government of India is committed and striving hard to enhance the income of farmers by the year 2022. plenty schemes have been initiated by government to fulfil the goal by motivating farmers by giving the incentive through "Kisan Sanman Nidhi", Agricultural reforms Laws for MSP and implemented IT infrastructure to enhance yield. Still they are not seems to be successful in achieving goal of doubling the income of farmers. The numbers of farmers committing to sucide are goes on increasing every year. In the financial year 2020, 5579 famers have committed to suicide. Offcourse there are number of reasons for this suicide. The farmers incur losses on the crop produced. Among the various reasons one of the most influencing factors for this loss is uncertain price of the produced crop.

The implementation of law of MSP Guaranty on all the agriculture produce is looks impractical as government can't purchase the whole agriculture produce of all the farmers. The price of any product depend on demand and supply, like other commodities this rule of economics applicable to agriculture products as well. The feasible solution is to choose the crop which has very less coverage than normal coverage in current season. This data is available with the agriculture department as this department is collecting weekly crop coverage from the field. This collected crop coverage information along with the information of best practices of farming for better crop yield with respective schedule and post harvesting information for marketing of the produced crop may be provided through design and development of DSS for crop selection and planning. This system not only ensure better price for the farmers but also regulate the balanced production of agriculture products.

This paper discusses the various systems provided by government and other organizations a for assisting farmers. Opinions of farmers on need of the information support for crop selection and planning. Finally introduce model for implementing the decision support system.

INTRODUCTION

India is a land of farmers. Prior to independence there was Subsistence agriculture, where the farmers aim was growing sufficient food to feed themselves and their entire families. The result of this type of farming was no surplus trade [1]. Later surplus agriculture products were sold to neighbours, relatives and villagers in exchange of other product. After the globalisation the agricultural products market was extended at global level. Unlike western countries Indian government does not impose any restriction on cultivation area of each crop. Indian farmers have liberty to select economically and socially feasible crop. As result of this there is no control on demand and supply of agriculture products. Eventually some crop production become surplus than demand or requirement where as others will have deficiency in the production. The price of any product depend on demand and supply, like other commodities this rule of economics applicable to agriculture products as well. Those farmers who have grown crops with surplus production will have to incur losses. so it is better to choose the crop with deficiency in the production. The potential production of crop can be ascertained based on the area coverage of each crop.

The agricultural development is maintaining weekly crop coverage and target area information. If this information is made available to farmers through implementing the DSS for crop selection the farmers would be able to select appropriate crop based on area coverage. This system not only ensure better price for the farmers but also regulate the balanced production of agriculture products The data should be made available in systematically in order to take proper decisions of farming. Various information systems, expert systems and Decision support system have been developed to address the problem face by farmers; none of the system has been developed for selection crop based on area coverage. [27]

Decision Support System is computerized system, which includes models and databases used in decision making. They are tools that help everyone who makes decision and choosing the best alternative solution that is economic, social or environmental point of view [2]. An interactive computer based expert system that help decision maker to solve the problem [3].

Farmers are supposed to take decision while doing the management of following activities.

1. Selection of crop
2. Fertilisers management
3. Water management
4. Crop protection
5. Weed management
6. Sale of produced crop

II. *REVIEW OF LITERATURE*

In order to help the farmers various information systems, decision support systems and expert systems have been

implemented. Following section provides a glance on such agricultural systems.

1. **CROPLOT**, An Expert System that ascertains suitability of plot a choosen crop [7]
2. **CROP-9-DSS** paste and disease Identification and control , water management, fertilizer management of 9 crops of Kerala [4]
3. **DSSAT**, Decide type of seed to grow, crop yield prediction, how much to irrigate, frequency of fertilizer application. [6]
4. **ESIM**, An expert system for management of irrigation.[9]
5. **CropSyst**, unique model ofwater –natrogen interaction in wheet crop. Agricultural water management system regime [10]
6. **CROPMAN**, This system has helped farmers to increase the yield by changing the transport schedule from May to June A Decision Support System used by farmers of Punjab to get site specific climate data. [12]
7. **Rayat Mitra**, The web portal crated by Karnataka Department of Agriculture to provide Extension Agricultural services to farmers and to give the latest best practices knowledge to the farming community, laying demonstrations, introduction of high yielding varieties, knowledge to boost up the agricultural Production and productive and imparting training to farmers to improve skills [14]
8. **MKRISHITM**, The system helped the farmers to schedule the scouting of paste and nutrients. A Decision Support System used by the farmers of maharastra i order acquire the climate data of particular crop. [13]
9. **Bhoomi**, This portal provides transparency in land records management with better citizen services and takes discretion away from civil servants at operating levels. It is the project of on-line delivery and management of land records in Karnataka. It [16]
10. **TUNGGUL**, Development model Decision Support System for rain water management in semi arid area[23]
11. **Intelligent fertilization DSS Based On Knowledge Model and Web GIS Decision For Fertilization,** The study constructed the basic frame of decision support system for management fertilization Intelligently.[19]
12. **CALEX**, A decision support system for better irrigation management of cotton crop.[8]
13. **CROPGRO**, decision support system for enhancing yield of soybean in limited water environment based on data of climate [11]
14. **Farmer Web Portal**, Farmers' Portal is an step direction to create one stop shop for meeting all informational needs of farmers relating to Agriculture, Fisheries sectors production and Animal Husbandry. This web portal to provide relevant information and services to the farming community as wel as private sector through the use of information and communication technologies, and supplement the existing delivery channels provided for by the department. [15]
15. **IPM**, This decision support system has provided comprehensive awareness of the paste management. This system is mainly used by the farmers of west Bengal to get climate date to choose the crop . [17] .
16. **CROPWAT**, It is tool developed by the Land and Water Development Division of US to support water scheduling decision CROPWAT is Windows base application program for the calculation water requirements and irrigation requirements of crop based on climate, soil, and crop data. [28]
17. **AQUAMAN**, Web based DSS for irrigation scheduling of peanut [22]
18. **DAIRY MGT**, A DSS for management of the Dairy business[24]
19. **APSIM**, APSIM is the System developed to simulate biophysical process in farming systems for economic and ecological outcomes of management practice in the face of climatic risk [25]
20. **eSagu**, A agricultural DSS that helped the farmers of Tamil Nadu to farm specific decisions in order to enhance the yield of by assessing the crop specific climate data from the system [26]
21. **Android Based ADSS**, Android based DSS to select the crop variety according to whether conduction and availability of water[21]

OPINIONS OF FARMERS ON NEEDS OF INFORMATION FOR CROP PLANNING

The sample survey of 400 farmers across the Hobli/Taluks of Belgaum district have been made through schedule for the study. Facts gathered and strategies are basic building blocks of the DSS for select and planning the appropriate crop tobe implemented. Following section summarise problems faced by the farmers. The information needs at three important farming stages of Crop Planning decision making. First information required prior to Sowing or plantation, secondly scheduling the farming activities and finally after harvesting of the crop.

Problems Faced By Farmers

Table 1 incur loss on crop

Sr. No	Criteria	Farmers	Percentage
1	Yes	211	52.75
2	No	26	6.5
3	Some times	163	40.75
Total		**400**	**100**

Source: Survey Data

Facts in the table depict overall the more than 90% farmers are incurring losses. Nearly 53% farmers expressing that they have incurred loss on their agricultural products. More than 40% cultivators express that they get some times incur losses. Only 6.5% of farmers accepts that the earn profit from agriculture.

Table 2: Frequency of Loss

Sr. No	Criteria	Farmers	Percentage
1	Never	25	6.25
2	once in five crops	29	7.25
3	Once in four crops	35	8.75
4	Once in three Crops	105	26.25
5	Once in Two Crops	134	33.5
6	Always	72	18
Total		**400**	**100**

Source: Survey Data

When farmers are asked the frequency of losses, in their responses they have shared that 18 percent of farmers committed that they always incur losses. More than 33.5% farmers agree half of the times they experienced loss. More than 26% express they incur loss once in 3 crops. Overall 8.75% farmers have experience loss in every 4th crop. More than 7% people find a loss on every fifth crop. Very less farmers that is 6.25% practicing profitable farming.

Table 3: Reasons for losses

Sr. No	Resons	Farmers	Percentage
1	Uncertainty in rate	144	36.00
2	Decrease in the yield due climate condition	139	34.75
3	Uncertainty in rate Decrease in the yield due climate condition	111	27.75
4	Uncertainty in rate Decrease in the yield due climate condition Maintenance	3	0.75
5	Insects	3	0.75
Total		**400**	**100**

Source: Survey Data

Above table shows major reasons of incurring loss on grown crops. Around 36 % farmers believe that uncertainty in the rate of agricultural crops in major reason of the loss. Whereas 34.75% farmers feel and experiencing due to adverse climate condition. Effects of both reasons are committed by 27.75% farmers. Very seldom i.e. less than 1% farmers described reasons like maintenance, infection on the crop flood etc.

A. Information Needs Prior To Sowing or Plantation of Crop

The following table depicts the farmers opinion on information need prior to plantation or sowing the crop to assist farmers in taking strategic decisions on selecting the appropriate crop.

Table 4: Information Needs Prior To Sowing or Plantation

Sr. No.	Kind information	Farmers	%
1	Past Years Production and Average Rate	327	81.75
3	Present Coverage of each crop	333	83.25

Source: Survey Data

Nearly 82% farmers want to know information related to production and rate of each crop in past year. Similarly 83.25 % farmers need information related to present crop coverage.

B. Information Needs Scheduling The Farming Activities

This information would help in scheduling farming activities for better yield of the selected crop.The below table shows the information needs to assist the farmer in taking tactic and operational decisions.

Table 5:Information Needs Scheduling

Sr. No.	Kind information	Farmers	%
1	Water Management	236	59
2	Weed Management	141	35.25
3	Pest Management	196	49
4	Fertilizers Management	232	58

Source: Survey Data

Above Table depicts 59% and 58% farmers want to information related to management of water and fertilizers respectively. Around 50% farmers need data of pest management. More than 35% farmers want information of controlling the weed.

C. Information Needs Post Harvesting of the Crop

Below table shows the summery of information need after harvesting the crop to assist the farmer in taking strategic, tactic and operational decisions.

Table 6: Post Harvesting Information Needs

Sr. No.	Information Needs	Farmers	Percentage
1	Facility of mortgage loan on crop to withheld sale crop at low price	177	44.25
2	where you get higher rate for the crop	225	56.25
3	buyer to purchase crop at field	146	36.5
4	MSP procurement of your crop	89	22.25

Source: Survey Data

More than 56% farmers want to know the various places where they get fair price for their crop. Around 45% farmers' need data related to facility of mortgage loan on crop to withheld sale crop at low price. More than 35% farmers need information of control of weed. More than one third farmers want information buyer for the crop at field and around one forth farmers want know MSP procurement of the grown crop.

CONCEPTUAL MODEL OF DSS

The figure 1 depicts conceptual model for the proposed system designed and implemented to assist the farmers during the various phases of farming. This information is provided through incorporating Decision Support System which is a web based and android based assistance. This information is accessible on computers and phone on interfaces like web portals and apps respectively. These gazettes may be connected through terrestrial connection or through radio network. The DSS technologies consist of database management system, knowledge base system and model management system.

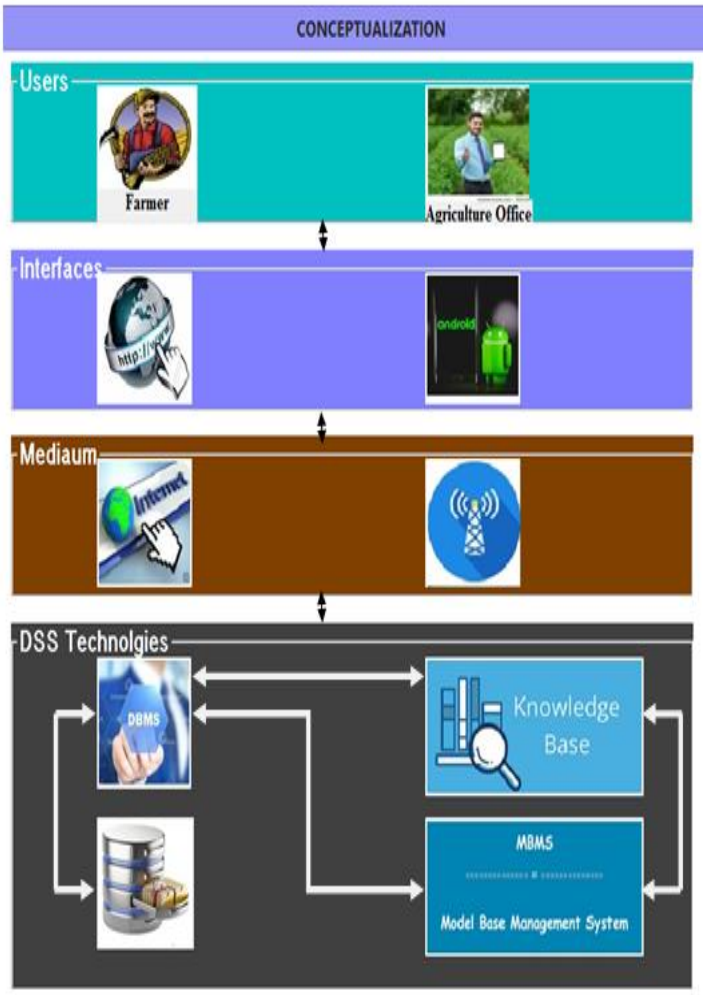


Figure 1: Architecture of CroPlan DSS

1. Users

i. Farmers

Although there are many types of stake holders of the system. The major focus of developing the system is to ensure better price for the crop and enhance the income of the farmers.

ii. Agriculture Officers

An Agriculture Officer(AO) at hobli center collect information from farmers and forward it to Assistant Director(AD). In the agricultural department at district level there is a Joint Director. An Assistant Director at each Taluks forwards current status of crop cultivation information of each every week to Joint Director (JD).

2. User Interfaces

The system should provide Two types viz:

i. Web Portal: farmers and agriculture

Officers connected through internet can use this interface to access the information and enter the crop cultivation Information.

ii. Android Application: Farmers and agriculture officers who are connected through internet and using smart phones can use this interface to access the information and enter the crop cultivation information

3. Database Management System

Database management system manages the data required for DSS. The system maintains the records of the farmer's details, land details, crop details, and cultivation of crops, yield, Price of agriculture products, harvesting etc.

4. Knowledgebase Management System

This module accepts the user input parameters and search the information from database and model management system required for the selection of appropriate crop. This module is major part of the DSS which actually deduce the information from the database and the model management system.

5. Model Management System

Each crop has certain requirements like type of soil, water schedule, fertilizers requirement, weed management, pesticide schedule, season, etc. Based on expert recommendations this system maintains the standard requirements of each crop

CROP SELECTION PROCESS

The below figure 2 Shows the phase followed inference engine to suggest the crop to be grown. In each phase the one parameter is considered and further filter of crops takes place which is input for the next phase. In the first phase the present season is consider and according crops are filtered for the next phase consideration. In the next phase availability of water is considered, in the third phase agro-climatic zone is assessed to choose crops suitable for the zone of the farmers field. The present crop coverage is considered in order to shortlist the crops with less percentage of coverage than normal or targeted area. In the fifth phase the availability of soil nutrients are considered and based on the PH, EC and OC level crops are shortlisted. Finally the cost and benefit ratio is considered, this ratio is calculated as income per day.

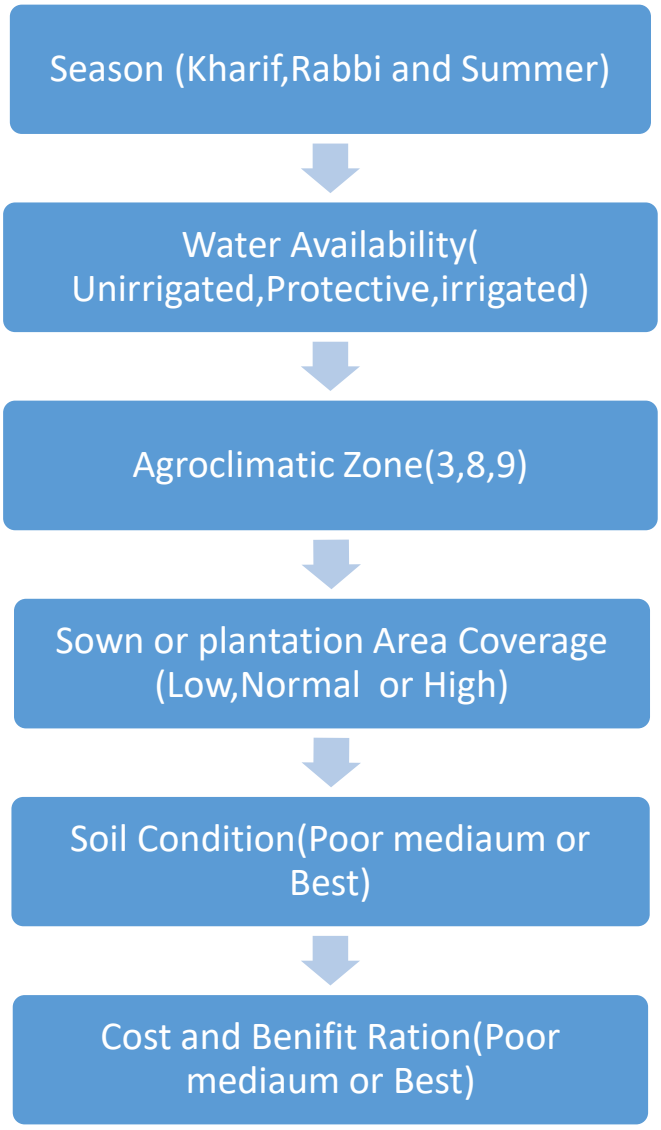


Figure 2: Crop Selection Phases

PLANNING OF CROP SCHEDULE

Once the farmers select the crop to be grown the system helps to schedules of farming activities. These schedule activities are based the best practices of the farmers in the north Karnataka and recommendations of University of Agriculture Sciences, Dharwad. This schedule consists of chronological activities related to major agricultural functions shown in the figure 3

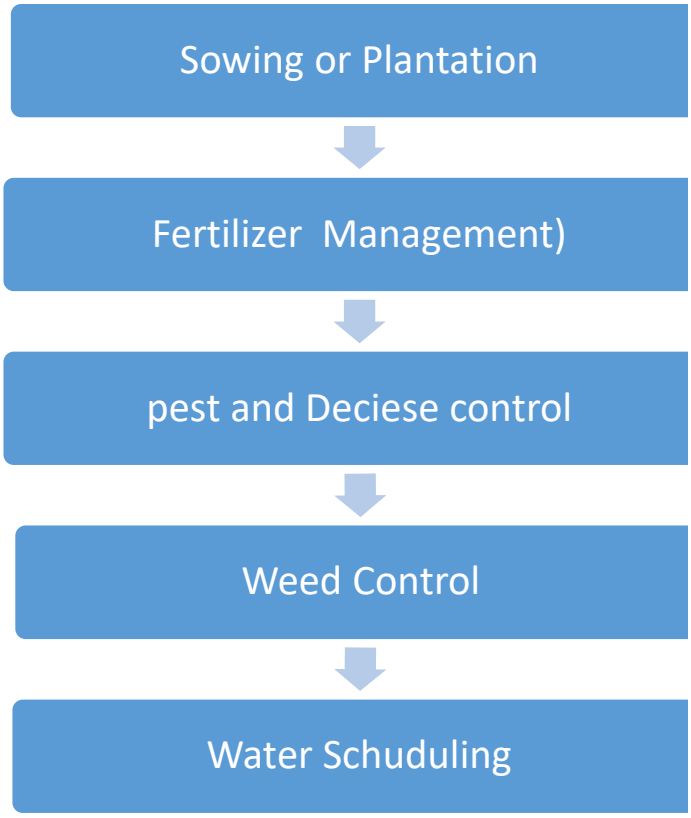


Figure 3 Scheduled Farming Functions

POST CROP HARVESTING PLANNING

Once the farmers harvest his crop the system provides the post harvesting aids as shown in the figure 4. Firstly information related mortgage loan is provided to withhold the sale of crop at low rate. Secondly find the market which offer higher rate for the grown crop finally MSP procurement a buyer who purchase the crop at filed itself.

