IMPACT OF COVID -19 PANDEMIC ON FMCG MARKET IN INDIA : A STUDY ON CUSTOMER PREFERENCE IN SELECTED AREAS OF COIMBATORE DISTRICT

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ABSTRACT

The Coronavirus/COVID-19 pandemic is having a substantial impact on business across the globe, including FMCG and retail. The pandemic is resulting in a recession in many countries. In India, The scenario is quite different in India compared to developed nations where the market is dominated by few large players, whereas FMCG market in India is very competitive and a big part of the market includes unorganized players selling unbranded and unpacked products. The main objective of the study was to identify the various factors which influencing on the customer behaviour of FMCG consumer. Descriptive analysis, ranking analysis and t-test has been used for the study. Majority of the respondents will go to the nearby town for buying the preferred brand or through online marketing. It was revealed from the study that customers cannot postpone the decision of buying the consumer goods, as it was one of the essential for day today life.

Keyword: *Brand Preference, Commodity Goods, Fast moving goods and Purchasing Decision.*

1.1 Introduction

The FMCG sector is the fourth largest sector in the Indian economy with an estimated size of Rs.1, 300 billion. The sectors has seen tremendous average annual growth of about 11% per annum over the last decade. Approximately 12-13 million retail stores exist across India, the major percentage of which around 9 million are Kirana stores. The Indian FMCG sector is having few significant factors like well-connected distribution network, high level of competition between the organized and unorganized FMCG players, and low operational cost. In India, FMCG companies have privilege of having easy availability of raw materials, cheaper labour costs and presence across the whole value chain gives India a competitive advantage.

Products which have a swift turnover and comparatively low cost are referred as Fast Moving Consumer Goods (FMCG). FMCGs are those which generally get replaced within a year. Examples of FMCG includes the range of daily consumed items such as toiletries, soap, detergents, cosmetics, oral care products, shaving products, packaged food products and digestives as well as other non-durables such as bulbs, batteries, paper products, glassware and plastic goods. FMCG may also include pharmaceuticals and consumer electronics, etc.

India's population is continuously increasing day by day, particularly in the middle class and the rural segments. These areas offer immense opportunity which is left untapped to FMCG players. The effect of Growth will be seen from product customization in the matured product categories like skin care, processed and packaged food, mouth wash etc. In India, there are many companies who have made their presence through their subsidiaries (HUL, Reckitt Benckiser, P&G) and the company's launches innovative products from their parent's portfolio in the market continuously to ensure the consistent growth. Indian economy is based on agriculture and has a varied agro-climatic condition which gives extended raw material base suitable for many FMCG sub sections like food processing industries etc. India is one among those countries which has the highest production of livestock, milk, vegetables and fruits. Similarly, India has an abundant supply of sodium hydroxide and sodium carbonate, the main raw materials required to manufacture soaps and detergents, which helps companies manufacturing soaps and detergents to grow and prosper. The easier accessibility and availability of the raw materials gives India a further edge over other countries.

Rural India accounts for 700 Million or 70% of the Indian population and accounts for 50% of the FMCG market. The working rural

population is approximately 400 Million. A normal citizen in rural India has lesser than 50 % of the purchasing power as compare to his urban counterpart. Even now there's an untapped market and most of the FMCG Companies are taking different steps to capture rural market share. The marketplace for FMCG products in rural India is estimated about 52%t and is projected to reach about 60% within a year. Hindustan Unilever is the market leader in the industry and has the widest market coverage.

1.1 Picture of FMCG

Fast Moving or Consumable Goods or Consumer Packaged Goods are sold very quickly and at a relatively low-cost. Even the margin of profit made on Fast Moving Consumable Goods is comparatively small, they're generally sold in large quantities thus, the cumulative profit on such products will be substantial. FMCG is perhaps the foremost classic case of low margin and high-volume business.

The world remains handling the consequences of the coronavirus pandemic, quite a year on. FMCG industries selling necessity-driven and essential products, like fresh foods, packaged food and drinking water, are being impacted thanks to supply chain breakdowns, stockpiling and stockouts. The COVID-19 pandemic has resulted in a slight shift within the paradigm of what we concede to be essentials; hygiene products have entered this category, whereas industries like apparel have shifted to discretionary.

1.2 Statement of the Problem

Coronavirus pandemic shows an extraordinary change globally, and the impact is even higher in emerging economies like India. Fast Moving Consumer Goods (FMCG) is one of the largest sectors in India with varied businesses, including household, personal care, etc., with high demand, consumed frequently, and services are provided for a low cost. Fast Moving Consumable Goods are substantially used to enhance and protect the health and physical appearance and also the dignity of the people among their counterparts. The spending on FMCG is showing an increasing tendency in the last 5 years. This is due to increase in income levels, fascination towards urban culture, good connectivity to nearby towns and cities, improvement in sanitary conditions, beauty awareness among teenagers emulating their counterparts in the urban areas led to the increased use of FMCG particularly beauty and health care products in the Coimbatore region. With this backdrop the brand awareness with reference to FMCG is thought off. But the post covid pandemic has changed the purchasing behavior of FMCG goods and there will be further changes in their wants and needs. A histrionic variations has become a chestnut for our times. But Covid-19 pandemic has had a significant impact on consumers buying behavior of various FMCG products. Thus it is unsurprising that most of the FMCG sales through digital channels has grown. This paper is an attempt to study the outbreak of COVID-19 in the FMCG sector. It shows that FMCG is affected uncommonly with many factors like Labours moved to their natives, logistics issues, and changes in the consumer basket like a sudden increase in demand for sanitary products and surged in demand for cosmetics, grocery items. It is believed that the findings in Coimbatore region are fairly representative of the other parts of the State and the lifestyle and other parameters are not much different from what exist in the area of survey.

1.3 Objectives of the Study

- To know the brand awareness of FMCG categories during pandemic.
- To study the perception of the customer towards FMCG during pandemic.
- To analyse the factors influencing the customer, buying behavior and customer decision making process during pandemic.
- To know the impact of FMCG during pandemic.

1.4 Research Methodology

A research design is a framework or blueprint for conducting the population research project. Descriptive research design is used for the study. Convenience sampling (also known as Availability Sampling) is a specific type of non-probability sampling method that relies on data collection from population members who are conveniently available to participate in study. Primary data are data which are collected for the first time directly by the researcher for the specific study undertaken by him. In this research primary data are collected directly from the respondent by using Questionnaire. The secondary data was collected from the articles, journals, newspapers, magazines and various websites. The study was conducted in Coimbatore District and sample size is 120 respondents.

1.5 Review of Literature

Aggarwal (2014) suggested that Consumer behaviour research is the scientific study of the processes consumers use to select, secure, use and dispose of products and services that satisfy their needs. Firms can satisfy those needs only to the extent they understand their customers. The main objective of this paper is to study the demographic differences in consumers buying behaviour of persons living in Madhya Pradesh and when they buy FMCG products. To attain this objective a survey was developed and administered across some part of Madhya Pradesh. The findings confirm the factors influencing consumer buying behaviour for tooth paste brands available in the market. Dr. Kiranmor & Sulekha (2013) conducted a study to identify the factors responsible for buying behaviours of rural consumers of FMCG in Haryana. A questionnaire structure for 500 respondents and factors analysis was used to find out the factors. The study revealed that the rural consumers are not only price sensitive but also – think about quality, performance, reliability; brand and other critical aspects, and they are highly affected by their life style and attitude.

Srivastava and Kumar (2013) analyzed that FMCG sector is a vital contributor to India‘s Gross Domestic Product. It has been contributing to the demand of lower and middle-income groups in India. Over 73% of FMCG products are sold to middle class households in which over 52% is in rural India. Rural marketing has become the hottest marketing arena for most of the FMCG companies. The rural India market is huge and the opportunities are unlimited. After saturation and cutthroat competition in urban areas, now many FMCG companies are moving towards the rural market and are making new strategies for targeting the rural consumer. Sulekha and Kiran (2013) concluded that in India more than 72% population lives in villages and FMCG companies are famous for selling their products to the middleclass households; it implies that rural India is a profitable and potential market for FMCG producers. Rural consumer’s incomes are rising and now they are more willing to buy products which improve their lifestyle. Producers of FMCG have to craft unique marketing strategies exclusively for rural consumers. Yuvarani (2013) analyzed that liberalization of the Indian economy had far reaching consequences, which led to the free entry of global brands in Indian markets. The study focuses mainly on the rural consumer behaviour towards selected FMCG products, but with the prevailing trend it is necessary to focus on the essence and emergence of vibrant rural marketing efforts of FMCG companies.

Muneeswaran and Vethirajan (2013) revealed that Consumer behaviour assumes much importance in the present consumer oriented marketing system with particular reference to 'gender attention'. The FMCG sector consists of four product categories such as Household Care; Personal Care; Food and Beverages; and Tobacco each with its own hosts of products that have relatively quick turnover and low costs. Every consumer is purchasing a particular product due to the influence of many factors. The influencing factors differ from one consumer to another and from product to product also. Ullah, Shafayet, Prince and Rozario (2012) depicted that Fast Moving Consumer Goods (FMCG) sector is one of the largest sectors in the economy of Bangladesh. In the last few years, the FMCG industry in Bangladesh has experienced a dramatic growth; both qualitative and quantitative improvements have taken place in the

consumer durables segment. FMCG in marketing means convenient and low involvement products like, salt, flours, pens, chocolates, etc. In recent years, the FMCG industry worldwide has experienced a difficult market condition. Anandan et al. (2007) studied that, majority of the respondents (54.00%) will buy another brand if preferred brand is not available, 18.00 percent of the respondents will go to the nearby town for buying the preferred brand. Fifteen percent of the respondents will postpone their purchase decision. It was revealed from the study that customers cannot postpone the decision of buying the detergents, as it was one of the essential commodities. Kubendran and Vanniarajan (2005) studied that, the change in consumption pattern was due to changes in food habits. If income and urbanization increase among consumers, the percentage of income spent on consumption increased. The urban consumer‘s preferred mostly branded products compared to rural consumers. The most significant factors influencing buying decisions were accessibility, quality, regular supply, door delivery and the mode of payment. Sarwade (2002) analysed a study on the emerging dimensions of buyer behaviour in rural area. It is observed that the role of husband in family purchasing decisions in various items was comparatively less than of housewife. The study reveals that, the consumer purchases the convenience goods in rural market was mostly did once a week and it is monthly for daily consumption goods such as toothpaste, shampoo, talc. With the increase in real income of rural people, a shift was found to have taken place in the items consumed by the rural consumers. It was also found in the study that most of the consumers from rural area developed brand familiarity with brand names, which are heavily known in urban areas.

S. Rajamohan, et al (2020) The COVID-19 in India made an adverse impact in automobile sector during the study period. The sudden fall of stock values affect the industry manufacturing process and it has been influenced the stock market for a period and it may recover soon with optimum potential. Amit Joshi, et al (2020) exclaimed the impact of covid19 and the ways in which the various sectors in the country affected, also suggested appropriate measures to control the negative impacts.

1.6 Results and Discussion

Table 1.1 showing Descriptive analysis

Factor	Variables	No. of Respondents	Percentage
Age	Below 20 Years	37	31
	21 to 30 Years	61	51
	31 to 40 Years	16	13
	Above 40 Years	06	5
Gender	Male	33	27.5
	Female	87	72.5
Marital Status	Married	41	34%
	Unmarried	79	66%
Educational Qualification	School level	14	12%
	Graduate	59	49%
	Post Graduate	38	32%
	Professional	09	7%
Occupational Status	Student	71	59%
	House wife	15	13%
	Employed	23	19%
	Business	11	9%
Monthly Income	Up to Rs. 5,000	06	5%
	Rs. 5,001 to Rs. 10,000	13	11%
	Rs. 10,001 to Rs. 20,000	39	32%
	Above Rs. 20,000	62	52%
	Lucky draws	10	8%
	Bundling offer	16	13%
	Scratch cards	19	17%

Majority (51 %) of the respondents belongs to the age of 21 to 30 years. Majority (72.5%) of the respondents gender are Male. Majority (66%) of the respondents are

Unmarried. Most (49%) of the respondents are Graduates. Majority (59 %) of the respondents are Students. Majority (53%) of the respondent's monthly income range is above Rs.20,000. Majority (72%) of the respondent's family members are between 2 to 4 members. Most (36%) of the respondents are preferred to purchase in online shopping. Most (41%) of the respondents are making purchase in their preferred store for Varieties. Majority (63%) of the respondents are stated the branded products are better than unbranded products. Most (42.5%) of the respondents have been using above brands from past 6 months to 1 year. Majority (62%) of the respondents are looking for various schemes in the FMCG. Most (33%) of the respondents are in need of Price offer schemes in the FMCG. Majority (60%) of the respondents are like to switch their brand preference if they get some promotional scheme with another brand. Most (35%) of the respondents are like to switch their brand if they get Quality scheme. Majority (57.5%) of the respondents have used other brands before their current brand. Most (39%) of the respondents are influenced by Friends. Majority (71%) of the respondents have stated that the advertisement play role towards their brand preference. Majority (48%) of the respondents are influenced by Television. Majority (63%) of the respondents have purchased FMCG brands recently after come across advertisement. Most (63%) of the respondents are saying that Positive impression created through advertisement.

Table 1.2 showing ranking analysis

Factors	1	2	3	4	5	Total	Mean	Rank
Skin & Hair care	31(5) 155	32(4) 128	13(3) 39	20(2) 40	24(1) 24	386	77	2
Tooth paste	32(5) 160	24(4) 96	32(3) 96	16(2) 32	16(1) 16	400	80	1
Detergent powder	15(5) 75	12(4) 48	33(3) 99	30(2) 60	30(1) 30	312	62	5
Soaps	24(5) 120	25(4) 100	23(3) 69	28(2) 56	20(1) 20	365	73	3
Cold drinks	18(5) 90	27(4) 108	20(3) 60	26(2) 52	29(1) 29	339	68	4

From the above ranking analysis, it was found that most of the respondents prefer Tooth paste and ranked as I, next most of the respondents prefer Skin & Hair care and ranked as II, next most of the respondents prefer Soaps and ranked as III, next most of the respondents prefer Cold drinks and ranked as IV, next most of the respondents prefer Detergent powder and ranked as V.

Hypothesis

There is no significant difference in the mean value of gender and reason for making purchase in their preferred store.

Table 1.3 showing t-test analysis

Personal factors	Type	Mean	T	Significance (p value)	Remark
Gender	Male Female	1.72 2.15	1.980	0.000	<0.05 Significant

The above table shows that p value (0.000) of gender is less than 0.05, therefore hypothesis is rejected and indicates that the difference between the two mean values is found to be significant. By comparing the mean values of gender of the respondents, most of the female respondents had the reason for making purchase in their preferred store than male respondents. Therefore, it is concluded that there is a significant difference between gender

of the respondents and reason for making purchases in their preferred store.

Hypothesis

Mode of purchase of FMCG goods under the study are used equally by the consumers.

Table 1.4 showing Chi-Square test

Mode of Purchase	Expected Frequency	Observed Frequency	Residual	Chi-Square Value	Significance (p value)
Departmental Store	17	40	-30.3		
Retail Store	27	40	12.7	26.113	0.000
Online Shopping	76	40	17.7		

It clearly shows that p value (0.000) is less than 0.05, therefore null hypothesis is rejected. Hence the mode of purchase FMCG products are not used equally by the consumers. From the residual value it is found that majority of the consumers preferred online shopping when compared to departmental and retail store.

Hypothesis

Consumer satisfaction is not significantly associated with age and income of the consumers.

Table 1.5 showing Chi-Square test

Factor	Chi-Square	Significance (p value)
Age	1.004	0.909
Monthly income of the consumers	0.133	0.936

It is seen that p value is greater than 0.05 significance which indicates that consumer satisfaction is not statistically significant associated with age and income of the consumers. It is found that age and income of the consumers are not influenced to satisfy the FMCG products.

To find out impact of categories of FMCG products on buying behavior of consumers, multiple regression method is applied. In this Buying behavior is dependent variable and Health care, Personal care and Food & Beverages are independent variables.

Table 1.6 showing Multiple Correlation Co-efficient

Model	R	R Square
1	0.476	0.227

The above table depicts that multiple correlation co-efficients (R) indicates the buying behavior of consumers influenced to purchase the categories of FMCG products. The Co-efficients of determination (R^2) indicates 22.7% of influence on buying behavior of consumers due to the various categories of FMCG products. The following F ratios in ANOVA tests the independent variables statistically significantly influence the dependent variable.

Table 1.7 showing ANOVA test

F	Significance
1.667	0.042

From the above table revealed that significance value ensures multiple regressions on the variables. The significance value is less than 0.05, therefore the needs of buying behavior of consumers influenced to buy the various categories of FMCG products.

Table 1.8 showing Regression Co-efficients

Categories	Unstandardized Co-efficients (B)	T	Significance
Constant	3.879	3.906	0.000
Health care products	-0.145	0.950	0.050
Personal care products	-0.166	0.075	0.008
Food & Beverages	0.037	0.355	0.078

The multiple regression equation is
Buying behavior = 3.879-0.145(HC)-0.166(PC)+0.037(FB)
From the regression equation it is found that buying behavior of consumers has more negative impact on personal care products. In similar way buying behavior of consumers has next negative impact on health care products. But buying behavior of consumers has positive impact on food and beverages during covid-19 pandemic. It may be concluded that the need and want of consumers during pandemic is more positively influenced to buy the food and beverages than the other health care and personal care products.

1.7 Conclusion and Recommendation

FMCG products are available at everywhere but most of the customers are purchasing in retail and online store and most of the respondents use their stated brands only for six months to one year only. So high quality and need based product should be given to the customer for increasing period of usage. E-commerce companies focusing on grocery sales also recorded an initial spike in sales due to people being confined to their homes, but many later had to halt operations due to logistics issues. E-commerce is expected to benefit over the long run, with a greater number of consumers developing an online grocery shopping habit.
Customer believes that when they get products for low price it is low quality and high price leads to high quality. So the companies need to give their best quality at affordable price. The FMCG companies need to give more advertisement about their product availability. The timely delivery of product needs to be improved in the market.
Non-grocery specialists, especially apparel and footwear specialist retailers, which went into complete shutdown, will witness a larger impact on their revenues. It will take a few more months after the lockdown for retailing operations to normalise, while a period of precautionary measures would lead to a shift in consumers' shopping channel preferences.
The Indian economy is undergoing significant field of growth in FMCG sector with diverse businesses, including food, beverages, grains, cosmetics etc. Growing awareness of maintaining high hygiene standards to prevent the spread of COVID-19 resulted in a spike in demand for personal care products, especially bar soap, liquid handwash and sanitisers, during March. These categories accounted for 22% of overall value sales of beauty and personal care in India in 2019. As consumer priorities shift to focus on purchasing necessities, discretionary spending on beauty and personal care categories such as colour cosmetics, fragrances, deodorants and skincare are expected to witness a fall in demand in the short term.
HULs up and running business model is a treat for investors seeking exposure in the FMCG segment. The company has delivered in the past and has the potential to do better in future. In the small and medium term, ITCs growth story is still evolving. ITC is eyeing the pie which HUL and other FMCG players currently enjoy. Though risky, the companies' business model will pay off in the long run. ITC has proved its expertise in the cigarettes, hotels, paper and agri-businesses. Investors who want to bank on its execution ability in FMCG can consider the stock with a long-term horizon.

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FACTORS INFLUENCING IN ADOPTION OF E-TRANSACTION AMONG PRIVATE EMPLOYEES IN WESTERN TAMILNADU

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ABSTRACT

The persistence of this research is to examine the factors influencing in adoption of e-transaction among private employees in western Tamilnadu. Selected six district of Tamilnadu (Namakkal, Salem, Erode, Karur and Tiruppur) as choose as study area and the sample size is 150 as 30 respondents from each district. Both primary and secondary data are employed. The major tools are applied as Rank analysis, Chi-square test and also factor analysis. The findings of this study expose that most of the defendants state that the 'Fund Transfer' is the main purpose for they using E-transaction and their opinion regard e-transaction is it make their life Convenient. This study concluded that most of the defendants prefer private bank for using E-transactions because of their simple procedure for handling in their Mobile and internet banking. Hence the present study recommended that, public sector bank may takes necessary steps for reduce their complexity in E-Transactions. These steps initiate our country in the path of Digital India.

Keywords: *Factors influencing, reasons, opinions, e-banking adoption and e-transactions. Abbreviations: E-Transactions, Electronic Transactions; E-Commerce, Electronic Commerce; E-Banking, Electronic Banking.*

Introduction

The encroachment of the internet and the subsequent growth of electronic commerce have effect in a lively operating background where electronic businesses are piloted through the internet. Electronic transactions are a precarious component of e-commerce as commercial transactions like selling and buying of goods, amenities and transfer are accomplished through the internet. E-transaction permits banking from everywhere at any time and is expended for transactions, imbursements, etc. The foremost advantages of E-transactions are increased efficiency, reduced costs, and the ability to operate across the various platforms in real time.

Significance of the Study

Increased competition, changing business environment, globalization and advancement of information and communications technology are the important changes that have forced the funding and monetary amenities to change. Demand for financial services is changing rapidly. Accompanying these changes is customer behavoiur regarding to these services. They need to adapt to the new banking environment. Therefore, with the passing of the traditional banking to electronic banking, banks need a new working system and strategies. Information technology is a capital intensive industry. Investing in e-banking if not done appropriately it can cost very substantial sum of money. Today many banks worldwide offer their services electronically.

In an increasingly integrated global economy, the Indian company will lag behind if it does not take advantage of this new banking system. Otherwise, employers who have the technological understanding are growing in number and these private employers prefer a distribution system that is based on information technology. The significance of this research work is on assessing the prospects of electronic transaction in India. This study tries to determine the central factors that affect development of electronic transaction. The study also intends to seek for solution to assist the banking industry to improve networking and services. Although the findings may be limited in scope but it however makes some contribution to the application of e-transaction in developing countries such as India.

Statement of the Problem

The study goals to identify the important challenges for development of e-transactions in India. With the help of the various modes of e-

transactions shall explore some possible implications of both opportunities and confronts that may ascend as results of the e-transaction.

It can be remain underdeveloped customers encounter low level security, widespread fraud, cultural resistance poverty and poor operational infrastructure and management. Contribution may also have been affected by the skill required for electronic transaction technology and the service level provided by the banks. There are numerous features that have directed underdeveloped nations being too relaxed in the claim of contemporary technologies. And also it is identified information that the claim of novel technology will be contingent by what method the technology is being observed and comprised by the private employers. So this study tries to determine the features influencing in adoption of e-transaction among private employees in select districts of Tamilnadu with the help of the following objectives.

Objectives of the Study

- To determine the features that influenced for adoption of E- Transactions among private employees.
- To analyse the major purposes of using e-transactions
- To know the opinion regards e-transactions
- To give suggestions for improve the e-transactions

Research Methodology

The research design expended in this research work is the descriptive survey method. It is based on the structured questionnaire which was conducted to factors influencing the adoption of e-transaction among private employees in select districts of Tamilnadu. Mutually primary and secondary data are expended in this research work. Primary data collected from through well structured questionnaire. Secondary data collected from various national and international journals and web sources. The sampling technique was used cluster sampling method from select districts. The statistical tools are used namely percentage analysis, rank analysis, chi-square test and also factor analysis with the help of SPSS.

Sampling Area

S. No	Districts	Sample Size
1	Namakkal	30
2	Salem	30
3	Erode	30
4	Karur	30
5	Tiruppur	30
	Total	150

Data Analysis and Interpretation

Table 1- Demographic Profile- I- Percentage Analysis

Variable	Classifications	Frequency	Percentage
Gender	Male	102	68.0
	Female	48	32.0
	Total	150	100.0
Age	20-30	78	52.0
	31-40	51	34.0
	41-50	15	10.0
	Above 50	6	4.0
	Total	150	100.0
Educational Qualification	UG	33	22.0
	PG	42	28.0
	M.Phil/Ph.D	75	50.0
	Total	150	100.0
Monthly	Below Rs.10000	21	14.0
	Rs.10001-Rs.15000	49	32.0
	Rs. 15001-Rs.20000	27	18.0

Income	Above Rs.20000	54	36.0
	Total	150	100.0
Marital status	Married	87	58.0
	Unmarried	63	42.0
	Total	150	100.0
Study District	Namakkal	30	20.0
	Salem	30	20.0
	Erode	30	20.0
	Karur	30	20.0
	Tiruppur	30	20.0
	Total	150	100.0

Source: Primary Data

The demographic profile of the respondents reveals that 68% of the respondents are male, 52% of the respondents age group is belongs to 20-30 years, 50% of the respondents educational qualification is M.Phil/Ph.D, 36% of the respondents Monthly Income is above Rs. 20000, 58% of the respondents are married and the sample is selected from the selected district of Tamilnadu. The selected districts are Namakkal, Salem, Erode, Karur and Tiruppur districts. In each district we choose 30 respondents as our sample.

Table 2- E-transactions

Particulars	Classifications	Frequency	Percentage
Preference	Public bank	39	26.0
	Private bank	111	74.0
	Total	150	100.0
Frequently of using e-transactions	Frequently	39	26.0
	Sometimes	105	70.0
	Occasionally	6	4.0
	Total	150	100.0
Opinion regards e-transactions	Easy of use	135	90.0
	Complexity	15	10.0
	Total	150	100.0

Source: Primary Data

From the above table reveals that 74% of the respondents prefer to private bank for using the E-transactions, 70% respondents' usage behaviour about E- transaction is sometimes only and 90% of the respondents opinion regards e-transaction is they feel easy in e-transactions operations.

Table 3- Purpose of E-Transactions- Rank Analysis

S. No	Purposes	Mean Score	Rank
1	Fund Transfer	3.08	1
2	Online Shopping (Purchase)	2.66	2
3	Account Statements	2.48	3
4	Online Ticket Booking / Recharge / Bill Payment	1.78	4

Source: Primary Data

From the above table reveals that the main purpose of E-transaction is 'Fund Transfer' and it got a first rank, 'Online Shopping' got a second rank, 'Account Statement, got a third rank and 'Online Ticket Booking/Recharge/Bill payments' got a least rank of using the purpose of e-transactions among the study area.

Table 4- Encouraging Factors of Cashless Transactions

S. No	Encouraging Factors	Mean Score	Rank
1	Free internet access provided	2.58	2
2	Free skill training provided	2.56	3
3	Better security features	2.08	4
4	More economical banking transactions (Less cost)	2.78	1

From the above table reveals that e-transaction is a economical one (less cost) and it got a first rank among the other factors, free internet access provided got a second rank, free skill training provided got a third rank finally better security features got a least rank of the encouraging factor. Hence majority of the respondents agrees that 'Less cost' that means it's an economical activity' has got the first rank in the encouraging factors of cashless transaction.

Table 5-E-Banking Adoption

E-banking Adoption	Frequency	Percentage
Environmental Factors (Competitive pressure, Govt. Support etc)	42	28.0
Organizational Factors (Financial and Human Resource etc)	39	26.0
Technical factors (Perceived benefits and Perceived risk etc)	69	46.0
Total	150	100.0

Source: Primary Data

From the above table reveals that 28% of the respondents agree that environmental factor is the main reason for adopting the e-transaction, 26% of the respondents are state that organizational factors are the main reason and 46% of the respondents are state that technical factors are the main reason for adopting the e-transactions. Hence the majority of the respondents 46% are stated that Technical factors are the main reason for adopting the e-transactions.

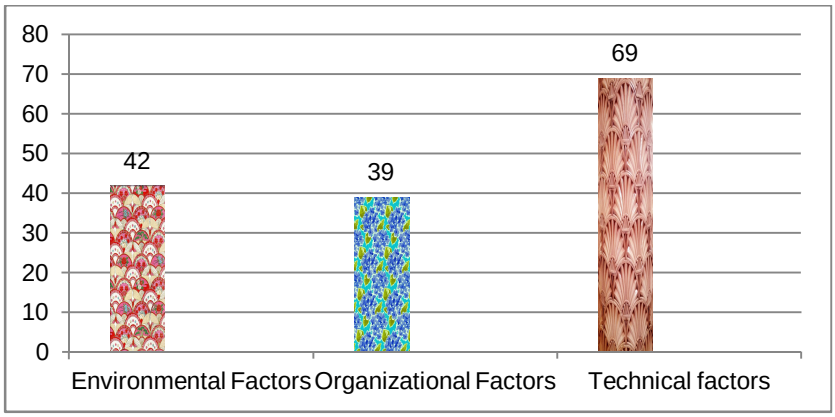

Figure 1 E-banking Adoption

Table 6- Opinion regards while using E-Transactions

Opinions	Frequency	Percentage
Suits respondents' life style	42	28.0
Suits respondents work style	48	32.0
Make life convenient	60	40.0
Total	150	100.0

Source: Primary Data

From the above table reveals that 28% of the respondents opinion regards while using e-transactions is it suits respondents life style, 32% of the respondents opinion regards while using e-transactions is it suits respondents work style and 40% of the respondents opinion regards while using electronic transactions is it make life convenient Hence the majority of the respondents 40% of the respondents' opinion regard e-transaction is it make their life Convenient.

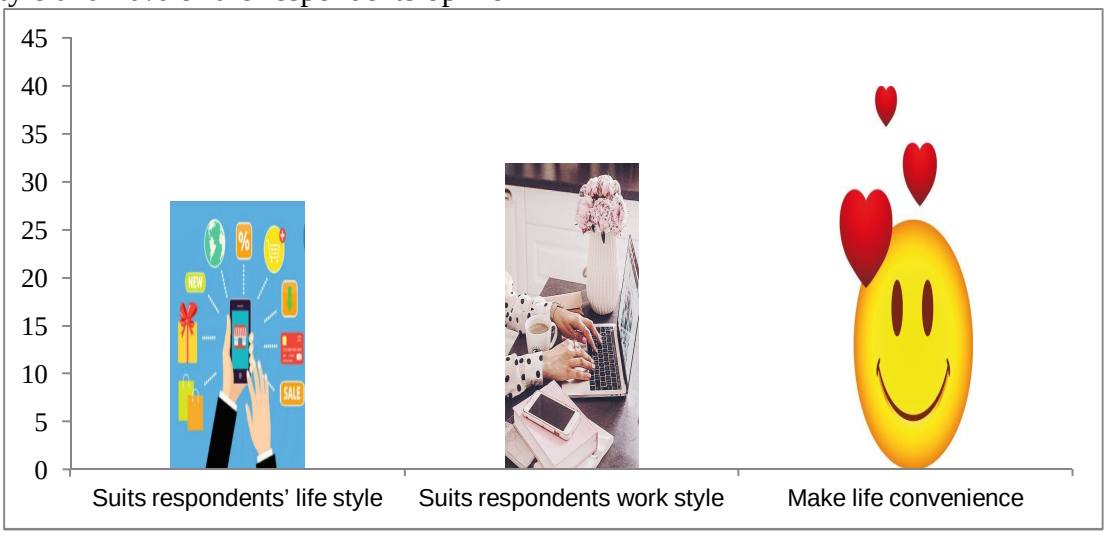

Figure 2- Opinion regards while using E-Transactions

Chi Square Test

Hypothesis

H0: There is no significant association between age and factors influencing of e-transactions

H1: There is significant association between age and factors influencing of e-transaction

Table 7- Age and Influencing factors of E-Transactions- Cross Tabulation

Age	Influencing Factors of E-Transactions			Total
	Agree	Moderate	Disagree	
20-30	36 (46.2%)	30 (38.5%)	12 (15.4%)	78 (100.0%)
31-40	3 (5.9%)	24 (47.1%)	24 (47.1%)	51 (100.0%)
41-50	3 (20.0%)	3 (20.0%)	9 (60.0%)	15 (100.0%)
Above 50	6 (100.0%)	0 (0.0%)	0 (0.0%)	6 (100.0%)
Total	48 (32.0%)	57 (38.0%)	45 (30.0%)	150 (100.0%)

Source: Primary Data

From the above table reveals that 50% of the respondents belongs to Namakkal district are state that they are not influenced by factors of e-transactions, 40% of the respondents belongs to Salem district are acknowledged that they moderately influenced, 70% of the respondents from Erode district are stated that they are well influenced by the factors of e-transactions, 60% of the respondents from Karur district are disagree with the statement and 50% of the respondents from Tiruppur district are stated that they are moderately influenced with the e-transactions factors.

Table 10- Study Area and Influencing Factors of E-Transactions

Factor	Value	Df	P value	Remarks
Pearson Chi-Square	47.586[a]	8	.000	Significant

Source: Primary Data

From the above reveals that p value (.000) is less than significant value (0.05). Hence the null hypothesis is rejected. So there is a significant association between study area and influencing factors of e-transactions.

Factor Analysis

The analysis is a multivariate statistical technique used to concentrate and simplify the set of large number of variables to smaller number called factors. This technique is helpful to identify the underlying factors that determine the relationship between the observed variables and provides an empirical classification of clustering of statements into groups called factors. Using all the 16 reasons namely Quick transaction (V1), 24*7 (V2), Easy to view transactions (V3), Time save (V4), Easy to access (V5), Job Nature (V6), Ease of monitoring (V7), No Queue (V8), Friends/Relative Advice (V9), Popularity of e-transactions (V10), E-service quality (V11), Social image (V12), Easy to get all kind of transaction activities (V13), User friendly website & Apps (V14), Internet familiarity (V15) and Exactness (V16) which have influenced the private employees, factors analysis is performed and the results are presented the following tables. This analysis is performed in the order to group the reasons on priority basis based on the strength of correlation between them and cluster these reasons in to the factors extracted.

Table 11- Factors Influencing among Private Employees

Reasons	Factors						Communalities
	1	2	3	4	5	6	
Quick transaction	.062	-.019	-.002	.106	.062	.570	.786
24*7	-.121	-.154	.428	-.035	.152	.091	.635
Easy to view transactions	-.139	.421	.030	.222	-.101	-.024	.743
Time save	-.076	.400	-.093	-.018	.182	-.107	.506
Easy to access	.009	.354	-.108	-.245	-.035	.276	.678
Job Nature	-.010	-.109	.392	.315	-.101	-.030	.699
Ease of Monitoring	.098	.144	.196	-.031	-.021	.159	.602
No Queue	-.014	.047	-.092	.499	-.007	.086	.788
Friends/Relative Advice	.055	.003	.062	.051	-.564	-.094	.778
Popularity of e-transactions	.244	-.134	.142	-.122	-.152	-.062	.524
E-service quality	-.016	.081	.411	-.134	-.044	-.100	.695
Social image	.294	-.041	-.024	-.233	.021	.206	.650
Easy to get all kind of transaction activities	.042	.149	.075	.003	.444	-.126	.678
User friendly website & Apps	.224	-.031	-.035	.114	.180	-.398	.793
Internet familiarity	.268	.051	-.076	.138	-.102	-.086	.710
Exactness	.317	-.140	-.152	.082	.093	.148	.627
Eigen Value	2.654	1.912	1.712	1.704	1.501	1.401	10.884
% of Variance	16.585	11.951	10.701	10.651	9.438	8.759	68.085
Cum Variance	16.585	28.536	39.237	49.888	59.326	68.085	

Source: Primary Data

The above table presents the rotated factor loadings, Eigen values and the percentage of variance explained by the factors. Out of the 16 factors, 6 factors have been extracted and these

6 factors explain the total variance of these factors to the extent of 68.08%. In order to reduce the number of factors and enhance the interpretability, the factors are rotated. The rotation increases the quality of interpretation of the factors. There are several methods if the initial factor matrix to attain simple structure of the data. The varimax rotation is one such method obtain better results for interpretation that is employed and the results are given in table

Table 12- Clustering of Influencing Factors of E-Transactions

Factor	Variables	Rotated Factor Loading
(Factor I) Passion (16.585%)	Popularity of e-transactions (V10)	.244
	Social image (V12)	.294
	User friendly website & Apps (V14)	.224
	Internet familiarity (V15)	.268
	Exactness (V16)	.317
(Factor II) Comfortable (11.951%)	Easy to view transactions (V3)	.421
	Time save (V4)	.400
	Easy to access (V5)	.354
(Factor III) Service quality (10.701%)	24*7 (V2)	.428
	Job Nature (V6)	.392
	Ease of monitoring (V7)	.196
	Friends/Relative Advice (V9)	.062
	E-service quality (V11)	.411
(Factor IV) No waiting (10.651%)	No Queue (V8)	.499
(Factor V) Easy monitoring (9.438%)	Easy to get all kind of transaction activities (V13)	.444
(Factor VI) Quick transactions (8.759%)	Quick transaction(V1)	.570

Source: Primary Data

Six factors are identified as being maximum percentage of variance accounted. The five reasons V10, V12, V14, V15, and V16 are grouped together as factor I (Passion) and 16.585% of the total variance. The three reasons V3, V4, V5 are grouped together as factor II (Comfortable) and 11.951% of the total variance. The five reasons V2, V6, V7, V9, and V11 are grouped together as factor III (Service Quality) and 10.701% of the total variance. The one reason V8 contributes the factor IV (No waiting) and accounts 10.651% of the total variance. The one reason V13 contributes the factor V (Easy monitoring) and accounts 9.438% of the total variance. The one reason V1 contributes the factor VI (Quick transactions) and accounts 8.759% of the total variance. In consequence, the factor analysis is strong and simplifies the sixteen reasons influencing private employees to using e-transactions and grouped into six factors explaining 68.085% of the variability of all the sixteen reasons.

Findings of the Study

- The demographic profile 68% of the respondents are male, 52% of the respondents age group is belongs to 20-30 years, 50% of the respondents educational qualification is M.Phil/Ph.D, 36% of the respondents Monthly Income is above Rs. 20000 and 58% of the respondents are married and the sample is selected from the selected district of Tamilnadu. The selected districts are Namakkal, Salem, Erode, Karur and Tiruppur districts. In each district we choose 30 respondents as our sample.
- The 74% of the respondents prefer to private bank for using the E-transactions, 70% respondents' usage behaviour about E- transaction is sometimes only and 90%

of the respondents opinion regards e-transaction is they feel easy in e-transactions operations.

- The majority of the respondents are state that the 'Fund Transfer' is the main purpose for they using E-transaction and it got a first rank, 'Online Shopping' got a second rank, 'Account Statement, got a third rank and 'Online Ticket Booking/Recharge/ Bill payments' got a least rank of using the purpose of e-transactions among the study area.
- The majority of the respondents agree that 'Less cost' is the main encouraging factors of E- transactions and it got the first rank among the other encouraging factors , Free internet access provided got the second rank among the encouraging factors.
- The majority of the respondents 46% are stated that Technical factors are the main reason for adopting the e-transactions.
- The majority of the respondents 40% of the respondents' opinion regard e-transaction is it make their life Convenient.
- Chi Square test proves that there is a significant association between age and influencing factors of e-transactions.

Suggestions

On the basis of finding majority of the people state that e-transactions makes their life convenient. Less expensive and passionate the key factors that influencing then to move towards e-transactions. These are key points of a successful journey of digital India. So the banks keep in it mind while introducing new apps and features in their upcoming movements.

Conclusion

The fruitful of the study expose that majority of the respondents are prefer private bank for using e-transactions, because of their simple procedure for handling in their mobile and internet banking. So the public sector bank also takes necessary steps for reduce their complexity in e-transactions. While comparing the purpose of using e-transactions, fund transfer is the main purpose for using e-transactions, in initial stage this is quite good. But our economy should become cashless economy only when all transactions are done through electronic mode especially online recharge, online bill payment and etc. this will happen widely if our government gives tax rebate or tax advantages to the people who are all using more e-transactions. And the government should encourage discounts while using e-transactions. These steps initiate our country in the path of digital India.

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A CULTURAL HISTORY OF SHINASHA IN ETHIOPIA

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ABSTRACT

Shinasha are an Omotic-speaking people living in north west Ethiopia near the Sudanese border. The objective of this study is to assess the cultural history of Shinasha people. The study has revealed several important points, such as their origin, language, religion, customs and economic activity . The study is based on written documents from library and internet as well as informants. In carrying out this work, the method of historical investigation focused on describing and analyzing the sources through critical analysis and interpretation to their authority and relevance.

Keywords: *Cultural-History, Shinasha, Ethiopia*

1. Introduction

Beliefs about the beginnings of peoples and origins of specific nation or ethnic groups sometimes presented as legend, and at another times in more written historical form. To understand the emergence and development of the omotic speaking people of the Shinasha, a brief review of their cultural history is necessary. Such a survey helps to provide some explanations for the cultural history of Shinasha in north western Ethiopia. But this is not an easy task for the history of them that is still shrouded and in mystery. There is no doubt that the study of the cultural history of this people would tremendously improve our understanding to their way of life.

As other omotic kingdoms of south western Ethiopia, Shinasha was relatively known before the Oromo expansion of the sixteenth century and their settlement on both sides of the Blue Nile river. Shinasha dominated both sides of the Blue Nile, even though it is impossible to assess its territorial extent. Relatively ample references to Shinasha are European missionaries and travelers, scholars as well as Shinasha oral tradition. It is not an easy task to know why the Shinasha settled at present location apart from other omotic speaking groups in south western Ethiopia. It seems that the demographic and search for pastureland are the decisive factors for their settlement at present location.

This study has objective, methods of gathering sources and way of interpreting data. The objective of this study is to assess a brief review of cultural history of Shinasha. This study is based on written materials and informants from their society. Here the researcher of this paper wants to explain that there is lack of written materials particularly on their customs. The historical investigation focused on describing and analyzing sources. Therefore, the reader will find what has been discussed. Finally, the cultural history of Shinasha includes various aspects such as their origin, language, customs and economic activities, which are considered as part of their life.

2. The Origin of Shinasha

The Shinasha (Boro) are an omotic-speaking group with thirty-two thousand populations living in north west Ethiopia near the Sudanese border. Shinasha share borders with the Oromo in the west as well as south, Sudan in the northwest, Assosa in the north and Amhara in the east. The bordering groups of Shinasha speak Amharic, Oromifa and other Nilo-Saharan languages. The Shinasha are the only survivors of the historical Gonga population north of the Blue Nile. Bruce stated the existence of Gonga on both sides of the Blue Nile by giving their location between latitudes 110 and 120 north surrounded by two mountains Dyre and Tegla in the south (3: 608). Even though Bruce did not mention the term Shinasha but Gonga, the location he identified is the exact area where the Shinasha live.

The term Shinasha come from the Amharic word shi ina shi meaning thousands of thousands. This term used by the Gojjam when Shinasha with great number settled in the land of Gojjam. In addition to this, Mesfin

confirmed that people known as Hamaties, who were considered as one of the ancestors of Shinasha came from Egypt, settled in Ethiopia around 2700 B.C. The informants confirmed their origin to the land of Canaan by describing the ancestors of Shinasha came from Canaan to Egypt in search of pastureland, where they lived for a long time, later moved towards Ethiopia until they reached and settled in Shawa. Scholars and Shinasha oral tradition believe their origin was first at Canaan, and they settled later on Egypt and finally came to Ethiopia. However, this beleive of the people is not confirmed by other sources.

The informants described also that the Shinasha ancestral father called Hamiti, crossed the Red Sea and arrived at Egypt, which is similar to the biblical story of Israelites who crossed the Red Sea when the God divided it during the exodus (Egyptian operation of the Jews) in that Moses led them. Tsegaw Endalew stated the reason for the Shinasha movement as follows; "Due to demographic factors they (Shinasha) were forced to move again to Horn" . He added that Shinasha chief, notably, Shao led and directed all of them to Shewa in which he ruled them for about two decades before they were dispersed on both sides of the Blue Nile in the sixteenth century due to the Oromo population expansion to their region. After this, the kingdom of Gonga that included other omotic-speaking groups became a single Gonga kingdom until they were separated in to north Gonga and south Gonga family on both sides of the Blue Nile. In conclusion Gongas were the ancestors for one of the Kaffa clans and the Shinasha.

The informants explained that south groups were left in south of the Blue Nile and established their own southern Gonga kingdom, which later divided into Kaffa, Mao, Anillo, Shaka and others. But the northern Gonga (Shinasha) became the only Gonga ancestor as well as omotic descent in the north of the Blue Nile. Gonga mentioned by the Jesuit writers such as Almeida who stated their existence on both sides of the Blue Nile. He also explained the report of Jesuit patriarch Oviedo about the expedition of Sarsa Dengil up on north Gonga (Shinasha) and surrounding peoples six times between 1606 and 1619. In short, it should be clear that north Gonga and Shinasha used interchangeably.

Other people used to call Shinasha with different names previously. Tsegaw Endalew confirmed this fact as follows, "Shinasha known by various names such as Boro, Dangabo, Sincho, Seneyto, Simitches, Senetjo, Scinascia and Xinax". Similarly, Moseley and Asher investigated that the term 'Shinasha' have been applied to other groups who were not even omotic speakers and indicated Boro is self-designation of the Shinasha; but they are most commonly referred to as Shinasha and Amharic designation emerged from the word shi ina shi which means thousands of thousands, who settled in the north of Blue Nile. This term conotation is not confirmwd by either informants oral others sources. Dangabo is place name after Dangeb and Sincho is Oromo pronunciation for Shinasha. Informants also explained Boro is their self-name widely used nowadays because they claim that Boro is their ancestral fatherin Canaan.

A Portuguese traveler, Alemeida used Gonga referring to Shinasha as one of the native inhabitants of western Gojjam with their town Senassie, which seems to be a Shinasha settled area. Schuver visited them in 1887 and described Shinasha as yellow skinned people, who live in Crests of Guba mountains and other three villages reported in region between Dangure and Kinien. It seems that Schuver identified them because of their skin pigmentation from the Gumuz. Bruce confirmed also the description of Frernandes, while Frernandes was crossing the Blue Nile from Wenbera (one of the Shinasha districts) to Enarya in 1613 and investigated Gonga on both sides of the Blue Nile. Though various individuals clearly stated their settlement in present location, nobody mentioned Shinasha properly by their self-name until the recent time.

The Shinasha have two main clans; Gongo and Do'o. These clans further divided in various families. Gongo includes Shaxirra, Nashina'o, Shenissa, Shuhina'a Anifa'a, Anboya, Irimassa, Aruna'a, Indu'a, Azina'a, Gutsina'a, Awisha, Awijjakilla, Andugusha and the like. The Gonga is the populous clan among the Shinasha. The Gongo are responsible for performing blessings and various rituals of the

society. He added that the Gongo clans are still today considered the Shinasha ancestors widely respected among the society. The Do'o clan includes Du'a, Endimarar, Atsira, Auzikila and the like. According to informants, Gongo and Do'o clans are further divided in to many categories. Informants also explained that Shinasha had had their own clan heads and nasha (king), who ruled altogether until the conquest of emperor Menelik to the region around 1890s. In general, either in Gongo or Do'o there are further sub divisions of clans.

Curiously enough, what is clear about their identity is that they are one of the several peoples of the Ethiopian interior speaking Omotic language. As all scholars and individuals stated above, the northern Gonga (Shinasha) who settled in north of the Blue Nile in Metekel province kept their traditional rituals. Though they were dispersed from their settlement in Shewa; due to search for pastureland, Oromo population expansion and the military expedition of Sarsa Dengil, Susynos and others of the Christian Highland kings, still some of their customs survives. Undoubtedly, the Christian kingdom influenced some of their cultural practices.

3. Language

Shinasha is one of the Afro-Asiatic categories of omotic language cluster. Beke and Abbaddie described the Gonga as a language spoken on both sides of the Abbay (Blue Nile) to Kaffa region (cited by Tsegaw 4). In addition to this, Fleming in his work; Omotic over View as well as Lange in his study; History of Southern Gonga, identified Shinasha language as Amuru, Boro, Guba and Naga (cited by Ashenafi and Wedekind 2). However, neither of these names is except Boro who is their ancestral father and their general self-name with their language Borna represents Shinasha. In various sources northern Gonga is referred to as the name of the people, language and the area in which Shinasha settled. This indicates that northern Gonga is in use at least the visit of Alemeida in the first half of the sixteenth century referring to a group of people living in separate localities on both sides of the Blue Nile, even though specific name of Shinasha is not mentioned rather they are said to be northern Gonga on the Sudanese border around Dura river, Wombera, Guba and Bulen.

The Gonga language divided in to three main branches such as southern, central and northern Gonga. According to Tsagaw Southern Gonga includes Kafa, Sheka, Yem and others. Central Gonga includes Anfilo in western Wellega and finally northern Gonga (Shinasha). Similarly, Bruce explained that a Portuguese traveler Alemeida used northern Gonga referring to Shinasha as one of the native inhabitants of western Gojjam. Though, the Shinasha language was not written it existed long years ago this fact is indicated by Cheesman as follows; "the Shinasha have their own language which is unwritten". Most of the Shinasha were subsumed in to the Agaw, Amharic and Oromifa speaking groups, but the Shinasha who moved to Metekel region particularly Bulen have strongly kept their language and other cultural traits up to present.

Shinasha language has slight dialect differences between highlanders and lowlanders. Ashenafi and Wedekind explained the speakers of Shinasha language in to two varieties: garibora and toribora. The garibora is the highland dialect spoken in the Dangur area whereas the toribora is the lowland dialect spoken in the regions of Dibate and Wonbera. They also explained that Shinasha is the only isolated northern omotic language. The Shinasha descendents south of the Blue Nile are still called "Sinccho" by the Oromos' who assimilated them. Shinasha belongs to Omotic groups of Kaffa, south Mao and Mocha. The similarity between Shinasha and Kaffa is more than 72% with Mocha more than 74% and with south Mao northern 80%. Daniel also confirmed the existence of the slight dialect differences in Shinasha language. These are Wombera as garibora and Bulen as toribora dialect and added Shinasha language as one of the Gonga languages. Undoubtedly, all the arguments elaborated the existence dialect differences in Shinasha language. Though there are distinct language similarities among the groups mentioned above, it is also true that there are significant differences in local customs, beliefs, social, economic and political life with that of Shinasha.

4. Religion

The Shinasha practice traditional ethnic religion and Christianity. They believe iqo (god) for rain, dry rivers, keep dead, keep their family, environment and the like. The Shinasha dried up water springs south of the Abbay around Wellega before they fled to Metekel during the sixteenth century. According to Taye Gebremedhin, Shinasha worship for birds, trees, stones, zagol (sprinkling food, drink and plants before doing something) and various magic spirits that they learned from Egyptians. Cheesman also explained by stating "Shinasha have their own religion-they are probably pagans". As informants explained that believing iqo (god) is commonly practiced nowadays in rural area. For instance, if they need the rain in dry season they collect money or other property from the community people and give it for the iqetsa (ritual specialist), and then it rains. Before eating or drinking, sprinkling the food or drink to god is mandatory in traditional Shinasha ethnic religion. But Christianity influenced the Shinasha traditional religion. Izeworo, God, is adopted before the introduction of Christianity by the end of the nineteenth century and the most common name than iqo. Shara ceremony is the belief that the deceased will be cleansed and the relatives of the deceased will be in peace that is similar to 'fitahat' (cleansing the sin of the deceased) ceremony of the Ethiopian orthodox Christianity.

According to the informants another ceremony shera (memorial feast) takes on Monday, which is considered as a freeing day. But the followers of the orthodox Christianity conduct the tesikar (memorial feast) for the same purpose on Sunday. As Tsegawu described also the shera takes place on Sunday nowadays which shows a direct orthodox Christian influence from Gojjam and Wombera. The informants also confirmed that the Ethiopian Orthodox Christianity greatly influenced the Shinasha traditional religion at present day. For instance, on those days such as mesqel (finding day of a true cross), timket (Ethiopian epiphany), Easter, Christmas (birth of Jesus Christ) and in other ceremonial days of Christianity is celebrated even at non-Christian followers. According to informants the term Izeworo is not commonly used to represent the biblical God, but iqo is widely used for God. In short, it should be clear that the Shinasha traditional religion called their god iqo and similarly the Christian followers took the name iqo to represent the Christian God with out any modification to the term.

5. Marriage, Funeral, Wearing and other Customs

The three forms of marriage among the Shinasha includes wita, biqa and tsitsa. The wita (formal one) is conducted by enashima (asking process) when a family of the boy sends woshsha (message) with tereffa (a kind of grass that believed to address a mission for a reality) to the home of a girl. The woshessoni (messenger) informs the entire situation to her family; in this process the messenger can go more than two times based on the interest of girl's family. Her family gives another appointment to see mika (revelation) whether she has to be allowed to marry that particular boy who sent the messenger to her family. After her family saw what the mika revealed for them is good prediction about her future life, if she marries that boy, her family become voluntary. Then her family gives appointment that allows a boy to come their home in another day. After few weeks the boy is expected to come to the girl's home and make the tara (oath) with her.

His family prepares a feast for deqiya (wedding) based on their plan to conduct a ceremony in a particular day. At the day of wedding, guya (bridegroom) go with the minjja (bridesmaids) and amamota (Accompaniers) to bride's family in which bridegrooms took blessing in a derra ceremony. While they celebrated a feast in bride's family, the journey is to his family. After they had reached to the boy's home taking the girl, another ceremony known as aqimosha, conducts in which his mother move round the bridegrooms and bless them. Then the bridegrooms kiss the forehead and foot of his family and relatives who waits them at his home. Since then bridesmaids, family and relatives enjoy the feast until they leave the people to their new home. Virginity (shapa) has value in Shinasha tradition, and bridesmaids family gives a lot of gift such as gold and cattle to bridegrooms and she is

highly respected. Meanwhile her family send additional gift to the bridegrooms and feel proud of their daughter.

The two informal marriages common in Shinasha are the biqa and tsitsa. According to the informants, either biqa and tsitsa marriage is not culturally acceptable in most of the time. The biqa marriage is conducted through abduction. But incase of tsitsa marriage, the boy and girl are agreed to make marriage without giving any information to their respective family. But either in biqa or tsitsa marriage, if there is any blood relation between boy and girl they are separated by their traditional legal process known as sherhi. After they are separated by sherhi ceremony, they can marry any person who had no blood relation. In short, the marriage in Shinasha is one of the respected customs, which is part of their life.