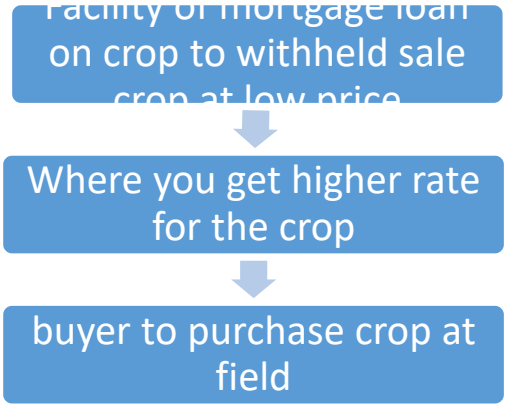


Figure 4 Post Harvesting Information Aids

CONCLUSION

Plenty decision support systems have been developed for the farmers for fertilizer, management, pesticide management water management, weed management, and climate information. These systems will be focus on the enhancing the yield of the crop. But no system has been developed so far to address the problem of ensuring reasonable price for his crop. This paper has provided with information needs of farmers collected through sample survey. A conceptual framework of DSS that helps the farmer to select the crop based on the information of demand and potential supply of crop has been proposed. Further system suggests the schedules of farming activities. Once the farmers harvest his crop the system aids in post harvesting functions.

REFERENCES

[1] https://en.wikipedia.org/wiki/Subsistence_agriculture

[2] B. Manos, A. Ciani ,Th.Bournaries, I Vassiliadou, J Papathanasiou, "*Taxonomy Survey Of Decision System In Agriculture"*, Agriculture Economics Review, vol 2,PP.80-93, Aug 2004.

[3] Vidya Kumbhar, T.P.Singh "*A Comprehensive Study of Application of Decision Support System in Agriculture in Indian Context*" International Journal of Computer Applications, Volume 63– No. pp.6-11, 14, February 2013.

[4] Ganesan V.: "*Decision Support System Crop-9-DSS for Identified Crops*", World Academy of Science, Engineering and Technology International Journal of Biological, Bimolecular, Agricultural, Food and Biotechnological Engineering Vol:1, No:12, 2007. Pp.186-188

[5] J.W. Jones, G.Hoogenboom, C.H Porter, K.J.Boote, W.D.Batchelor, L.A.Hunt, P.W Wilkens, U Singh, A.J.Gijsman,J.T Ritchie, *"The DSSAT cropping System model"*, European Journal of Agronomy, Volume 18, Issues 3–4, January 2003.

[6] K.R.Thorp, K.C. DeJonge, A.L. Kaleita, W. D. Batchelor, J. O. Paz. *"Methodology for the use of DSSAT models for precision agriculture decision Support"*. Computers and Electronics in Agriculture, Volume 64, Issue 2, December 2008.

[7] Nevo and I. Amir. 1991. CROPLOT : "*An expert system for determining the suitability of crops to plots"*. Agric. Syst., 37: 225-241.

[8] R.E. Plant, R.D. Horrocks, D.W. Grimes and L.J. Zelinski. 1992. CALEX / Cotton: "*An integrated expert system application for irrigation scheduling. American Society of Agricultural Engineers*. " 35(6): 1833 –1838.

[9] R. Srinivasan, B.A. Engel and G. N. Pandyal 1991. *"Expert system for irrigation management (ESIM)."* , Agric. Syst., 36: 297-314

[10] A. K. Singh, R. Tripathy, U. K. Chopra, "*Evaluation of CERES-Wheat and CropSyst models for water–nitrogen interactions in wheat crop*", Agricultural Water Management, Volume 95, Issue 7, July 2008.

[11] V.S. Bhatia, P. Singh, S.P. Wani, G.S. Chauhan, A.V.R. Kesava Rao, A.K. Mishra, K. Srinivas, "*Analysis of potential yields and yield gaps of rain-fed soybean in India using CROPGRO-Soybean model*", Agricultural and Forest Meteorology, Volume 148, Issues 8–9, 4 July 2008

[12] S. K Jalota, A Sood,W. L. Harman, "*Assesing the response of chickpea(Cicer aeritium L.) yield to irrigation water on two soils in Punjab(india) a simulation analysis using the CROPMAN Model*", Agricultural Water Management, Volume 79, Issues 3, 10 Feb 2006.

[13] A Pande et al. "*m-KRISHI Market facing innovation*", TATA Consultancy services TCS innovation Labs Mumbai.

[14] (2017) Rait Mitra Web Portal [Online] available: http://raitamitra.kar.nic.in/

[15] (2017) Farmers Web Portal[Online] available: http://farmer.gov.in/

[16] (2017)Bhoomi Project[Online] available: " http://www.bhoomi.karnataka.gov.in/"

[17] L. Patel,Mondal C, Maitra N, "*Cell Phone –A Decision support for sustainable Plant Protection of the district south 24 Parganas,West Bengal*", Global Journal of Bio-Science & Bio-Technology,2012 Volume 1, p(59-64)

[18] L. Patel,Mondal C, Maitra N, "*Cell Phone –A Decision support for sustainable Plant Protection of the district south 24 Parganas,West Bengal*", Global Journal of Bio-Science & Bio-Technology,2012 Volume 1, p(59-64)

[19] Yang Yushu,Wang Filin,Zhao Jie, "*Intelligent fertilization DSS Based On Knowledge Model and Web GIS Decision For Fertilization"* IEEE,2009, ISBN 978-1-4244-4520-2, p(232-253)

[20] G.B.S. Chahal,A Sood,S.K. Jalota,B U Choudhari, P K Sharma, "*Yield- Evapotranspiration and water productivity of rice, Wheat system in Punjab as influenced by transplanting date of rice and wheat parameters*", Agriculture water management, Volume 88,Issue 1-3,16 March 2007.

[21] Ms Rachana Koli, Mr. Suhas Raut, "*Android Application Agriculture Decision Support System*", International Journal of Engineering Research and Applications, Volume 4,Issue 43, April 2014 p(63-66).

[22] Yashvir S. Chauhan, Graeme C. Wright, Dean Holzworth, Rao C. N. Rachaputi, José O. Payero, "*AQUAMAN: a web-based decision support system for irrigation scheduling in peanuts",* irrigation science, Volume 31,Issue 3, May 2013

[23] Petr Hanzlík, František Kožíšek, Josef Pavlíček ," *Design of intelligent decision support systems in agriculture",* International Journal Of Mathematics And Computers In Simulation, volume 9, 2015

[24] Jay M. Janowski and Victor E. Cabrera," *Decision Support System Program for Dairy Production and Expansion"*

[25] B A Keating, B S Carberry and others, "*An overview of APSIM, a model designed for farming systems simulation",* European journal of agronomy, Volume 18, Issue 3-4, January 2003

[26] (2017) E-Sagu, Web Portal[Online] available: http://farmer.gov.in/

[27] S. S. Managave, Dr. R. D. Kumbhar, "*Decision Support Systems for Agricultural Crop Planning to Enhance Farmers Income*", ISSC 34th Annual National Conference, 2nd Feb 2019

[28] S. S. Managave, Dr. R. D. Kumbhar, "Decision Support Systems for Agricultural Crop Planning to Enhance Farmers Income", ISSC 34th Annual National Conference, 2nd Feb 2019

[29] S. S. Managave, Dr. R. D. Kumbhar," Literature Review on Decision Support Systems in Agriculture" ,International Journal of Information Systems, ISSN: 2229-5429 – Vol. VIII, Issue II February 2018.

[30] S. S. Managave, Dr. R. D. Kumbhar, "Conceptual Model of Decision Support Systems for Agricultural Crop Planning for Enhancement Farmers Income" , Cooperative perspective, Vol 54 No 1&2 April-Sept 2019

[31] S. S. Managave, Dr. R. D. Kumbhar, " Decision Support Systems for Crop Selection an Imperative", ISSN - 2348-2397Vol. 7, Issue 25, January to March 2020

Demystifying Cryptocurrency:

A Challenge for the Central Government and Central Bank

Dr.Kedar Vijay Marulkar, Assistant Professor, Dept. of Commerce and Management, Shivaji University, Kolhapur

Dr.Nilam V. Jadhav, Assistant Professor, Yashwantrao Chavan School of Rural Development, Shivaji University, Kolhapur

Abstract

A cryptocurrency is designed to be a currency, but it does not really function like a currency. Currency always has an issuer, usually a trusted entity like the sovereign. There are already indications that cross-border flows are taking place in cryptocurrencies. If this trend is regulated, a part of the flows related to trade payments, remittances or cross border investments would be made in these cryptocurrencies. Cryptocurrencies have specifically been developed to ignore the regulated financial system. These should be reason enough to treat them with caution. It is also seen that cryptocurrencies are not amenable to definition as a currency, asset or commodity; they have no underlying cash flows, they have no intrinsic value; that they are akin to Ponzi Schemes, and may even be worse. These should be reason enough to keep them away from the formal financial system. More significantly, they can destabilise the currency system, the monetary authority, the banking system, and in general Government's ability to control the economy.

Keywords : Cryptocurrency, Risk, Central Bank, Government, Financial Innovation

I. INTRODUCTION

Cryptocurrencies are being considered as the innovations that would feature in decentralized finance, which are blockchain applications geared to disrupt the traditional financial system. The basic purpose of blockchain technology on which these crypto-products run, is to make financial intermediation, and therefore banks are negligent about this as of now. The class of crypto products are fundamentally designed to bypass the established financial system, and on a larger scale even the Government. Some experts claim that cryptocurrencies can be referred to as 'freedom' money. It may thus not be adequate, from a regulatory point of view, to treat cryptos as just another type of currency or asset or commodity but also as a potential social movement.

II. OBJECTIVES OF STUDY

The present paper has been designed on the basis of few objectives which have been elaborated as below:

a. To understand the basic concept of cryptocurrency and allied products
b. To assess the risk associated with cryptocurrency
c. To discuss the issues which the RBI or central government needs to resolve about cryptocurrency

III. CONCEPTUAL UNDERSTANDING OF CRYPTOCURRENCY

When a transaction is made using paper currency, all that the receiver needs to check is that the currency is not bogus or fraudulent. Thus, it is the receiver who authenticates the instrument of payment. This arrangement generally works, except for those few instances when the receiver fails to detect a authenticity of currency. In the case of digital transactions, the authentication of the payment is done by an intermediary like a bank, because almost all electronic transactions are transfer of money from one bank account to another. This arrangement also works as the bank certifies that the sender has sufficient balance in the account to complete the transaction. Some people are of the opinion that intermediation by banks is avoidable. This is because it is their perception that banks are not trustworthy, or they considered that the cost charged by banks is huge, or they were not comfortable with their transactions being tracked. Therefore, most of

the governments have come out with the solution to create their own currency. The basic problem they need to address was : since electronic money can be easily replicated, in the absence of a trust institution like a bank, how does the network ensure that the same currency is not spent again, and again. This was called the 'double spending problem'. The first 'person' to effectively solve this problem was one Satoshi Nakamoto who paved the way and bitcoin was born. He did this by creating the blockchain. On a blockchain, when a transaction occurs, it is broadcast to all computers on the network. A set of new transactions, called a block, are authenticated by an agreed consensus mechanism, and then the validated transaction block is added to the previous chain of blocks. Every block is linked to the previous block, making double spending difficult because it would involve changing every subsequent block. Bitcoin was followed by many others, which collectively are called cryptocurrencies. The prefix 'crypto-' refers to the fact that cryptography is used to authenticate transactions. The defining characteristics of cryptocurrencies are i. That cryptocurrencies are decentralized systems where transactions are authenticated by participants themselves. ii. They are designed to escape the financial system and all its controls. They cannot be detected by Governments. Even the transaction of these currencies take place through bank accounts, the purposes of transactions can not be traced and hence, they can escape from the government controls. They work over the internet without any physical existence.

The most popular cryptocurrency, Bitcoin was started more than a decade back in 2008, until 5 years ago, total market capitalisation of all cryptocurrencies was only $20 billion. This went up to $289 billion in February 2020 and thereafter exploded to reach a peak of $2.9 trillion in November 2021. Currently (Feb 09, 2022) it stands at $1.98 trillion. Bitcoin has 42% of the share in this market capitalisation, the top two cryptocurrencies account for 61% while the top five account for 71%. The total number of cryptocurrencies is at 17,436 and the total number of crypto exchanges is more than 450.

IV. AN ASSESSMENT OF CRYPTOCURRENCIES

At this juncture, the time has come to assess the cryptocurrencies as to the exact nature of cryptocurrencies, their implications, and the present myths about it in India on the topic. The starting point is to get a clear understanding on (a) What exactly is a cryptocurrency, (b) What significant economic role does a cryptocurrency play, and (c) What, if any, are the risks it poses to the society and economy?

A cryptocurrency is designed to be a currency, but it does not really function like a currency. Currency always has an issuer, usually a trusted entity like the sovereign. Even when gold is used as a currency, the gold coins had to be issued by a sovereign entity. Historically, a currency has always been either a commodity with intrinsic value or a debt instrument. Cryptocurrencies do not match to this understanding of a currency as they do not have an issuer, they are not an instrument of debt, or commodities nor do they have any intrinsic value. Currency needs trust, not everything that can be trusted is a currency. So even if technology provides the trust for cryptocurrencies, they can at best perform the role of a currency within the private and closed environment of that cryptocurrency. They do not, and should not, automatically become a currency for the larger society.

In some countries cryptocurrencies are treated as a financial asset. This is also questionable because all financial assets have underlying cash flows and need to be some person's liability. Cryptocurrencies are neither liability nor do they have any underlying cash flows for any person. They are not financial assets, by definition.

There is also an attempt to treat cryptocurrencies as a commodity. But cryptocurrencies are neith like commodities as they are not tangible neither they have physical utility. There is this somewhat awkward attempt to equate some of them with gold, hence limiting their supply like natural resources, or creating them through mining. It is said that cryptocurrencies have limited supply and such design can always be modified and hence such limitation is artificial. If one cryptocurrency has limited supply, that limitation does not work for all cryptocurrencies taken together. Further the fact that gold is mined does not in itself make it money, it has to be stamped and issued by a state to make it money.

Thus, if cryptocurrencies are neither a currency in the usual sense of the term, nor a financial asset nor a physical asset, then what is their exact nature? The proponents have improvised to call them as digital assets. Even that is doubtful as cryptocurrencies do not have any underlying use, like for instance car hiring softwares or a core banking system, or, for that matter, smartphones. That basically leads to the conclusion that it is an electronic code which has created enough hype such that people are willing to pay money to buy ownership rights to that electronic code, on the hope that someone else would buy it at a higher price in future. What started off as a medium of exchange has appeal similar to that of a speculative asset.

Cryptocurrencies like bitcoin have given impressive returns so far. Cryptocurrencies are very much like a speculative or gambling contract working like a Ponzi scheme. In fact, it has been argued that the original scheme devised by Charles Ponzi in 1920 is better than cryptocurrencies from a social perspective. Even Ponzi schemes invest in income earning assets. A bitcoin is akin to a zero-coupon perpetual; it's like you paid money to buy a bond which pays no interest and which will never pay back the principal. A bond with similar cash flows would be valued at zero, which, in fact, can be argued as the fundamental value of a cryptocurrency. If everything eventually returns to its equilibrium value, then the prognosis for investors in cryptocurrencies is not a so good.

V. ROLE OF CRYPTOCURRENCY

If cryptocurrencies are actually intended to revolutionize finance, it is to be understand what exact role they play in finance. An equity share enables a business to mobilize risk capital, a bond enables a company/Government to borrow money, a mutual fund enables retail investors to diversify their portfolio, derivatives enable users to manage their risk and so on. Every financial instrument exists to serve a basic purpose quite distinct from its use as an investment asset. In this connection, what is the role played by cryptocurrencies? Since it claims to be a currency, does it perform the functions of a currency? The answer is that the volatility of many cryptocurrencies make them as an efficient medium of exchange. Besides, a priori there is no ground to believe that people place the same trust in them as they do in legal tender currencies. With all indications their use as a currency appears to be negligible.

Are cryptocurrencies have utility? Given the surge in value of some cryptocurrencies, it has been argued that they have utility. Think of any store of value – they are either currencies, or financial assets or commodities which are tangible and have intrinsic value. We have seen that cryptocurrencies are none of these. Notwithstanding their current valuations, if a threshold number of people decide to opt out, the entire values can easily collapse to nothing.

The huge discussion about a revolutionary innovation, cryptocurrencies do not look to be designed to meet any need in the financial market that is currently not being met or to meet existing needs more efficiently. Still, this innovation can flourish even if cryptocurrencies are banned across the world as the enthusiasm among the people is increasing and is not going to come down even if any governments decide to ban cryptocurrency.

VI. THE RISKS ASSOCIATED WITH CRYPTOCURRENCIES

There are two fundamental risks of cryptocurrencies: - i. they are intended to be private currencies and ii. they are structured to escape Government control with respect to financial integrity standards such as KYC. Historically, private currencies have resulted in instability. The retrograde step back to private currencies cannot be taken simply because technology allows it without any consideration for the dislocation it causes to the legal, social and economic state of society. Every private currency will eventually replace the Rupee to some extent. Consequently, the role of the Rupee as a currency will be undermined. With one or more private currencies being allowed, there would be parallel currency system(s) in the country. Thus, increased acceptance of cryptocurrencies would result in effective 'Dollarization' of our economy. In this situation, the monetary policy measures which are presently taken by the central banking system in India to combat problems like inflation, would not work, as monetary policy would not have any impact on the non-Rupee currencies or payment instruments. When that happens, India loses not just its currency, a defining feature of its sovereignty, but its policy control of the economy. With loss of traction for monetary policy, the ability to control inflation would be materially insignificant.

Cryptocurrencies priced in these convertible currencies like US Dollar of Euro would provide an opportunity to the people to convert their money. If private currencies are permitted, the banking system's ability to mobilise deposits in Rupees, and consequently, the ability to create credit, would get affected. Credit creation in convertible currencies would be impervious to monetary policy. In the extreme case where a major part of deposits and credit shift to cryptocurrencies, the result would be a troubled and a weak banking system, impairing financial stability.