The funeral ceremony of Shinasha is characterized by having sad and no sad depending on the age of the deceased. The people mourn and feel great sad when young person dies and nobody is allowed to mourn and feel sorrow when elders die. According to informants the reason is that the old saw every thing in his life and stayed many years, but the young did not do these things. The shara (cleansing sins) ceremony is conducted by ritual specialists. In this ceremony the ritual specialists pray god to forgive the sins of dead. When the journey starts to burial place, a dead person's daughter boasts his/her history and sprinkles chumbo (local spongy pan cake) until it finishes from a pottery plate and she broke a plat at the end. The reason for sprinkling chumbo is to express that a deceased is taking his/her last part and breaking a plate is to confirm his/her life ended on the earth. The traditional mourning song called eppi-dubba supported by traditional musical instruments such as bamba (drum), tinba (triangular shaped lyre) and turika (trumpet) honors a deceased.

The burial hole of Shinasha is different from others in which it consists of the room like structure. According to the informants, the burring hole is dugout having room like structure in underground as a model of their actual traditional hut in which not only one person but also the family as whole can be buried. The entrance of the hole is narrow that allows one person to pass-through underground. The dead body is put down underground at room like place by closing the narrow entry of the hole with one stone. According to the informants, the dead person is buried with in one day. They added that most of the time one known tool of a dead person that may be gina (spear), shikka (knife) or any other property is broken and is put down or planted on the tomb in order to confirm that a person is already passed way. As they also explained, coffin is not allowed in their tradition that the dead body is put only in the hole shrouded with clothes.

After a few days or months based on the family's plan, at the ceremony known as shera relatives and others commemorate a deceased. According to the informants, the families conduct the process by preparing food and drink to the people invited at the place called sheribiwoka. They added that the ceremony starts with his/her uncle by calling a dead person and others those who died before him as well as praying iqo (god). The person who is calling a deceased is termed as tsessina'a. After tsessina'a called all the deceased that he can memorizes, he sprinkles the dowisa (local beer) on the soil as gift to god. The dowisa is filled in shopa (local pot) and from the shopa they give dowisa to the people with drinking straws known as shel (local cup). Traditionally, the ceremony is conducted on Difina'awa (Monday) because they believed it as a freeing day. In short, the reason for shera is their belief that the dead mixed with those who died before and prevent further death from the family.

Shinasha have staple foods such as chumbo, mo'a and sedo as well as native drink known as dowisa. Chumbo (local spongy pancake prepared from sorghum) is prepared from ta'a (eleuesine tree), janga (sorghum) and boqola (maize). Mo'a (porridge) is similarly prepared from eleuesine, sorghum and maize. Thus the sedo (serving food) is prepared from cabbage like vegetables. They did not eat sedo alone but used as serving food on chumbo. According to the informants, sedo is special serving food with chumbbo widely used. The local beer known as dowisa (local beer) prepared from eleuesine tree with out any mixture from any other plants. The material used to handle any

food is by qula (basket shaped pot) and for drinks shopa (local pot). The use of gawa (pottery pan) is to cook chumbo and qula is to cook mo'a and sedo. Shopa used to prepare dowisa and shel (local cup) uses to suck dowisa as well as other drinks like water, milk and the like. According to informants, test of dowisa various based on the content of bila (yeast). They eat the food from wicher table like material called mish-mara. In general, they prepare traditional foods and drinks from sorghum, maize and eleuesine tree.

The wearing style of male and female is different among the Shinasha. According to the informants the young boys wear short trouser and those beyond young age wear long trouser that is very wide around knee, which is known as gulbashiritaha but mostly called as "jilbajile" from the Oromo name. According to Tsegaw Endalew, Shinasha practice Oromo traditional customs but retained their language and other cultural traits. Though cultural features such as religion, language, and customs vary enormously from one tribe to another, there are certain elements which are encountered frequently and shared by many tribes that is true incase of Shinasha. The females' cloth is known as fara is the popular dress in Shinasha. Any age of females are expected to wear fara which is a long dress. As the informants mentioned it is not cultural to wear fara without a belt known as wojeka. In short the wearing style of their culture varies based on the age and sex.

Decorating their body has various purposes such as body strengthen and to become strong swimmer. They put sign or decorate it on the left hand. As informants explained, the Shinasha believe that males became strong if their body, particularly left hand is burned. It enables their body to become very strong physically. They added that decorating their body is not only making them strong but also enables as fast and strong swimmer of the river. According to the informants, a type of plant called elta is wisely used to make sign on their body. This means that the powder from elta plant is put up on the left hand and rotated together with stick until the buda (powder) changed in to fire which burns the body and make the symbol. After the rotating this stick with elta powder at constant place, it makes symbol. What is evident here is that the researcher saw such kind of the sign put on one of the informant and asked immediately asked its importance. The informant responded by confirming similar purpose; to become strong swimmer and body strengthen. In general, even though decorating body is one of their customs lasted long; nowadays few people use it.

Shinasha have various artifacts of pottery, wood and iron. The artisans of Shinasha are collectively known as woziwozifossi. The artifacts made from soil as a kind of pottery are gawa (pottery pan) and qula (basket shaped pot). The traditional musical instruments are made up of woods and skins. The musical instruments used during the time of songs are bamba (drum), xinba (triangular shaped lyre) and turika (trumpet). Metal is used as an important material to make gina (spear), shika (knife), axe, plough, hoe and other instruments. But those artisians producing metallic products are also called qitsiqitsaka (blacksmiths). Their cultural jewelries known as dimba includes kishika-dimba (hand bracelets), albuwa (foot bracelets), bimika-dimba (necklaces) which are made up of sliver widely used to put on foot, hand and neck respectively. According to informants, Shinasha used silver widely than gold and other metalloid elements. They also explained that silver is inaccessible element than gold because they could not find it from their own land. But gold is enormous in their land particularly in Wombera. In addition to this, they use naturally grown plant products like shopa (local vessel) and shel (local cup) to suck water, dowisa, coffee and any other drinks as artifacts. According to the informants, artisans are mostly from Do'o clans. Even though Shinasha have learned and experienced many things from Egyptians, they do not have a way of writing system. In general, they use different artifacts for various purposes in everyday life activities when it is necessary.

The Shinasha are well known practitioners of traditional medicine. They are known to stop and allow rains, to make rivers dry up by touching some plant leaf and the like. Taye stated that they acquired the knowledge of practicing traditional medicine and magic during their stay in Egypt from Egyptians (37). Their tradition states that God has originally provided a book of guidance for all human

beings and while all peoples of the world have kept the book, the father of Shinasha left the book on a tree and the book lost; God instructed him: let plants and other roots grown on trees by your guidance and medicine (Tsagaw 10). The traditional medicinal plants are obtained from the forest and cultivated land.

According to the WHO 80% of the world's population relies on traditional medicine to meet their daily health requirements. They added that in Africa reliance on such traditional medicines is partly owing to the high cost of modern drugs and inaccessibility of modern health institution and in Africa, traditional systems are more culturally acceptable and are able to meet psychological needs in a way does not. Today this huge traditional knowledge of medicinal plants is playing an important role in the development of new drugs. As in any African countries, the use of plants in religious ceremonies as well as for magic and medicinal purposes is common in Ethiopia, particularly in Shinasha.

Desalegn and Pierre investigated medicinal plants used by Shinasha for various diseases. According to their investigation, these traditional medicines with their respective diseases are: first kosowa, hembersha and matiwa for tapeworm, second; kbuwa and gizawa for evil spirit, third; simbla, hitana and dingate are for stomach ache, fourth; yoha and hipa for malaria, fifth; orombera" for askers and finally, kunya for snake bite. These all medicine plants are openly marketing in exchange of other items on market day. There are others, which are not limited to these medicinal plants categories. Informants added that medicinal plants for various diseases such as sati'a for cancer, beriwis for stomachache especially to ameba, chemesa for snake bite and various plants for toothache, dog bite and other diseases are widely practiced.

6. Economic Activities

Agriculture that includes rearing of animals and crop production is one of the methods of economic activities. The rearing animals are goats, sheep, oxen, cows, hens, horses, mule and donkeys. Those listed animals except horses, mule and donkeys used as food items. Cows give milk, which latter became butter and cheese. Oxen used to plough or farm the land. Horses and mule are used for transportation. Donkey used to carry any material from various distances. These animals used as a means of income when sold. In addition to rearing animals, they produce crops such as eleuesine tree, sorghum, maize and vegetables. These crops are their staple foods grown once in year and vegetables depend up on rain season. According to informants there is no pastoralist in Shinasha due to their sedentary way life. Therefore, rearing of animals and crop production are the base for their economy.

Trade is widely practiced between Shinasha and neighbors, particularly with Gumuz. The export items are gold, coffee, butter and alcoholic drink like araqe (local wine) to Gumuz and eastern Sudan. In exchange of exports, the import items like amole (salt bar) from eastern Sudan; and skin of maha (leopard) to wear during the time of mourning and after the hunting conducted; and bata (skin coat) made from skins, especially of crocodile which used as coverage for spear, knife, and other materials from Gumuz. The informants elaborated that the relation between Shinasha and Gumuz had long history and sometimes hostile. The reason is that the Gumuz claim that the cultivated areas of the land between them and Shinasha had been their grazing land, which is later on settled by the Shinasha. Taye argued that the Shinasha raided the "Shanqila," (Gumuz) from their settlements (37). In general, it is clear that Shinasha influenced the Gumuz from their former settlements.

Similarly, Wolde-Sellassie argued that the relationship between Gumuz and Shinasha is troubled with tensions of conflict and uncomfortable coexistence.. He added both the Shinasha and the Gumuz had severe conflict in the past that driven the Gumuz from their earlier locations now inhabited by the Shinasha. However, the Gumuz and Shinasha have long history of trade relationship. Bruce stated the northern Gonga (Shinasha) trade of the bracelets of copper with the gold from the community. Little is known about the penetration of the Sudanese merchants to the Shinasha region before the ninetieth century. After the nineteenth century commodities like animals and animal products, grain, coffee and

slaves exported in exchange of salt, beeds, cloths and other foreign goods from Sudan while coming to Beneshangul markets. The sources also stated that the Sudanese merchants reached to Beneshangul as well as Shinasha in which they imported and exported similar items described by Guluma. In general the Shinasha and Gumuz have long history of relationship.

7. Conclusion

The Gonga, who lived in both sides of the Blue Nile area, at least by the sixteenth century, were not initially known as Shinasha, but northern Gonga, although they do have their own history. In sixteenth century, changes occured in Shinasha due to the Oromo population expansion. Both travelers and Shinasha oral traditions confirm their existence on both sides of the Blue Nile. They are not indigenous to Ethiopian region, but are descendants of immigrants to the region. Even though scholars and their oral tradition state Canaan their home land, it is important to consider how changes altered the nature of relationsh ips between Shinasha and Israelites. It is believed that the descendants of Shinasha arrived from Egypt, established a kingdom at Shewa. Before Oromo population expansion to the Shewa, an important man called Shao ruled them.

From the foregoing, it seems clear that various aspects of the oral tradition of the Shinasha are important for enriching the social and moral life of the people and ensuring the continuity of their culture. These are highly effective means of expressing the ideals and values of the communities, teaching young generations the history of their ancestors and helping them improve their self-awareness by giving them the information they need for understanding their identity. Shinasha oral tradition, with its various themes of love, life, praise and death, is especially relevant in this regard. A young child is introduced about the significance of his/her birth and the distinguished history of his/her ancestors. At the same time, he/she is encouraged to uphold this tradition and contribute to its distinction. This, among others, is an important function of oral tradition and it is what has kept it alive among the Shinasha in particular, and Africans in general.

Their culture is not exhibited for the world in any privileged position due to a combination of economic, social and political reasons. About a decade and half years ago, opportunity was set up to serve the social, economic and cultural interests of their people. Yet, by 1991 the decline of the “Derg” regime had transformed their cultural history. Shinasha is still claiming their customs and making way to become known. This society survives even while the influences from the Christian community suppressing its culture, is a sign for us that there is still hope for Shinasha cultural history. So their tradition is still alive and can be developed. Further study is necessary to understand the balances between change and continuity in cultural history of Shinasha.

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22. Daniel Abera, p.154-55.
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27. To avoid a blood relation in marriage, they (Shinasha) count seven generation of her father's genealogy and three generation of mother's genealogy of a girl.
28. After Tara (oath) ceremony either a boy or a girl are not expected to see or contact their family in law until the wedding day.
29. Shinasha oral informants states this is a formal marriage and respected.
30. This is acceptable practice in Shinasha culture.
31. Informants claims it as special event in Shinasha
32. Shopa is a large like earthenware (but prepared from plant fruit) strong vessel of Shinashas' antiquity having anoval shape.
33. Tsegaw Endalew, p.6.
34. Due to cultural dynamics community is not frequentlydecorating their body.
35. In the process of forging iron, the raw metal is heated to a particular temperature and it is hammered in to desired form such as agricultural tools and weapon, knives, spear and other objects. Charcoal is used to make fire.
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DIFFERENTIATION IN THE SELECTED MOTOR PERFORMANCE VARIABLES BETWEEN BASKETBALL AND VOLLEBALL PLAYERS

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ABSTRACT

Motor fitness is an expression that exhibits an athlete's capability to perform efficiently during games or other physical movement. An athlete's motor performance is a combination of different variables, each one is essential for elevated performance. There are lots of studies carried out toadvance the level of agility, flexibility,and speed of Basketball and Volleyball male players but a small number of studies have been carried out to find out the variation in agility, flexibility, and speed Basketball and Volleyball male players . The researcherhas undertaken this research to evaluate the Motor Fitness variables agility, flexibility, and speed Basketball and Volleyball male players. The data collected by administeringagility, flexibility, and speed test on the subjects. The data collected were analyzed by applying paired sample T-Test to evaluate the selected Motor performance ofBasketball and Volleyball players. There was a significant difference in agility, flexibility, and speed components of Basketball and Volleyball male players.

***Keywords**: Motor performance, agility, flexibility, speed, T-test.*

Introduction

In the last few decades, sports have got incredible recognition all over the world. The recognition of sports is still escalating at a faster rate and this cheerful tendency is likely to prolong in the days to come also. A fit individual one who is well accustomed to his surroundings, his mind and body are in accord to meet the usual demands without getting fatigue.

Basketball and volleyball are the world's most popular and widely viewed sports. Motor performance qualities play significant part in both Basketball and Volleyball competition. The knowledge of differences in these qualities among University players are utmost important for sports administrators .Basketball and Volleyball is a distinctive sport that can develop overall fitness and self-confidence for players of all age groups. For the elite performance in any ball games, it requires agility, flexibility, and speed. So scholar has undertaken this study.

Methodology

Selection of subjects: For the present study researcher randomly selected sixty male player, thirty players from Basketball and Thirty from Volleyball game. Who have represented different universities of Karnataka State.

Selection of variables: Basketball and Volleyball players were selected as independent variables. Agility, flexibility and Speed were selected as dependent variables.To measure agility Boomerangtest, to assess flexibility modified sit and reach test, to measure speed 50mtrs dash test were administered.

Statistical technique: To Know the difference in the agility, flexibility and speed variables statistical technique 't' test was applied by using SPSS and results are presented in the following tables.

Results

Table 1: Comparison of selected motor performance variables between Basketball and Volleyball players

Variables	Basketball players		Volleyball players		t value
	Mean	Standard Deviation	Mean	Standard Deviation	
Agility	12.7852	1.17609	14.0221	.79963	4.487*
Flexibility	14.3607	4.66771	17.0286	3.45954	2.571*
Speed	7.0872	.56148	7.4821	.63043	2.829*

Significance at 0.05 level.

The above table indicates the mean value, standard deviation and 't' value of Basketball and Volleyball players. The 't' value has shown a significant difference in agility, flexibility and speed between Basketball and Volleyball players. Basket ballers are agile than volleyball players, Volleyball players are having more flexibility than Basketball players and in speed Basketball players are having more speed than the Volleyball players.

Findings and Discussions

Within the limitations of the study after treating statistical technique to the collected data following findings were found

In Agility Basketball players have shown superiority than Volleyball players because Basketball players have to cover more area than the Volleyball players during the game.

In flexibility Volleyball players exhibit more range of movements than Basketball players due to the skills of the game.

In speed Basketball players revealed reasonable time than Volleyball player because in basketball game they get lesser duration than Volleyball players to exhibit their skills, that might be the reason to this result.

Conclusion

- In agility Basketball players are better than Volleyball men players.
- In flexibility Volleyball players found significant than Basketball men players.
- In speed Basketball players are having good speed than Volleyball players.

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ANALYTICAL METHOD DEVELOPMENT AND VALIDATION OF ANTITUSSIVE DRUG IN SIMULATED GASTROINTESTINAL FLUID

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ABSTRACT

UV-spectrophotometric method has been developed in different mediums simultaneously for the assessment of Dextromethorphan hydrobromide (as model drug) with their analytical investigation from bulk. There was no report for the method validation of drug in Simulated Gastrointestinal fluid without enzymes. The equilibrium solubility of crystalline Dextromethorphan HBr is 0.0066 ±0.87 mg/ml in distilled water and this experimental value was near by the literature value and in SGF, SIF, PBS pH 7.4 was found to be 0.0111 ±0.17, 0.0079 ±0.10, 0.0111 ±0.44 in mg/ml by using shake flask method, respectively. The λ_{max} of drug in distilled water, SGF, SIF, PBS pH 7.4 were found to be 277.8 nm, 277.6 nm, 278 nm, 278 nm. The proposed method was specific as the drug follows linearity in the concentration range 20-180 µg/ml with r^2 value 0.999, 0.9998, 0.9991, 0.9994 and % purity was 99.6383 %. The % recovery was found to be 98.89-103.44 %. The % R.S.D. value less than 2 indicate that the method is precise, accurate and reproducible.The above method used in this research work was a swift and economical for routine analysis of drug (bulk)in Biorelevant dissolution medium for the formulation of Stable dosage form relating with bioavailability.

Keywords: *Calibration curves, Dextromethorphan HBr, Method Validation, Solubility analysis, UV spectrophotometric.*

Introduction

Dextromethorphan is a synthetic compound having 3-methoxy-17-methylmorphinan monohydrate, **Guenin (2014), Bi (2018),**which is the d isomer of levophenol, a codeine analogue and opioid analgesic which is an NMDA receptor antagonist (receptors, N-methyl-D-aspartate) and acts as a non-competitive channel blocker**Allena (2014), Rauha(1996)**.

In its pure form, dextromethorphan occurs as a white powder. It is readily absorbed from the upper GIT but don't enter in the systemic circulation**Guenin (2014), Ostrov (2018)**. Dose is 10-30mg daily in divided dose because of its short biological half-life of 1.4-3.9h, multiple dosing (2-3 times a day) is required and which ultimately leads to the alteration in the drug blood level and often dose related adverse effects**Guenin (2014), Ostrov (2018)**. The outcome of multiple dosing often leads to the poor compliance andinefficient therapy**Kaza (2013)**. The brief description of dextromethorphan HBr given in (Table 1)**Guenin (2014),Ostrov (2018)Allena (2014), Rauha (1996), Ayman (2008), Hou (2006), Luying (2021), Joshi (2012), Najam (2018), Fuad (2010), Malladi (2010), 34-35, Al-Kuraishy (2012)**.

Table No.1: Tabular description of Antitussive Drug

SNO.	Parameter	Dextromethorphan HBr
1.	Category	Antitussive agent/ Cough suppressant
2.	BCS Class	II (low solubility and high permeability)
3.	Oral Bioavailability	11%
4.	Biological half life	1.4-3.9h
5.	Dose	10,20,30,60,120
6.	Molecular formula	$C_{18}H_{25}NO$
7.	Molecular weight	271.4 g/mol
8.	Shelf life	2 years
9.	Partition Coefficient (logP)	3.75
10.	Metabolism	Hepatic (liver) enzyme: major CYP2D6, minor CYP3A4 and minor

		CYP3A5
11.	Route of administration	Oral
12.	Duration of action	Short
13.	M.O. A	Suppresses the cough reflex by a direct action on the cough centred in the medulla of the brain.
14.	Target organ	Brain
15.	Side effects	Sudden infant death syndrome, body rash/itching, nausea, drowsiness, dizziness, closed eye, hallucination, Difficulty breathing, constipation, abuse and toxicity due to it.

M.O. A= Mode of action

Various HPLC and UV method were reported for Dextromethorphan Hydrobromide. But no HPLC and UV method was reported for method validation of Dextromethorphan Hydrobromide in Simulated Gastrointestinal fluid without enzymes such as SIF, PBS pH 7.4.

Materials And Methods

Dextromethorphan Hydrobromide was gift sample from JRC Pvt Ltd, Gujarat. All the other chemicals and reagents were used in this research work are of analytical grade and the maximum wavelength of drug was detected by using PC dual beam UV spectrophotometer, SHIMADZU UV-1800 240V (Model) (Japan).

Ultraviolet Spectrum (Uv Spectrum)

Drug was dissolved in 0.1 N HCl pH 1.2 SGF (without enzyme), phosphate buffer saline pH 7.4, pH 6.8 SIF (without enzyme), distilled water and the solution was scanned using aUV/VIS Double beam Spectrophotometer in the range of 200-400 nm, **Khanvilkar (2016), Carnevale (1983), Virani (2015)**.

Development Of Calibration Curve Of Dextromethorphan Hbr

The calibration curves for estimation of Dextromethorphan HBr were prepared in four different dissolution mediums i.e., 0.1 N HCl (pH 1.2, simulated gastric fluid, SGF) without enzymeConstanzer (2005), pH 7.4 phosphate buffer saline, pH 6.8 (simulated intestinal fluid, SIF) without enzyme and distilled water **Ostrov(2018), Calleri (2004),Palabiyik (2007), Khalode (2012)**.

Preparation Of Standard Stock Solution, Λ Max And Calibration Curve

In Distilled water- Accurately weighed 20 mg of Dextromethorphan was solubilized by 10 ml of methanol in a 100 ml volumetric flask, and Distilled water was added to make up the volume so as to give stock solution of concentration 200 µ g/ml**Maria (2002), Budai (2002), Bendriss (2001)**. The different aliquots of standard solutions of Dextromethorphan in range 1-9 ml were transferred into series of 10 ml volumetric flask and diluted with Distilled water to get the concentrations (20, 40, 60, 80, 100, 120, 140, 160, 180 µ g/ml) in standard volumetric flasks (10 ml)**Rajan (2014), Meyyanathan (2008), Kane (1998)**. The dilutions were scanned in the wavelength range of 200-400 nm. The λ max of Dextromethorphan was found at 278 nm. The linear relationship was observed over the range of 20-200 µ g/ml. Absorbance were noted at 278 nm against Distilled water used as blank **Fierens(2009), Saleh(2015),Wilson (1993)**. A calibration graph of the absorbance versus the concentration of the drug was plotted.

In SIF (pH6.8)- Accurately weighed 20 mg of Dextromethorphan was solubilized by 5 ml of methanol in a 100 ml volumetric flask, and phosphate buffer saline pH 6.8 was added to make up the volume so as to give stock solution of concentration 200 µ g/ml. The different aliquots of standard solutions of Dextromethorphan in range 1-9 ml were transferred into series of 10 ml volumetric flask and diluted with SIF pH 6.8 to get the concentrations (20, 40, 60, 80, 100, 120, 140, 160, 180 µ g/ml) in standard volumetric flasks (10 ml). The dilutions were scanned in the wavelength range of 200-400 nm. The λ max of Dextromethorphan was found at 278 nm. The linear relationship was observed over the range of 20-200 µ g/ml. Absorbance were noted at 278 nm against pH 6.8 SIF used as blank. A calibration graph of the absorbance

versus the concentration of the drug was plotted **Gowree(2011)**.

In PBS (pH 7.4)- Accurately weighed 20 mg of Dextromethorphan was solubilized by 5 ml of methanol in a 100 ml volumetric flask, and phosphate buffer saline pH 7.4 was added to make up the volume so as to give stock solution of concentration 200 µ g/ml. The different aliquots of standard solutions of Dextromethorphan in range 1-9 ml were transferred into series of 10 ml volumetric flask and diluted with phosphate buffer saline pH 7.4 to get the concentrations (20, 40, 60, 80, 100, 120, 140, 160, 180 µ g/ml) in standard volumetric flasks (10 ml). The dilutions were scanned in the wavelength range of 200-400 nm. The λ max of Dextromethorphan was found at 278 nm. The linear relationship was observed over the range of 20-200 µ g/ml. Absorbance were noted at 278 nm against pH 7.4 used as blank. A calibration graph of the absorbance versus the concentration of the drug was plotted.

In SGF (pH 1.2)- Accurately weighed 10 mg of Dextromethorphan was dissolved in 5 ml 0.1 N HCl (pH 1.2) 10ml volumetric flask, and was added to make up the volume so as to give stock solution of concentration 1000 µ g/ml. 2ml of the stock solution was pipetted out and transferred in a 10 ml volumetric flask and was diluted to 10 ml with 0.1 N HCl (pH 1.2) to give the concentration of 200 µg/ml. The different aliquots of standard solutions of Dextromethorphan in range 1-9 ml were transferred into series of 10 ml volumetric flask and diluted with 0.1 N HCl (pH 1.2) to get the concentrations **(**20, 40, 60, 80, 100, 120, 140, 160, 180 µ g/ml) in standard volumetric flasks (10 ml). The dilutions were scanned in the wavelength range of 200-400 nm. The λ max of Dextromethorphan was found at 278 nm. The linear relationship was observed over the range of 20-200 µ g/ml. Absorbance were noted at 278 nm against 0.1 N HCl (pH 1.2) used as blank. A calibration graph of the absorbance versus the concentration of the drug was plotted **Virani (2015)**.The experiment was performed in triplicate. The calibration curves (refer Fig. 2) were prepared by analysing samples using UV/Visible double beam spectrophotometer.

Solubility Analysis

This study includes selection of suitable solvent to dissolve the pure drug used for the design of superfluity drug delivery system. The sample was quantitatively tested in various solvents for its solubility**Mali (2016)**. It was determined by taking 10mg drug sample in necessary amount of solvent such as distilled water, methanol, SGF, SIF, PBS pH 7.4 etc., in small test tube as well as solubilized by shaking, according to USP **Handa(2018)**.

Analytical Method Validation

The method was validated with respects to linearity, accuracy and precision as per ICH guidelines **Schwartz (2008).** The specificity of the method was evaluated by comparing the UV spectra of blank samples (dissolution medium) against Dextromethorphan Hbr standard solution to demonstrate the absence of interference with the elution of analyte.

Linearity-The linearity was determined by analysing three independent levels of calibration curve in the range of 20-200 µg/ml. The spectrum was recorded at 278 nm. The calibration plot was constructed as absorbance v/s concentration and correlation co-efficient and regression line equation for DEX were determined**Azizollah (2019),Thummala (2014)**.

Accuracy/Recovery- To the pre-analysed sample solutions, a known amount of standard stock solution was added at different levels i.e., 80%, 100%, 120%. The solutions were re-analysed by proposed method **Bitar (2020)**.