There are already indications that cross-border flows are taking place in cryptocurrencies. If this trend is regulated, a part of the flows related to trade payments, remittances or cross border investments would be made in these cryptocurrencies. As they are non-reserve currencies, this could have negative implications for India's foreign exchange reserves, which lend stability to the external sector. Besides, such cryptocurrency payments can take place outside the ambit of capital account regulations. This would adversely affect the integrity of the capital account regime, as policy control on capital flows would be escaped. The consequence of this on

foreign exchange reserve accretion and exchange rate management raises serious macroeconomic stability issues.

It is important to appreciate that the concern with private currencies is not limited to bitcoin or just cryptocurrencies. The concern extends to any private currency, whether digital or physical, whether crypto-based or not. Stablecoins are being promoted globally, presumably because they are more stable than bitcoin. The central banking system or government should in fact be more concerned about stablecoins because they would be more effective as currency than volatile cryptocurrencies.

There are few more important negative consequences of allowing cryptocurrencies into the formal financial system. It is already noted that there is no basis for valuation of cryptocurrencies. Since valuation is largely based on perception, and not on underlying value, it is bound to have a destabilizing effect on monetary stability of a country through huge wealth loss to investors, even if it not allowed to be used as a currency. The socially wasteful energy use of crypto infrastructure has been a subject of widespread discussion. By some estimates electricity use of bitcoins equalled that of the entire country of Switzerland in 2019. Thus, there does not appear to be any case to allow cryptocurrencies to be legalised in India. Nonetheless various arguments have been extended to permit cryptocurrencies and subject them to close regulations.

VII. ISSUES BEFORE THE CENTRAL GOVERNMENT AND THE RBI ABOUT THE CRYPTOCURRENCIES

There are two major views about the cryptocurrencies. One is to legalise and regulate the cryptocurrencies and another one is ban the cryptocurrencies. The first view i.e. to regulate the cryptocurrency is supported by the advocates of technology is that Blockchain or Distributed Ledger Technology is a promising technology where Indians might have a global edge. Most of the countries are not banning cryptocurrencies, but are considering some kind of regulation. Many Indians have invested in cryptocurrencies and banning it may lead to wealth loss for them. An argument often advanced against banning cryptocurrencies is that advanced economies are not resorting to such bans. While replicating the practices followed in such economies, it is often an acceptable route to reforms, as far as cryptocurrencies are concerned. It has to be noted that India is not similarly placed as advanced economies. If some private currency substantially replaces the Rupee, the corporate which manages that cryptocurrency can practically control India's economic policy. There are a number of other reasons why it might be in the interest of advanced economies not to ban them. Almost all cryptocurrencies are priced in terms of Dollars (or potentially any of the freely convertible currencies). Wider adoption would actually result in wider use of these currencies. So cryptocurrencies are not a threat to convertible currencies as they are to the Rupee, which is not an international currency. Most cryptocurrencies are owned by businesses of advanced economies; therefore, better adoption of cryptocurrencies would add to their growth and employment. Significantly, it might be of advantage to the advanced economies if cryptocurrencies replace emerging market (EM) currencies as that would give them a better strategic control on the EMEs. Advanced economies have quicker legal systems and hence concerns of misuse of cryptos can be addressed through the legal systems. In India, on the other hand none of the major instances of consumer exploitation have been redressed legally. The advanced economies have the political power to control the crypto companies. The recent instance where the US recovered bitcoins from the hackers of the oil pipeline in US, is an example that notwithstanding claims of non-traceability of cryptocurrencies. India or most other countries would lack such advantages. Another argument often advanced is that so many Indians have already invested in cryptocurrencies and banning cryptocurrencies would lead to a loss of wealth for them. There are three reasons such arguments do not appear justified. One, banning in India does not mean investors would lose money, because they can be provided with a reasonable exit. Two, persons who have invested in these instruments are fully aware of the risks involved. Reserve Bank has been warning investors of the risks for nearly a decade. That an Inter-Ministerial Committee of the Government has recommended banning cryptocurrencies was widely known for the last three years, as was the fact that cryptocurrencies are not regulated products and there are no investor protection norms in place. Investors who have acquired these instruments have done so with their eyes wide open, at their own risk and do not warrant any regulatory dispensation. Three, there is no data to justify how many investors have invested in these instruments and what is the amount of investment. Data informally gathered in November seems to indicate that crypto investments by Indians is nowhere near to being significant (although the pace of growth could make it a concern in future). This data showed that four out of five investor accounts held investments of less than Rs.10,000, with an average holding size of Rs.1,566. Wealth loss, if at all it is a possibility, is likely to affect only a small fraction of these investors.

Interestingly, concentrated ownership appears to be characteristic of cryptocurrencies. As a January 2021 report published in The Telegraph points out: “According to industry data, around 13% of all Bitcoin sits in the hands of just over 100 individual accounts." They are referred to “crypto whales”. Such concentrated ownership, usually by creators or initial investors, in what is touted to be (or at least hoped to be) the alternative monetary system, would make that system prone to manipulation. That cryptocurrencies should not be banned because a ban is unlikely to be effective is a superficial argument. One might as well argue that drug trafficking is a rampant phenomenon despite a ban, and therefore drug trafficking should be legalised and regulated. If cryptocurrencies are banned, the vast majority of investors who are law abiding would desist from investing. Those few elements who would continue to invest will essentially be carrying out an illegal activity. Such exceptions should reinforce the need for a ban, rather than invalidate it.

It has also been argued by some that the concerns raised in allowing private currencies as a ‘medium exchange’ are valid. Therefore, they may not be allowed as legal tender but should be allowed as an investment asset. This argument appears to be made more with hope than with any real conviction. Not allowing them as currency would still amount to cryptocurrencies being used as store of value. ‘Store of value’ demand is a more substantial source of demand for a currency than transaction demand. One only needs to compare the volume of time deposits with transactional deposits to understand this. If a cryptocurrency is used as a store of value the same concerns arise again. Also, unlike the value of Rupee, which is anchored by monetary policy and its status as legal tender, the value of crypto assets rests solely on the expectation that others will also value and use them. Since valuation is largely based on beliefs that are not well anchored, it is bound to have a de-stabilising effect on the monetary and fiscal stability of a country, even while it is not permitted to operate as a legal tender. There are other reasons why it would be futile to regulate cryptocurrencies. As discussed, cryptocurrencies are not currencies, or financial assets or real assets or even digital assets. Therefore, it cannot be regulated by any financial sector regulator. It is not possible to regulate something that one cannot define.

VIII. CONCLUSION

The technology based virtual currency is having a philosophy to escape the Government controls. Cryptocurrencies have specifically been developed to ignore the regulated financial system. These should be reason enough to treat them with caution. It is also seen that cryptocurrencies are not amenable to definition as a currency, asset or commodity; they have no underlying cash flows, they have no intrinsic value; that they are akin to Ponzi Schemes, and may even be worse. These should be reason enough to keep them away from the formal financial system. More significantly, they can destabilise the currency system, the monetary authority, the banking system, and in general Government’s ability to control the economy. They threaten the financial independence of a country and make it susceptible to strategic manipulation by private corporates creating these currencies or Governments that control them. All these factors lead to the conclusion that banning cryptocurrency is perhaps the most advisable choice open to India. This paper has examined the arguments proffered by those advocating that cryptocurrencies should be regulated and found that none of them stand up to basic scrutiny.

References:

1 Keynote address delivered by Shri T Rabi Sankar, Deputy Governor, Reserve Bank of India, on February 14th, 2022 at the Indian Banks Association 17th Annual Banking Technology Conference and Awards.

2 https://www.ft.com/video/ccb48782-82f9-44ef-97c7-dcfa02431123

3 https://time.com/5486673/bitcoin-venezuela-authoritarian/

4 https://coinmarketcap.com as on 09 February 2022.

5 https://www.ft.com/content/83a14261-598d-4601-87fc-5dde528b33d0

6 https://bitcoin.org/bitcoin.pdf

7 https://www.bbc.com/news/technology-48853230

8 https://www.telegraph.co.uk/technology/2021/01/22/weird-world-bitcoin-whales-2500-people-control-40pc-market/

9. The Economic Times, Various Issues

 ISBN 978-81-927230-0-10

Effect of Promotional Tools in Product Marketing

Prof. Gangadhar Dukare #1, Miss. Sarita Salunke #2
Assistant Professor, Yashaswi Education Society's IIMS- Chinchwad.
Savitribai Phule Pune University, Pune.
gangadhardukare@gmail.com, Saritadsalunke97@gmail.com

Abstract:

A product listing page (PLP) could be a page on website that presents a list of items based on an inquiry. It pipes location guests to item detail pages closer to change. Frequently alluded to moreover wealthy with metadata, as a result each item joins back to a category page, and they can intensely impact SEO rankings& inner interface building methodologies. Product listing seller Anker does a wonderful job of crafting their title while balancing the needs of Product Listing's search engine and human site visitors.

Keywords: promotion, price, brand image, and purchase decision.

INTRODUCTION:

Bio compare is a resource for life scientists who want to compare products and services using our extensive database. Users may rapidly browse and compare products side-by-side with a view of all specifications and product information by grouping products into easy-to-find product categories. When a user fills in their information and clicks the request information or request quote buttons, qualified leads are generated. The most comprehensive life science product repository, our Product Directory has over 7 million product listings from over 400 global suppliers.

Features Point:

Basic company profile that includes contact information and related product categories.
Links to product pages on your website that generate sales-ready traffic.
Lead generating options, such as "Request A Quote", "Request a Demo", or "Request a Sample" for sales-opportunity creation.
Information collected from the lead generating options include full contact details and timeframe pertinent to the lead type. Leads are delivered by email via an excel spreadsheet or can be imported directly into your CRM through an API Listings can be updated quarterly.
Product-specific links can be different to allow for country-specific information.

Research Point:

Product listing page design

1. Category name:

The beat route menu settled over all location pages, and on a PLP, a plan component is included to highlight which category the PLP in see falls beneath to superior arrange the customer.

2. Breadcrumbs:

Breadcrumbs show what parent category or sub-categories the list of items have a place to, advertising clients a straightforward way to explore backand forward between diverse item posting pages for more profound browsing

1. PLP page name:

The title of each PLP regularly shows up highlighted within the category segment or on the page. Also, the number of items coordinating the PLP criteria regularly shows up some place on the page.

1. Sort menu:

Clients can filter through items recorded on a PLP employing a dropdown menu showing the different

sorting choices accessible to them. Alternatives incorporate “Featured,” “Price: Moo to High,” “Newest,” and “Rating: Tall to Low.”

Pages:

Clients can browse through numerous pages on the off chance that sufficient SKUs coordinate the criteria of the PLP utilizing this navigational component. Also, a choice to see things by 10, 50, or 100+ items per page can offer adaptability for customers based on their favored browsing strategy.

1.Browse by:

On the off chance that a PLP has sub-category pages hat drop underneath it, clients can explore to more particular category pages utilizing this menu bar.

1. Filter menu:

This menu bar shows the different sifting choices accessible for advance refinement of the posting page by qualities such as cost, color, fashion, in-store accessibility, brand, and more.

1.Product Details:

Below each item on a PLP, brands regularly incorporate the thing title, cost (or extend), and accessible colors. This may be customized to too incorporate client appraisals, any special offers related with the item, and more.

Product listing can be broken down into eight different components.

1. Product title.

A product title is something where you list your item in an ecommerce store with a title giving all the desired data with respect to your item, hence making a difference clients to see your item way better.

2. Product images.

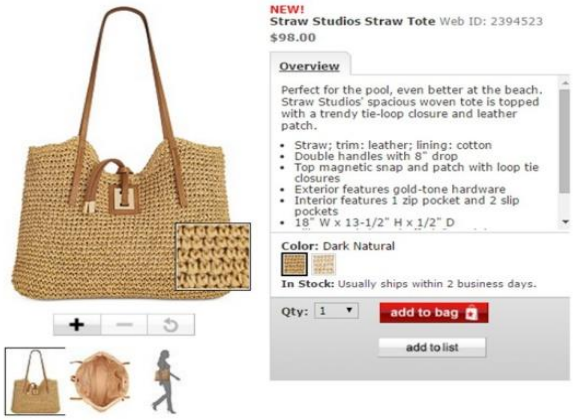
The most product picture is the primary photo clients will see when they see your item among the look comes about on Amazon. It is of most extreme significance that your primary picture allures the client whereas taking after the prerequisites recorded over.

3. Key product feature

Technically called “key item features,” the bullet focuses ought to center on how the item benefits the client and reply the normal questions. Whereas highlights are critical, what's more imperative is how those highlights influence the client.

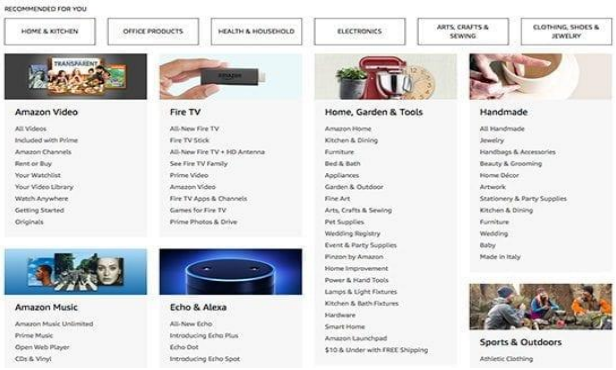
4. Product description.

A product description is the showcasing duplicate that clarifies what a item is and why it's worth obtaining. The reason of a item portrayal is to supply clients with imperative data approximately the highlights and benefits of the item so they're compelled to purchase.



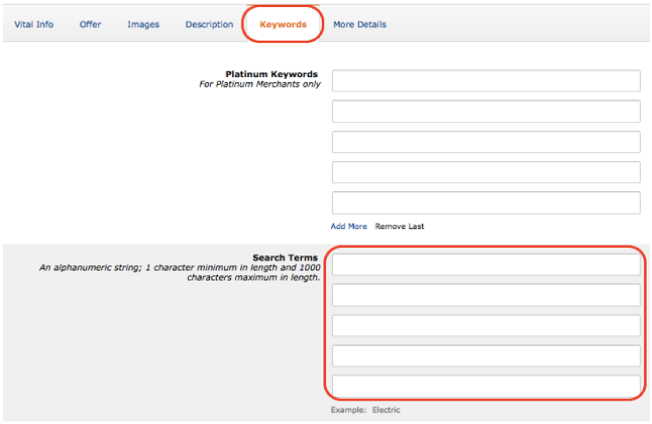
5. Keywords.

Product keywords are terms related to particular brand offerings. These sorts of watchwords are expressions that specifically reference a company's items or administrations. Brands ought to have a watchword methodology for each of their items and administrations so clients and prospects can discover their offerings through look.



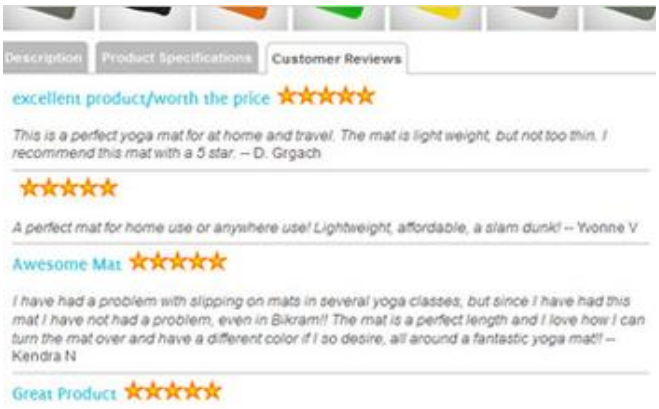
6. Search terms fields.

Product search terms are catchphrases that customers utilize to discover items. One way is by entering significant posting catchphrases to the title, bullet focuses, and item portrayal. Another way to optimize your item posting for client looks is the backend – frequently alluded to as Amazon look terms.



7. Product reviews.

Publishing high quality item surveys on your ecommerce or item survey location can offer assistance customers learn more around an item some time recently buy. For illustration, surveys can direct customers between competing items, making a difference customers choose the leading make or demonstrate for their needs.



8. Product rating.

Product ratings are appeared in advertisements and free item postings, showing up as 1 to 5-star evaluations that too show the full number of audits for the item. These appraisals and surveys offer assistance with item inquire about and buy choices, driving more qualified clients to your item pages.

Objectives & Scope of the Product Listing:

Product listing objectives: Firms make money on the totality of products and services that they sell, and sometimes, profit can be maximized by settling for small margins on some, making up on others.

Scope –

Product scope recognizes the characteristics and capacities of an item or benefit. These characteristics incorporate physical highlights such as measure and materials, as well as utilitarian details. Utilitarian contemplations incorporate what the item is outlined to do and its reason or end-use.

Product scope focuses on the result or the real advertising. Usually the ultimate item or benefit. Item scope may too allude to a benefit or other thing for client utilize. Item scope frequently considers how to assess whether the protest is on track for completion and whether it meets the anticipated result.

Women Innovator – First Virtual Incubator for Women #NaariShakti. Womennovator was started in the year of 2014 with the motive in mind to make a virtual incubator for women entrepreneurs or women who do have exceptional ideas and want to get a platform to grow.

This campaign is an endeavour to communicate excellent work done by women around the world. It is an initiative with the goal of helping women entrepreneurs to grow local economies by providing business education, training, mentoring and networking. Gaining new revenue contract through interaction with Industry leaders; provide media reach (digital and print) through their story on exclusive YouTube Channel. Access to capital and Govt. Support schemes across the country.

Research methodology:

Product research may be an expansive and exceptionally expanded bunch of shopper considers. Arrangements connected inside that gather vary both in terms of the subject of inquire about as well as utilized investigate strategies. However, what they all have in common is giving back in taking trade choices concerning the offer plan and improvement.

The 7C's of Marketing Every Online Business Should Develop in 2022:

1. Managing business has gotten to be one of the foremost challenging assignments within the modern trade environment. Worldwide markets have gotten to be progressively immersed. The competition is getting fiercer with each taking after day. Thousands of modern businesses are entering the showcase each year, making clog in existing advertise channels. So, numerous partners are relying on restricted showcase potential. The advertise isn't expanding at the same pace as businesses are. Hence, showcasing methodologies have to be be imaginative and more intensive to create positive results.

1. The First C – Customer

The most important factor of any commerce is its clients. The promoting methodology must carefully cater to the proper client portion. For occasion, when a self-storage company targets a specialty, it must decide all of its unique requirements. With promoting campaign ought to be indeed more exact and focused on toward client inclinations.

1. The Second C – Convenience:

A basic run the show of thumb is that clients buy helpfully accessible items. It doesn't fair relate to the accessibility but moreover the included comfort of getting product-related data. The promoting methodology ought to pass on a clear message almost the item or benefit advertising. It includes comfort for the advertiser and the client to get it the genuine esteem recommendation of the items.

The Third C – Competition

Business is all almost distinguishing, overseeing, and after that handling competition. A fruitful promoting technique separates your brand from others.

It eventually creates a particular persona for your brand, which isolates you from your competition. Adroit marketers closely monitor their competitors and after-that plan their showcasing procedures.

The Fourth C – Creativity

Why has Apple become a trillion-dollar company? Why is Amazon still in profit even under testing times like the wake of the COVID pandemic? The simple answer to so many of such examples is creativity and innovation. It enables a business to meet the actual needs of the market. Innovation helps to stay updated with contemporary market demands. Otherwise, brands become outdated and lose their market share.

Creativity equips a marketing strategy with modern-day tools and contemporary gimmicks. It has become essential to stir the interest of the consumer. Since people are exposed to thousands of advertisements and marketing content, only the innovative ones capture their eye.

1. The Fifth C – Communication

People consider communication different from marketing and that it has more to do with other business dealings. However, marketing communication is an essential part of any company's functions. A marketing strategy with clear and precise communication produces the desired results. Similarly, effective communication with the internal and external stakeholders creates a positive brand image.

It develops trust among the consumer, which creates loyal customers for a brand. Proper communication is necessary to increase customer lifetime value for a business. People only trust brands that communicate with their customers regularly. They feel a part of the larger philosophy behind a brand's market perception.

1. The Sixth C – Change

Change is difficult. People do not readily accept change. However, when the atmosphere of change sets in, things start to transform rapidly. The same happens with market dynamics at regular intervals.

They keep on fluctuating with deviating customer orientation. Therefore, change becomes a critical component of any brand's marketing strategy. Marketing efforts need to change with time.

They should integrate all the necessary facets of current market dynamics. Moreover, effective marketing always relies on continuous improvement. Businesses can never attain continuous improvement if they don't alter their marketing strategy with time.

The process of marketing adjustment is crucial, especially for managing technological change. Modern-day marketing is incomplete without technical support. Therefore, marketers should welcome change with time.

1. The Seventh C – Credibility

Delivering on your commitment is a fundamental ethical premise. However, not providing what you promise becomes unforgiving in the business world. Once customers lose trust in a brand, it becomes almost

impossible to regain it. Therefore, credibility in marketing communication is pivotal for business success.

Online businesses are more vulnerable to credibility threats because a plethora of information is available online. Customers can tally a market offering against many others. If marketing communication is not credible, it spreads devastating word of mouth for the company. Online platforms provide an efficient tool to widespread these reviews like fire. Therefore, credible marketing collaterals act as a cornerstone for business success.

CONCLUSION:

Every time a new products comes to the market there will be some difficulties in the beginning. Thus, a good marketing manager should think properly and get over these problems that may appear. Further on, having research the environment, having done a reliable swot analysis the firm has fewer chances to fail. The marketing mix analysis is going to be the final project in order to start producing.

The product must be design as your target market wants it to be. Moreover, in order to adjust a final price the firm has to search for the economic situation of a country and then decide the level of the price. Additionally, the firm should distribute there, were most people go in order to shop or in areas were firm's target market lives. Finally, promotion is a way of showing new product to the audience and by choosing a slogan that is memorable ,distinctive and makes your target market feel nice when are using the product, the firm can succeed and joy a healthy business.

References:

1. Mr. David Nour Three Ways to Co-Create Business Value (and New Products and Services) via Adaptive Innovation -2022

2. Mr. Alon Ghelber Top 9 Product Marketing Articles For March -2021.

3. Mrs. Amy Finn the Right Packaging Helps Customers Connect With Your Brand in -2021

4. Mr. Corey Ferreira the 15-Step Checklist for Finding Profitable, In-Demand Product Ideas May-2021.

5. Mr. Sean Silverthorne Secrets for Creating a Long-Lasting Brand Nov-2019

6. Mr. David Nour What Is Your Social Networking Strategy in 2008? In-2018

7. Mrs. Laura Forer the State of E-Commerce in Fast-Moving Consumer Goods 2017

8. Mr. Laura Patterson How to Use Product-Market Fit to Drive Business Growth in -2007

Classification of Respiratory Disease Severity Levels Using Artificial Neural Network

Charushila Patil[1], Dr.Anita Chaware[2]
[1]*Research Scholar,SNDT WU Mumbai,India*
[1]*Asst. Professor,Pratibha College of Commerce and Computer Studies ,Chichwad,Pune*
[1]patilcharushila82@gmail.com
[2]*Asso. Professor ,SNDT WU Mumbai,India*
[2]anita.Chaware@computersc.sndt.ac.in

Abstract: Respiratory diseases, such as chronic obstructive pulmonary disease (COPD), affect a large percentage of the world's population, with higher mortality rates than lung cancer and breast cancer. The number of patients who are incorrectly diagnosed, as well as whether the severity levels are correctly identified or not , is a major challenge. To address this, we created an Artificial Neural Network Classification model that can distinguish between patients' disease severity based on measurements of lung function and information about the patient's symptoms. COPD dataset from kaggle repository with 101 patients record was used to develop an accurate classification model. Our findings show that this classification model can correctly identify patients with COPD and their severity levels, such as mild, moderate, severe, and very severe, with an accuracy of 98% and minimal loss, which will aid in providing effective treatment to needy patients based on severity levels and reducing emergency mortality rates

Keywords: Classification, Artificial Neural Network, chronic obstructive pulmonary disease (COPD), severity levels, spirometry

I. Introduction

COPD is a chronic inflammatory lung disease in which airflow is obstructed in the lungs[[1],[2]]. It is estimated that up to 75% of COPD patients are undiagnosed. COPD deaths currently outnumber lung cancer and breast cancer combined [[3]–[6]], with 200,000 to 300,000 deaths due to COPD in Europe alone. Although asthma has a low fatality rate compared to other chronic respiratory diseases, its prevalence, as well as the costs of asthma treatment and care, has increased in recent decades [[1],[2]]. The number of patients with chronic respiratory diseases, such as asthma or COPD, who are either incorrectly diagnosed or misdiagnosed for other respiratory diseases, such as the common cold, acute bronchitis, or pneumonia, is a major challenge in chronic disease management, especially in non-specialized clinics[[6]-[7]]. To help medical professionals, a number of evidence-based guidelines for the prevention, diagnosis, and management of chronic respiratory diseases have been developed over time. Based on their most recent research and recommendations, the Global Initiative for Chronic Obstructive Lung Disease (GOLD)[8] and the Global Initiative for Asthma (GINA)[9] have published guidelines for medical professionals. Despite the fact that these recommendations are available, a lack of awareness among non-specialized medical practitioners remains a major barrier to accurate identification of many respiratory diseases. Many primary medical practitioners are unable to identify asthma from COPD, according to Yawn and Wollan, and are unaware that women are at a higher risk for COPD than men. When COPD symptoms are misinterpreted as asthma, women are given the incorrect therapy, delaying the proper COPD treatment[10]. In terms of disease burden and the probability of future exacerbations, this misinterpretation has substantial consequences.

Chronic obstructive pulmonary disease (COPD) is a long-term inflammatory lung condition that causes the lungs to process less air. Breathing difficulties, production of body fluid (sputum), and wheezing. COPD is curable, despite the fact that it is a progressive illness that worsens over time [19].

Computer-based approaches for medical diagnosis are becoming more common, and they are steadily enhancing the quality of medical services by employing greater datasets of symptoms and patient history, as well as diagnostic test findings for diagnosis. Expert systems that can leverage human knowledge and solve problems that would normally require

direct human expertise are being developed using artificial intelligence and machine learning methods [[11]-[12]]. Expert systems based on machine learning approaches, such as artificial neural networks (ANNs) and fuzzy logic (FL), were utilized for the identification of many diseases, including respiratory ailments, beginning in the 1990s and rising in the 2000s.

The goal of this work was to create a classification model for grading the severity of respiratory diseases like COPD in order to provide appropriate treatment to patients in emergency situations.

II. LITERATURE REVIEW

Several studies have been conducted focusing on the use of various types of ANN architectures for respiratory disease classification with high classification accuracies developed on various datasets [[11]–[15]]. Other machine learning techniques, such as Random Forests, Gradient Boosting, and even Logistic Regression, can be used for disease classification and prediction [[16]–[18]], but neural networks perform best when databases have a large number of samples. Obstructive emphysema and chronic bronchitis are two common examples. Approximately 75% of COPD patients have not been diagnosed. The majority of them have mild COPD, but 4% have severe COPD and 1% have extremely severe COPD [23].

III. SYSTEM COMPONENTS

In this section, we describe the details of the System architecture, Method, dataset, models, and the new loss function.

A. *System Architecture*

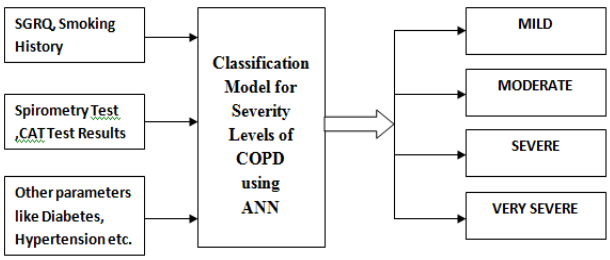


Fig.1 System Flow diagram

Fig.1 shows the flow of system like input parameters, classification model and output.

B. *Method*

To classify COPD severity levels, we propose using artificial neural networks with a new loss function. Artificial neural networks with multiple inputs and outputs using numerical and categorical data form the basis of our prediction model. By defining a suitable loss function, such as the least-squares method for regression, categorical cross-entropy for multiclass classification, and other loss functions, deep neural networks can deal with a variety of tasks. In Classification model we used the concept of "Sparse categorical cross-entropy" to deal with mixed data because our model challenge was to use mixed data (numerical and categorical data). The dataset, models, and the new loss function are all described in detail in this section.

C. *Dataset*

The Novel COPD dataset from the Kaggle repository was used. This is a hybrid dataset that includes both numerical and categorical patient data. Spirometry test parameters (FEV1, FEV1PRED, FVC, and FVCPRED), CAT test, SGRQ Questionnaires, pack history, smoking, diabetes, hypertension, and other attributes from the dataset are used to define disease severity levels. The dataset was initially preprocessed for missing values and outliers before feature scaling. For model creation and testing, the dataset was divided into training and testing sets

D. *Classification model :-*

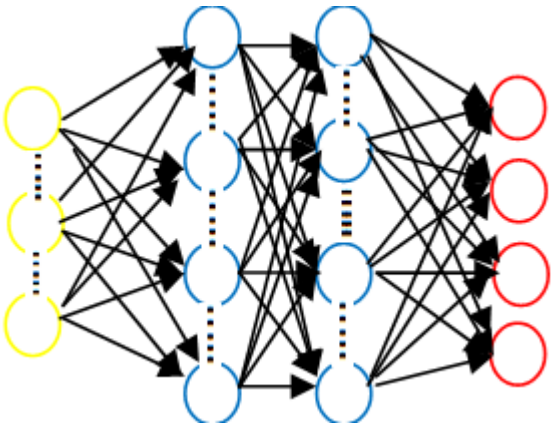


Fig. 2 Artificial Neural Network

Yellow Color Circle indicates: Input Layer

Blue Color Circle indicates: Hidden Layer

Red Color Circle indicates: Output Layer

Artificial neural networks (ANNs) have been widely employed in the development of classifiers. ANNs are artificial intelligence systems that can extract information from many

classes of signals after being trained to do so through the use of examples [20]. According to application specialists, the linear feed forward (FF) neural network is sufficient to complete the classification task properly, and these forms of NN are commonly employed for classification tasks [21]. The selection of input features and the model complexity, i.e. the number of neurons in the hidden layer, are two crucial elements in the creation of this neural network classifier [22]. In proposed classification model the goal of input feature selection is to find the fewest amount of features that can produce acceptable results [24]. It's also crucial since a large number of inputs necessitate the estimate of a large number of model parameters, which can be challenging in datasets of limited size [25].

IV. RESULTS

With 101 samples, all 13 features of the dataset were used in the study. The relationship between the hidden layer and accuracy is seen in Table I. The accuracy is used to determine the number of neurons in the hidden layer. As the accuracy of the system improved, the loss decreased. Sparse_categorical_entropy was used to determine the loss. The Optimizer was Adam, with batch size 48 and epoch 50, and the Relu Activation function was used.

TABLE I
Experimental Results

Units/neurons per hidden layer(i/p dimension 13)		**accuracy**	**Loss=sparse_categorical_cross entropy**
Hidden Layer1	Hidden Layer2	In percentage	
1	0	0.46	1.28
5	0	0.43	1.28
10	0	0.43	1.28
20	0	0.43	1.32
40	0	0.43	1.37
60	0	0.43	1.27
60	1	0.43	1.35
60	5	0.43	1.32
10	10	0.63	1.14
20	20	0.65	1.13
30	30	0.65	0.97
40	20	0.86	0.58
60	40	0.98	0.25

As table I shown that this classification model achieved 0.98% accuracy and loss was reduced to 0.25 which one was a very good result.

V. DISCUSSION

For decades, we have encountered difficulty in diagnosing and managing numerous chronic respiratory disorders due to a population lifestyle that includes smoking and air pollution, among other factors [26]. Standardized protocols for the diagnosis and therapy of respiratory diseases are available, but they have yet to provide results that considerably reduce mortality rates, particularly in remote places where medical professionals are not always available. As a result, new inventive techniques to dealing with this type of disease are required. Artificial intelligence has successes in all scientific fields, it is expected to produce comparable results when applied to the problem of detecting respiratory diseases, particularly COPD. Indeed, our findings suggest that using an automated approach to disease classification is a viable option that leads to an increase in timely right classification, particularly for non-specialized medical personnel working in remote places. Early intervention strategies can be designed based on this information to prevent illness complications and guarantee that patients receive prompt care. Using a dataset with a variety of variables, this study used neural network model to classify the respiratory condition COPD and its severity levels. A classification model for COPD severity levels artificial neural network was constructed, which is consistent with recent studies in this domain. The severity levels were classified into four groups, each of which was mutually exclusive: (1) mild, (2) moderate, (3) severe, and (4) very severe. The parameters describing the patient's etiology, spirometry tests, CAT tests, SGRQ questioners parameters, and physical examinations were all included in this database. As a result, an important intervention would be the classification of illness severity levels at primary healthcare units, which might be accomplished using classification models like the one proposed in this study. The purpose of putting these systems in primary healthcare facilities is to connect patients with services that will assist them get timely health care and increase their access to healthcare resources. According to international guidelines, the patient should be examined as a whole system, taking into account functional testing elements such as social factors, habits, diet, and epidemiological considerations. While doing classification in this study, a total of 13 distinct parameters were used. In the SGRQ, which correlates to patient symptoms are given a distinct significance factor. Spirometry was chosen for functional assessment throughout this study, due to the availability of spirometers and their low cost. One of the key features of this study, while evaluating its strengths and shortcomings, is its high accuracy of 98 %. When artificial

intelligence is used to diagnose respiratory problems, it performed admirably. Some limitations of proposed research is that we have used a relatively small dataset, with only 101 records. These systems are particularly beneficial in distant healthcare facilities where a medical specialist, in this example a respiratory medical specialist, is unavailable and a general practitioner is unsure how to assess severity levels or determine future treatment. Because of this many symptoms are misinterpreted and accurate diagnosis of respiratory disorders is frequently overlooked, resulting in a higher percentage of misdiagnosis or late diagnosis. These mistakes have a major negative impact on patients' overall health. The output of the model aids medical professionals in the prescription of medication or recommendations for additional confirmatory tests in these circumstances because timely diagnosis is a critical step in illness management. This, in turn, lowers death rates and improves patient quality of life. It is important to stress that the use of these methods does not imply that medical experts are a non-essential component of diagnosis. On the contrary, these systems helps medical practitioners in providing patients with high-quality care.

VI. CONCLUSION

A classification model for COPD severity levels was reported in this paper. This model was trained on 101 samples from the Kaggle repository during its development. With an accuracy of 98 percent and minimal loss, the generated model properly categorized the severity levels. This concept is useful for providing effective emergency treatments to needed patients. This method would help general practitioners in making preliminary diagnoses and categorizing severity levels, allowing for better use of time, lower medical device costs, and improved patient outcomes.

We intend to improve and validate an effective user interface for the automatic classification system in the future, allowing it to be used in general practitioners' hospitals also can work on large datasets.

REFERENCES

[1] Tortora, G. J. & Grabowski, S. R., Principles *of Anatomy and Physiology*, John Wiley&Sons, 2003.

[2] Mayo Foundation for Medical Education and Research, Mayo Clinic: COPD and Asthma Definition., http://www.mayoclinic.com/ health/ 2017

[3] Goldman, L ,Anthonisen, N. ,Chronic obstructive lung disease, in Cecil Medicine. chapter 88, 24th ed., 2007.

[4] European Lung Function: COPD Burden in Europe. http://www.european-lung-foundation.org/index.php?id=63 ,2017.

[5] Ferlay, J. *Cancer Incidence, Mortality and Prevalence Worldwide, IARC Cancer Base*. IARC Press, Lyon, France, 2004.

[6] Murray, C. J. & Lopez, A. D., Alternative projections of mortality and disability by cause 1990–2020, *World Health Organization, Global Burden of Disease Study*. 1498–504,1997.

[7] Nielsen, K. G. & Bisgaard, H. ,The Effect of Inhaled Budesonide on Symptoms, Lung Function, and Cold Air and Methacholine Responsiveness in 2- to 5-year-old Asthmatic Children,*American Journal of Respiratory and Critical Care Medicine* 162, 1500–1506, 2005.

[8] Global Initiative for Chronic Obstructive Lung Disease: Pocket guide to COPD Diagnosis, Management and Prevention, http:// www.goldcopd.it/materiale/2015/GOLD_Pocket_2015.pdf ,2015.

[9] Global Initiative for Asthma: Pocket guide to Asthma Diagnosis, Management and Prevention. http://www.goldcopd.it/ materiale/2015/GINA_Pocket_2015.pdf ,2015.

[10] Yawn, B. & Wollan, P. Knowledge and attitudes of family medical professionals coming to COPD continuing medical education. *International Journal of Chronical Obstructive Pulmonary Disease*. 3(2), 311–317 ,2008

[11] Er, O. & Temurtas, F. A study on chronic obstructive pulmonary disease diagnosis using multilayer neural networks. *Journal of Medical Systems*. 32(5), 429–432 ,2008.

[12] Mohktar, M. S. et al. Predicting the risk of exacerbation in patients with chronic obstructive pulmonary disease using home telehealth measurement data. Artificial intelligence in medicine. 63(1), 51–59 2015.

[13] Prosperi, M. C., Marinho, S., Simpson, A., Custovic, A. & Buchan, I. E. Predicting phenotypes of asthma and eczema with machine learning,*BMC medical genomics*. 7(1), S7 ,2014.

[14] Spathis, D. & Vlamos, P. Diagnosing asthma and chronic obstructive pulmonary disease with machine learning. Health informatics journal, 2017.

[15] Badnjevic, A., Cifrek, M., Koruga, D. & Osmankovic, D. Neuro-fuzzy classifcation of asthma and chronic obstructive pulmonary disease. *BMC Medical Informatics and Decision Making Journal*, 2015.

[16] Mohktar, M. S. et al. Predicting the risk of exacerbation in patients with chronic obstructive pulmonary disease using home telehealth measurement data. *Artificial intelligence in medicine*. 63(1), 51–59 2015.

[17] Prosperi, M. C., Marinho, S., Simpson, A., Custovic, A. & Buchan, I. E. Predicting phenotypes of asthma and eczema with machine learning. *BMC medical genomics*. 7(1), S7 , 2014.

[18] Spathis, D. & Vlamos, P. Diagnosing asthma and chronic obstructive pulmonary disease with machine learning. *Health informatics journal*, 2017.