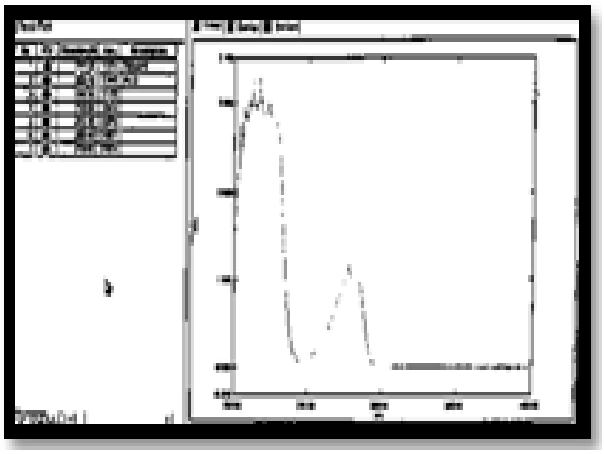
Precision-The method was studied as intra-day and inter-day variations. Intra-day precision was determined by analysing the 80, 100, 120 µg/ml of Dextromethorphan Hbr solutions for three times in the same day. Inter-day precision was determined by analysing the 80, 100, 120 µg/ml of Dextromethorphan Hbr solutions daily for three days over the period of week **Bitar (2020)**.

Repeatability-Repeatability was determined by analysing 100 µg/ml concentration of Dextromethorphan Hbr solution for six times **Virani(2015)**.

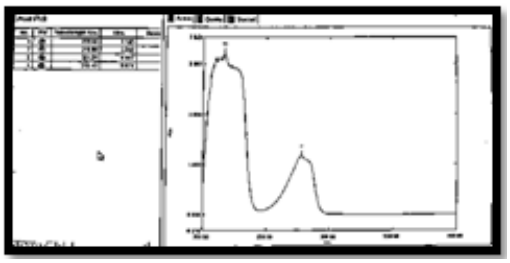
Results and Discussions

UV spectrum: The λ max was found to be 277.6 nm, 278 nm, 278 nm, 277.8 nm in pH 1.2 SGF (without enzyme), phosphate buffer saline pH 7.4, pH 6.8 SIF (without enzyme), distilled water,respectivelyas shown in (Fig. 1). Thus, was comparable to I.P. value 278 nm.

Figure 1: UV spectrum of Dextromethorphan HBr in different mediums (a) SGF (pH 1.2) (b) PBS (pH 7.4) (c) SIF (pH 6.8) (d) distilled water.



(a)



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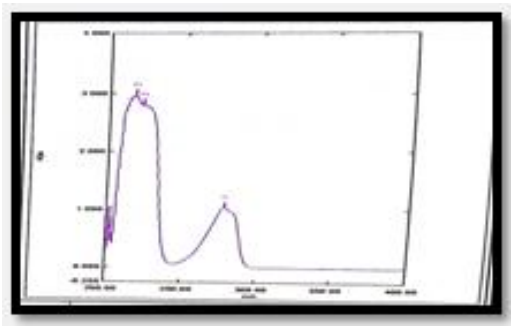
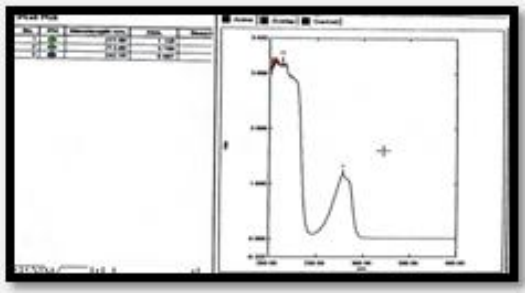


(c)



(d)

Solubility analysis: The equilibrium solubility of crystalline Dextromethorphan HBr is0.0066 ±0.87 mg/ml in distilled water and this experimental value was near by the literature value. The solubility of Dextromethorphan HBrin SGF, SIF, PBS pH 7.4, sparingly soluble in water as shown in (Table 2).

Table No.2: Solubility studies of Dextromethorphan HBr

Solvents	Method used	Experimental value (mg/ml)	Literature value
Distilled Water	Shake flask method	0.0066 ±0.87	0.00851 mg/ml
SGF		0.0111 ±0.17	NA
SIF		0.0079 ±0.10	NA
PBS (pH 7.4)		0.0111 ±0.44	NA

SIF= Simulated intestinal fluid, SGF= Simulated gastric fluid, PBS= Phosphate buffer saline, (SD± n=3)

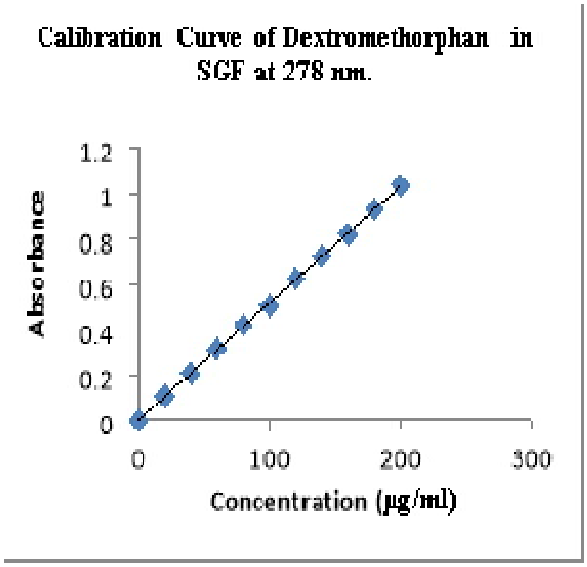
Analytical Method Validation

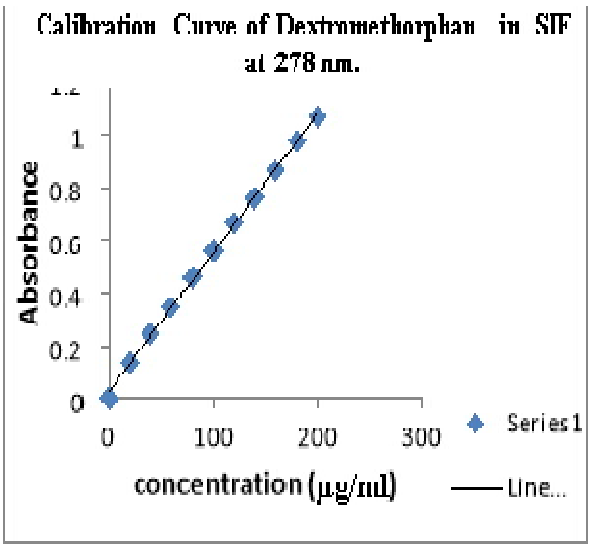
Linearity- In all four-dissolution medium i.e., DW, SGF (without enzyme), SIF (without enzyme) and PBS pH 7.4, the correlation coefficient (R square) was 0.999 which indicates good linearity. In SGF the concentrations ranging from 20-180 µg/ml, which obeyed Beer's law. Similarly, in DW, SIF and PBS pH 7.4 the linearity range was found between 20-200 µ g/ml. The result is shown in (Table 3) and Calibration curve is shown in (Fig. 2).

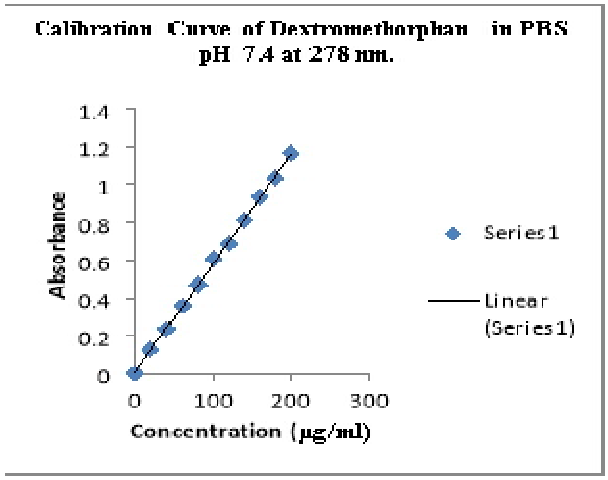
Table No.3: Statistical Data of Linearity of Dextromethorphan HBr

SNO.	Dissolution Medium	Correlation coefficient	Slope	Intercept
1	SGF	0.9998	0.0051	0.0024
2	SIF	0.9991	0.0053	0.0254
3	PBS ph 7.4	0.9994	0.0058	0.006
4	Distilled water	0.9990	0.0056	0.0026

DW= Distilled water, SIF= Simulated intestinal fluid, SGF= Simulated gastric fluid, PBS= Phosphate buffer saline







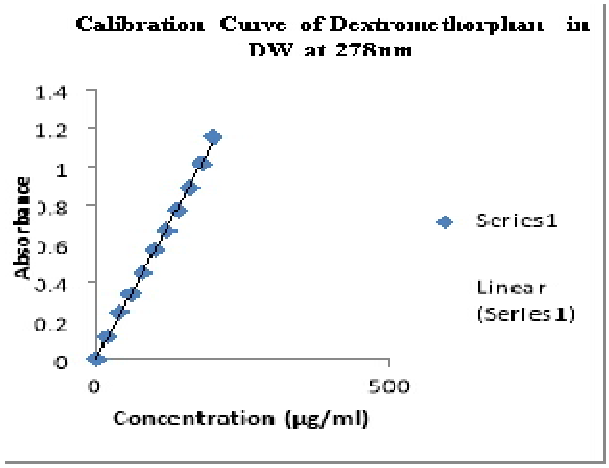


Figure 2: Calibration curve of Dextromethorphan HBr in different solvents

Accuracy/Recovery- The solution was reanalysed by the proposed method; results of recovery studies are reported in (Table 4) which showed that the percent recovery of Dextromethorphan was found to be in the range 97.84-103.44 %.

Table No.4: Recovery study data for of Dextromethorphan HBr

Medium	Concentration (%)	Original level (µg/mL)	Absorbance (278nm)	Found Concentration (µg/ml)	% Recovery	% RSD	AcceptanceCriteria
DW	80	80	0.450	79.892	99.940	0.12	90-110%
	100	100	0.567	100.785	100.72	0.10	90-110%

	120	120	0.668	118.821	99.067	0.08	90-110%
SIF	80	80	0.458	81.622	102.028	0.26	90-110%
	100	100	0.559	100.679	100.679	0.10	90-110%
	120	120	0.665	120.679	100.566	0.18	90-110%
SGF	80	80	0.421	82.078	102.598	0.13	90-110%
	100	100	0.505	98.549	98.549	0.23	90-110%
	120	120	0.625	122.078	101.732	0.18	90-110%
PBS pH 7.4	80	80	0.467	79.482	99.353	0.43	90-110%
	100	100	0.606	103.448	103.448	0.25	90-110%
	120	120	0.687	117.413	97.844	0.14	90-110%

DW= Distilled water, SIF= Simulated intestinal fluid, SGF= Simulated gastric fluid, PBS= Phosphate buffer saline, RSD = Relative standard deviation

Precision- The % RSD values for inter-day and intra-day precision were found to be less than 2% which indicates that the developed method is precise for the determination of Dextromethorphan as shown in (Table 5).

Table No.5: Precision studies of Dextromethorphan HBr in different solvents

Precision Parameters	Dextromethorphan HBr% RSD					Acceptance Criteria
	Concentration taken (µg/ml)	DW	PBS (pH 7.4)	SGF	SIF	
System Precision (n=3)	100	0.101±0.08	0.690±0.3	0.114±0.06	0.103±0.05	< 2.0%
Intraday Precision (n=3)	80	0.312±0.18	0.303±0.1	0.167±0.09	0.309±0.17	< 2.0%
	100	0.101±0.08	0.690±0.3	0.114±0.06	0.103±0.05	
	120	0.086±0.04	0.651±0.3	0.092±0.05	0.173±0.10	
Inter-day Precision (n=3)	80	1.07±0.61	1.73±0.83	1.14±0.66	1.51±0.87	< 2.0%
	100	0.631±0.36	1.26±0.73	1.76±1.02	0.89±0.51	
	120	0.312±0.18	1.02±0.59	1.49±0.86	0.766±0.44	
Repeatability studies (n=6)	100	0.148±0.06	0.504±0.2	0.205±0.08	0.179±0.07	< 2.0%

DW= Distilled water, SIF= Simulated intestinal fluid, SGF= Simulated gastric fluid, PBS= Phosphate buffer saline, RSD = Relative standard deviation

Repeatability-The repeatability was found by analysing 100µg/ml concentration of Dextromethorphan HBr solution for six times with % RSD less than 2 in different medium (Table 5).

Conclusion

The UV-spectrophotometry method is wholly swift, accurate, precise, reproducible and sensitive. For the quantification of Dextromethorphan hydrobromide in stable and bioavailable dosage formulation, the UV method has been developed in four different dissolution mediums. The validation procedure gives the authentication about the method

which is an appropriate for the quantification in any formulation. The developed UV method is also used for the groove of quality control of the raw materials as well as formulations containing this entire compound.

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Conflicts Of Interest

The authors declare no conflict of interest.

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EFFECT OF YOGIC EXERCISES ON BALANCE ABILITY OF SANSKRIT STUDENTS

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ABSTRACT

The aim of this study was to identify the cause of yogic exercises on the Balance ability of the Central Sanskrit University (formerly Known as Rashtriya Sanskrit Sansthan), Rajiv Gandhi Campus students. For the present study the 60 students from the Central Sanskrit University, Rajiv Gandhi Campus, Sringeri were selected at random and the subjects were in 18 to 25 years. The participants were divided in to two equal groups with thirty participants in each group and one is control group and another one is experimental group. The experimental group was treated with yogic exercises and control group has not undergone any training. The experimental group treated with Yogic exercises for eight week duration. The data were collected before and after every four and eight weeks duration of training. The collected data were treated by applying ' t ' test statistical technique. The level of significance was set at 0.05. The yogic exercises had a positive impact on the Balance ability among students of the Central Sanskrit University, Rajiv Gandhi Campus, Sringeri.

***Keywords**: Yogasanas, Balance ability, Sanskrit students, T-test.*

Introduction

Yogasanas are psycho-physical activities which are influencing fitness and also influence the psycho-physio-sociological concepts. The word Yoga originated from the Sanskrit language, yoga, denotes “union” and asana, means “posture” or “pose.” The yogasanas are mostly connected with the physical practices of Hatha Yoga; a few are practiced for our physical profit.

There are ten basic Yogasanas namely, Tadasana-Mountain Pose, Vrikshasana-Tree Pose, AdhoMukhoSvanasana-Downward Facing Dog Pose, Trikonasana-Triangle Pose, Kursiasana-Chair Pose, Naukasana-Boat Pose, Bhujangasana-Cobra Pose, Paschimottanasana, Child's Pose and Sukhasna.

In olden days sages, able to reach a state of realization in which the secret of healthier, happier and more meaningful living were exposed to them. Sages called that secret and holy knowledge of “yoga”, apart from this, Yogasanas are psycho-physical activities which influences fitness and also influence the psycho-physio-sociological concepts.

Methodology

For the present study, sixty students were selected from the Central Sanskrit University (formerly Known as Rashtriya Sanskrit Sansthan), Rajiv Gandhi Campus students and the two kilometers surrounding area of the campus were considered as subjects. Thirty subjects were allotted for each group. One is called control group and another one is called experimental group to know the effect of yogic exercise on balance ability of the students

The following Yogasana training was given for eight weeks.The yoga training was comprised Surya Namaskara, Standing Postures Asanas, Sitting Postures Asanas, Prone Position Asanas, Supine Position Asanas, Pranayama and Shavasana. Training was given in the following manner.

The experimental group was undergone with a yoga training program as per the schedule. Yogasana practices were done only three days per week, alternatively (Monday, Wednesday and Friday from6.00 am to 7.00 am) .The training program was designed as per the sources composed from periodicals, books, e-materials and deliberations with the expert. The duration of experimental designed was 60 minutes per day. All participants considered in this study were cautiously observed all through the training period.

Results

Table:1 shows the pre test balance ability mean, standard deviation and t value of control and experimental groups

		Mean	N	Std. Deviation	df	t
Pre Test	Control group	13.3047	30	8.49220	29	.093
	Experimemtal Group	13.0867	30	10.30388		

The above table shows the t value of pre test of control and experimental groups , the t value shows no significant difference in balance ability of control and experimental groups.

Table:2 shows the four weeks discriptive statistics of balance ability and t value of control and experimental groups

		Mean	N	Std. Deviation	df	t
Pre Test	Control group	13.3520	30	4.42969	29	-2.822
	Experimemtal Group	19.3640	30	11.06717		

The above table shows the t value of after four weeks of control and experimental groups , the t value shows that there is a significance difference in balance ability between control and experimental groups.

Table:3 shows the eight weeks balance ability mean, standard deviation and t value of control and experimental groups

		Mean	N	Std. Deviation	df	t
Pre Test	Control group		30	10.05841	29	-3.200
	Experimemtal Group	21.4037	30	9.73405		

The above table shows the t value of over eight weeks of control and experimental groups, the t value shows that there is a significance difference in balance ability between control and experimental groups.

After four weeks of yoga training there is a significanct difference between control and experimental group.

After eight weeks of yoga training there is a significanct difference between control and experimental group.

Conclusion

The result of present study showed that there is no significanct difference in pre test scores of the control and experimental group.

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COMPARATIVE STUDY OF ARTIFICIAL NEURAL NETWORKS AND ITS APPLICATIONS

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ABSTRACT

In growing era of Artificial Intelligence and Machine Learning, Neural network is significant algorithm to identify underlying connections in dataset. The algorithm works exactly like human brain functions and that's the reason Neural network is widely used in Artificial Intelligence gadgets. The current proliferations of Neural Network models such as Natural Language processing and Image processing has led to a need for the comparative study of such models. In this paper I have analyzedfeed forward neural network, recurrent neural network, Hopfield neural network and convolutional Neural Network and also compared which model gives best performance in certain situations. In this paper learning of Neurons and widely used activation functions are also studied.

Keywords: *Neural Network, classification, Backpropagation*

Introduction

In growing era of Artificial Intelligence and Machine Learning, Artificial Neural Network is a fundamental building block of it. Artificial Neural Network is inspired from structure of brain. In Human brain, there are some cells responsible for calculation and decision process, called as neurons. Brain is made up of vast network of neurons. These neurons are connected with each other and pass information to each other based on inputs given by our organs. Same as Human neuron, an artificial neuron is an information processing unit, which is fundamental of ANN.Every neuron has weighted inputs (that will work as synapses), an activation function and one output. In this paper, we have explained working of Artificial Neuron as well as various activation functions used for it. Activation function is linier or non-linear mapping between input values and output.

Neural Network is consisting of single input layer, single output layer and zero or more hidden layers.The input layer comprises input neurons that send information to the hidden layer. The hidden layer sends information to the output layer. When a neural network has more than one hidden layer, it is called as deep neural network or deep learning. Deep Neural Networks are more powerful and can handle very complex relationships.

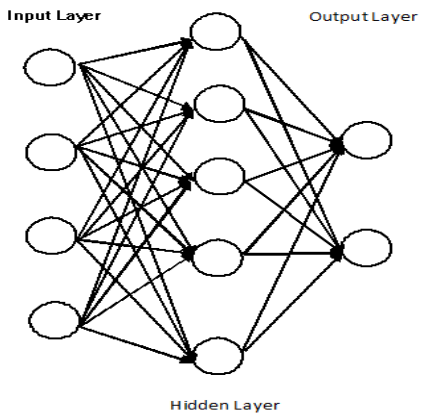

Figure 1 General Architecture of Neural Network

1. Literature Survey

Artificial Neural Network is one of the powerful algorithm in Machine Learning and Artificial Intelligence. It is used in many applications such as Natural Language Processing (NLP), Speech Recognition, Face recognition, Spam Filtering, Recommendation System, Fraud Detection, dieses detection in plants, weather prediction and may more.

ANN can be used in fraud detection by giving samples of legitimate transaction and fraudulent transactions. In the paper [1], authors have demonstrated how ANN can be used for fraud detection.

Authors in [2], have surveyed use ofANN for various speech recognition applications. They have focused on ANN Architecture,

parameters, methodology and performance measure.

With the ANN, we can predict air temperature as well as river water temperature. In [3], Authors have given method using ANN to predict water temperature. They have tested compared various models of ANN(Multi-Layer Perceptron (MLP) , Product Unit ANNs (PUNN), Adaptive-network-based fuzzy inference systems (ANFIS) and Wavelet ANN (WNN)) and concluded that MLP gives better result on said problem.

2. Working of Neuron

Artificial neuron is the smallest unit of ANN. It converts input features and give output by applying any of the activation functions. Neuron take input features and multiplies it with weights assigned to edges, it is called weighted input.Thensum of all weighted inputs iscalculated and activation function is applied to the sum in order to get output.

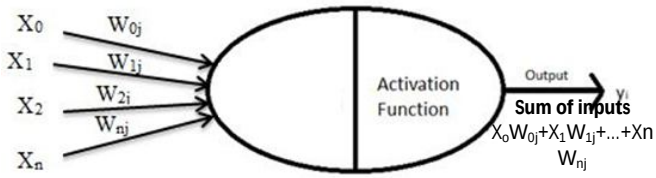

Figure 2 Working of neuron

3. Activation Functions

Activation function is a mathematical function used for neural network to transform inputs into output. Several types of activation functions are used in Neural Network. Common activation functions are listed below.

Function name	Function	Description
Linear Function	f(x)=ax+c	This function creates an output signal proportional to the input. Back-propagation cannot be used with this function. Neural Network with linear activation function is same as linear regression.
Step function	if x < y, f(x)=0 else f(x)=1 , where y is threshold.	It is simplest activation function. This function will give output 1 only when input is greater than or equal to threshold value. Neurons which input is less than threshold value, will not be activated. (output will be 0)
Sigmoid Function	$f(x)=\frac{1}{1+e^{-x}}$	It is widely used non-linier activation function because it is continuously differentiable function. This function will always give output between 0 and 1.
Tanh Function (Tangent Hyperbolic Function)	$f(x)=\frac{2}{1+e^{-2x}}-1$	It is similar of sigmoid function but zero-centered.
Rectified linear Unit (ReLu) Function	if x ≤ 0, f(x)=0 else f(x)=x	It will convert all negative inputs to 0, so that not all neurons will get activated at the same time. It is also most widely used activation function.

4. Classification of Neural Networks[4]

a. Feed-forward Neural Network

This is the simplest neural network designed. In this neural network no cycle is formed among neurons. In this type of network, information moves in one direction only, from input layer to hidden layer and hidden layer to output layer.

b. Recursive Neural Network

This network is created by applying same set of weights recursively.

c. Recurrent Neural Network

In this type of neural network, output of current step is given as input of next step. This type of network has ability to memorize information and with help of that it will predict next output. That's why it is used in sequential prediction such as natural language processing.

d. Hopfield Network

This is a form of RecurrentNeural Network. This is fully connected network and neurons do not have self-loops. Weights are symmetric in this network.

e. Convolutional Neural Network (CNN / ConvNet)

This network take image as an input, applies filters and capture the temporal and spatial dependencies of image. CNN reduce the image for easy process such as no features are lost and can get good prediction that's why it is used in image processing or image prediction and face detection.

5. Comparison of Neural Networks[5]

Type	Benefit	Limitations	Application
Feed-forward Neural Network	- Less training time compare to other types of Neural Network - Very flexible	- Cannot handle complex data	- Regression prediction - Classification prediction
Recursive Neural Network	- Produce structure prediction over variable –size input structure	- Not suitable for image data input - it cannot process very long sequences if using tanh as its activation function	- Natural language processing
Recurrent Neural Network	- Suitable for temporal data	- Very difficult to train Require lots of power - Not suitable for image data input - it is very unstable if using relu as its activation function	- Sequential prediction problem - Natural language Processing - Machine translation
Hopfield Neural Network	- Has auto associative memory	- Configuration is not stable	- Optimization problems
Convolutional Neural Network[6]	- Can handle complex data - able to develop an internal representation of a two-dimensional image.	- Require more time to train - Hard to interpret for human.	- Image processing - Text Classification Task - Speech recognition[2] - Fraud detection[1]

6. Conclusion

ANN is computational model that is able to perform problems of classification, prediction, visualization and many more. Various types of neural networks are defined from its structure and connections of neurons. Out of all activation functions; most used activation function is sigmoid function because of its smooth derivation. Each neural network performs best for certain application. Based on application, type of neural network should be selected.

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THREE IN ONE SOLID STATE PORTABLE REFRIGERATOR COOLER AND HEATER

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ABSTRACT

The purpose of this project is to design fabricate and evaluate a three in one portable solid-state refrigerator, heater and cooler. The most important utilization of this is portable cooler is for the preservation of insulin in extreme conditions a thermoelectric module is used instead of compressor. So that it becomes portable as it is based on the principal of Peltier effect. The use of Peltier effect is to create a heating side and a cooling side and maintain effectiveness. Thermoelectric cooler (TEC) is a solid-state heat pump.The thermoelectric refrigerator doesn't produce chlorofluorocarbons. It is pollutant free and does not contain liquid or gasses. It is portable, compact,and it doesn't create vibration or noise because of the difference in mechanics of the system. it's semiconductor materials by Peltier effect, to provide instantaneous cooling and heating.

Keywords: *Peltier; thermoelectric; Heat pump; Semiconductor.*

1. Introduction

Semiconductor thermoelectric coolers also known as Peltier coolers offer several advantages over conventional systems. They are entirely solid-state devices, with no moving parts, this makes them reliable and quiet. They use no ozone depleting chlorofluorocarbons, potentially offering a more environmentally responsible alternative to conventional refrigeration. They can be extremely compact, much more than compressor-based system. Precise temperature control can be achieved with Peltier coolers. However, their efficiency is low compared to conventional refrigerators. Thus, they are used in such applications where their unique advantages outweigh their low efficiency. Peltier coolers are generally used in applications where small size is needed.

Conventional cooling systems such as those used in refrigerators utilize a compressor and a working fluid to transfer as the working Fluid undergoes expansion and compression and changes phase from liquid to vapour heat. Thermal energy is absorbed and released and back, respectively.

Solid-state thermoelectric device can heat and cool from the same device with a simple switch in direction of electric current. Solid state nature provides acompact form of reversible and rapid heating and cooling with no moving part and this technology is highly reliable and it does not require greenhouse gas.