[19] Ahmar Shamim,"Chronic Obstructive Pulmonary Disease (COPD) - Types, Causes and Symptoms", 2021 Medical and Clinical Reviews ISSN 2471-2120X Vol. 7 No. 4: 131, *iMedPub Journals*,2021

[20] Jorge L. M. Amaral, Alvaro C. D. Faria, Agnaldo J. Lopes, José M. Jansen and Pedro L. Melo," Automatic Identification of Chronic Obstructive Pulmonary Disease Based on Forced Oscillation Measurements and Artificial Neural Networks", *32nd Annual International Conference of the IEEE EMBS Buenos Aires, Argentina*, August 31 - September 4, 2010

[21] Goldman L, Auseillo D. Goldman, Anthonisen N: In Chronic Obstructive Pulmonary Disease, Cecil Medicine, Philadelphia; 2007.

[22] S. Haykin, Neural Networks a Comprehensive Foundation, Englewood Cliffs: Macmillan College Publishing Company, 1994.

[23] Badnjevic et al. BMC Medical Informatics and Decision Making 2015, 15(Suppl 3):S1 http://www.biomedcentral.com/1472-6947/15/S3/S1

[24] G. P. Zhang, Neural Networks for classification: A Survey, IEEE Trans. Systems, Man and Cybernetics-Part C: Aplications and Reviews, vol. 30, pp. 451–62, 2000.

[25] C. E. Pedreira, L. Macrini, M. G. Land, E. S. Costa, New Decision Support Tool for Treatment Intensity Choice in Childhood Acute Lymphoblastic Leukemia, *IEEE Trans. Information Technology in Biomedicine*, vol. 13, pp. 284–90, 2009

[26] Almir Badnjevic, LejlaGurbeta1& EddieCustovic ," An Expert Diagnostic System to Automatically Identify Asthma and Chronic Obstructive Pulmonary Disease in Clinical Settings ",SCIENTIFIC REPORTS | (2018) 8:11645 | DOI:10.1038/s41598-018-30116-2

 ISBN 978-81-927230-0-10

PROCUREMENT OPERATIONS IN SCM

Mr. Gangadhar D. Dukare, Mr. Shripad G. Deshpande
Prof.of International Institute of Management science chinchwad, pune
gangadhardukare@gmail.com
Student of International Institute of Management science chinchwad, pune
shripaddeshpande1996@gmail.com

Abstract— The best companies around the world are discovering a powerful new source of competitive advantage. It's called supply-chain management and it encompasses all of those integrated activities that bring product to market and create satisfied customers. The Supply Chain Management Program integrates topics from manufacturing operations, purchasing, transportation, and physical distribution into a unified program. Successful supply chain management, then, coordinates and integrates all of these activities into a seamless process. It embraces and links all of the partners in the chain. In addition to the departments within the organization, these partners include vendors, carriers, third party companies, and information systems providers. In this research we have analyzed various KPIs from Procurement of EMS Industry.

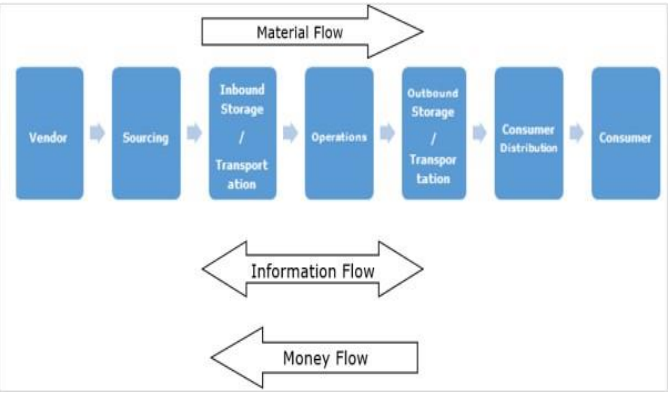
Introduction:

Supply Chain Management can be defined as the management of flow of products and services, which begins from the origin of products and ends at the product's consumption. It also comprises movement and storage of raw materials that are involved in work in progress, inventory and fully furnished goods. The main objective of supply chain management is to monitor and relate production, distribution, and shipment of products and services. This can be done by companies with a very good and tight hold over internal inventories, production, distribution, internal productions and sales. Supply chain management basically merges the supply and demand management. It uses different strategies and approaches to view the entire chain and work efficiently at each and every step involved in the chain. Every unit that participates in the process must aim to minimize the costs and help the companies to improve their long-term performance, while also creating value for its stakeholders and customers. This process can also minimize the rates by eradicating the unnecessary expenses, movements and handling. Here we need to note that supply chain management and supply chain event management are two different topics to consider. The Supply Chain Event Management considers the factors that may interrupt the flow of an effective supply chain; possible scenarios are considered and accordingly, solutions are devised for them.

Brief Description of the Problem:

Supply Chain Management (SCM) is field which is essential part of any industry. Every company tries to maximize its supply – demand percentage with keeping optimum inventory level. Planning Procurement & Logistics plays key role in SCM. We have selected various Key Point Indicators (KPI) in procurement operations to determine success of SCM in specific EMS Industry.

Observation of the Process:



Research Methodology:

It is critical to understand what is procurement first because it will give an in-depth understanding of procurement and supply processes. Procurement is the term that is used to refer to the process or the act of sourcing or obtaining services or goods for a business. Some businesses use the term procurement only to refer to the actual buying while others refer to the entire process that leads up to the purchase as procurement.

Stages of Procurement:

- Identification of Requirement
- Determination of the Specifics of the Requirement
- Sourcing
- Negotiation and Finalization of Price and Terms
- Purchase Requisition and Order
- Delivery of the Purchase Order
- Expediting
- Product/Service Supply and Inspection
- Payment Process
- Record Keeping and Review

Procurement KPIs:

Procurement KPIs or key performance indicators help gauge the efficiency, effectiveness and standard of performance of a procurement strategy and process.

- **Qualitative and Quantitative KPIs**

The performance of a procurement process should be evaluated on a qualitative and quantitative basis. Quantitative KPIs are by definition those that can be represented by a number. Qualitative KPIs are those that deal with factors that are not numerical such as ease of business or customer satisfaction.

- **Essential KPIs To Monitor**

There are numerous KPIs that a company can decide to monitor. The most important KPIs that give a clear picture of procurement performance are:

1. Purchase Order KPIs
2. Supply KPIs
3. Return on Investment KPIs
4. Cost KPI

- **Other Types of KPIs:**

➢ **Inventory KPI**

The efficiency of a procurement cycle is highly dependent on how well inventory is managed. Good warehouse and inventory management avoids bottlenecks in the entire process. Key inventory KPIs are:

1. Stock Accuracy
2. Fulfillment Accuracy
3. Timeline
4. Back Order Rate
5. Deadstock
6. Turnover

 ISBN 978-81-927230-0-10

➢ **Employee Learning and Growth KPI**

A procurement process can only perform when the manpower involved is highly productive. When evaluating a procurement process, it is important to include the following employee-related KPIs.

1. Training effectiveness
2. Training cost
3. Number of trainees
4. Attrition rate
5. Turnover rate of high performers
6. Rate of internal promotions
7. Percentage of below-par performers

➢ **Delivery KPI**

An important aspect of procurement is the efficiency of the delivery process. KPIs that help evaluate delivery are:

1. Lead Time
2. Purchase Order Cycle Time
3. Percentage of Emergency
4. Percentage of Deliveries
5. Supplier Availability

➢ **Quality KPI**

The quality of procurement can be measured by:

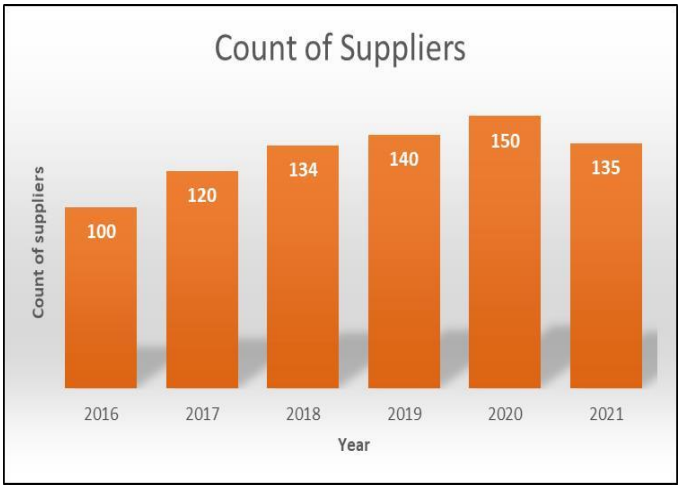
1. Quality and Defect Rate
2. Compliance Rate
3. Accuracy

Data Analysis & Interpretation:

Data of various KPI taken from Year 2016 to 2020. Graphical representation of quantitative analysis of data as follows:

- **Count of Supplier**

Track your level of dependency towards your suppliers. This KPI tracks the evolution of how many suppliers the company has. Relying on too few suppliers and not diversifying your sources creates a risk of dependency, and potential further problems if one of them pulls out at the last moment. On the other hand, too many suppliers reduce the possibilities of discounts. The procurement KPI aside shows the evolution of the number suppliers over the years.

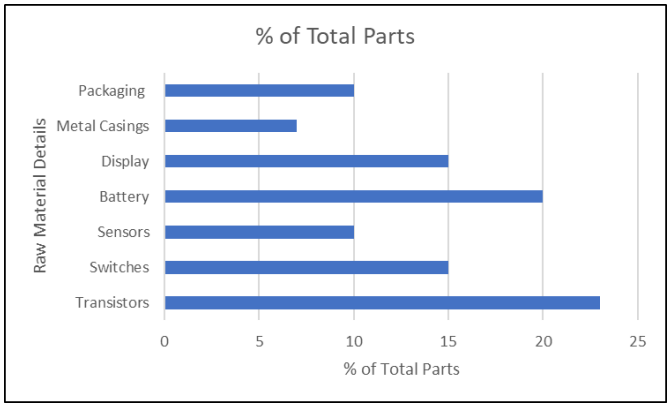


Interpretation –
Count of suppliers increased from 2016 to 2020. But count decreased by 15 suppliers due to impact of pandemic on global supply chain.

 ISBN 978-81-927230-0-10

- **Raw Material Parts & Role in Inventory**

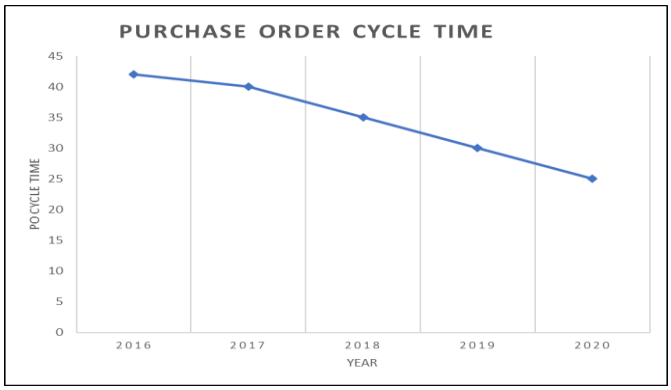
Parts used in EMS industry & percentage of inventory it constitutes per below.



Interpretation –
Graph shows various quantity of parts in percentage which are purchased by Direct Procurement. Major inventory is of C class components whose MOQ & QPS is high such as Transistors.

- **Purchase Order Cycle Time:**

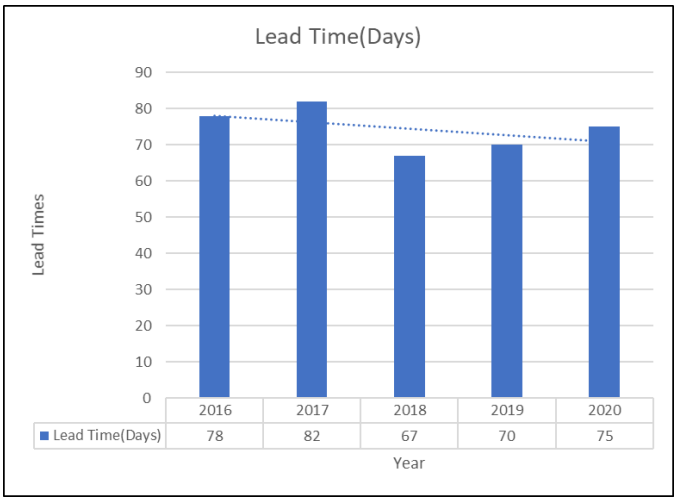
How long or short is the turnaround time of one order cycle. The purchase order cycle time is a procurement KPI that covers the end-to-end ordering process, from the moment a purchase order is created to the order approval, receipt, invoice and finally payment of the order. It focuses on the order and does not include the creation and delivery of the product or material itself.



Interpretation –
Graph shows purchase order cycle time trend from 2016 to 2020. Time is calculated in Days.
Trend is decreasing manner as various automation processes implemented to reduce internal processing time.

- **Lead Time**

Measure the total time to fulfill an order. Our next procurement KPI measures the interval of time between the initiation of a procurement action, and the receipt of the production model into the supply system, purchased as a result of such action. In other words, it is the latency between the initiation and the execution of a process. It is composed of production lead time and administrative lead time. The idea is to reduce lead time as much as you can while keeping a good quality level.

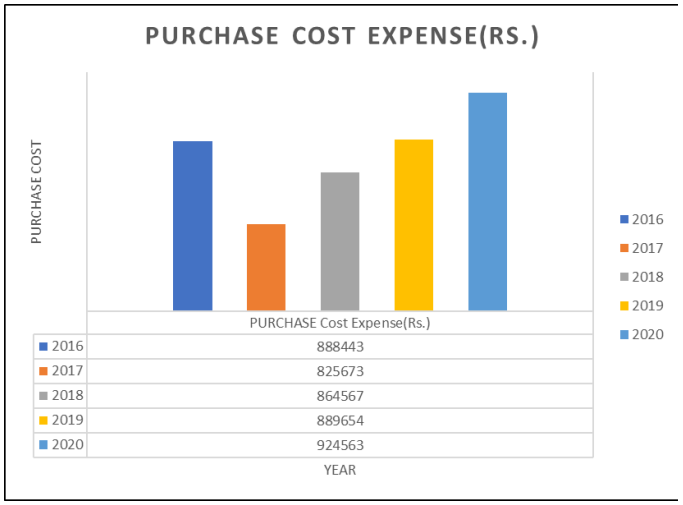


Interpretation –
Graph shows lead time trend from 2016 to 2020. Time is calculated in Days.
Trend is changing manner as various issues of sub-suppliers keep LT unastable. But in general Avg. Lead time found to be 75 days.

ISBN 978-81-927230-0-10

- **Purchase Cost Expense (Rs.)**

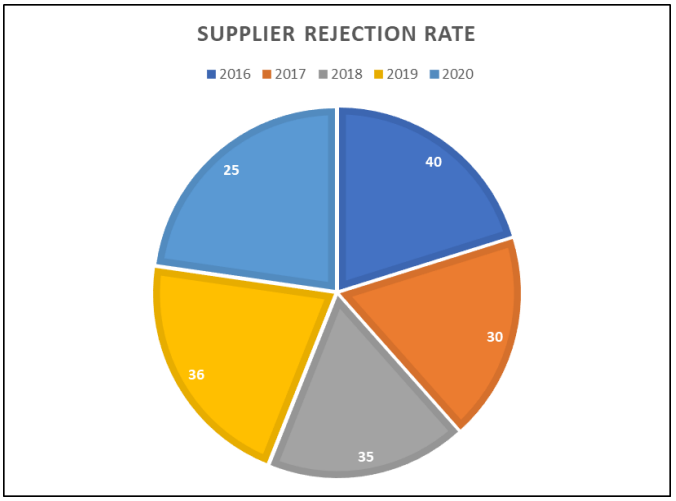
The cost that is incurred to process each purchase and helps to keep track of internal costs incurred.
The cost of purchase order is one of the disputed procurements KPIs, as the definition and application vary. In theory, this metric represents the average costs of processing an order, from purchase creation to invoice closure.
The idea is to improve the efficiency of the procure-to-pay cycle, so as to prevent errors and reduce costs.



Interpretation –
Graph shows Purchase Cost Expense trend from 2016 to 2020. Expense is calculated in Rs.
Trend is increasing in manner. Lowest purchase cost was calculated in 2017 that was Rs. 825673.
But highest purchase cost was calculated in 2020 which was Rs. 924563

- **Supplier Rejection Rate**

Evaluate your suppliers' individual quality
This is a procurement KPI that is crucial when it comes to determining the final quality of a product. It measures the percentage of products received from suppliers that do not meet the compliance specifications and quality requirements. The supplier defect rate is more critical in some industries that have high-risks and multi-tiered supplier bases like the aerospace and defense or the automotive. Tracking your different suppliers' defect rates and break it down into defect type will provide you insights on which supplier is more performant and reliable than other, and what type of errors are done.

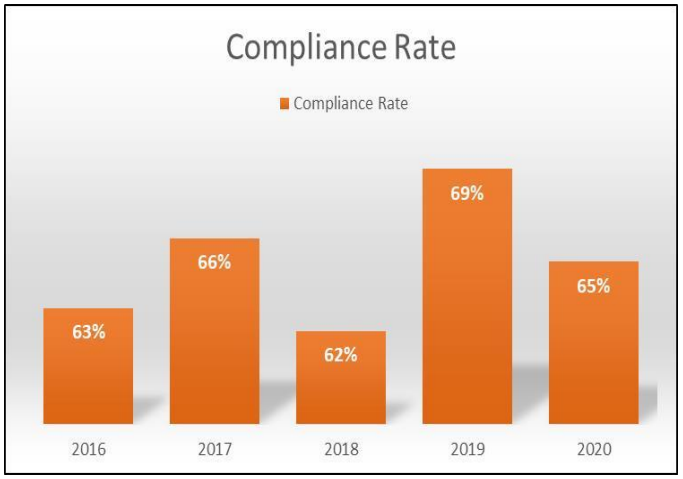


Interpretation –
Pie Chart shows trend of supplier rejection rate from 2016 to 2020. Total 40 defects found in 2016 but only 25 defects found in 2020. Various incoming quality measures taken to reduce defect rate.

- **Compliance Rate**

Find out if suppliers fulfill your requirements.
One of our compliance metrics examples represent the whole of basic agreements a company and a supplier lay down. It results in various requirements such as the maximum reaction time in case of any issue, the delivery time, special discount offers, etc. It is a key component in providing guidance and insights into processes, and participates in saving costs through better negotiations with suppliers.

For an average company that is not operating world-wide with millions of suppliers or end-users, reaching an overall of 50% of compliance is a good target to set.



Interpretation –

Graph shows trend of compliance rate from 2016 to 2020. Total 63% suppliers found compliant in 2016. Highest compliant rate found in 2019 which was 66%. Lowest compliant rate found in 2018 which was 62%.

Analysis

- ✓ Company is utilizing its 13% of Manpower in Supply chain operations.
- ✓ Procurement department has Sourcing & Purchasing sections.
- ✓ Company is working with 150 Local & Global suppliers under Direct Procurement.
- ✓ Company is purchasing 600 different parts under Electrical & mechanical commodity.
- ✓ Avg. 100 Purchase orders are released per week.
- ✓ Avg. lead time for PO is 75 Days.
- ✓ Purchase orders are transmitted manually & via ERP to suppliers by purchasing team.
- ✓ ERP tool is used in Procurement Department.
- ✓ Avg. 40 pcs rejection found per year.
- ✓ Avg. Compliance Rate of supplier is 65%.
- ✓ Total Purchase cost expenses increased from Rs.8,88,443 to Rs.9,24,563 from 2016 to 2020.
- ✓ ITO ratio for 2020 was 4.

Conclusion & Final Result:

- ✓ Procurement operations & its importance in SCM can be studied with help of various KPIs.
- ✓ Maximum 150 suppliers per year handled by purchasing team.
- ✓ Total 400 different parts of Electrical & Mechanical category purchased.
- ✓ C class components constitute major part of total inventory.
- ✓ Purchase order cycle time can be reduced with help of automation which helps to fulfill demand within lesser time.
- ✓ Various external issues such as supplier's market & natural calamities impacts on manufacturing lead time of raw material.
- ✓ Purchase cost expense on direct material is increasing as market unastability affects on prices.
- ✓ Supplier rejection rate is found lowest in 2020.
- ✓ Supplier compliance rate can be studied to see success of sourcing team.

Inference:

- ✓ Study of different KPI of Procurement help to see success of Procurement in SCM.
- ✓ Systematic approach of Procurement in supply chain can achieve demand & supply goals.
- ✓ Proper selection of suppliers & day to day purchasing activities add values in growth of company.
- ✓ Customer demands fluctuations & changing market situations can be overcome by utilizing talented manpower in Procurement operations & supply chain area.

Reference:

1) Logistics and Supply Chain Management: Strategies for Reducing Cost and Improving Service (Financial Times Management) -- Christopher Martin
2) Introduction to Supply Chain Management -- Robert B. Handfield, Ernest L. Jr. Nichols
3) Advanced Supply Chain Management: How to Build a Sustained Competition -- Charles C. Poirier
4) Supply Chain Management: The Basics and Beyond (The St. Lucie Press/Apics Series on Resource Management) ~ William C. Copacino / Published 1997
5) Basics of Supply Chain Management James E. Hill/ Published 1999
6) Introduction to Supply Chain Management ~ Robert B. Handfield, Ernest L. Jr. Nichols / Published 1998
7) Quick Response in the Supply Chain Eleni Hadjiconstantinou (Editor), Eleni Hadjiconstantinou (Editor/Published 1999)
8) www.tutorialspoint.com

 ISBN 978-81-927230-0-10

A STUDY ON THE IMPACT OF COVID-19 PANDEMIC AND RECOVERY OF INDIAN ECONOMY

Dr. Pushpraj Wagh #1, Dr. Vaibhav Patil *2

Assistant Professor, Yashaswi Education Society's IIMS- Chinchwad.
Savitribai Phule Pune University, Pune.
169/A,Station Road, Opp. Elpro International, Chinchwad, Pune, Maharashtra 411033 (India)
pushprajwagh864@gmail.com

Assistant Professor, Balaji Institute of Management and Human Resource Development, Pune.
Survey No. 55/2-7, Tathawade, Opp. Wakad Police Station, Off Pune-Mumbai, Highway, Imm Road, Tathawade, Pune, Maharashtra 411033 (India)
vaibhav0222@gmail.com

Abstract:

The covid-19 outbreak had a huge adverse impact on the Indian economy. The Indian economy was already struggling for growth, Covid-19 impact made it worse. India has to take measures like countrywide lockdown, stop all economic activities, testing of the covid-19 virus, vaccination, restriction on transportation and travel resulted in slowdown similar measures are taken by the other countries made it global recession. Covid-19 significantly affected the demand-supply in the Indian economy. Covid-19 impacted the health of people across the globe. Its actual damage can be calculated only after the covid-19 situation. This research paper discusses the impact of a covid-19 pandemic on various industries of the economy and how fast recoveries are taking place. Which areas of the economies are severely affected and which are less affected due to covid-19. Impact on International Trade, export and growth rate has also been discussed.

Keywords: Covid-19, India, Economy, Recovery, GDP

INTRODUCTION:

The covid-19 pandemic was unprecedented as people have observed nationwide lockdown. All major activities were stopped due to the covid-19. There were many epidemics and pandemics like SARS (Severe Acute Respiratory Syndrome), MERS (Middle East Respiratory Syndrome), HIV, Plague, TB and Ebola which affected mankind however severity of the covid-19 was more. Most of the economies in the world have been significantly affected due to the covid-19. Vaccination is the only remedy found on the Covid-19 which will also take significant time. India reported 13,512,493 Coronavirus Cases, 170,066 Deaths on 11th April 2021 & 12,147,081 people were recovered. The health sector in India was poorly developed which is badly affected during this covid-19 pandemic leading to huge mortality and morbidity. The government has

come up with the measures like social distancing, lockdown, closed public offices, isolation at home, testing, vaccination restriction on transportation & travel.

India used a series of lockdowns, first lockdown was announced from 25 March 2020 onwards and extended due to the increasing cases of covid-19. Indian economy suffered due to covid-19 like GDP growth rate decreased, restriction on travel and tourism, export hampered, FDI decreased, demand-supply affected, inflation raised, the unemployment rate increased, Agriculture, services and industrial production decreased, logistic and supply chain management affected. Due to covid-19 infection mortality rate increased loosing working human resources.

SIGNIFICANCE:

The present study on recovery of the Indian economy from the Covid-19 pandemic to the policymakers to understand the impact of the Covid-19 pandemic on the economy, the sectors of the economy under the impact, and inputs for formulation of policies in order to revive the economy of the country.

The study will also be useful to the managers in the businesses to understand the various alternatives available and to make decisions about survival and growth under the conditions of uncertainty.

OBJECTIVES:

1. To understand the impact of the Covid-19 pandemic on the Indian Economy.
2. To understand the economic recovery and its process in various sectors.

RESEARCH METHODOLOGY:

The present study is based on the collection and analysis of secondary data collected from various journals, websites and published reports for understanding the impact of the Covid-19 pandemic on the Indian economy and the revival process of various sectors of the economy.

IMPACT OF COVID-19 ON THE INDIAN ECONOMY:

Due to Covid-19, all the economic activities of India had to stop. The government has ensured the supply of medicines and essential commodities. Demand and supply have impacted badly for a long duration of time. It will take a couple of years to come to a normal state of the economy. Social distancing, mask, hand sanitization has to continue till we recover completely from covid-19. It is unlikely to restore the demand for the essential commodities till next year. India has been affected in three major consumption investments and export.

Due to covid-19 India faced many obstacles like disruption in demand-supply, industrial production affected due to unavailability of raw material, migration of labor from an urban area to rural areas, recession in international trade, & tourism restrictions. It is predicted that supply chain management will take a longer time to come to a normal position. It is difficult for small and medium enterprises to continue to sustain for a longer period of time. Domestic industries are showing negative growth in production. India will have a huge impact on the GDP due to less investment, restriction on the availability of Manpower, impact on income & consumption.

Tourism Aviation and Hospitality industries are among the worst affected. Is the Indian economy also get easily affected due to the Global recession because

foreign direct investment significantly gets impacted? If India wants to grow further India should have strong ties with the developed countries for market and investment. Globally companies are pulling out investment from countries like India is another worry of concern. It will take a few years to calculate overall loss due to the covid-19 pandemic. Due to covid-19 future has become uncertain and risky. It's very difficult to show growth in GDP in this uncertain and risky situation. Many reports suggest that India is likely to have a short-term recession period.

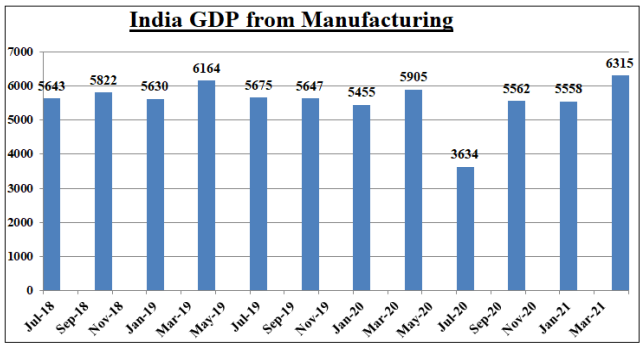
GDP GROWTH:

Many International agencies including CRISIL MOODY'S and International Monetary Fund IMF estimated that India's GDP growth will reduce for or 2020-21. The covid-19 situation can bring back recession and depression. Estimated that most of the countries will report negative growth in 2020-21. It is estimated that there will be a 3% decrease in global output. Many International agencies including CRISIL, MOODY'S, World Bank and International Monetary Fund IMF estimated that the GDP growth rate of India will remain 2 to 3% in 2020-21. The estimated growth rate will be India's lowest growth rate since globalization. India's GST collection has been hampered due to the Covid-19 pandemic.

	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21
Industry	3.3	3.8	7	9.6	7.7	6.3	4.9	0.9	-9.6
Mining	0.6	0.2	9.7	10.1	9.8	4.9	-5.8	3.1	-12.4
Manufacturing	5.5	5	7.9	13.1	7.9	6.6	5.7	0	-9.4
Electricity	2.7	4.2	7.2	4.7	10	11.2	8.2	4.1	2.7
Construction	0.3	2.7	4.3	3.6	5.9	5	6.1	1.3	-12.6

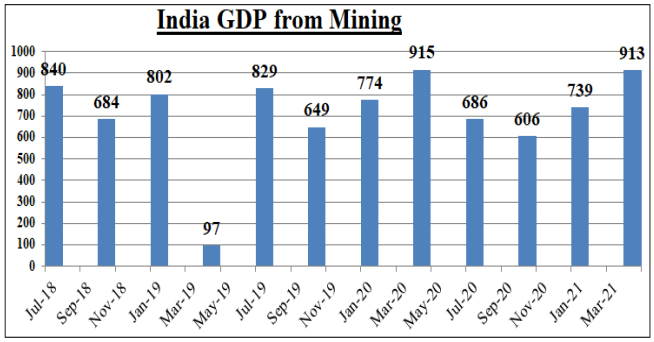
The table shows the impact on GDP category wise Industry, mining, manufacturing, electricity, construction categories have affected GDP growth, it can be seen from the above table that in the FY 20 & FY21 GDP growth rate has been impacted due to the Covid-19 pandemic.

RECOVERY OF MANUFACTURING ECONOMY FROM THE IMPACT OF COVID-19:



GDP from manufacturing has dropped from 5905 billion Rs. to 3634 billion rupees respectively in March 2020 to May 2020. From September 2020 it started improving till March 2021. In January 2020 agricultural output was reported at 5558 billion Rs. and its growth sustained also in March 2021 which is 6315 billion Rs.

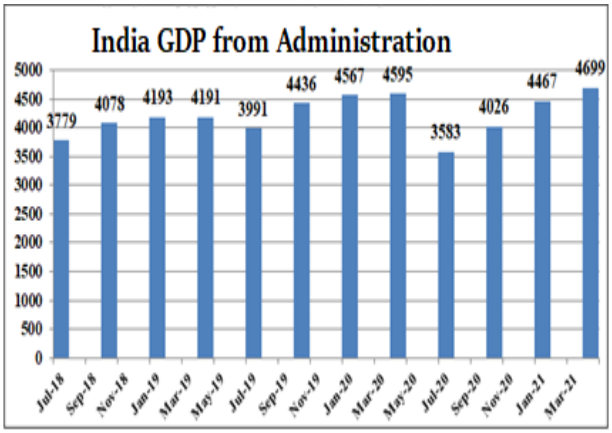
RECOVERY OF MINING ECONOMY FROM THE IMPACT OF COVID-19:



GDP from Mining has dropped from 915 billion Rs. to 606 billion rupees respectively in March 2020 to November 2020. From January 2021 it started improving till March 2021. In January 2021 Mining

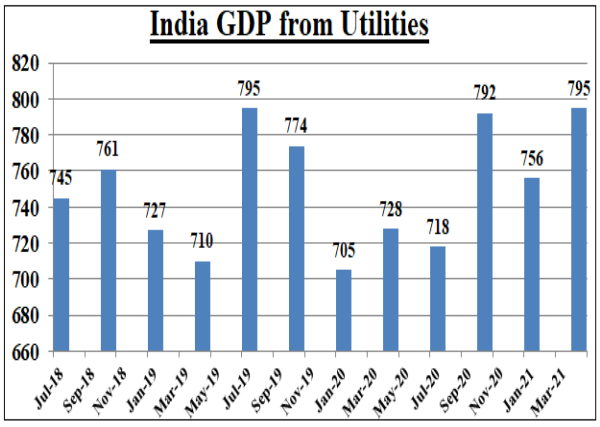
output was reported at 739 billion Rs. and its growth sustained also in March 2021 which is 913 billion Rs.

RECOVERY OF ADMINISTRATION ECONOMY FROM THE IMPACT OF COVID-19:

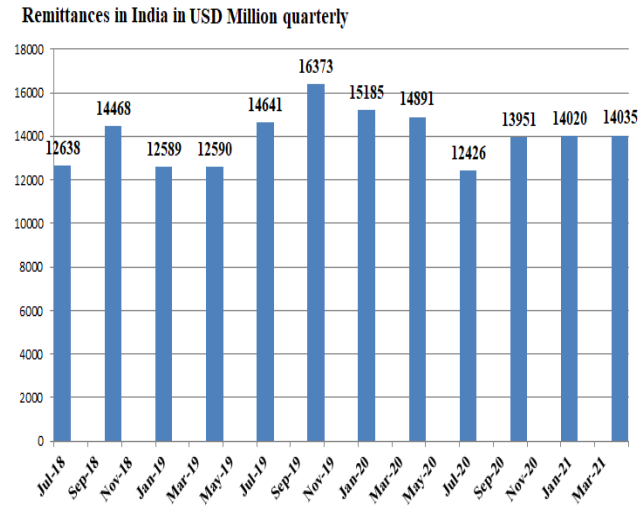


GDP from Administration has dropped from 4595 billion Rs. to 3583 billion rupees respectively in May 2020 to July 2020. From September 2021 it started improving till March 2021. In November 2021 Administration output was reported 4026 billion Rs. and its growth sustained also in March 2021 which is 4699 billion Rs.

RECOVERY OF UTILITY ECONOMY FROM THE IMPACT OF COVID-19:



GDP from Utilities has dropped from 774 billion Rs. to 705 billion rupees respectively in November 2019 to Jan 2020. From May 2020 it started improving till March 2021. In September 2021 Administration output was reported 792 billion Rs. and its growth sustained also in March 2021 which is 795 billion Rs.



Source – Reserve bank of India

Due to the Covid-19 pandemic, remittance from other countries to has decreased in July 2020 however from September 2020 remittance has started increasing and in March 2021 remittance is estimated to be 1493 $ mn. Recovery of remittance is shown in the above chart.

CONCLUSION:

Covid-19 has posed an unprecedented challenge for India. Given the large size of the Population, the precarious situation of the economy, especially of the financial sector in the pre- Covid-19 period, and the economy's dependence on informal labour, lockdowns and other social distancing measures would be hugely disruptive. The central and state governments have recognized the challenge and have responded but this response should be just the beginning. Policymakers need to be prepared to scale

up the response as the events unfold so as to minimize the impact of the shock on both the formal and informal sectors and pave the way for a V-shaped Recovery. At the same time, they must ensure that the responses remain enshrined in a rules-based framework and limit the exercise of discretion in order to avoid long-term damage to the economy.

REFERENCES:

1. Barclays. (2020). How will India lockdown play out for economy & markets: 4 scenarios. Economic Times. https://economictimes.indiatimes.com/markets/stocks/news/how-will-india-lockdown-play-out-for-economymarkets-4-scenarios/articleshow/74804087.cms
2. Bloom, E., Wit, V. d., & Jose, M. J.-S. (2005). Potential economic impact of an Avian Flu Pandemic on Asia. Asian Development Bank. https://www.think-asia.org/handle/11540/2165.
3. Elizabeth A., Adam I., Dayour F., & Badu Baiden F. (2021). Perceived impacts of COVID-19 on risk perceptions, emotions, and travel intentions: evidence from Macau higher educational institutions. Tourism Recreation Research, 46(1), 1–17.
4. Hasan M. K., Ismail A. R., & Islam M. F. (2017). Tourist risk perceptions and revisit intention: A critical review of literature. Cogent Business & Management, 4(1), 1–21.
5. Mertens G., Gerritsen L., Duijndam S., Salemink E., & Engelhard I. M. (2020). Fear of the coronavirus (COVID-19): Predictors in an online study conducted in March 2020. Journal of Anxiety Disorders, 102258. pmid:32569905
6. Monika Chaudhary, P. R. (2020). Effect of COVID-19 on Economy in India: Some Reflections for Policy and Programme. Journal of Health Management, 22(2), 168-180.
7. Neuburger L., & Egger R. (2020). Travel risk perception and travel behaviour during the COVID-19 pandemic 2020: a case study of the DACH region. Current Issues in Tourism, 24(5), 1–14.
8. Rahman MK, Gazi MAI, Bhuiyan MA, Rahaman MA (2021) Effect of Covid-19 pandemic on tourist travel risk and management perceptions. PLoS ONE 16(9): e0256486. https://doi.org/10.1371/journal.pone.0256486
9. Santosh Mehrotra. (2019). EMPLOYMENT Working Paper No. 254. GENEVA: Employment Policy Department & INTERNATIONAL LABOUR OFFICE – GENEVA
10. Sorokowski P., Groyecka A., Kowal M., Sorokowska A., Białek M., Lebuda I., et al. (2020). Can information about pandemics increase negative attitudes toward foreign groups? A case of COVID-19 outbreak. Sustainability, 12(12), 1–10.
11. Wen J., Kozak M., Yang S., & Liu F. (2020a). COVID-19: potential effects on Chinese citizens' lifestyle and travel. Tourism Review, Vol. ahead-of-print No. ahead-of-print.
12. https://www.theindiaforum.in/article/india-s-biggest-challenge-future-farming

"Impact of Covid-19 Pandemic: On IT Enabled Non-banking Payment Portals"

*Prof. Sonali Bhor, **Prof. Kirti Bothe

* Professor, Balaji College of Art's, Commerce and Science, Tathawade , Dist:Pune.
Mob.8999102453
sbssonali93@gmail.com
**Professor, Balaji College of Arts, Commerce and Science, Tathawade, Dist: Pune.
Mob.9096575698
kirti.nikam1@gmail.com.

ABSTRACT

The pandemic of COVID 19 has devastating impact on economies worldwide. While few economies ran into doldrums several other developed economies are still trying hard to nullify its effects. It has affected several industries in a go. One of the very few industries that did well despite of the devastating impact of pandemic is the digital payment industry. Countries worldwide shifted their orientation from paper backed economies to cash less ones. While the types of digital payment instruments grew enormously on one hand it posed a serious concern for regulatory bodies on the other hand to take care of the security concerns to reduce the possibility of frauds. Several guidelines have been laid out to reduce the breach of security amidst increasing usage of online payment systems and ease out convenience of usage and confidence of customers. The present study is an attempt to analyse the various digital payment options that have emerged in process and an endeavour to study the impact of pandemic on IT enabled non-banking portals.

Keywords: ***Covid-19 pandemic, non-banking payments, IT enabled services.***

1. INTRODUCTION

The outbreak of COVID-19 pandemic which took a massive form starting from the city of Wuhan taking a toll over the rest of the world has not only posed a risk over health of people but has even brought the economic activity to a standstill and impacted the GDPs of all the major economies of the world as restricted movements were imposed on people and activities so as to contain the virus. As per the report on global economic prospects (Global Economic Prospects, june 2020) it will result in the most impactful recession of the decade and has been forecasted and it is estimated that

global GDP will contract by 5.2% and per capita income also in the largest fraction globally since 1870. Irrespective of the fact that governments of both developed and developing countries are trying hard to counter the impact of the slump using appropriate monetary and fiscal policy measures still the figures have been alarming with developed economies shrunk by 7% and developing ones by 2.5%.