Hardware Requirements

- ESP32 controller
- H-Bridge
- Logic Shifters
- Temperature sensor
- LCD display
- Keypad
- DC to DC converter
- Peltier

Software

- Arduino IDE
- C++

System Design

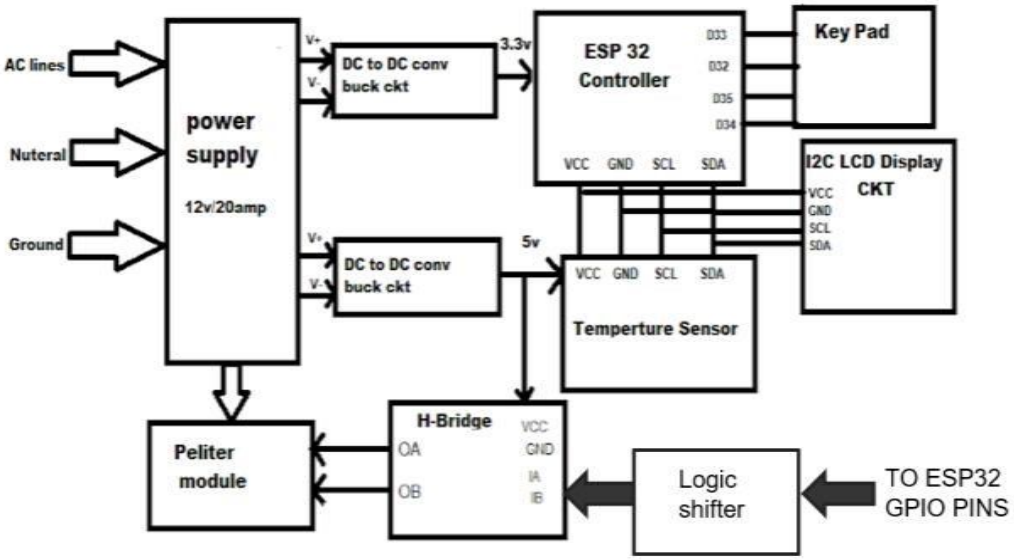

Fig1: Block diagram

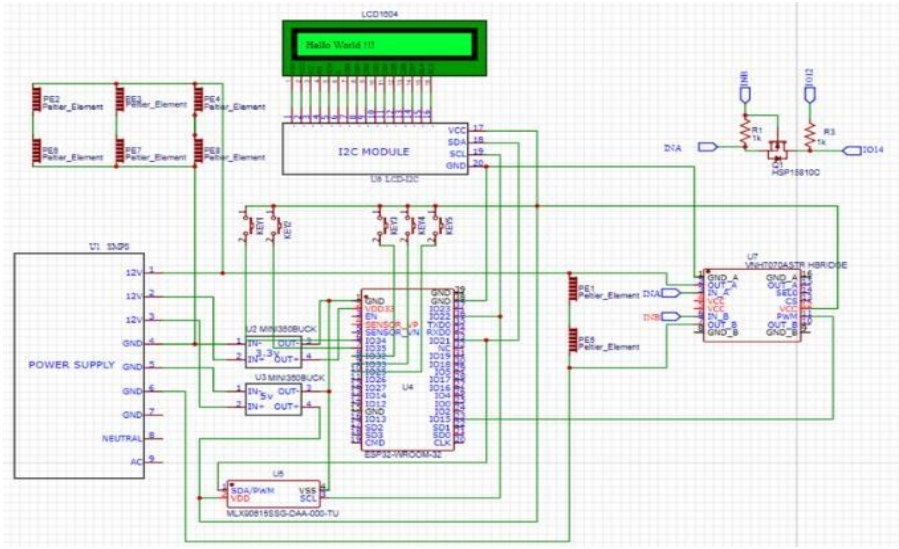

Fig2: Circuit diagram

Power Supply

Power is the backbone of any electronic system, and the power supply is what feeds the system. Choosing the right supply can be the critical difference between a device working at optimum levels and one that may deliver inconsistent results. In addition to alternating current (AC) to direct current (DC) power supplies, DC to DC converters is also available

Dc To Dc Converter

A buck converter (step-down converter) is aDC-to-DC power converterwhich steps down voltage (while stepping up current) from its input (supply) to its output (load). It is a class ofswitched-mode power supply(SMPS) typicallycontaining at least two semiconductors(adiodeas well as atransistor,although modern buck converters frequently replace the diode with a second transistor used forsynchronous rectification)and at least one energy storage element, acapacitor,inductor,or the two in combination. To reduce voltage ripple, filters made of capacitors (some-times in combination with inductors) are normally added to such a converter's output (load-side filter) and input (supply-side filter)

Temperature Sensor

This Is an Infrared thermometer a non-contact temperature measurement sensor develops by Me lexis microelectronics integrated system, code name MLX90614. The MLX90614 has

thermopile detector chip and the signal conditioning ASSP are integrated in a low noise amplifier, 17-bit ADS and DSP unit. This integrated device is calibrated with a digital and pulse with modulation and SM Bus output at 10bit PWM continuously transmit the measured temperature in range of -20 to 120 degree Celsius with an output resolution of 0.14 degree Celsius.

H-Bridge

The term H bridge is derived from the typical graphical representation of such a circuit. An H bridge is built with four switches (solid-state or mechanical). When the switches S1 and S4 (according to the first figure) are closed (and S2 and S3 are open) a positive voltage will be applied across the motor. By opening S1 and S4 switches and closing S2 and S3 switches, this voltage is reversed, allowing reverse operation of the motor.

LCD Display with Push Buttons

As we all know, though LCD and some other displays greatly enrich the man-machine interaction, they share a common weakness. When they are connected to a controller, multiple IOs will be occupied of the controller which has not so many outer ports.

Peltier

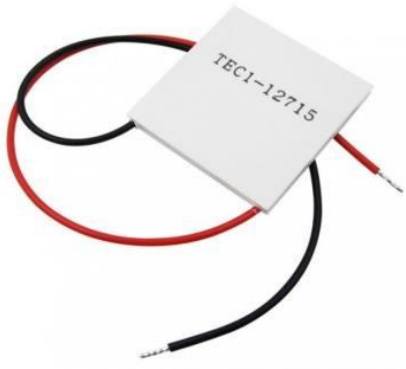

Fig 3: Peltier

Thermoelectric coolers (TEC or Peltier) create a temperature differential on each side. One side gets hot, and the other side gets cool. Therefore, they can be used to either warm something up or cool something down, depending on which side is used. You can also use temperature differential to generate electricity.

A thermo - electric cooling (TEC) module isa semiconductor-based electronic component that functions as a small heat pump. By applying DC power source to a
TEC, heat will be transferred from one side of the module to the other. It creates a cold and hot side.
They are widely used in industrial areas, for example, computer CPU, CCDs, portable refrigerators, medical instruments, and so on. When exposed to different temperatures on both sides it will also work as a generator and therefore generate electricity depending on the temperature difference.

Liquid Cooling

Liquid cool can make system to faster and quieter. When the CPU gets hot instead of cooling it directly with the fan adding a water block with the liquid pump and the radiator and then cooling the CPU is called liquid cooling.

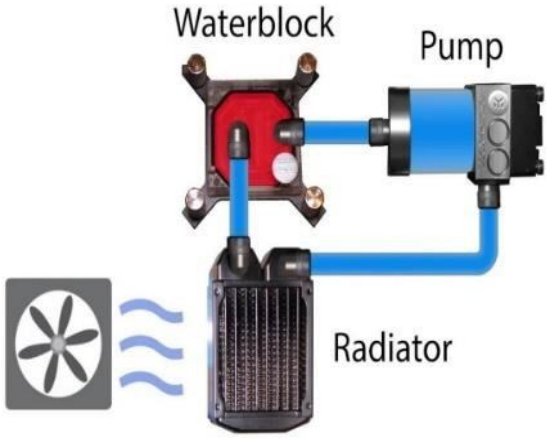

Fig 4: liquid cooling mechanism

Cold water gets pumped through the tubes and into the water block, the water absorbs the heat from the CPU water has higher heat capacity than air so water can absorb lot more heat before it increases in temperature.
The heat is then carried to the radiator which is extremely efficient in dissipating heat the fan doesn't have to blow very hard to help cool down the water therefore the system which uses liquid cooling is quieter now that the water is cooled down again it sent back to the water block and the whole process repeats repeatedly. All the pipes are completely filled, and the water moves and mixes so fast that the whole loop reaches a consistent temperature.

Radiator efficiently cools the water because the radiator has many little fins that absorb heat from the water and dissipate the heat into the air, the more fins the radiator has the faster it cools down because lot of surface area is being exposed to the air.

Testing Results

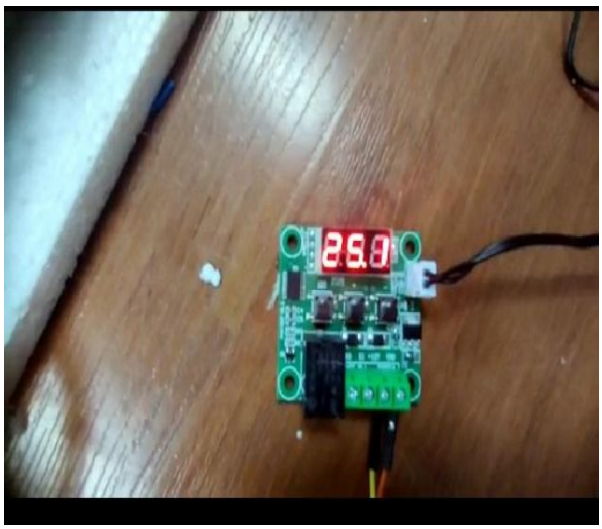

Fig5: Ambient Temperature

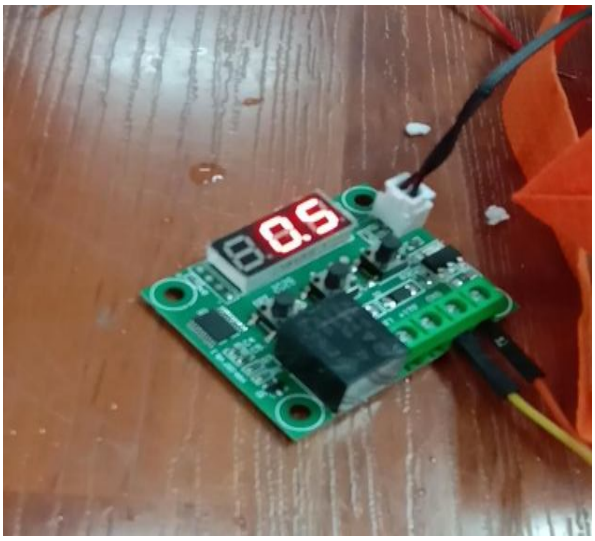

Fig6: Cooling Temperature

- Peltier effect cooling can potentially reach -1 C below ambient temperature.
- The term refrigeration means cooling a space, substance, or system to lower or maintain its temperature below the ambient one.
- For cooling process, we are using six Peltier's.
- For coolingthe hot side of the Peltier's, we are using six Aluminiumwater blocks one for each Peltier.

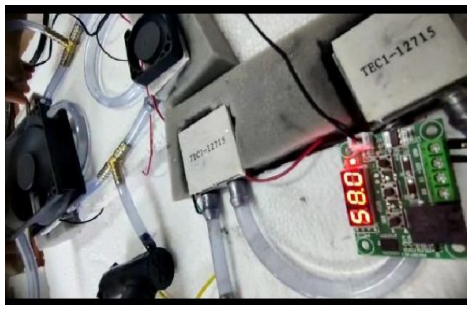

Fig7: Heating Temperature

During the heating operation, the heat energy is extracted from the ambient air and fed to the interior. There is no exchange of outside air, and the interior is thus not dehumidified. The physically induced, unavoidable dripping water during the cooling process does not take place inside the constant climate chamber and Peltier-cooled incubator but outside the working space at a humidity trap. There, the condensate is fed specifically into a collection tray.

- It is capable of temperatures that are about 60 degrees Fahrenheit lower than ambient temperature.
- For heating process, we are using two Peltier's
- For heating cold side of Peltier, we are using two aluminium water blocks one for each Peltier.

Conclusion

It is obvious that an attempt to go into the construction of this kind portable refrigerator, that will achieve its intended benefit efficiently and effectively and is quite challenging project, especially to student to go into full procurement of materials for superb model of the design. Since it is not different from most engineering projects which requires the application of the principles of engineering design, which include recognition of need, definition of the problem, synthesis, analysis and optimization evaluation and final presentation. Finally, it can be conveniently concluded that the project is quite challenging. However, it is undoubtedly interesting as well as inspirational as sufficient information and basis have been made available for future and further research relating to this project. We hope that the design will meet the day to day need for refrigeration.

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PERFORMANCE ANALYSIS OF ELECTRIC BICYCLE

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ABSTRACT

ThispaperpresentstheanalysisofBLDCmotorpropelledelectricbicyclesimulatedinMatLab/Simulinkenvironment.Anefforti smadetodevelopamathematicalmodeltoinvestigatevariousperformance parameters in designing of electrical bicycle such as state of battery; road inclinations, variation in weather conditions, air velocity, and variation in loadsarestudied.Simulationresultsarepresentedandspeed-torquecharacteristicsareanalyzed.Overall performance of electric bicycle system for Sustainable Urban Development and Mobility is presented.

Keywords: bicycle, greenhouse, mobility, power, sustainability

I. Introduction

Electric vehicle plays an important role in the green house effect. In particular, Electric bicycles can be easily accessible by any individual and is viable, sustainable, vibrant alternative to fossil fuel vehicles leading to various environmental issues and unsustainable human life. Electric Bicycles are acquiring significant place in automobile market world widewith helps in reducing air pollution and dependency on crude oil. Electric bicycles make cities carbon & GHG-emissions free also densification in nodes traffic. For the continuous evolution and timely upgradation of the electric bicycle, continuous research is required.

Electric bicycles being economical, ecofriendly and giving various health benefits to the user to travel short and moderate distance made easily affordable is discussed [1]. The advantages of Permanent Magnet Brushless DC motors (BLDC) over brushed DC motor and its suitability for electric bicycles is addressed [2]. Efficiency, reliability, size, dynamic response, acoustic noise, speed-torque characteristics of BLDC motor is discussed [3]. Many industrial applications such as automotive, aerospace, medical, automated industrial equipment and instrumentation encouraged to replace the brush DC motor by BLDC is mentioned [4]. Three phase inverter in put with hall sensor for the operation of BLDC motor is explained[5].Operation of the BLDC motor based on force interaction between permanent magnet and electromagnet coil is discussed[6]. Investigation of various instantaneous drive parameters, such as motor current, voltage, torque and battery energy and system efficiency is discussed[7]. The power consumed in propelling a bicycle along with rider's and also ca rgo weight toovercome wind resistance, lifting mass up-hills at normal speed and bearing and tire friction is highlighted [8] Three phase inverter transforms power from the source to the PMSM converting electrical energy to mechanical energy is highlighted[9]. Mathematical realization of BLDC motor in -abc and d-q axis model with electrical & mechanical system is discussed [10].

This paper presents the mathematical model to investigate various performance parameters in designing BLDC propelled electrical bicycle such as state of battery, road inclinations, variation in weather conditions, air velocity, and variation in loads are studied. Simulation results are presented and speed- torque characteristics are analyzed. Overall performance of electric bicycle system for Sustainable Urban Development and Mobility is presented in MATLAB/ Simulink environment.

II. Mathematical modelling of BLDC motor

BLDC motor can be realized with mathematically modelling electrical & mechanical Subsystem. The equations for electrical system with phase inductance Ls is assumed constant and does not vary with rotor position.

$$\frac{dia}{dt} = \frac{1}{3Ls}(2Vab+Vbc-3Rs.ia+\lambda p\omega(-2\phi a+\phi b+\phi c)) \quad (1)$$

$$\frac{dib}{dt} = \frac{1}{3Ls}(Vab+Vbc-3Rs.ib+\lambda p\omega(\phi a-2\phi b+\phi c)) \quad (2)$$

$$\frac{dic}{dt} = -\left(\frac{dia}{dt}+\frac{dib}{dt}\right) \quad (3)$$

$$Te = (\phi a.ia+\phi b.ib+\phi c.ic) \quad (4)$$

Where

Ls= inductance of stator winding in mHRs=Resistance of stator winding in ohms ia,ib,ic=a,band cp hasecurrentsin Amps

φa ,φb, φc= a , b and cphase electromotive forces in volts Vab,Vbc= ab and bc phase to phase voltages in volts

ωr=Angular velocity of rotor in rad/sec

λ=Amplitude of flux induced by the permanent magnet of the rotor in the stator phases.

P= number of pole pairs Te=Electro magnetic torque inNm

The mechanical system is expressed using following equations (4)&(5)

$$\frac{d\omega r}{dt} = \frac{1}{J}(Te - Tf - F\omega r - Tm) \quad (5)$$

$$\frac{d\theta}{dt} = \omega r \quad (6)$$

Where

J= Combined inertia of rotor and load in Kg-mF= combined viscous friction of rotor and loadθ= Rotor angular position in rad/sec

T_m=Shaft torque nN-mT_f=friction torque inN-m

III. **Mathematical Model of Electric bicycle**

Figure1 shows the components of an electric bicycle system in which BLDC motor is fed from the battery supply through inverter.

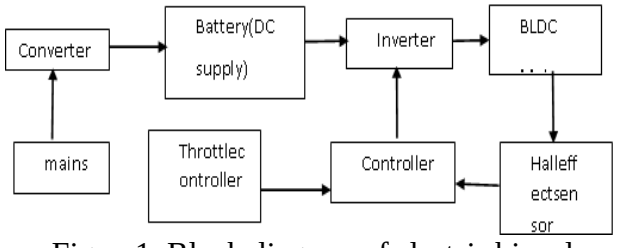

Figure1: Block diagram of electric bicycle

The components of electric bicycle include:

(1) Electric motor,
(2) Controller it self consists of three sub modules:
(a) Transformation of user demand into corresponding duty cycle
(b) Control of switching based on duty cycle
(c) A capacitor to provide a stiff voltage at the switch through terminal
(3) Battery
(4) Electromechanical system that relates net torque and acceleration using a simplified single-wheel representation.

The mathematical model of an Electric bicycle is as in Figure 2. The power consumed in propelling a bicycle along with rider's and also cargo weight if any, to overcome wind pressure, lifting mass up-hills at normal speed and also due to bearing and tire friction forces acting are modelled in mathematical model.

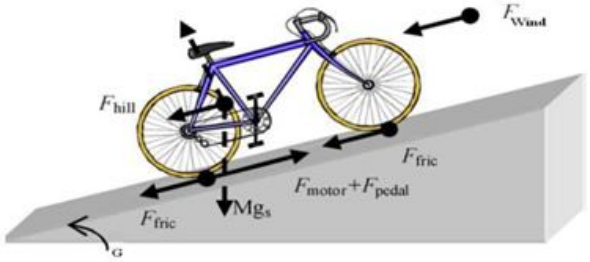

Figure2. Mathematical model of electric bicycle

The model is designed for the investigation of both the instantaneous and overall performance of BLDC propelled electric bicycle driving system under different riding conditions. Analysis of various instantaneous drive parameters, such as motor current, voltage, torque, state of charge of the battery energy and system efficiency is carried out. Total performance of the drive over a given driving cycle such as system efficiency and total power consumption is illustrated.

IV. **BLDC based propulsion**

A. Brushless DC Motor Operation:

A Brushless DC motor is an inside out permanent magnet DC motor with conventional multi-segment commutator acting as a mechanical rectifier is replaced with an electronic circuit to do the commutation. In a BLDC motor permanent magnets are mounted on the rotor with the armature winding being housed on the stator with a laminated steel core as depicted in Figure 3. BLDC motor consists of stator coils with rotor permanent magnet, electronic commutator and hall sensor to sense the position of rotor and help in commutation

in order to have continuous rotation of motor.

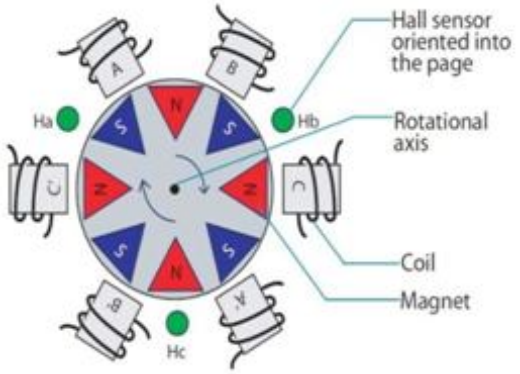

Figure3. Construction of Permanent magnet BLDC

B. Inverter for BLDC Motor:

Rotation in BLDC is initiated by sequentially energising opposite pairs of poles phases such that the angle between the stator flux and rotor flux is kept at 90 ^{o} to generate maximum torque from the motor. By electronic switching using H-bridge inverter. The H-bridge inverter consists of six power MOSFET for 600V. The rotor position information is sensed with three Hall effect sensors placed at 120 degree mechanically apart such that each sensor outputs a high level for 180 degree of an electrical rotation, and a low level for the other 180 degree. The three sensors have 60 degree relative offset from each other and this divides the rotation in to six-phase. Table.1 show the relationship between the hall sensor input code, the required active motor windings.

Table.1 sensor Input by actives witch table

Theta_elec	Hallsensors	Commutationno.	Activedrive	
0^{o}-60^{o}	101	1	Q1	Q6
60^{o}-120^{o}	100	2	Q1	Q5
120^{o}-180^{o}	110	3	Q3	Q5
180^{o}-240^{o}	010	4	Q3	Q4
240^{o}-300^{o}	011	5	Q2	Q4
300^{o}-360^{o}	001	6	Q2	Q6

V. **Simulation Results And Discussion**

The complete model of Electric Bicycle propelled by BLDC motor of 1kw, 50Hz, 48 V, 1500 rpm energised by boost converter and 3 phase inverter is implemented in Matlab/ Simulink Enviroment and simulation results are presented. The model of Electric Bicycle is organized into sub models.

The precise value of the torque given to the model is very important in designing BLDC motor drive system because it is related to back emf and torque. For energizing the stator winding in correct sequence of rotor position is necessary to rotate the rotor. Statorwindingaresequentiallyenergizedwithelectronicallycommutation.Figure4showstheSimulinkmodelofBLDCpropelledelectricbicyclesystem

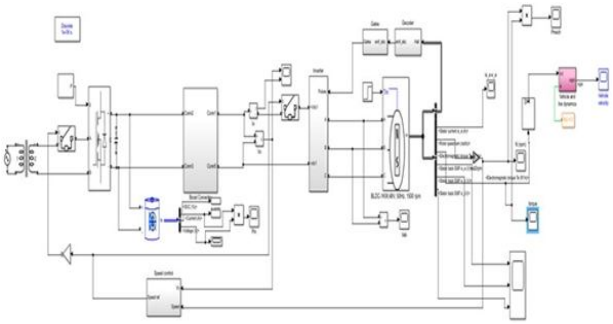

Figure 4. Simulation model of the BLDC propelled Electric bicycle

The controller controls the power flow from battery source to motor. Here the input speed is compared with the reference speed, if input speed is greater additional voltage Vo is given to motor and with PWM technique the required speed is developed as in Figure5..

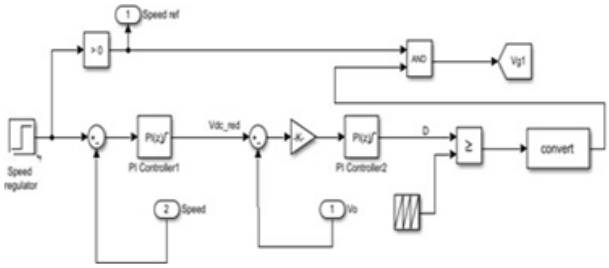

Figure5. Model of PI controller

The electric bicycle system with BLDC motor of 1kw, 50Hz,48V,1500 rpm with boost converter and 3 phase inverter is simulated and simulation results are presented from Figure 6-10. Initially the speed of the motor rises to 1800 rpm at a torque of 11N-m as in Figure 6and 7.Figure 8indicates the state of battery decreases from to3.5% of its full charge in 0.3 seconds. Figure 9 shows the back emf developed indifferent phases of the stator. Figure 10 shows the line voltage between the phases aandb. Figure 11shows the variation in vehicle velocity at different gradients at constant wind velocity. Figure 12 shows the variation in vehicle velocity for different wind velocity at constant gradient of 5^{0}.