As is the economy being affected by the COVID -19 outbreak so are the ways of living and ways in which day to day transactions are being taken care of. The pandemic has not only brought about far-reaching changes in the economy and daily lives of people but also the ways in which businesses are conducted and payments made.

Although the virus outbreak has affected all the industries in some way or the other a major impact of the outbreak has been on the payment Industry. The Digital Payments Industry is projected to grow at a CAGR of 20% by 2023 from $3,885.6 billion (2019) to $8,059.3 billion (Global Market Report 2020-30:COVID-19 Implications and Growth, 2020). It has impacted not only the payment capacity of people but also the modes of payments. So as to ensure safety and looking into the comfort, people are getting inclined heavily towards online transactions. Even for offline trades people are moving more towards making contactless payments. A clear shift is evident towards increasing intent towards contactless cards and mobile payments.

There was a time when the major transactions were done in cash which then shifted to payments through banks including POS, Cheque, draft which later on shifted to payments through credit and debit cards. Thanks to the world of digitisation now a whole gamut of Industry has come into existence, the digital payment Industry where payments are done through a range of methods from NEFT or IMPS transactions to wallet payments, UPI, mobile payments. These days People are opting more than one online payment options as per their convenience. Thus, as the buying behaviour of consumers is changing so is the payment behaviour. A study reveals that almost approximately 50% customers all across the globe have shifted to more digital payments post pandemic and intend to continue so in future also (Global Online Payment

Methods 2020 and COVID-19's Impact, 2020).With the shift in ways in which payments are being carried out there has been a sudden splurge in players for both mobile wallets like Google pay, phone pay and digital wallets like PayPal. Each of the player offers excellent security system so as to ensure safe payments. The current study is an attempt to figure out this shift in payment mode adopted by customers post pandemic and to appraise the Impact of covid-19 pandemic- On IT enabled non-banking payment portals.

2. OBJECTIVES OF THE STUDY

2.1. To study the Impact of Covid 19 pandemic on IT enabled non-banking payment portal.

2.2. To study various types of Payment Instruments.

2.3. To analyse operations of Non-Banking Payment Portals.

3. RESEARCH METHODOLOGY

The present research is an attempt to study the various types of Payment Instruments with special focus on Non-Banking Payment Portals. The research is descriptive in nature. The research data has been collected through various secondary data sources which includes research articles, based web sources etc.

4. SIGNIFICANCE OF THE STUDY

4.1. Payment portals are important and inseparable part of state's and nation's economy. There has been a drastic change in utilization of payments portals post Covid 19 pandemic. Hence it is necessary to the study Impact of Covid 19 pandemic on IT enabled non-banking payment portal.

4.2. Payment Instruments are cumulatively growing day by day and is ought to capture all economic transactions in near future. This has generated researcher's interest in types of Payment Instruments.

4.3. Non-Banking Payment Portalshave changed business scenario.The service charges of payment portals and gateways have changed in past one year. Hence analyse operations of Non-Banking Payment Portalsis need of time.

5. CONCEPTUAL FRAMEWORK

5.1. Rapid evolution of digital payments:

The payments industry has endured gamut of changes in the past one decade, needless to mention that the payment modes differ across countries owing to the cultural, economic and regulatory differences they experience. Economies over globe have been trying to move toward becoming cashless economies while strengthening safety and security concerns.

Customer conduct and expectations, technological advancements, emergence of non-banking players, financial inclusion and the want for improved payment mechanisms is the driving force behind the range of developments in this sector.

The payment systems in India are regulated by Payment and Settlement Systems Act 2007 ("**PSS Act"**) and RBI is the designated authority which deals with related matters. The policy making body of RBI i.e. The Board for Regulation and Supervision of Payment and Settlement Systems (BPSS), makes and revises policies related to payment systems. The evolution of the payment systems starts right from the replacement of precious metals and barter system with the currency system which was then taken over by ATMs, cheque payments and bank transfers. Thanks to the ICT a number of payments instruments have then evolved as an advancement over paper-based payment system.

5.2. Types of Payment Instruments:

5.2.1. Credit card and Debit card payments:

Credit card and debit card payments are one of the popularly accepted modes of payments which use CVV number and OTP for verification and authentication for security purposes. The basic difference between payments done through debit and credit cards is that the former relies on cash held by the person in his own account while credit card payments are not limited by the financial limits of an individual. The billed amount can later be paid once the billing period gets over.

5.2.2. Prepaid cards:

People often use prepaid cards as a payment mode which have different denominations and virtual money stored which automatically gets debited once a payment is made.

5.2.3. Bank transfers:

With the adoption of other online payment methods banks transfers have lost their popularity these days but still can be an option when payments are made through internet banking or through banking mobile applications. It can be preferred by people for their simplicity of adoption and avoiding hassles of carrying cards with self each and every time.

5.2.4. E-Wallets and Mobile wallets:

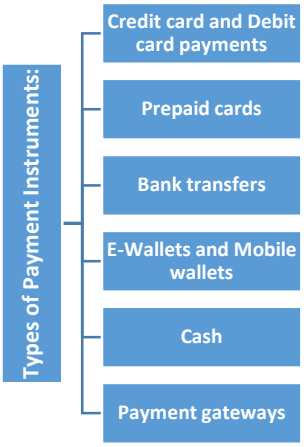
E-wallet and mobile wallets have altogether changed the shopping experience by increasing the ease and convenience of operation. E-Wallets are linked to bank accounts through which payments can be made.

5.2.5. Cash:

Cash has long been considered as the safest payment options. People still use COD as one of the major payment options when the site they are shopping on is not considered to be safe.

5.2.6. Payment gateways:

One of the major tools that help in processing of online payments an e-commerce payment gateway which processes payment information for several websites integrated through them. It bridges a link age amid the bank and its customer.



5.3. Non-Banking Payment Portals:

The table below shows a summarised version of the essential features of several Payment gateways operational in India.

5.3.1 Settlement Cycle

SNO	Payment Gateways	Settlement Cycle
1	Cashfree payment gateway	fastest 24 hours to 48 hours
2	PayU Payment Gateway Service	T+2 days
3	Razorpay Payment Gateway	3 days
4	InstaMojo Payment Gateway	3 days
5	PayPal Payment Gateway Service	All payments auto-withdrawn to the local bank account on a daily basis
6	**PayKun Payment Gateway**	T + 1 to T + 3 working days
7	CCAvenue Payment Gateway	Payment settlement done on a weekly basis for all amounts over & above of Rs. 1000
8	Atom Paynetz Payment Gateway service	T+2 days
9	PayTM Payment Gateway	2-3 days
10	DirectPlay Payment Gateway Service	T + 2 days
11	PayUbiz Payment Gateway Service	T+2 days

5.3.1. Payment Gateway Charges

SNO	Payment Gateways	Payment Gateway Charges
1	Cashfree payment gateway	Annual maintenance - 0 charges, Transaction Fee per Transaction:1.75% per transaction
2	PayU Payment Gateway Service	Annual maintenance Charge: Zero. Transaction Fee per Transaction: 2% + GST for each transaction. For American Express & Diners Cards, transaction fees = 3% + GST for international transactions
3	Razorpay Payment Gateway	Annual maintenance - 0 charges, Transaction Fee per Transaction: 2% per successful transaction; +1% for International cards, EMI and Amex; No setup fees; GST applicable of 18% on the transaction fee
4	InstaMojo Payment Gateway	Annual maintenance - 0 charges, Transaction Fee per Transaction: Flat fee @ 2% + Rs 3 per transaction
5	PayPal Payment Gateway Service	Annual maintenance - 0 charges, Transaction Fee per Transaction: 4.4% + US$0.30 + Currency conversions charges
6	PayKun Payment Gateway	Annual maintenance - 0 charges, Transaction Fee per Transaction: Domestic: Flat 1.75% taxes as applicable
7	CCAvenue Payment Gateway	Annual maintenance Charge for a Start-up account: Rs 1200, Transaction Fee per Transaction: Variable fee below Domestic Credit & Debit cards on Visa, Mastercard, Maestro RuPay: Flat fee @ 2% Wallets: Freecharge, Mobikwik, OlaMoney, Jiomoney, Paytm, PayZapp, Jana Cash, SBI Buddy, The Mobile Wallet: Flat fee @ 2% IMPS & UPI: Flat fee @ 2% International Credit Cards on Visa, Mastercard, American Express, JCB and Diners Club: Flat fee @ 3% Taxes extra as applicable from time to time
8	Atom Paynetz Payment Gateway service	Annual maintenance Charge: Generally waived off for first year, however second year onwards you have to pay Rs 2400. Transaction Fee per Transaction: Credit Cards: 2.1% Debit cards: for transactions less then Rs 2000 it is 0.75% Debit cards: for transactions more than Rs 2000 it is 1%
9	PayTM Payment Gateway	Applicable Fee per Transaction: Domestic Debit or Credit cards on Visa, Mastercard, Maestro, RuPay: Flat 1.99%, Amex, ezeClick, JCB and Diners: Flat 1.99%
10	DirectPlay Payment Gateway Service	Annual maintenance Charge: Zero. Transaction Fee per Transaction: variable transaction fee applies, Domestic Credit and Debit cards on Visa, Mastercard, Maestro, RuPay: Flat fee @ 2% Wallets: Flat fee @ 2%, NEFT, IMPS, Cash cards & UPI: Flat fee @ 2%Amex, ezeClick, JCB and Diners: Flat fee @ 3%

5.3.2. Distinctive Features

SNO	Payment Gateways	Distinctive Features
1	Cashfree payment gateway	Visa, Mastercard, Maestro, RuPay, and 75+ net banking, International Payment / Credit Card Support, Pay Later and EMI Options, EMI — Flexmoney, Zestmoney and multiple bank EMI options, Recurring Billing Support,32+ foreign currencies supported
2	PayU Payment Gateway Service	International Payment / Credit card Supported, Domestic Credit cards Visa/ Mastercard/ Diners/ Amex credit Cards supported, Multi-Currency Support
3	Razorpay Payment Gateway	International approval is a separate process and takes longer, which is subject to the bank's approval, Multi-Currency not Supported
4	InstaMojo Payment Gateway	International Payment / Credit card Not supported, Multi-Currency not Supported, Supported eCommerce CMS System: All major ones such as Magento, Presta shop, Open cart etc
5	PayPal Payment Gateway Service	PayPal can be used by an Indian merchant only for receiving international payments only. PayPal does not support or recognize Indian currency, support over 100 currency globally
6	PayKun Payment Gateway	International Payment / Credit card not Supported, Multi-Currency not Supported, Payment link option for single & multiple customers, Powerful dashboard, Offers 120+ payment options with simple and lowest pricing
7	CCAvenue Payment Gateway	International Payment / Credit card Supported; CCAvenue allows the collection of payments in 27 major foreign currencies
8	Atom Paynetz Payment Gateway service	International Payment / Credit card Not supported, Domestic Credit Cards supported: Visa, Master, AMEX, Diners, JCB, Discover, Multi-Currency Support: Not Supported
9	DirectPlay Payment Gateway Service	International Payment / Credit card Support: Supported with an additional refundable security deposit of Rs 30000.Multi-Currency Support: US$ is supported for merchants with International Payment Gateway activation.
10	PayUbiz Payment Gateway Service	International Payment / Credit card Not supported Domestic Credit cards supported: Visa/Mastercard/Diners/Amex credit Cards Multi-Currency not Supported

5.3.3. Documentation required

SNO	Payment Gateways	Documentation required
1	Cashfree payment gateway	Completely online process. Need only scanned copy of the cancelled cheque, PAN Card and address proof
2	PayU Payment Gateway Service	Extensive list of documents
3	Razorpay Payment Gateway	Extensive list of documents
4	InstaMojo Payment Gateway	Documentation list can be seen after signing up with them.
5	PayPal Payment Gateway Service	Simple documentation process
6	PayKun Payment Gateway	Extensive list of documents
7	CCAvenue Payment Gateway	Extensive list of documents
8	Atom Paynetz Payment Gateway service	New merchant accounts need to provide Business Registration documents mostly and a PO.
9	PayTM Payment Gateway	Domestic Credit Cards supported: Visa, Master, Maestro, Amex, Discover and Diners, International Payment / Credit card Support: Supported all kind of credit cards. Multi-Currency Support: Not supported as of now International Credit Cards supported: Visa, Master, Maestro, Amex, Discover and Diners
10	DirectPlay Payment Gateway Service	New merchant accounts need to provide business registration documents.
11	PayUbiz Payment Gateway Service	Extensive list of documents.

Other payment gateway services that exist include Emvantage Payment gateway Service, EBS Payment Gateway, Easebuzz, Mobikwik Payment Gateway etc.

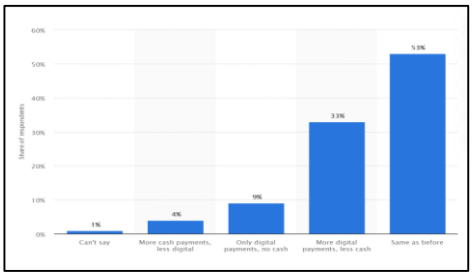


Figure: COVID-19 impact on use of digital payments in India 2020 (Source: Stastista)

In an article published by Sandhya Keelery (Oct 16, 2020) put to record that, according to the findings of a survey among Indians on the effects of the corona virus (COVID-19) and its consequent lockout, a majority of respondents registered no improvement in their use of digital payments. However, 33 percent said they used digital payments more than before, while nine percent made online payments solely.

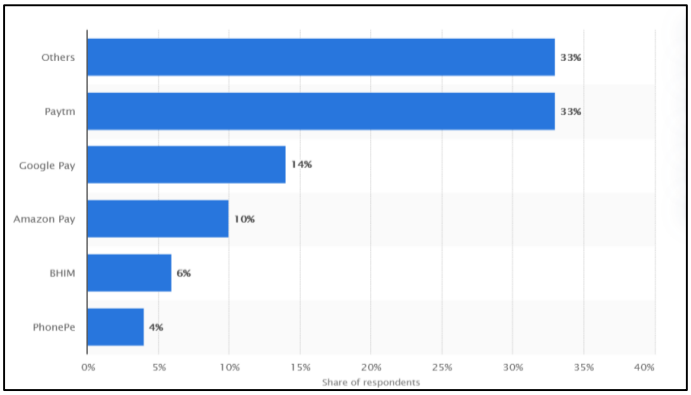


Figure: COVID-19 impact on digital payment app usage in India 2020 (Source: Statists)

A majority of respondents used Paytm to make digital payments, according to the findings of a survey of Indians on the effects of the corona virus (COVID-19) and its consequent lockout. More than 30 per cent of the survey participants registered a rise in the use of online payments.

India went into lockdown on March 25, 2020, the largest in the world, restricting 1.3 billion people, extended until May 3, 2020.

5.4. Government Guidelines in connection to digital payment systems:

Motivated by the thrust to move towards a paperless economy by switching on to a digital mode coupled with the intent to reduce digital banking fraud, RBI has constantly been coming up with regulatory measures and

necessary guidelines. The key stake holders are governed and regulated to a lot extent by policies and guidelines framed by regulatory institutions in regards to digital payment systems. The recent policy guidelines issued, 'Guidelines on Regulation of Payment Aggregators and Payment Gateways' in April 2020, provides for meeting twin objectives i.e. Regulation of payment aggregator activities on one hand and baseline technology recommendations for payment gateways on the other hand. The guidelines call for discontinuance of payment aggregator services provided by E-commerce marketplaces before June 30, 2021. RBI has also laid down policy guidelines for Minimum net-worth requirements, Public grievance redressal systems and RBI authorisation for non-bank entities offering payment aggregator services on or before June 30, 2021 to name a few. These guidelines have been issued keeping in mind the interests of the consumers and development of an advanced paperless economy.

6. CONCLUSION

6.1. The outbreak of the pandemic of COVID-19 has brought about several compelling changes in the economy across globe.

6.2. While the outbreak has resulted in bringing life to a standstill and losses for all the major industries, one of the industries which has emerged at a winning edge is the digital payment system Industry.

6.3. Emerged as a necessary response to the pandemic, the advancements in the digital IT enabled payment systems, have acted as a boon to the economy besides increasing ease and convenience of the customers as it provides hassle free shopping experience.

6.4. While the payment systems are evolving so are the developments and amendments taking place in the regulatory mechanisms so as to ensure a safe shopping experience.

7. REFERENCES

7.1. Bhatt, P., Agarwal, A., Baja, John, ROnald, J., Anush, Anu. (2020, December 13). Top 10 Best Payment Gateway in India [Updated Nov 2020]: BrandLoom. Retrieved January 16, 2021, from https://www.brandloom.com/10-best-payment-gateways-in-india

7.2. Dar, A. (2020, April 15). RBI Guidelines On Regulation Of Payment Aggregators And Payment Gateways - Corporate/Commercial Law - India. Retrieved January 16, 2021, from https://www.mondaq.com/india/compliance/918062/rbi-guidelines-on-regulation-of-payment-aggregators-and-payment-gateways

7.3. Keelery, P., & 16, O. (2020, October 16). India - COVID-19 impact on digital payment usage 2020. Retrieved January 16, 2021, from https://www.statista.com/statistics/1111082/india-coronavirus-impact-on-digital-payment-usage/

7.4. Keelery, P., & 16, O. (2020, October 16). India - COVID-19 impact on digital payment apps 2020. Retrieved January 16, 2021, from https://www.statista.com/statistics/1111087/india-coronavirus-impact-on-digital-payment-app-usage/

7.5. Pricewater house Coopers. (n.d.). Payments regulations: Understanding the global state of play. Retrieved January 16, 2021, from https://www.pwc.in/consulting/financial-services/fintech/dp/payments-regulations-understanding-the-global-state-of-play.html#sources

7.6. The Future of Payment Gateway: Lyra. (2020, April 20). Retrieved January 16, 2021, from https://www.lyra.com/in/the-future-of-payment-gateways/

A STUDY ON IMPACT OF LIFESTYLE ON HEALTH AND WELLNESS

Mr. Siddharam Someshwar #1, Dr. Pushpraj Wagh *2

Student, Yashaswi Education Society's IIMS- Chinchwad.

Savitribai Phule Pune University, Pune.

169/A,Station Road, Opp. Elpro International, Chinchwad, Pune, Maharashtra 411033 (India)

siddharams578@gmail.com

Assistant Professor, Yashaswi Education Society's IIMS- Chinchwad.

Savitribai Phule Pune University, Pune.

169/A,Station Road, Opp. Elpro International, Chinchwad, Pune, Maharashtra 411033 (India)

pushprajwagh864@gmail.com

Abstract:

The changing lifestyle, sedentary nature of many jobs, work related stress are causing serious impact on health of people. The various related health issues include hypertension, stress induced diabetes, kidney disorders, sleep disturbances, mental disorders and many more.

A structured questionnaire was used to collect information from 420 individuals in Pune city selected on the basis of convenience sampling method. The present paper attempts to explore the various effects of lifestyle on general health and wellbeing of people. The study will be useful as valuable reference for healthcare services to understand, evaluate and mitigate the various lifestyle induced diseases and disorders.