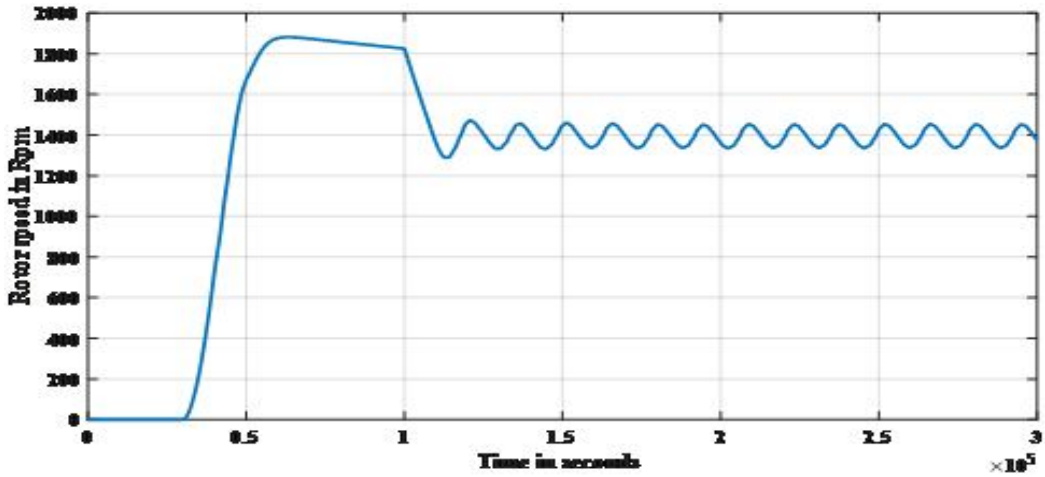

Figure 6. Motor speed versus time

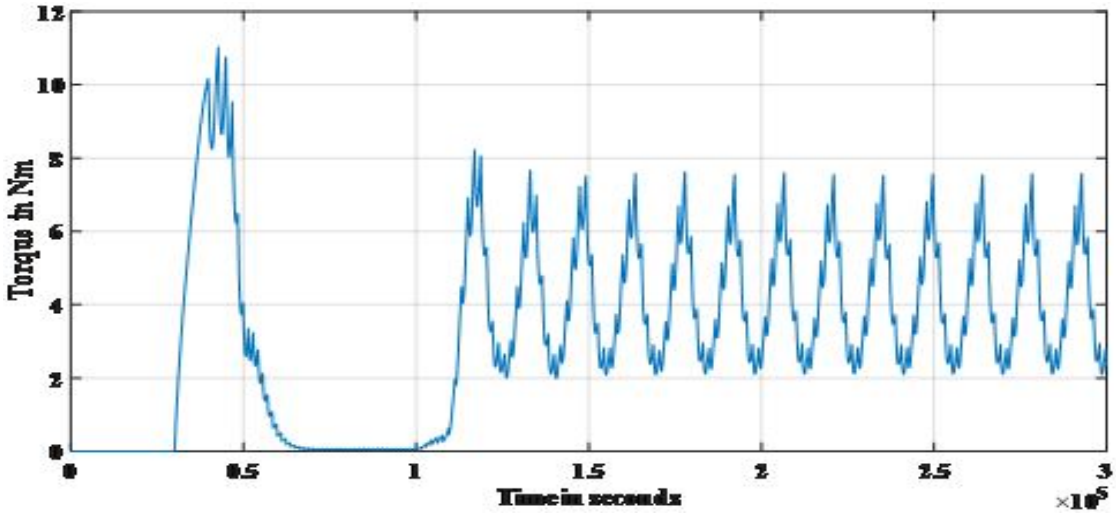

Figure7. Variation of Torque with respect to time

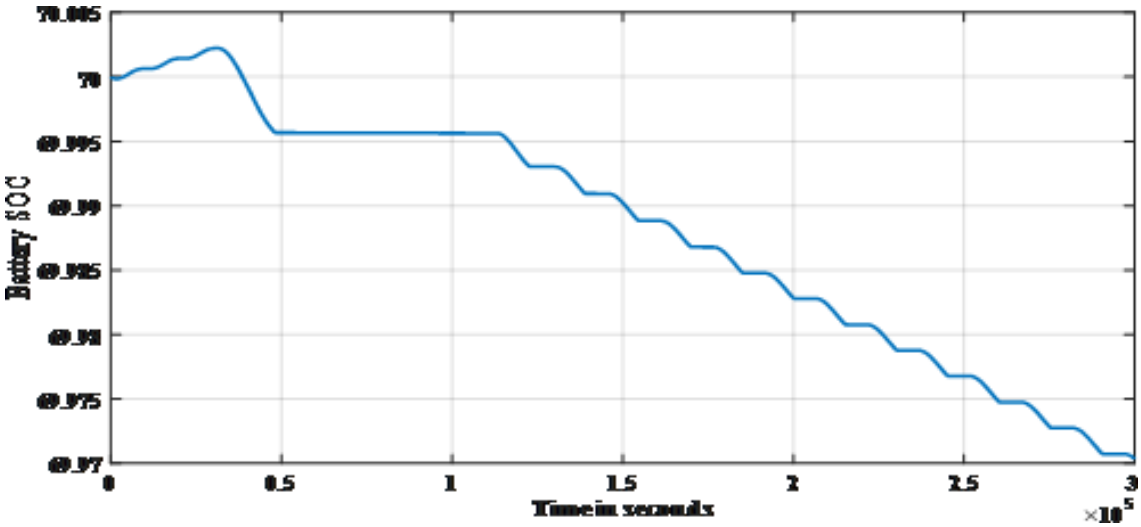

Figure 8. Percentagef all of Battery SOC

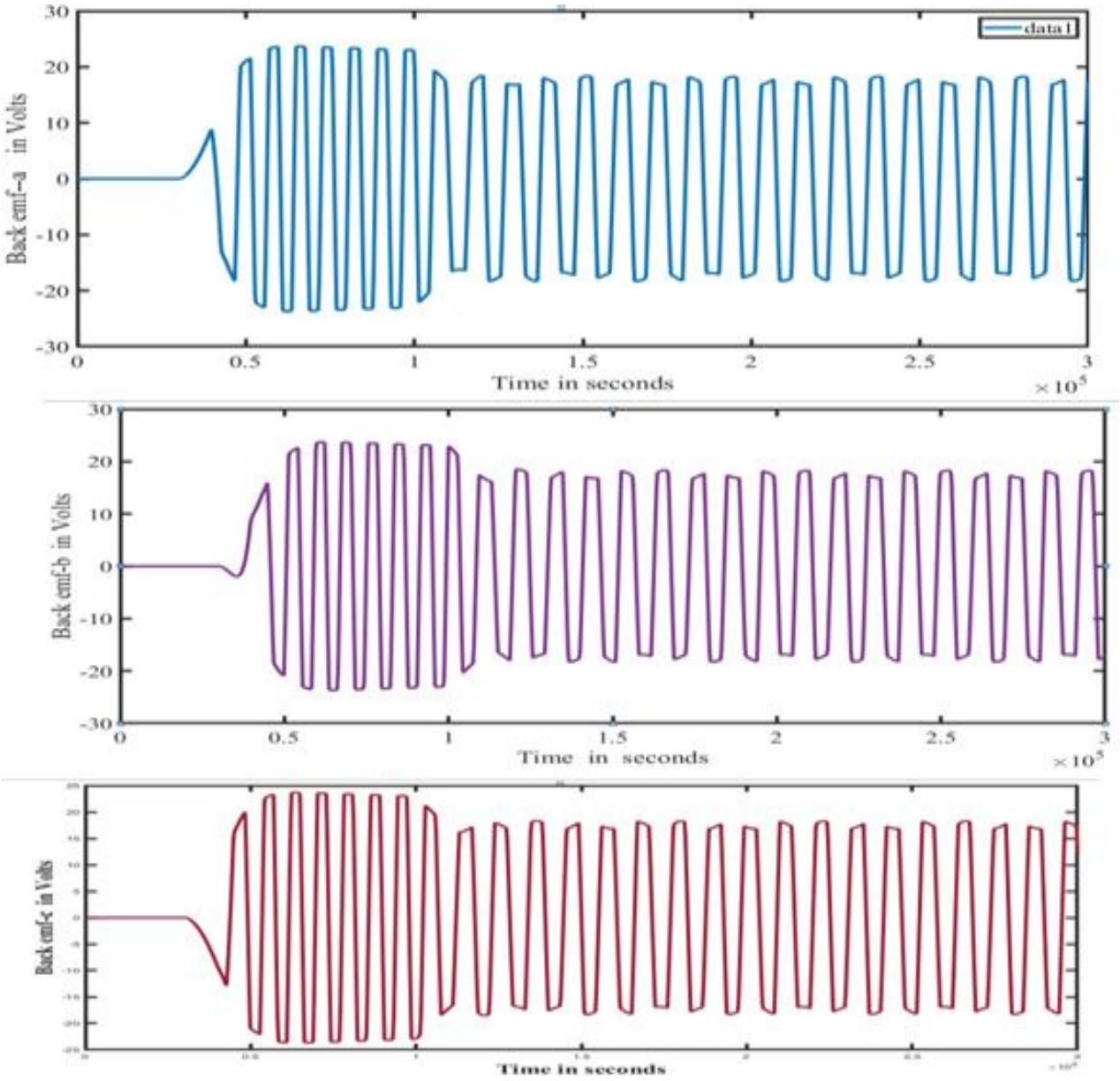

Figure9. Stator back emfinphasesa, b,c

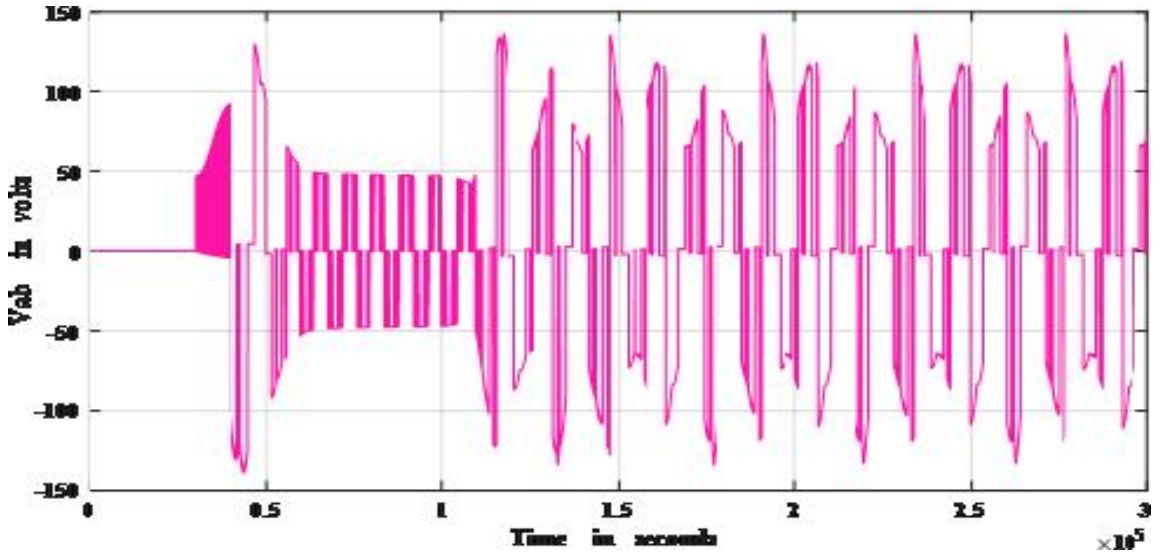

Figure10.Linetolinevoltages

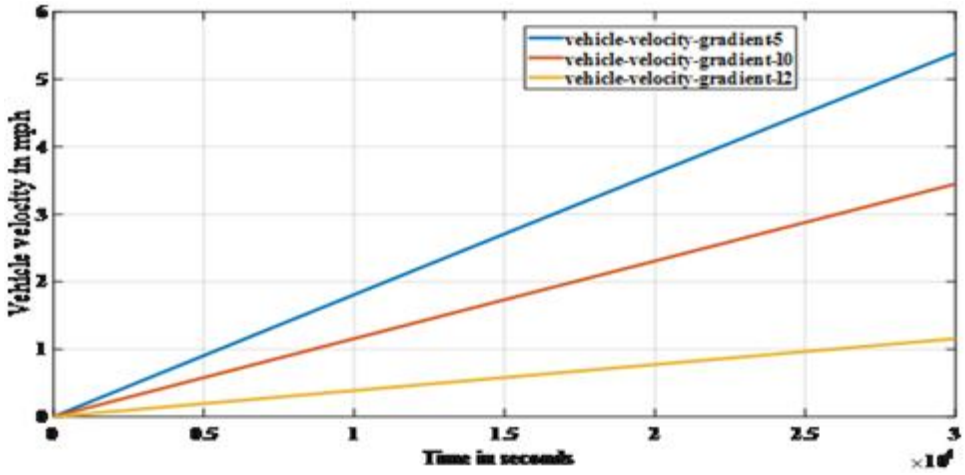

Figure11. Variation of vehiclevelocityfordifferentgradients

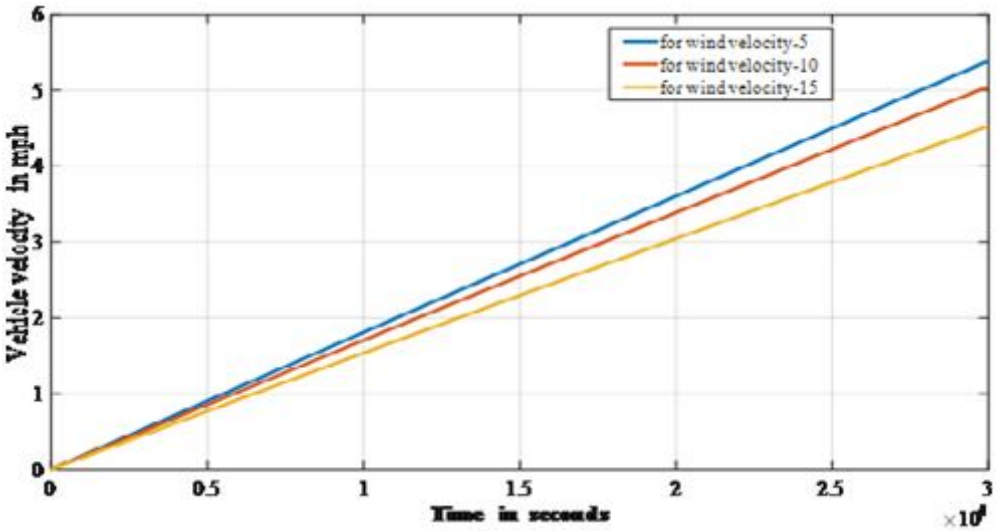

Figure12.Variationinvehiclevelocity for different wind velocity

VI. **Conclusion**

Modelling and simulation of PI controlled BLDC powered electric bicycle is presented in this paper. Simulation is done for variations in different parameters like variation in velocity of vehicle at different gradients by keeping all other parameters constant and variation in velocity of vehicle for different wind velocity. Simulation results are presented in Matlab/ Simulink environment. The hardware implement is in progress.

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TEA AND EDUCATION: EXPLORING THE IMPACT OF SOCIO-ECONOMIC CONDITION ON THE EDUCATIONAL ACHIEVEMENTS OF THE WOMEN LABOURERS IN TEA PLANTATIONS

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ABSTRACT

This present study tries to find the connection between the poor socio-monetary circumstance of the girl'slaborer's inside the tea plantations of Assam. Since this paper is based totally at the available secondary literature, there would be no quantitative analysis of data. Rather, this paper will try to engage with the questions of the dearth of educational success most of the ladies, and the socio-economic instances which make it difficult for the women to come out of this cycle of dependence.

Keywords: *Working -Conditions, Tea-Plantation, Living Conditions, Socio-economic*

Introduction

India began developing tea during the 1780s and the primary transfer, filled in Assam, was shipped off England in 1823 for public deal. In the structure of this work serious industry when supporting framework was practically non-existent, vision and hazard taking inclination of English business people meant a lot. Yet, nothing of that pioneering experience would have yielded results via giving millions all throughout the planet a rich mix toward the beginning of the day and this was unrealistic without the work of tea garden workers who stay overlooked yet truly great individuals in history of bequest.

Britishers made huge fortunes out of tea before they began giving once again resources for Indian gatherings. Resources much of the time were sold fit. Yet, laborers in this industry needed to endure helpless wages and awful day to day environments during English proprietorship. The significant space of my investigation manages this part of tea domains which has a wide range of fields covering under it like the situation of a tea worker, the states of its work, its endurance in the complex financial construction and the inaccessible government assistance approaches which as a general rule would give no advantage to the worker.

It is important to see in this project of social work that how and in what ways solutions to such important issues can be located because those hands which provides the major selling commodity in the world which has always dominated the market needs justice and it has to be given nowand major purpose of my research deals with the issue of conditions and recruitment of the workers because in order to improve their present living state it is essential to locate the problem at the grass root level.

The development of tea has never been a simple occupation in the set of experiences and had consistently required thorough work, English established the modest work in India and used it for their advantage in the creation. Tea shrub should be native to China however it was accounted for by Significant Robert Bruce in 1823 that native tea shrubberies developed wild on the slope inclines of upper Assam. In the year 1840, tea seeds were imported from China and business tea ranches were set up in the Brahmaputra valley. In any case, tea estates were restricted to Upper Assam just yet later on, new regions, for example, lower Assam and Darjeeling were likewise opened up to tea manors and by 1859, there were 30 tea ranches in Assam alone.

Brief Historical Background

There was a deliberate work to grow a abode and manageable labor force which could be made to work and become subject to the of the tea ranches. A deliberate interaction was utilized to fulfill the workers with the absolute minimum and the forswearing of the admittance to essential assets, for example, wellbeing and training was denied. This cycle

has proceeded with the pioneer tradition of treating the tea estate workers as 'fortified work'. This has been featured in the writing.

Behal (2014), in his study done in the past cover's tea plantation varying the living conditions of the worker. Through the cycle of enrollment, transportation and work, the dependent ranch systems changed the Indian agrarian networks of tribal, aboriginals and helpless laborers into laboring 'coolies'. The cycle of change of networks of tribal and laborers from the areas of Chotanagpur, Bihar, Bengal, Orissa and South India into ranch coolies started from the time they were enrolled and pushed on their go towards Assam.As researchers like Rana Behal have contended that, "they were crowded together for a long and curvinggo to these far-off lands by foot, rail, stream and ocean liners, unprotected from components of nature however consistently under steady observation". The states of their work don't shift and they needed to work under ruthless observation by the pilgrim rule and furthermore heavily influenced by the grower contract. Close by that their family structure and broken house aggravated the condition for them, no appropriate disinfection, inappropriate transportation, reconnaissance, disciplines, the dread of prison subsequent to breaking the agreement and with no solidarity to revolt made the existence of the workerhopeless.

Rodney (1981), accepts that entrepreneur ranch required a specific kind of work: 'The work should be modest and ample, and, significantly more significant; the work should be effortlessly controlled. Except if work can be given under conditions that expand the modern control, you can't have a working ranch framework.'. in any case, what has not been protect in this whole task of enlistment research is the type of conditions that traveler laborers goes through as far as transportation of him from his unique spot of birth, his separation from his family and assuming he moves with family, what are the impacts at the family structure lastly what are the results of transient specialist on the first occupant of Assam as far as his enrollment and the sharing of economy from the rest of the world.

Socio-Economic condition and Education: A review

The reliance endured by the ranch laborers as a rule confines them from partaking in the advantages which strategies at the focal and state levels can give. The state of bondage and reliance requests that the work is persistently given across ages, and subsequently through refusal of fitting wages and the capacity to unionize to advance the requests, the workers are frequently denied the opportunity to get to public merchandise like schooling which might have helped the class gotten upwardly versatile. As we feature in the writing underneath, the lower accomplishments in schooling has both immediate and roundabout causal relations with different financial components.

Deb Nath Ruma1 and Nath Dipak (2014), In their work uncovers that the tea worker's poor instructive status has an immediate relationship in lacking standard nature of living, wellbeing and nourishment, unemployment-insuranceand recognition on rights and duties. The lower pace of proficiency among tea laborers adversely affect their youngsters schooling status. His exploration at Dewan tea bequest amplify the way that 56% of the male and a lot of the female respondent were totally unskilled who neither knew to peruse, compose or sign their name. In contrast with the Public normal, the advancement of proficiency rate inside the tea clan citizens is frustrating.

Sharma (2011), on her examination restricted Universalization of easy schooling at Jorhat Area analyzes the academic potential to assess the enrolment figure at grade schools, evaluate dropouts and under investigation the understudy educator proportion at garden schools. As the guardians are unskilled or because of lower status of schooling, they don't know about the significance of training. In this way, the kids in the tea garden are not urged to concentrate more than their essential level. She recommended that each choice taken for strategy making, development and execution in regards to instruction in the express, the training of the tea clan ought to be given unique inclination.

Baruah (2015), in his news report highlighted shocking revelation of Assam State

Commission for protection of child rights in their reports It expresses that a lot of tea gardens in Assam would not comply with the Right to Schooling act. Just six regions of 24 tea creating locale has Government provincialized schools. Overview led by ASCPCR reports that youngsters are compelled to work in processing plants as opposed to going to schools with huge number of kids are associated with culling tea leaves. In spite of the fact that arrangement of admittance to schooling offices for kids between 6 to 12 years are established by the ranch work act 1951, yet youngsters are wrongfully utilized in the Nurseries. The educators selected in the schools are undeveloped andunderqualified**.**

Das (2015), in her examination composes that ladies in the tea bequests are generally ignorant or less upskill. They invest the vast majority of the energy in acquiring their work and don't know about their Fundamental rights. Has been noticed that the ladies are not chief concerning casting a ballot and their votes are basically counter by the male individuals in the house.

Conclusion

This is a small evaluate of literature and therefore cannot provide any concrete inferences or conclusions. However, it could direct the proper questions closer to the possibility of destiny studies. It has been shown that the ladies in the tea gardens are likewise least keen on going to political races, rallies and so on yet they go to the Public gathering held by Assam Chah Mazdoor Sangha, an extremely amazing tea work worker's organization in Assam. Just seven percent in the tea gardens settle on autonomous choice on cooperation into the democratic cycle**(Das, 2015).**Thus, the shortage of training has turn out to be a bane for the improvement and freedom of ladies. Any empowerment of the girls labourers has to include stronger guidelines on education, fitness and concomitantly, equal wages as the any shape of freedom whether or not cultural, political or social can simplest be viable through monetary freedom.

Diganta (2014), states that in this day and age both man and lady similarly add to the general public and offer equivalent rights, so ladies' improvement is especially imperative to have a superior society's upliftment. Devi (2017), in her study states lady's improvement is particularly essential to have a superior society's upliftment. Ladies should work for their own advancement and for their families and ought to have a decent pay. Ladies laborers working in the tea garden are as yet lingering behind in each angle, regardless of whether its socially, financially and ethically.

Indeed, even today ladies are not instructed, and they are turning out only for their families. It is the obligation of the public authority, Ngo's, social orders to give them training so they can take on their own conflict, difficulties and circumstances. An informed young lady can be a more grounded lady in future who can find out about their possibilities and what rights they have which can assist them with having a decent existence.It can help them and their households to come out of the 'bondage' and 'servitude' one notices inside the tea plantation.

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PREPARATION AND EVALUATION OF SOLID DISPERSION

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ABSTRACT

The present research was done to formulate a solid dispersion of telmisartan to attain maximum bioavailability and solubility by fusing the drug with the polymer in different ratios. Telmisartan is an antihypertensive drug which comes under the category of angiotensin receptor blockers (ARBs) that works by lowering the blood pressure. The solid dispersion was prepared by using polymer, polyethylene glycol 4000. The dispersion was evaluated under standard procedures of different parameters of dissolution, drug content estimation and drug release. The F3 formulation had highest solubility and drug release was found to be 81.26%. The drug release was found in the order F3>F2>F1. Hence, the solid dispersion containing more concentration of PEG 4000 was considered to have the highest solubility and dissolution.

Keywords: *Telmisartan, Polyethylene glycol 4000, drug content, dissolution.*

1. Introduction

The management of illness through medication has entered an era of rapid growth. Today, there are many advanced formulations developed over conventional formulations with improved strategies. . Another promising approach is the solid dispersion technology. Ease of scalability, its conversion to solid dosage forms such as capsules, tablets, taste-masking strips and implants are some of the advantages offered by solid dispersion over other approaches.[1] Solid dispersion are defined as a group of solid products consisting of at least two different components, generally a hydrophilic matrix and a hydrophobic drug. The matrix can be either crystalline or amorphous. Much of the research have been reported on solid dispersion technologies involves drugs that are poorly water-soluble and highly permeable to biological membranes as with these drugs dissolution is the rate limiting step to absorption. Formulation of drugs as solid dispersions offers a variety of processing and excipient options.[2]

The first drug whose rate and extent of absorption was significantly enhanced using solid dispersion was sulfathiazole by Sekiguchi and Obi in 1961, in which eutectic mixture of sulfathiazole with urea as the inert carrier was formed.[3]

Numerous solid dispersion systems have been demonstrated in the pharmaceutical literature to improve the dissolution properties of poorly water-soluble drugs. On the other hand, formulation of drugs as solid dispersions offers a variety of processing and excipient options that allow for flexibility when formulating oral delivery systems for poorly water-soluble drugs. A solid dispersion can enhance the dissolution rate of a poorly soluble drug through increasing surface area, increasing solubility through formation of a solid solution and surface modification through intimate contact with hydrophilic carriers.

2. Materials and Methods

Materials

Telmisartan I.P was obtained as a gift sample from Sirmour Remedies Pvt Ltd. Polymer polyethylene glycol 4000 was obtained from SD Fine Chemicals. Solvent HCl and Methanol was obtained from Merck Speciality Ltd.

Methods

Preformulation Studies

Studies of the procured drug were done including melting point determination, drug content estimation, FTIR studies and solubility analysis along with the Preformulation studies.

- **Melting point-** Melting point of the drug (Telmisartan) was determined by capillary tube method. In this method, small quantity of the drug was filled in the capillary and one end of the capillary was sealed. The capillary tube was placed in the melting point apparatus. The temperature was noted

when the drug begin to melt. The melting point of Telmisartan should lie in the range of 265-272ºC. [4,5,6]

- **Organoleptic property of the drug-** As per Indian Pharmacopeia, the physical appearance of the drug (Telmisartan) was enlisted on the basis of colour, odor and taste. All these parameters were recorded and compared with the standard.[7,8]
- **Solubility-** The solubility of the drug was observed in different solvents such as water, methanol, etc. and the results were observed visually after 24 hrs.
- **FTIR studies of drug and Excipient-** FTIR spectra was recorded for Telmisartan and prepared solid dispersion using FTIR spectrophotometer (Shimadzu IR affinity 1, Tokyo, Japan) in the region 4000-500 cm^{-1}. 10g of the sample was mixed with potassium bromide (200-400 mg) and compressed disc was placed in the light path and spectra were obtained. After running the spectra, significant peaks relating to major functional groups were identified.[9]

Analytical method adoption by UV Spectrophotometer

By using UV Spectrophotometer, the concentration of Telmisartan was estimated in the formulation. For method adopting following steps were performed:

- **Preparation of 0.1N HCl- 8**.2 ml of HCl was taken in 1 litre of volumetric flask with the help of pipette and dissolved in distilled water. Finally, the volume was made upto 1000ml using distilled water.[9]
- **Preparation of stock solution-** For the preparation of stock solution, 10mg of the pure drug was accurately weighed and dissolved in 10ml 0.1N HCl and then volume was made up to 100ml with 0.1N HCl to give standard stock solution of 100µg/ml. This solution worked as stock solution**.** [10,11]
- **Determination of λ max. of Telmisartan-** Stock solution of Telmisartan (100µg/ml) was prepared in 0.1N HCl. From this stock solution, the sample of concentration 10µg/ml was prepared by appropriate dilution. The sample was filtered and scanned in the range of 200-400nm using UV spectrophotometer to determine λ max. The standard says that λ max of Telmisartan should lies in the range of 216-363nm.[12]
- **Preparation of calibration curve for Telmisartan-** 0.1N HCl was used. 1 mg/ml solution of drug was prepared. Then, different concentrations for this were carried out for estimation under UV spectrophotometer at 296 nm using methanol as a blank. The absorbance values corresponding to each concentration were then statistically evaluated and plotted as a standard graph between absorbance on Y-axis and concentration on X- axis.[9]

Formulation of Solid Dispersion

Solid dispersion containing Telmisartan drug was prepared by fusion or physical mixing method or melting method. This required proportion of drug and polymer as per formulation table. Drug and polymer was weighed accurately as per the design of the formulation table and mixed thoroughly in pestle-mortar with triturating for about 10 minutes. The melted mixture is then solidified rapidly in an ice-bath using vigorous stirring. The final solid mass is crushed and pulverized.[13]

Formulation Chart

For developing the solid dispersion of Telmisartan, the drug and the polymer was taken as per the following formulation chart:

S.N.	Formulation Code (FC)	Drug (mg)	Polymer	Ration (Drug:Carrier)
			Polyethylene Glycol4000(mg)	
1.	F1	100	100	1:1
2.	F2	100	200	1:2
3.	F3	100	300	1:3

Table 1: Formulation Table

Evaluation of Solid Dispersion

The evaluation parameters of the prepared solid dispersion were described as follows:

Angle of Repose

By determining the angle of repose, one can determine the flow property of powder. It is the maximum angle that can be obtained between the freestanding surface of a powder heap and the horizontal plane. A greater angle of repose indicates poor flow property. It should be less than 30^0 and can be determined by following equation:

$\tan\Theta=h/r$

Where, Θ=angle of repose h=height of pile r=radius

The limits were given in the following table:

Angle Of Repose (in degree)	Type of Flow
<25	Excellent
25-30	Good
30-40	Passable
>40	Very poor

Table-2

The solid dispersion was poured into a pile on a level surface allowing it to build a pile from the top. This resulted in a pile with a relatively circular base making measurement easier. The height of the pile (h) and distance from the middle of the pile to the edge (r) was measured with the help of a ruler.[14]

Carr's Compressibility Index

It is a simple, fast and popular method of predicting powder flow characteristics. Carr's index was calculated by the following formula:
Carr's index= (Tap density- Bulk density)/Tap Density ×100 The limits were mentioned in the table given below:

Carr's Index	Type Of Flow
5-15	Excellent
12-16	Good
18-21	Fair to passable
23-35	Poor
33-38	Very poor
>40	Extremely poor

Table- 3

Hausner's Ratio

A simple indication of the ease with which a material can be induced to flow is given by the application of Hausner ratio. It was calculated as per the following formula:
Hausner's ratio= Tap Density/ Bulk Density[15]
The limits were mentioned in the table below:

Hausner's ratio	Flowability
1.05-1.18	Excellent
1.14-1.20	Good
1.22-1.26	Fair-Passable
1.30-1.54	Poor
1.50-1.61	Very poor
>1.67	Extremely poor

Table- 4

Bulk Density

Bulk density is an intrinsic property of powders, granules and other particulate matter and is defined as the mass of many particles of the material divided by the total volume they occupy.
The product prepared was poured in a measuring cylinder and the volume was noted. Before this, the weight of the product was also noted and finally the bulk density was observed by using the following formula:

Bulk density=Mass or weight of powder/ Volume occupied by it[16]

Tapped Density

It was referred to as the bulk density of the powder after specific compaction process usually involving vibration of the container or tapping the container.
Tapped density= Mass of powder/ Volume after tapping[17]

Percentage Yield

It was calculated to know about percentage yield or efficiency of any method, thus it helped in selection of appropriate method of production. Solid dispersion were collected and weighed to determine practical yield from the following equation: [18]
%practical yield= Practical mass (solid dispersion)/Theoretical mass (drug+ carrier) ×100

Drug Content Estimation

10 mg of solid dispersion was weighed accurately and dissolved in 10 ml of methanol. The solution was filtered, diluted suitably using

0.1 N HCL and drug content was analysed at 296nm by UV spectrophotometer. Each sample analysed was analysed in triplicate. Actual drug content was calculated for all batches using the equation as follows: [19]

% drug content= Actual telmisartan content in weighed quantity of solid dispersion / Theoretical content of telmisartan in solid dispersion×100

In-Vitro Dissolution Rate Studies

Sample equivalent to 10 mg was added to 900 ml of 0.1 N HCL. Aliquot of 1 ml was withdrawn at different time intervals. The withdrawn volume was replaced with the same volume of dissolution medium in order to keep the total volume constant. The absorbance was measured at 296nm after suitable dilution if necessary using appropriate blank (methanol). Results of in-vitro drug release studies obtained from absorbance data were shown graphically as cumulative percentage drug release vs. time.[20, 21, 22]

3. Results and Discussion

Results

Preformulation Studies of the Drug

4. **Colour**- White to slightly yellowish
5. **Odour**- odourless
6. **Taste**- Slightly bitter
7. **Appearance**- Powder

3.1.2- Solubility

8. **Methanol**- Slightly soluble
9. **Water**- Insoluble
10. **Dichloromethane**- Sparingly soluble

3.1.3- Melting point

Melting point of the drug was found to be 263^{0}C. The normal range is 261-272^{0}C.

3.2- Determination of λ max of Telmisartan

From the stock solution, 10 µg/ml solution of Telmisartan was prepared in 0.1 N HCl. The solution was scanned at the wavelength range of 200-400 nm. The λ max for Telmisartan in 0.1 N HCl was found to be 296nm.

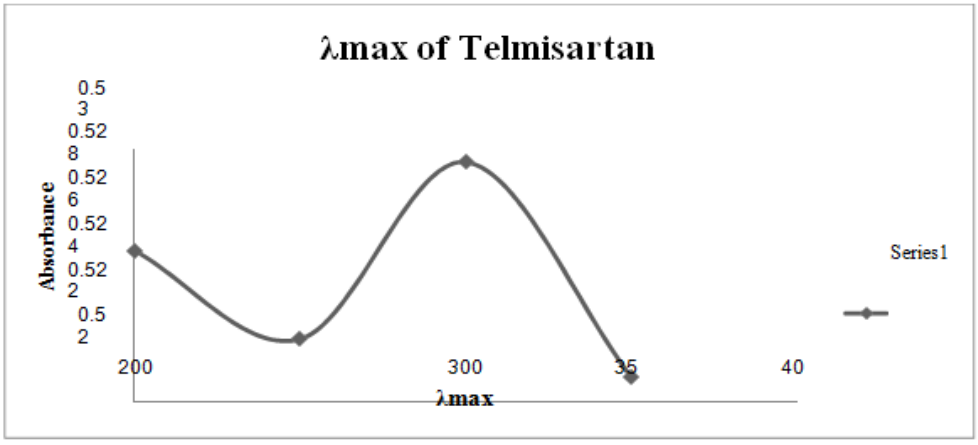

Fig.1 - Spectra of Telmisartan in 0.1 N HCl

3.3- Calibration curve of Telmisartan in 0.1 N HCl

For the preparation of calibration curve, the samples were prepared from the stock solution of 0.1 N HCl (1, 2, 3, 4, 5, 6 µg/ml). Absorbance of all the samples were determined at 296nm by using Shimadzu 1601 UV spectrophotometer which is mentioned in the following table:

Concentration (µg/ml)	Regressed value of absorbance
0	0
1	0.125
2	0.223
3	0.318
4	0.398
5	0.486
6	0.588

Table 1- Absorbance of Telmisartan in 0.1 N HCl at 296nm

The standard graph plotted between absorbance on Y- axis and X- axis was found to be linear and straight line.

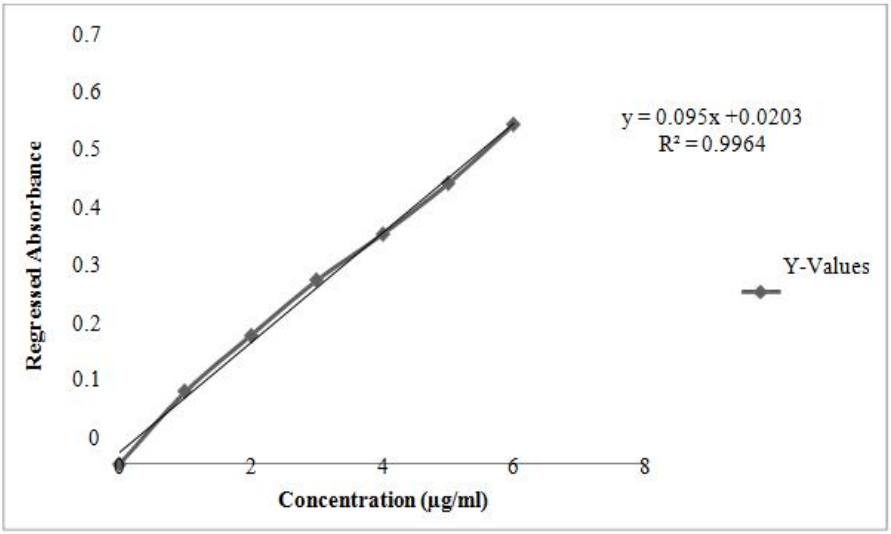

Fig.2- Calibration Curve of Telmisartan in 0.1 N HCl Straight Line Equation, y= mx+c y= 0.095x+0.0203, R^2= 0.996

3.4- Evaluation of Solid Dispersion

The evaluation of solid dispersion was carried using the following parameters:

3.4.1- Angle of repose

S. No	Product	Angle of repose (in degree)
1	Telmisartan	32.14
2	F1	28.34
3	F2	25.8
4	F3	22.49

3.4.2- Bulk Density

S. No	Product	Bulk density
1	Telmisartan	0.54
2	F1	0.61
3	F2	0.63
4	F3	0.66

3.4.3-Tapped density

S. No	Product	Tapped density
1	Telmisartan	0.67
2	F1	0.72
3	F2	0.73
4	F3	0.72

3.4.4- Hausner's ratio

S. No	Product	Hausner's ratio
1	Telmisartan	1.24
2	F1	1.18
3	F2	1.16
4	F3	1.09

3.4.5- Carr's Compressibility Index

S. No	Product	Carr's index
1	Telmisartan	19.40
2	F1	15.27
3	F2	13.69
4	F3	8.33

3.4.6- Percentage practical yield

S. No	Product	% practical yield
1	F1	95.75
2	F2	87.66
3	F3	95.375

3.4.7- Percentage Drug content

S. No	Product	Drug content (%)
1	F1	80 ± 1.40
2	F2	64 ± 2.00
3	F3	45.3 ± 1.90

3.4.8- Percentage drug release

Theories of carrier and drug controlled dissolution highlight the drug release pattern of solid dispersions. The solid dispersion of telmisartan was prepared as per the described formulation table and showed drug release as mentioned below. Three batches of solid dispersion formulated, were evaluated and interpreted for assessing that which one showed better release of drug out of three batches of solid dispersion containing different drug- polymer ratio.

S. No	Time in min.	F1	F2	F3
1	5	21.48 ± 7.48	24.07 ± 8.20	29.62 ± 9.00
2	10	28.08 ± 7.56	30.58 ± 7.47	41.06 ± 7.94
3	15	38.97 ± 4.28	40.69 ± 6.18	50.31 ± 10.77
4	20	51.33 ± 8.22	52.47 ± 8.57	62.88 ± 7.71
5	25	58.28 ± 5.07	63.67 ± 7.42	70.16 ± 8.91
6	30	64.41 ± 5.57	76.92 ± 6.44	81.26 ± 9.74

Table 2- Cumulative % drug release

Different formulations showed different drug release rate which was found to be maximum in F3 that is 50.31 ± 10.77 in 15 minutes**.**

3.4.9- Graphical Representation of Drug Release from Formulation

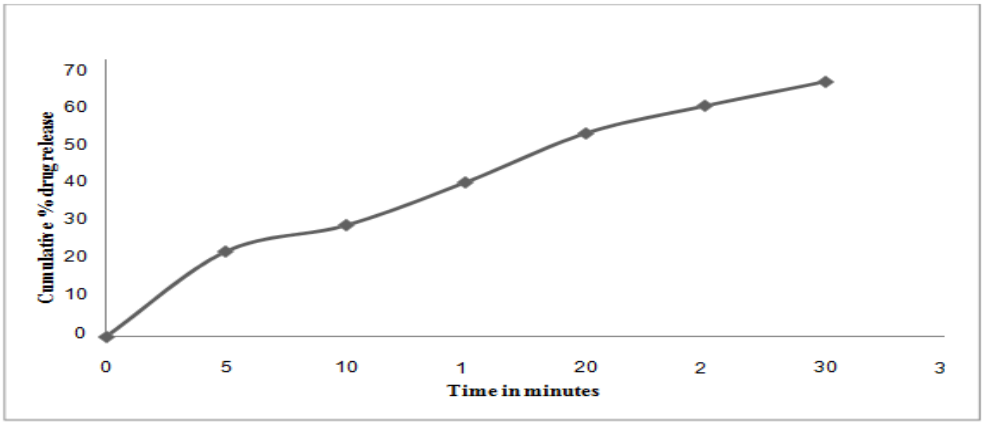

Fig.3- Cumulative % drug release of F1 solid dispersion

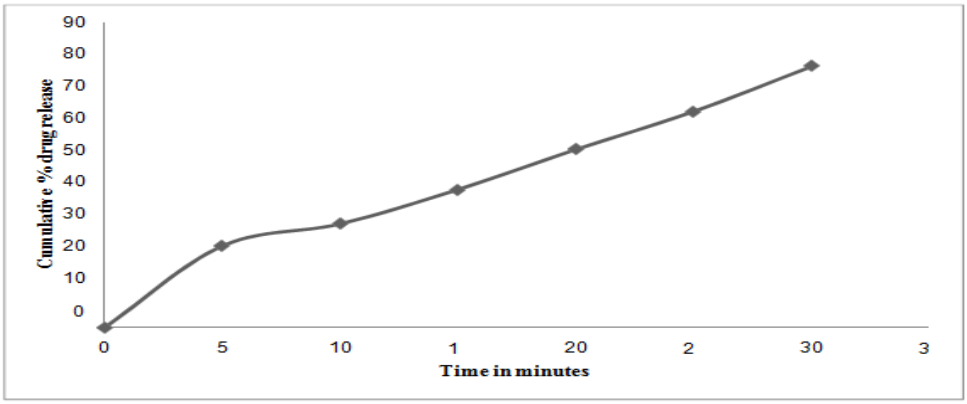

Fig.4- Cumulative % drug release of F2 solid dispersion

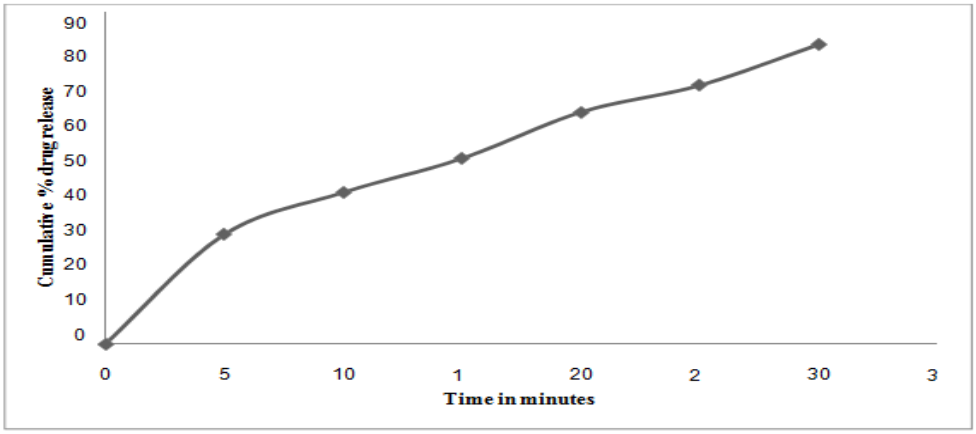

Fig.5- Cumulative % drug release F2 solid dispersion

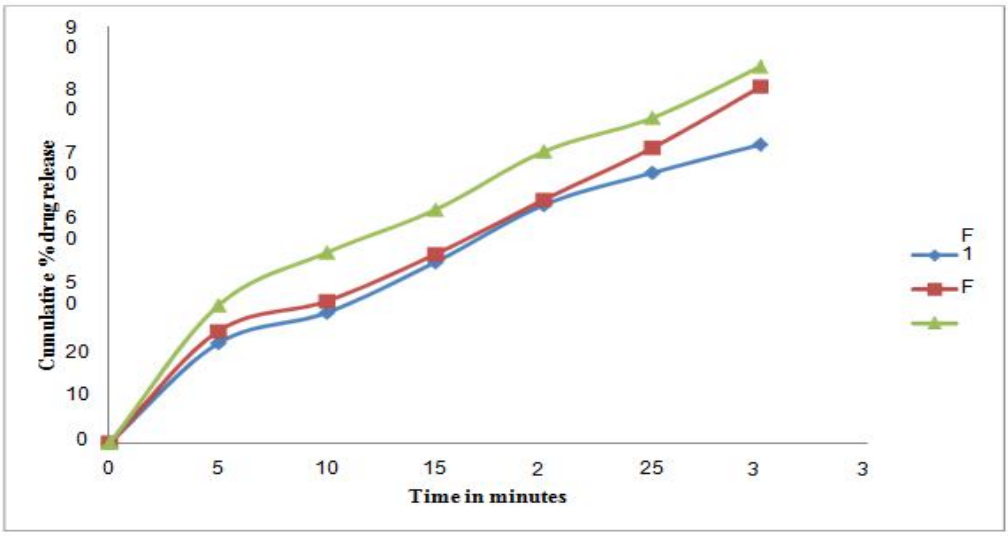

Fig.6- Cumulative % drug release of solid dispersion F1 to F3 3.5- Discussion

In this project, Telmisartan I.P was procured as a gift sample from Sirmour Remedies Pvt Ltd. for the development of solid dispersion for hypertensive patients.

Firstly, the Preformulation studied was performed on Telmisartan and the drug was found to be up to mark as per Indian Pharmacopeia.

The analytical method was selected to evaluate the drug concentration in the formulation. For this purpose, the UV spectrophotometric method was selected for the determination of λ max for the drug which was found to be 296nm and from this the calibration curve was plotted by taking different concentration of solutions which was used as a reference for the release studies for Telmisartan in solid dispersion technique.

Solid dispersion was successfully prepared by physical mixing/fusion method. In this project, three batches of solid dispersion of Telmisartan were prepared by mixing drug (telmisartan) and the polymer (polyethylene glycol 4000) in different ratios as per the formulation table.

The physical appearances of the various formulations in terms of their properties were recorded. Prepared solid dispersions were evaluated for different parameters like in vitro drug release, % drug content, bulk and tap density, % compressibility, angle of repose, etc. all the readings were taken in triplicate.

The angle of repose of the drug Telmisartan was found to be 32.14^0 and that of the formulations F1 to F3 were found to be 28.34^0, 25.8^0, 22.49^0.

The bulk density of the drug was found to be 0.54 g/ml and that of the solid dispersions formulations F1 to F3 was found to be 0.61g/ml, 0.63g/ml and 0.66g/ml.

The tapped density of the drug Telmisartan was found to be 0.67 g/ml and that of the dispersions F1 to F3 were 0.72, 0.73 and 0.72 g/ml respectively.

Hausner's ratio of the drug was reported as 1.24 and that of the solid dispersion F1, F2 and F3 were reported as 1.18, 1.16 and 1.09.

Carr's compressibility index of Telmisartan was showed to be 19.40 and that of SD formulations F1, F2 and F3 were found to be 15.27, 13.69 and 8.33.

The % practical yield of F1 formulation was 95.75%, F2 formulation was 87.66% and F3 formulation was found to be 95.375%.

The % drug content of formulations F1-F3 was found to be 80, 64, and 45.3 having the standard deviation as 1.40, 2.00 and 1.90 respectively. All the formulation indicated that the drug was uniformly distributed through the solid dispersion and evidenced by the low value of standard deviation.

Cumulative % drug release was evaluated after physiochemical evaluation along with release studies that was conducted on different batches.

The cumulative % drug release with its standard deviation for F1, F2 and F3 batches were found to be 64.41±5.57, 76.92±6.44 and 81.26±9.74 respectively at 30 minutes. The formulation F3 with ratio 1:3 (telmisartan: PEG 4000) was considered as best formulation,

since it showed maximum in-vitro drug release at 30 minutes that is 81.26±9.74. All the three batches showed maximum release at 30 minutes. The drug release pattern ordered as F3>F2>F1 among which F3 was considered to be taken for further studies if required as it showed highest release rate at 30 minutes. Further in-vivo studies can be conducted to get better results with this formulation.

4- Conclusion

In this project, solid dispersion of Telmisartan was prepared by fusion method by using the polymer, polyethylene glycol 4000 that was taken in different ratios and then evaluated by using different parameters for their solubility, flow property and dissolution rate.

Solid dispersion of Telmisartan along with suitable and optimum concentration of the polymer was used to obtain the increase in the solubility of the drug and so the dissolution rate of drug from the solid dispersion.

F1 and F2 formulations were rejected because when they were evaluated under different parameters the result of their dissolution rate, drug content, flow properties, etc. were found to be low as compared to the F3 formulation.

After the in-vitro drug release studies, F3 formulation was found to be the best formulation because of its release 81.26±9.74% at 30 minutes, good flow properties and increased dissolution. F3 formulation contained drug (Telmisartan) and the polymer (PEG 4000) in the ratio of 1:3 that was found to be effective hydrophilic polymer increasing the solubility of the poorly soluble drug, Telmisartan. So, F3 formulation can be used further for in-vivo studies to get better insight on this formulation.

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AN EMPIRICAL STUDY ON OPPORTUNITIES AND CHALLENGES FACED BY WOMEN ENTREPRENEURS IN SHIMOGA DISTRICT

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ABSTRACT

Entrepreneurs are playing a dominate role in today's global world. They have greater skills and initiative capacity to start a firm to achieve something and to make a profit. Technically, here a "woman entrepreneurs" are the women those who have organized and mange any enterprise by taking considerable risks and initiatives. Woman entrepreneurship and woman empowerment are considered as an important tool for preventing poverty and unemployment. Empowerment of woman's is not only possible by creating employment opportunities. It is also needed to motivate them to start their own business or enterprise. Women are most activating in family, form, shop; factory and also even she acquire the place of politics. Woman entrepreneurs are gaining a greater place in all over the world and at the same time, they were facing many obstacles. Those challenges are making them and their family more aware and their family more aware of the opportunities available for them. Hence, the support of the family members is necessary to show up their creative ideas. In this contact present study has been taken up to study the awareness about various opportunities available for woman's and also understand the current status of women entrepreneurs in India.

***Keywords**: women entrepreneurship, women entrepreneurs, challenges, and opportunities.*

I. Introduction

Women entrepreneurship and women empowerment are considered as an important tool in eradicating poverty and unemployment now a day's women empowerment has become a buzzword. Empowerment of women may not be feasible just by creating employment opportunities for them. The need of the hour is to inspire them to set up their own enterprises. Traditionally, women have been on stage, by playing a crucial role in the management of the family as well as in the management of the family as well as in the society. But their job has not been duly recognized. She is active in family, farm, shop, and factory and even in policies, women entrepreneurs are gaining momentum all over the world but at the same time, they are facing a number of challenges. These challenges can be faced with making them and their family aware of the opportunities available to them. Hence the support of family members is essential for leveraging their creative talent.

II. Review of Literature

Sonu and Agarwal [2017] brought study on "problems and prospects of woman entrepreneurship", today's women have ventured into manufacturing. Trading and services sector from the earlier days where they were limited only to the domestic jobs. The participation of women in the entrepreneurial activity makes them not only self-confined but also enables them to give a better life to their family. The women make up for almost 50% of the population of India. Only 10% of the firms in the MSME sector are owned by them, hence, if supported, the women entrepreneurs can provides a much-needed boost to the economy by creating new employment opportunities.

Kavitha and mallikarjun [2016] conduct a study on "women entrepreneurship" with the objectives of examining and create an awareness of opportunities in the field of women entrepreneurship. The study reveals that due to lack of support and financial availability women are not willing to go forward to do business and they are also lacking in balancing the work and life. So, that the study gave a suggestion for overcoming those problems. There will need to strengthen the role of women in the development of various sectors, women to be economically independent and also women entrepreneurship and economic development go hand in hand however many challenges are faced by women.

In the competitive business environment, executive leadership matters more than over before, repaid changes in both internal and external environment with respect to technology, govt, policies, customer demand, workers expectations etc,

Vanitha and Jeemal [2016] the study carried out on "women entrepreneurship"; research review and future "this paper suggest that women can play a significant role in the larger entrepreneurship phenomenon and economic development. Aspiring women entrepreneurs can benefit by gaining access to an apprenticeship in target industries. This experience can help them prepare better prior to launching their own business in that particular industries. Specifically, gaining exposure to a business startup can be beneficial. Future, much of the colleborations in the women entrepreneurship area are still restricted within national boundaries and there is a need to build research as well as practice networks across transnational borders.

Meenu & Priya [2015] made research on "women entrepreneurship". This article tells that women entrepreneurship is a considered an important tool enabling women empowerment main objective of this research was to study the significant rise of women entrepreneurs in India and how it has evolved since the pre-independence days during the British colonial days. The study also analyzed the reasons that have promoted the women entrepreneurs to unleash their entrepreneurial energies into startups. The study finally concluded to what extent the various support systems in India can further foster a conductive ecosystems for women entrepreneurs in India.

Valeric and Lancaster [2015] conducted a study on "Belonging and women entrepreneurs: women's navigation of gendered assumptions in entrepreneurial practice". The concept of belongings has received little attention. This article breaks new ground by asking what belongings involves for women entrepreneurs, how gender impact on belongings, how women counter gendered perceptions. It focuses on the inter-relational space between the individual women entrepreneur and their social entrepreneurial context, has enable more dynamic and nuanced understanding of the interplay of structure and agency, and also increased understanding identity work. This literature points to women's resistance and lack of alignment with normative entrepreneurial identities. The value and contribution of this expiation of women's performing of belonging are how their use of legitimacy practices and identify work then positions women, enabling them or not to belonging to the entrepreneurial community with full legitimacy.

Yogita Sharma [2013] made a study on "women entrepreneurship in India". With the objective of analyzing the women's contribution in the entrepreneurship. India is a male-dominated society and women are assumed to be economically depended on male members in the traditional society, they were confined to the four walls, playing household roles, but in the modern society, they are coming out to participate in all sorts of activities, women have the potential and determined to set up, uphold and supervise their own enterprises in a very systematic manner, appropriate support and encouragement from the society, family and government can contribute to the economy progress in India. Obstacles in the growth of women entrepreneurship are mainly lack of interaction with successful entrepreneurs, and family responsibility and lower level of priority to provide a loan to women entrepreneurs.

Anesha Kalim [2013] conducted a study on "women entrepreneurship", the emerging workforce in 21th century; turning challenges into opportunities", the study found that entrepreneurship is presently the most discussed and encouraged concept all over the world to overcome economic challenges, women being the vital, gender of the overall population have great capacity and potential to be the contributor are definitely in dire need to encourage women entrepreneurship as women workforce is promptly available to exploit the unexploded dimensions of business ventures, the developed nations should be concentrate.

Asgharafshar et. All [2010] made research on "Issues and challenges for women entrepreneurs in the global scene, with special reference to India". With the objective of the study is to investigate the issues and challenges faced by women's entrepreneurs in the gobble sense, especially in India. This paper tells that

government of India has defined women entrepreneurs as an enterprise owned and controlled by women having a minimum financial interest 51% of the capital and giving at least 51% of employment generated in the enterprise to women. They had to deal with discrimination and withstand the skepticism of society, and also put in more effort then men to prove their credibility to others.

Bharathi and Megha Jigalur [2012] this paper revels that women entrepreneurs are faced with multiple problems are main. It can be said that today we are in a better position wherein women participation in the field of entrepreneurship is increasing at a considerable rate, but efforts are still to be taken as we still lack compared to other countries at the global level. This is mainly because of attitude change, the conservation mindset of society, less daring and risk taking abilities of women, lack of support and cooperation by society members. There is a need for support from all aspects of government and society.

III. Challenges Faced by Women Entrepreneurs

Some of the challenges and problems faced by women entrepreneurs are discussed below.

1. Family restriction

Women are expected to spend more time with their family members. They do not encourage women to travel extensively for exploiting business opportunities.

2. Lack of finance

Family members do not encourage women entrepreneurs they hesitate to invest money in the business venture initiated by women entrepreneurs. Bank and other financial institutions do not considered Middle-class women entrepreneurs as proper applications for setting up their projects and they are hesitant to provide financial assistance to unmarried women or girls as they are unsure as to who will repay the loan either parents or in-laws after their marriage.

3. Lack of education

Women are generally denied higher education, especially in rural areas and underdeveloped countries. Women are not allowed to enrich their knowledge in technical and research areas to introduce a new product.

4. Unfavorable averment

The society is dominated by males. Many businessmen are not interested to have business relationship with women entrepreneurs. Male generally do not encourage women entrepreneurs.

5. Stiff competition

Women face a lot of competition from men. Due to limited mobility, they find difficult to compute with men.

IV. Opportunities for Women Entrepreneurship

1. Agarbatti Making
2. Paper making
3. Embroidery
4. Handicraft
5. Catering services
6. Small retails shops
7. Beauty parlors
8. Running restaurants, snack bars etc,
9. Pickle manufacturing etc,

V. Status of Women Entrepreneurship

Now a day's women entrepreneurship is going importance in India in the wake of economic liberalization and globalization. There are many policies and institutions supports are given by the government on order to make them strong and also entrepreneurial skills, training programs and vocational education are also provided to the women enterprises. They are performing well both in social and economic fields in India. In the Hindu scriptures, women have been described an embodiment of Shakhty. But in real life, they are treated as able, but nowadays woman's not to be a homework but as job-making entrepreneurs. Finally, women owned enterprise are playing an active role in the development of an economy as well society in a greater way.

VI. Statement of Women Entrepreneurship

The government of India has been the declared the year 2001 as women empowerment year as there exists a need to strengthen and streamline the role of women in the development of various sectors. Women across India are showing a concern to be economically Independent. Nowadays with the growth of MSME, many women have embarked into entrepreneurship and running their enterprise

successfully. With the relevant education, work experience, improved economic condition and financial opportunities more women are venturing into business.