The study revealed that the lifestyle, work related stress and nature of various jobs have impacted the health and wellness of people and may lead to serious illness, chronic diseases and disorders and that the preventive and curative measures can be taken to mitigate the negative effects.

KEY WORDS: Health Care, Wellness, Lifestyle, Disease, Discomfort

INTRODUCTION:

The present study involved the identification of causes of illness of people and how healthcare and wellness centers can become prevention system, which leads to step towards wellness of the society.

The study revealed the potential for healthcare and wellness centers improve health care quality, safety and how this potential has been demonstrated. Process and planning stage was about conducting descriptive research for healthcare survey with the help of questionnaire in different types of hospitals like Mental hospitals, Thyroid hospitals, De-addiction Centers, Wellness centers, Old-age Homes, Yoga Clubs, and Laughter Clubs.

The study included collection of information from 420 individuals in Pune city between the age ranges of 55-75 who visited clinics regularly for their health issues.

A structured questionnaire was used to collect information from respondents using personal interview method.

The study reported the various causes and issues that are directly or indirectly have an impact on overall health and wellness of people.

LITERATURE REVIEW:

Dariush D. Farhud (2015)[1] in his study on "Impact of Lifestyle on Health" discussed 9 Key Factors, for healthy lifestyle. 1. Diet 2. Study, 3. Application of Modern Technology, 4. Sex, 5. Substance Abuse, 6. Recreation, 7. Medication Abuse 8. Exercise 9. Sleep. He further states that lifestyle has a significant influence on physical and mental health of human being. Today, wide changes have occurred in life of all people. Malnutrition, unhealthy diet, smoking, alcohol consuming, drug abuse, stress and so on, are the presentations of unhealthy life style that they are used as dominant form of lifestyle. Besides, the lives of citizens face with new challenges.

Corina Dima-Cozma1, Cristina Gavriluta, Geta Mitrea and Doina-Clementina Cojocaru (2014)[2] in their study on **"**The Importance of Healthy Lifestyle in Modern Society, A Medical, Social and Spiritual Perspective" mentions that lifestyle describes a complex behavioral strategies and routines, attitudes and values. In this study researchers have used the study of WHO, and various authors study paper. They conclude that Healthy lifestyle have to be learned in childhood and must include all components related to diet, dietary supplements, rest and relaxation, stress management, physical activity. Personalized lifestyle medicine will become the future of medicine in order to effectively prevent and treat disease, including using of modern technological advances.

Abhay Tirke, Devendra Ahiwar, Kirn Tandia (2015)[3] in their research paper "A study of Thyroid Dysfunction in Diabetic Patients" state that, world over have around a higher incidence of thyroid dysfunction among the diabetic patient. The study included sample size of 100 individuals and was observational cross-sectional study done in Department of Medicine of Bundelkhand Medical College Sagar. The study concluded that thyroid dysfunction increases with duration of diabetes thereby underlining the importance of annual screening of thyroid function in diabetics over and above the initial screening at the time of diagnosis.

Pickering T.G., Hall JE, Apple LJ, Falkner BE, Hill MN, Jones DW, Kurtz T- (2005)[4] in their paper "Recommendations for blood pressure measurement in humans and experimental animal" mentioned that accurate measurement of blood pressure is essential to classify individuals, to ascertain blood pressure-related risk, and to guide management. The high blood pressure is found in not only the aged group but also now children also suffering these issues. Healthy life style is the most important factor to control the issues.

ST, Singh-Manoux A, Pentti J, et al (2020)[5] in their research paper on "Association of Healthy Lifestyle With Years Lived Without Major Chronic Diseases" based on study of 116043 individuals noted the statistically significant association between overall healthy lifestyle score and an increased number of disease free life-years. They concluded that various healthy lifestyle profiles are seen to be associated with gains in life-years without major chronic diseases.

SIGNIFICANACE:

The Study will be of value for the healthcare services to identify, evaluate and plan for mitigation of various lifestyle induced diseases and disorders.

The study will also be a useful reference to society for understanding the long term ill effects of unhealthy lifestyle and take preventive measures to avoid the related issues.

RESEARCH METHODOLODY:

The present study is based on primary as well as secondary data. The secondary data was collected through various journals, books and websites. The primary data is collected through a structured questionnaire and personal interview from a sample of 420 individuals selected on the basis of convenience sampling method from Pune city. MS Excel was used for the analysis of the data. The conclusion is based on the information collected through questionnaire,

interaction with healthcare wellness center employees, formal/informal interactions with the respondents as well as observations of respondents made during the study.

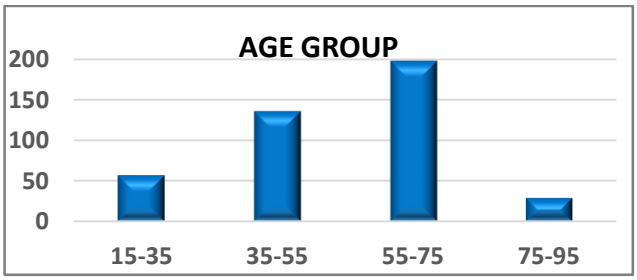
OBJEVTICES OF THE STUDY:

1. To understand the demographic characteristics, major events and lifestyle changes.
2. To understand the impact in the form of diseases and discomfort due to major events in life and lifestyle.

DATA ANALYSIS AND INTERPRETATION:

Age Group of the Respondent

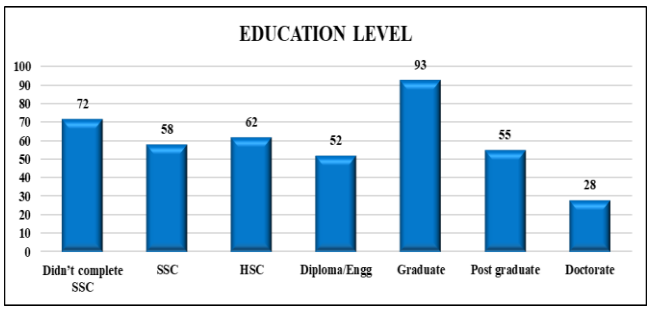
Graph No. 01: Age group of the respondent



Interpretation: The total number of respondents are 420, out of which the highest age group for this study is between 55-75years age and we have 198 respondents. The age group of 55-75 have more health issues due to improper life style in the age of 15 to 55.

Education of respondents:

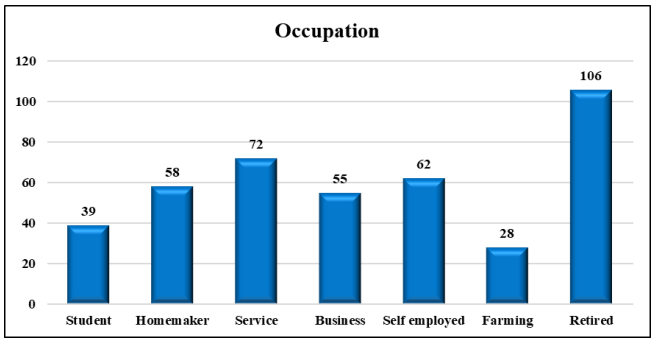
Graph 02: Education Level



Interpretation: Among the respondents, 93 are graduates, 55 are post graduate and 28 are doctorate.

Occupation of Respondents:

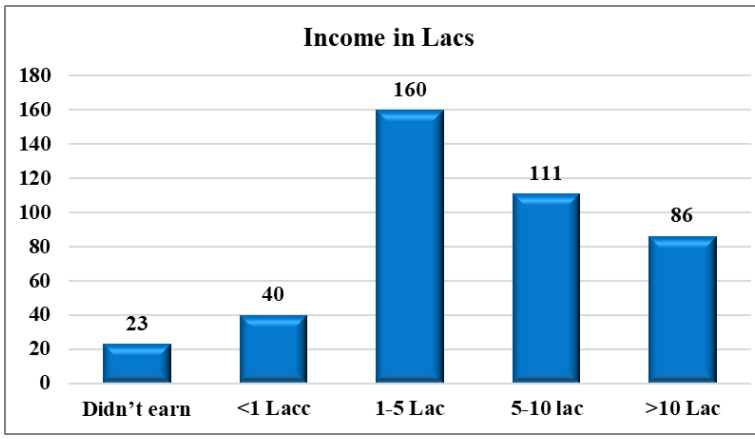
Graph 03: Occupation of Respondent



Interpretation: Among the respondents, retired have the maximum number of 106. Respondents who are doing 'Service' are 72. The age group of retired people is above 55-75 and they are suffering the common health issues.

Yearly Income of Respondents:

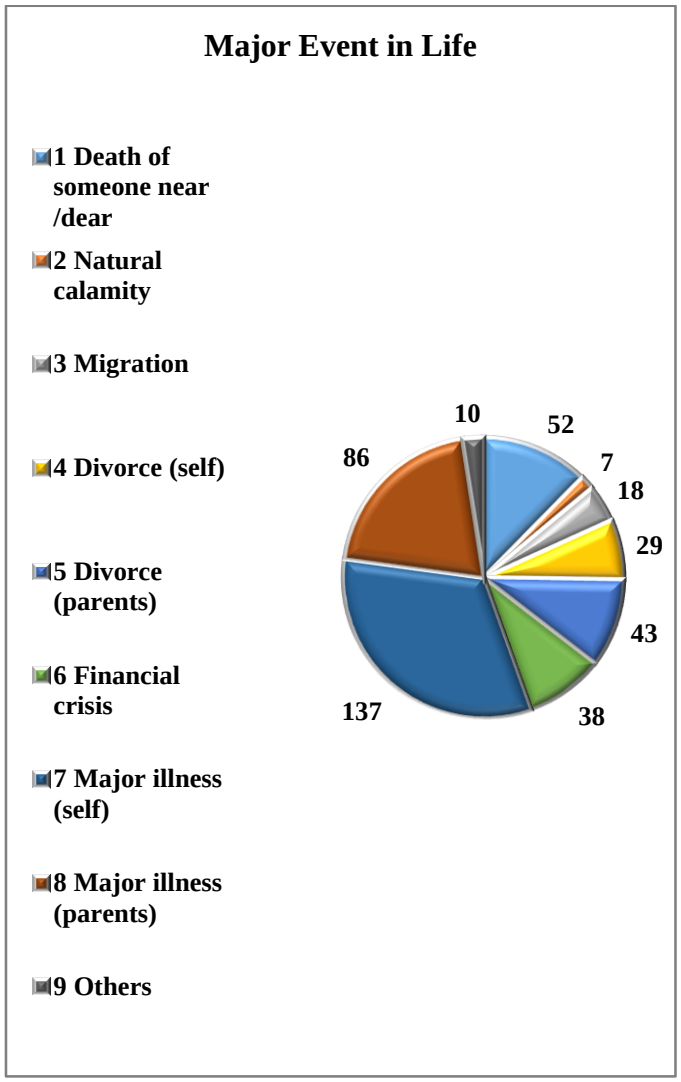
Graph 04: Yearly Income of Respondents



Interpretation: Among the respondents, respondents with yearly income between 1 TO 5 lc are 160. And respondents with yearly income between 5TO10 lc are 111.

Major event that had a significance impact on respondents' life:

Graph 05: Major event that had significant impact on respondent life.

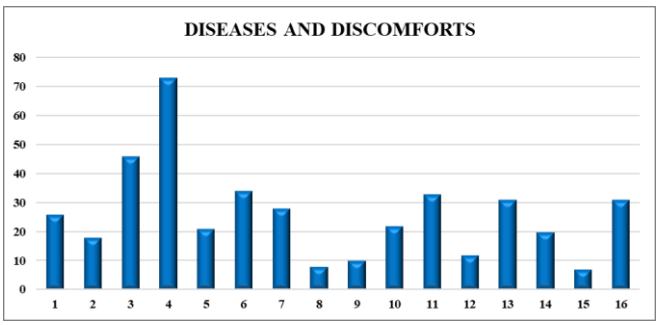


Interpretation: The event which impact on people life that is major illness of self and this is 137 out of 420. And the 2nd event which impact on life that is major illness of parents.

Presence of diseases and discomforts in respondents:

Graph 06: Presence of diseases and discomforts in respondents

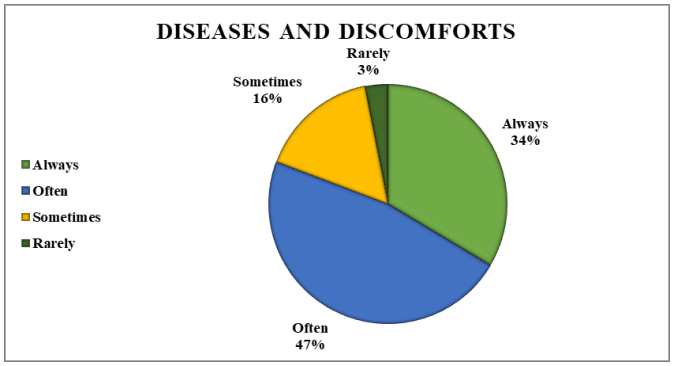
Sr. No.	Diseases and discomforts	No. Of respondents (total
1	Common cough/cold	26
2	Giddiness/headache/neck pain	18
3	Constipation/indigestion	46
4	Acidity	73
5	Lack of concentration	21
6	Nervousness/short tempered	34
7	Leg cramps/ pain in heels	28
8	Eyes pain/irritation	8
9	Fatigue/tiredness	10
10	Back ache/body pain	22
11	Insomnia	33
12	Tinging/numbness	12
13	Hair fall	31
14	Anxiety/worry	20
15	Skin rashes	7
16	Sinusitis	31



Interpretation: Among the respondents' diseases and discomforts, 73 respondents have hyperacidity and hyperacidity induced disorders as a general symptom of discomfort which is higher in proportion, this happen due to irregularity in meal, bad sleeping habit, bad food habit, and improper lifestyle.

Frequency of discomforts or diseases occurrence to respondents:

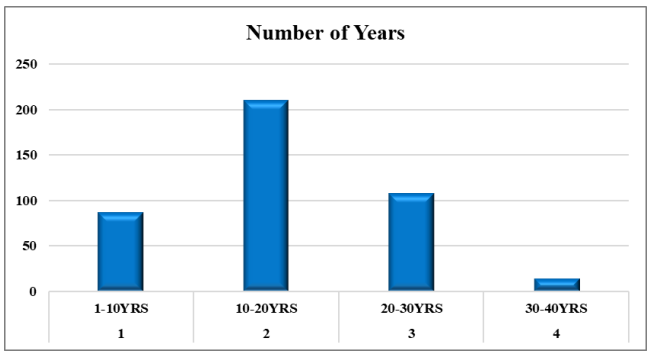
Graph 07: Frequency of discomforts or diseases occurrence to respondents



Interpretation: The frequency of occurrence of discomfort and diseases is very high and that further leads to chronic illness and disorders in later point in time.

The period (years) of suffering from discomforts and diseases:

Graph 08: The period (years) of suffering from discomforts and diseases



Interpretation: The analysis revealed that most of the respondents have diseases and discomfort since the 10-20 years. This is the age of hard work, earning money so it impacts on health as usual.

FINDINGS:

Age Group of 55-75 is having many health issues and among the respondent this age group is highest (Graph 01)

- Researcher found that maximum respondents are Graduate and among the 420 respondent 72 means 13% respondent are illiterate or not complete their SSC. (Graph 02)
- The present research revealed that maximum respondents are retired so their age is more than 58 and they having common health issues (Graph 03) and 160 respondents have the income between the 1 Lac to 5 lacs annually (Graph 04)
- The Major event which impacts on individuals' life is basically a self-illness and family illness (Graph 05) and these discomforts occur to respondent often and always (Graph 07) and this illness they having mostly since 10 to 20 Years (Graph 08)
- Researcher found out that the number of literate people were more as compared to illiterate people. As the number of literate people is high, the income of the people is as per their educational qualification. Most of the people are very much concerned about their health issues followed by the health issues of their family members which make a major impact in their lives.
- On the basis of analysis done on the diseases and discomforts Graph (06), researcher found out that major population is facing the problem of hyperacidity and hyperacidity induced disorders. The main reason for this discomfort is in the change of their daily lifestyle like rotational shifts at workplaces, skipping meals, incomplete sleep and many more.
- The changed lifestyle has an impact on their digestive system too which creates problems like indigestion, constipation, gases and peptic ulcers. These discomforts often appear and they need to rely on medicines. These discomforts affect their health a lot and happen to last for many years.
- Researcher also found that major population suffering from thyroid disorders and diabetes. Thyroid disorders and diabetes being a hereditary disease, it is been passed from one generation to another. However, the stress induces diabetes is also on rise irrespective of the age of the

individual.

CONCLUSION AND DISCUSSION:

The present research revealed that improper diet, unhealthy lifestyle and habits will affect the health and wellness of individuals. In long run, if proper precautions are not taken, it can lead to various chronic illnesses and diseases like hypertension, diabetes, kidney related disorders and many more that will deteriorate the quality of life. Therefore, staying healthy by adopting proper lifestyle is important to avoid complexities in later part of life.

SCOPE FOR FUTURE RESEARCH:

The present study is based on exploring various negative effects of unhealthy lifestyle and practices on individuals in society. Further studies can be conducted to find out the various other causes of various chronic diseases and disorders.

The study can also be extended over comparison of such lifestyle induced disorders within various age groups, income groups' rural-urban population and so on.

Further exploratory study can also be done over the ways of healthy lifestyle and best practices to avoid the occurrence of such diseases and disorders.

REFERENCES:

1. Farhud D. D. (2015). Impact of Lifestyle on Health. *Iranian journal of public health*, *44*(11), 1442–1444.

2. Cojocaru, Doina-Clementina & C, □ & C, Gavriluță & Mitrea, Geta. (2014). The importance of healthy lifestyle in modern society: a medical, social and spiritual perspective. Eur J Sci Theol. 10. 111-120.

3. Tirkey, A.S., Ahirwar, D., & Tandia, K. (2015). Study of Thyroid Dysfunction in Diabetic Patients.

4. Pickering TG, Hall JE, Appel LJ, Falkner BE, Graves J, Hill MN, Jones DW, Kurtz T, Sheps SG, Roccella EJ. Recommendations for blood pressure measurement in humans and experimental animals: part 1: blood pressure measurement in humans: a statement for professionals from the Subcommittee of Professional and Public Education of the American Heart Association Council on High Blood Pressure Research. Circulation. 2005 Feb 8;111(5):697-716. doi: 10.1161/01.CIR.0000154900.76284.F6. PMID: 15699287.

5. Nyberg ST, Singh-Manoux A, Pentti J, et al. Association of Healthy Lifestyle With Years Lived Without Major Chronic Diseases. *JAMA Intern Med.* 2020;180(5):760–768. doi:10.1001/jamainternmed.2020.0618

Yashaswi Education Society's

INTERNATIONAL INSTITUTE OF MANAGEMENT SCIENCE,[IIMS] CHINCHWAD, PUNE,INDIA

WELCOME

2nd INTERNATIONAL CONFERENCE ON INNOVATIONS IN MANAGEMENT & INFORMATION TECHNOLOGY (ICIMIT –22)

in Association with

National Institute of Personnel Management [NIPM]

&

Indo European Education Foundation [IEEF],Poland.

25 TH & 26TH OF FEBRUARY 2022

ISBN 978-81-927230-0-10