VII. Need for the Study

The need for the study is to investigate the issues and challenges faced by women's entrepreneurs in the global scene, especially in India women's entrepreneurship needs to be studied for two main reasons. The first reasons is that women's entrepreneurship has been recognized during the last decade as an important untapped source of economic growth, secondly, the topic of women's entrepreneurship has been largely neglected both in society in general and in the social sciences.

VIII. Objectives of the Study

- To identify the challenges faced by women entrepreneurs
- To examine the opportunities available for women entrepreneurs.

IX. Hypothesis of the Study

- Ho: there is a no significant relationship between the demographic profile of respondents and awareness level about opportunities available for women entrepreneurs.
- H1: there is a significant relationship between the demographic profile of respondents and awareness level about opportunities available for women entrepreneurs

X. Limittions of the Study

- The study is restricted to the selected sample size of shimoga District
- Finding are applicable only for the women entrepreneurs who are running their business in shimoga District.

XI. Methodology

For this study, shivamogga (a city in Karnataka) is taken as an area of study.

Primary Data

Primary data collected by the respondents by using a structure questionnaire, the required number of women entrepreneurs are selected by using Convenient sampling technique. Total sample of 100 respondents are used for the purpose of the study.

Secondary Data

Secondary data is second hand information because here researcher collect data from the agency or someone who are already collected the data and processed it. This study collects the data through published one like journals, articles, newspaper, books, websites, and periodicals.

XII. Analysis and Interpretation

Table 1: Socio-Demogtaphic Profile of Responsdents

Personal Factors	Particulars	No. of Respondents	Percentage
Gender	Female	100	100
Age	18 to 25	5	5
	26 to 35	30	30
	36 to 45	40	40
	Above 45	25	25
Educational Qualification	Below SSLC	20	20
	SSLC	21	21
	PUC	26	26
	UG	13	13
	PG	10	10

From the table, it is clear that 100% of the respondents are female because this survey is only concentrating on the women entrepreneurs. Majority of respondents are the age of 36 to 45 and 26 to 35 that is 40% and 30% respectivly and also 5% of women's are coming under the age group of 18 to 25 and 25% are above 45 years of age. While coimg to their educational qualification half of the

precentages of women's are lied in SSLC and PUC.

Test Application: Chi-square Test

Responses	Observed	Expected	(O-E)	(O-E)^2	(O-E)^2/E	Values
Yes	30	40	-10	100	100/40	2.50
No	70	60	+10	100	100/60	1.67
Total						4.17

- The calculated values is 4.17
- The degree of freedom n-1 i.e, 2-1=1
- Table value of chi-square for 1 degree of freedom @ 5% level of significance is **3.841**

Since, the calculated value is more than the table values Null hypothesis is rejected. Hence alternative hypothesis is accepted i.e, there is a significant relationship between demographic profile of respondents and awareness towards opportunities available for 0 women entrepreneurs. Here analysis of data reveals that the demographic factors (such as age and educational qualificatin) made them aware about the opportunities which are availbile foe women entrepreneurs.

XIII. Finding of the Study

The major findings of studies are;

- Women entrepreneurs are facing certain challenges like family restriction, lack of finance, lack of education and stiff competition.
- Women entrepreneurs have a lot of opportunities to be succesful entrepreneurs.
- Study proves that there is a relarishiip between demograhip profile of women entrepreneurs and awareness lebel refarding opportunities.

XIV. Suggestions for Overcoming the Challenges to Potential Opportunites

1. Measure to be taken to overcome the challenges faced by women entrepreneurs.
2. Women should undersrand and implement a new way to balance work and life.
3. Women should attend training programms and workshop held by the government.
4. Women should first tke the initiative of small entreprise and then go farward large scale.
5. Women should always keep contect with the strong entrepreneur's network.

XV. Conculsion

India is a male dominated society and women are assumed to be economically as well as a society depended on male members. The Indian women even after facing many challenges she is now trying to become economically independent women. The government has come forward with many facilities, concessions, and incentives exclusively for women entrepreneur. But unfortunetly, government-sponsord development activities have benified only a small section of women I,e. the urben middle-class women. They have the potential and determination to set up, uphold and supervise their own enterprise in a very systematic manner, appopriate sipport amd encouragment given by the soceity, family and government make them successful in the business.

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SIGNIFICANCE OF TRAINING AND DEVELOPMENT FOR EMPLOYEES AND ORGANIZATION: A CONCEPTUAL STUDY

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ABSTRACT

In today's fast-paced, competitive industry, training has become a buzzword. Organizations that engage in excellent human resource training and development tend to achieve benefit both short-term and long-term. Due to organizational, technical, and social dynamics, employees tend to become absolute, making the need to adapt to constant learning and upgrading of skill and knowledge important. As a result, efficient management of training and development programs is critical for businesses and get the most out of their investment. As a result, the purpose of this study is to offer a conceptual study that has been developed and created on the advantages of an employee training and development program. The article also seeks to determine the many aspects of employee training and how they impact the output and performance of the company. Employees will be capable of supporting the business in attaining its competitive position in today's global market with appropriate training and development opportunities, as well as effective employee performance evaluation techniques.

Keywords: *Training and Development, Employee productivity, Organization goals, Training methods, Performance measure*

Introduction

For each company, training and development is an important element. Improved capability, knowledge, and skills of the human workforce have been proven to be a competitive advantage for any business in a global globe and changing market (Mc Kinsey, 2006). Employees are the organization's backbone. The organization's achievements or problems are determined by the performance of its workers (Mwema & Gachunga, 2014). As a result, it's critical for organizational leaders to understand the value of training and development in terms of employee performance and assessment. Training and development for workers helps organizations and people achieve many objectives such as moral improvement, a sense of safety, employee engagement and overall skills required for the execution of a certain task. Furthermore, the leaders of organizations should utilize systemic ways to measure employee performance, where results are generally based on personal, organizational, environmental, motivation, skill, skills or roles (Rodriguez and Walters, 2017). Each firm needs efficient training programs that increase employees' motivation and impact the efficiency of the company. Any company may assess this efficacy by increasing productivity, high profit range, a lower turnover rate and workers.

Research Problem & Need

This study intends to carry out a study and to manage the workforce and corporate performance effects of training. It helps enhance employee potential, skills and knowledge through a structured training procedure and has an overall influence on organization's efficiency, productivity, achievement and higher revenues. The topic of study remains, thus, how training impacts employee performance and organization. The researcher seeks to emphasize the need of doing a critical examination of the subject in order to gain a better knowledge of the process and development of how successful training leads to improved employee performance and, as a result, higher organizational performance.

Importance of Training & Development

Productivity of employees can be a measure of the efficacy of training. Below are some examples of strategies to increase staff productivity through training and development programs. Training and development programs assist employees individually or in teams handle their jobs, depending on a better grasp of procedures and well stated objectives.

Conventional 'training' is necessary to cover key work-related skills, methods and information, and much of this adopting a constructive progressive approach to this kind of traditional training. Training and development guidance is centered mainly on what's beneficial for individuals, rather than chiefly what's lucrative for businesses (Vinesh, 2014). Training and development programs help to modify the thought and behavior process of the employees in such a way that is conducive to building a healthy work environment. Due to the knowledge and abilities needed for their profession, it takes less time for the personnel to identify ways to complete their responsibilities. Organizations which approach training and development from this stand point inevitably foster people who perform well and progress, and importantly, stay around for long enough to become great at what they do, and to help others become so (Vinesh, 2014). Training is seen as a systemic approach to learning and development that enhances people, groups and organizations (Goldstein & Ford, 2002). Training, according to Manju & Suresh (2011), is an intervention to enhance the quality of company goods and services by increasing workers' technical abilities.

Employee benefits

Employee Satisfaction

Employee Satisfaction is crucial for every business to develop and function smoothly. Firms that are ready to spend their staff money provide value to their job with these firms, though this investment ultimately benefits the company (Wilson, 2000). Providing training to the employees will help to improve their performance and their longer retention in the organization. Employees will benefit from training in order to improve their work potential and be acknowledged, allowing them to love their jobs and work places. Employees who are happy that their work has a goal and is essential for their company (Moses, 2000) gets more productive. Staff feel comfortable and want to continue with their organization when they believe that they are making a difference in their organization's efforts and talents (Logan, 2000).

Career Capacities

Training may not only influence declarative or procedural knowledge but may also improve strategic knowledge defined as knowledge to use particular information or skills (Kozlowski et al., 2001, Kraiger et al., 1993). Employee development helps employees survive in the future and learn new technology skills. New university graduates mostly regard a company that aggressively trains its staff (Feldman 2000). The majority of industry professionals understand the value of a training program and would like to enhance their income (Dillich 2000). Young professionals with entrepreneurial ambitions recognize that they lack experience and funds, therefore they seek employment with firms that provide training programs to educate their employees for the future (Feldman 2000).

Employee development and Performance

Employee performance can also be improved via training and development. Training can improve the quality of working, improve skills, improve creativity and therefore, development of an employee and their performance. The impacts of training on employee behavior and working abilities resulted in improved employee performance and more constructive adjustments (Satterfield and Hughes, 2007) that help to improve employee performance (Kraiger, 2002). Barber (2004), stated that a mechanic has worthy emotion of how to hit the metal at a certain location as a consequence of good training, and that work must be done in a disciplined and appropriate manner. The impact of performance management system on employee performance figured out strategies for identifying, encouraging, improving and rewarding the good performance. Performance management system and the stages of imparting the same has a significant impact on the employee performance. And the increase the performance Training in the right direction plays an important role for better results and that every organisation should adopt it. (Zhang , 2012)

Organization benefits

Growth in the market

Employee development programs are critical for every business to be viable and competitive in the marketplace. Employee training and development programs not only help businesses make more money, but they also help them stand out in their local market. According to Greengard (2000), businesses must create and sustain a learning environment for their employees that expands their organizational knowledge and competitive competence. Organizations may boost their image as a top employer in the job market by implementing staff training and development initiatives.

Organizational Performance

Training has been identified as a significant contributor to organizational success (Schuler and MacMillan 1984). The benefits of investing in a training and development program on developing individual and organizational effectiveness, according to research, can justify the cost (Bartel, 2000). Furthermore, previous studies have found a link between training and organizational effectiveness (Blundell et al., 1999). However, there is an increasing factor that Human resource management practices impacts on attitudes and work-related manners (Allen et al., 2003). To evaluate the effectiveness of training and development program it has been advised that check directly the relationship of training and organizational commitment. Further it has been revealed as certainly correlated to the efficiency of the organization (Bartlett, 2001). Training and development should be treated as an instrument and an apparatus that makes the human capital more resourceful. For a competitive changing world, every organiation need to have adaptable employees and organisations need to invest in Training in order to reach its organizational goals and generate revenue for the organization. (Nda, M.M and Fard ,2013)

Employee Retention in the organization

Training has a lasting influence on learning, as it helps to retain the lifelong skills and to discover better answers in difficult situations. Continuous learning is vital to succeed in today's fast-running environment. People need to get to live and work successfully. Companies need to guarantee that their staff continue to adapt to meet growing demands for work and that their businesses achieve or retain competitive advantage (Vinesh, 2014). Several businesses have discovered that providing chances for employees to improve their learning is one of the characteristics that helps to retain them (Logan 2000). As a result, firms who offer training and development program to their workers have a better chance of retaining them. Many workers participate in employee training program, but there is no proven link between program and employee retention (Rosenwald, 2000); nonetheless, some managers discovered that a good learning environment led to greater retention rates (Dillich, 2000). According to Vinesh, (2014), Each employer who makes a significant investment in training and development will reap the benefits of a more enriching working environment, as well as enhanced productivity and performance.

Employee Training and Employee Productivity

Employee training and development is an important part of Human Resources planning since it not only maximizes individual returns, but it also has the potential to recruit superior people to the company (Bapna et al, 2013). Training, according to Konings & Vanormelingen, (2009), is a tool that has a significant impact on the achievement of an organization's goals and objectives. Individuals who are unable to achieve at the anticipated level of performance may choose to leave the company because they believe they are not being productive and are unsatisfied with their work. That's why employee training and development serves not only as a tool to improve the skills necessary to execute a job, but also to help people feel more happy about their performance outcomes. Improved skills lead to improved performance and retention (Rodriguez and Walters, 2017). Investment in development programs as most successful firms look at workforce advancement and invest in their education. This increases skills and skills which boost morale and production (Sheeba, 2011). Training as a process is one of the most common techniques for improving people's productivity and conveying corporate

goals to employees (Ekaterini & Vasilios, 2009).

How to Maximize the Benefits of Training

Pre-training was also found to be connected to personality of trainees (Rowold, 2007), self-efficacy of trainees and a reputation for training (Switzer et al., 2005) as well as to reactions of the previous courses (Sitzmann et al., 2007). Klein et al. (2006) showed that students are more likely to learn when they have high learning objectives and view environment conditions as teaching facilitators (e.g. time, Internet access) than if they have a lower learning goal guidance (rather than as barriers). Learner satisfaction, metacognition, and course grade were all linked to motivation to learn. According to Aguinis and Kraiger (2009), there are two approaches to optimize the advantages of training: (1) perform a needs assessment with experienced SMEs, and (2) ensure that trainees are ready and motivated to train. Training preparedness may be improved, for example, by reducing learner concern about training, showing the benefit of training before it begins, and ensuring that workers are actively interested and engaged in their employment.

Training and Development Conceptualized

Human Resource Management (HRM) is one of the many management disciplines that cannot be isolated and managed alone; rather, it must be effectively integrated with every department of a business. It begins with recruitment and continues with selection, induction and orientation, training and development, performance appraisal, compensation and package, employee motivation, employee welfare, health and safety, and therefore healthy compliance. Apart from these functions, every company builds its human resources system for the following reasons:

- Hire the right person for the right job
- Develops the HR policies and implementation of it
- Review the employee needs
- Utilization of Human Resource
- Effective training
- Appraisal
- Lower attrition rate

All of the preceding elements appear to be interconnected, yet they separately play an essential part in the formation of organizations. One of the most essential tasks of HRM is training and development, which is critical for improving employee performance and increasing organizational effectiveness. To stand out in this competitive market, innovation is the buzzword, and to make employees different and unique from their competitors, as well as to increase productivity through the implementation of innovative processes, all of these things necessitate training, which is regarded as a critical component for innovative change in both organizations and human behavior (Sheeba and Christopher, 2020). As education includes costs, organizations should take this cost, time and effort into consideration as investment for both.

In any organization, training is necessary to have a strong grip and a knowledge of the planned tasks of each person. They gain new talents and skills via training programs and obtain opportunities for professional growth (Elnaga and Imran, 2013). Past study has shown and shown that training affects employees and companies enormously. While the performance of employees will depend on elements like job happiness, reward and recognition, working conditions and so on, research has been adequate to establish that training and performance have a link. Scholars have proposed and argued that training, on the one hand, aids in increasing return on investment and, on the other hand, has a beneficial influence in high levels of staff retention (Colarelli & Montei,1996; Becker 1993).

Conclusions and Suggestions for Future Research

Training and development improves not just individual productivity but also the productivity of the company. Employee development, it has been claimed, is the key to long-term organizational success. Employees that can swiftly adjust to an ever-changing global market are essential for businesses. In order to maintain workers and be successful, businesses must engage in ongoing employee training and development. In summary,

training and development that has an influence on employee productivity has not only improved organizational well-being, but has also helped most countries to develop, develop and develop their workforce at national level. Since national policies seek to develop the human capital of the country, this in turn leads optimally to the nation's economic growth. However, management of companies should prioritize training and staff development in order to get the finest possible workforce as well as to improve the efficiency of the organization. Further study on staff training and development is also required in order to have a better understanding of the positive effects.

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A SITUATIONAL ASSESSMENT OF SOCIO- MONETARY CIRCUMSTANCES OF HANDLOOM WEAVING COMMUNITY IN SALEM DISTRICT, TAMIL NADU

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ABSTRACT

Traditional Indian handloom has a global name and delights great concerns in the inhabited open market.Nevertheless, the characteristics of the weaver show their support and absolute happiness.Handloom is an important cottage industry in our country and it is an important key to the cultural heritage of Tamil Nadu. It is a pioneer state in India in the textile sector including handloom sector, power loom sector and factory sector. Tamil Nadu is the 4th largest industry in the country.The government has identified twenty-two places to install handloom clusters with the financial assistance of the Center. The main industry in the Salem district was weaving, which was carried on in almost every major city or village, and the weavers of Salem and Kasipur in particular mentioned the period of 1850- 1947.The textile cottage industry includes cotton, silk and bleaching, dying, finishing, hosiery, lace embroidery, silk reeling, and silk twisting. It was the main means of livelihood for the people who depended on it completely.The word "textile" is derived from the Latin word "texture", which means weave, originally used only for woven fabrics. The handloom sector plays an important role in the state economy. Weaving is a basic process in various production stages of handloom garments.It is defined as a frame for weaving with certain wooden devices. The sound of handlooms is the music of the rural home. Handloom weavers achieve harmony of movement and rhythm in this region in the process of weaving. It is important as an urban and rural industry, providing employment to thousands of men, women and children from all communities. Encourage the progress of these objectives for monitoring the socio-monetary conditions of weavers and possible approvals to reduce their difficulties.This correction has been approved in the primary data self-contained through interview schedule from 131 weavers residing in Salem district of Tamil Nadu.The results of the review show that weavers are carrying out a number of tasks such as monetary controls, weakness in purchasing innovative technologies, backward employment, inadequate pay and lack of government support.

Keywords: *Handloom weavers, Socio- monetary circumstances, Handloom weaving, Micro level study, Salem District, Tamil nadu, Situation amendment.*

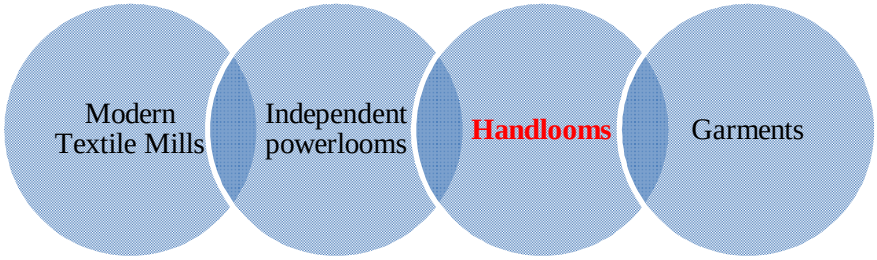
Introduction

The Indian textile and garment industry has established itself as a major export sector of the national economy and a major domestic consumer base. The sector contributes significantly to the economy at 6% of GDP and 13% of exports.

The strength of this industry is natural in its full value chain, ranging from man-made fiber to clothing to home decor. Besides, the sector provides the second largest employment after agriculture, employing nearly 51 million people directly and 68 million indirectly. These numbers clearly show that the growth of the textile sector and all-round growth will directly support and lead to the growth of the Indian economy.

The textile industry has four main divisions - modern textile mills, independent power looms, linen and garments.

Major Segments of the Textile Industry



Source: TARI Research Team

The handloom industry in India has a long tradition of excellent craftsmanship, which represents and preserves the vibrant Indian culture. Indian artists now differ globally with hand spinning, weaving and printing elegance.
The activities of this business are primarily home-based, in which different members of the family make joint efforts for production. These activities are spread across thousands of cities and villages across the country, and involve transferring skills from one generation to the next.
The industry has a large number of artisans from rural and semi-urban areas, most of them women and from economically backward groups.Some of the strengths of this industry are the availability of cheap and plentiful labor, the use of local resources, low capital investment, unique craftsmanship in the production of products and the increase in the appreciation of international consumers.
Despite these unique characteristics, it is important to note that the industry has a very small share of Indian exports and the global market, so efforts are needed to encourage and promote its concessions to tap into the hidden potential of the industry.

The New Hand Weaving Industry

The handloom industry is one of the oldest cottage industries in the Salem district of Tamil Nadu, India. Salem is one of the premier handloom centers of South India. Sari, dhodi and angavastram are made of silk yarn and cotton yarn.In recent times, home export products are also woven mainly for export purposes. It employs more than 75,000 handlooms and the total value of fabrics produced annually is estimated at Rs 5,000 crore.
The history of handloom and spinning mills in Salem dates back to the pre-independence period. Because until the 1960s there were only less than 5 spinning mills in Salem District. Private handloom weaving began to flourish with large-scale co-operative sector handloom weaving and marketing divisions in the region. Small-scale hand-death units were launched around the region to support the industry.The taxi industry saw tremendous growth in the 1980s. There were many large spinning mills and waste spinning units. Many handloom associations and dye houses were established. New and increased power loom units at Cave, Ammapet, Attayampatti, Vennandur, Magudanchavady, Rasipuram, Komarapalayam and Pallipalayam, Jalakandapuram and Ellambilai.
But now there are more than 125 spinning mills, modern weaving units and garment units. The garment export has established itself as one of the main businesses of the district. The industry grew rapidly by establishing market links with small business units that directly export textile goods and clothing. Easy access to required inputs such as threads and die units has led to customization of clothing even in small customized products.

Review of Literature

1. (Sandhiya, 2015)They study the socio-economic status of weavers and offer possible compliments to alleviate their misery. The study is based on primary data collected through interview schedule from 100 weavers residing in Parker district of Odisha.Both qualitative and quantitative technique of exploration has been used in the study. Interviews have been qualitatively analysed and interpreted. The author concluded that Introduction of low-cost machines will make the weaving process well-organized, promotion of market linkage, linkage with the banks and other financial institution for credit will encourage them for working and also linkage with designers can provide creative designs for expansion of weavers. Participation in trade fairs will lead to promotion of their products and also market entrepreneurship etc.
2. (Venkateswaran, 2014) Stated that the socio-economic profile handloom weavers in kallidaikurichi of Tirunelveli District. This study is founded on both primary and secondary data sources. The study results discovered that the situation of the weavers was disturbing due to illiteracy, financial constraints, health problems, and poor Government support. From the present study it is concluded that the Handloom weavers in Tirunelveli, mainly those who have hereditary this occupation, are in a miserablesituation owing to the poor socio-

economic situations. The widely held of them are wage weavers who clear minimal wages in spite of working for more than ten hours a day. It is stimulating to note that the educational status among the weaver's community was not disheartening.

3. (Sadanandam, 2016) Pointed out that the socio-economic condition of the weavers and proposalconceivablegood word to moderate their plight. This study is based on primary data composed through interview schedules 57 active societies in Warangal district of Telangana State. The result of the study exposed that the weavers are facing a number of challenges like financial restraint, inability to purchase up-to-date technologies, poor working condition, meagre payment and the nonappearance of government support.
4. (Sandhiya & Bikash, Socio-Economic Profile of Handloom Weaving Community: A Case Study of Bargarh District, Odisha, 2015) Observed that handloom weavers faced more susceptibility particularly due to weak organisational structure, administrative disappointments, monetary discouragement, lowly infrastructure, regionalized looms, lowly marketing etc. Thus the present study intentions at exploring the socio-economic outlines of the weaving community to scrutinise their status in Bargarh district of western Odisha.The present study also replicates that the majority of accused prefer Government service as an occupation for their children for better livelihood of their family.
5. (Subramaniya, Bharathy; Jothi, 2017)Pointed out thatthe situation of the weavers. Most important factors accompanying with physical difficulties in handloom weaving occupation and enhancement of solutions of discharges and precludes their physical condition difficulties.
6. (Subaramaniya & Jothi, 2020) Experientialthose are producing the consumers to good buy handloom products and the inspirations that may barrier them. The study determined that plummeting GST and intensification consciousness about importance and uniqueness of the handloom produce helps handloom industry to withstand in Salem district.

Objectives of the Study

1. To examine the monetary situations of the handloom weavers and discover on show there monetary position and alive state of affairs.

Scope of the Study

The level of artistry and intricacy achieved in the handloom fabrics is unparalleled and certain weaves are still beyond the scope of modern machines. The sector is one of the largest unorganized economic activities in the country providing employment directly and indirectly to over 43.31 lakh weavers. Handloom sector has developed over the years and to see how far it is meeting the threats of globalization a study of handloom sector has been undertaken. In the present study is made to measures the current economic level of handloom weavers and their situations of living status. Through this study is an endeavor to determine the factors that explanations for its, liveliness, strength and weakness.

Statement of the Problem

Through means of the presented literature imitates there is not one considerably revisions accompanied on socio- monetary eminence of Salem District. In spite of several schemes executed for the development of community and monetary circumstances of weaving groups up till now there is no considerable enhancement realized. They faced more helplessness especially due to weak organisational structure, organisational disappointments, monetary discouragement; Fabrication difficulties, deprived promoting etc. accordingly the contemporary revision wishes next to discovering the socio- monetary circumstances of the weaving communal to inspect their eminence in Salem district of Tamil nadu.

Research Methodology

The objectives of the study primary data has been conducted the respondent weavers. The study was conducted in weaver small house in Salem District of Tamil nadu. Simple random sampling method was used. The researcher

collected the statics of handloom weavers in the district collectorate office, Salem District. Primary data was collected from 131 weaver's household interview schedule. Interview schedule contained both open ended as well as close ended questions. The first part of schedule dealt with general information of the respondent about demographic profile and other necessary information's, the second part dealt with social conditions of the weavers and third fabrication teething troubles and challenges of the weavers.

Statistical Tools

The tables are prepared with the help of the primary data for easy understanding and these data are used for drawing simple bar diagrams, pie diagram on the basis of age wise, sex wise, educational qualifications, family size monthly income, Expenditure. We have also applied percentage and --- analysis the primary data.

II. Analysis and Interpretation of Data

The data are collected from 132 sample respondents by supplying the questionnaires, the data are analysed by using simple bar diagrams, pie diagram on the basis of gender wise, age wise, educational qualifications, family size, monthly income, Expenditure.

Table 2.1 Gender Wise Classifications of the Respondents

S.No	Gender	Frequency	Percentage
1	Male	99	75%
2	Female	33	25%
	Total	132	100%

Source: primary data

From the above table it is clear that 75% of the weavers are in the group of male, it indicates that gender of male groups highly involved in handloom production when compare to female groups. Only 25% of the weavers are in the female groups.

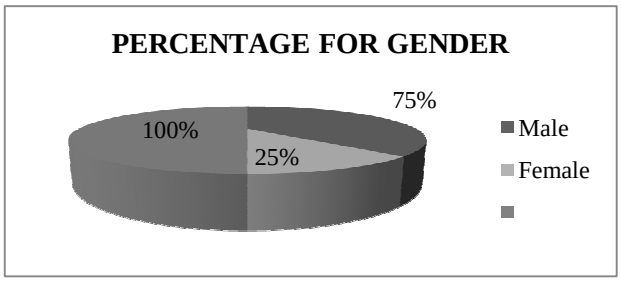


Table 2.2 Age Wise Classification of the Respondents

S. No	Age	Frequency	Percentage
1	<30	9	6.8%
2	31-40	42	31.8%
3	41-50	23	17.4%
4	51-60	32	24.2%
5	> 61	26	19.7%
	Total	132	100.0%

Source: primary data

From the above table it is clear that 31.8% of the weavers are in the age group of 31-40, it is indicates that middle aged group people are highly involved in handloom production when compare to other age groups. 24.2% of weavers are in the age group of 51-60, 19.7% of weavers are in the age group of above 61 years, 17.4% of weavers are in the age group of 41-50 years and only 6.8% of weavers are in the age group of below 30.

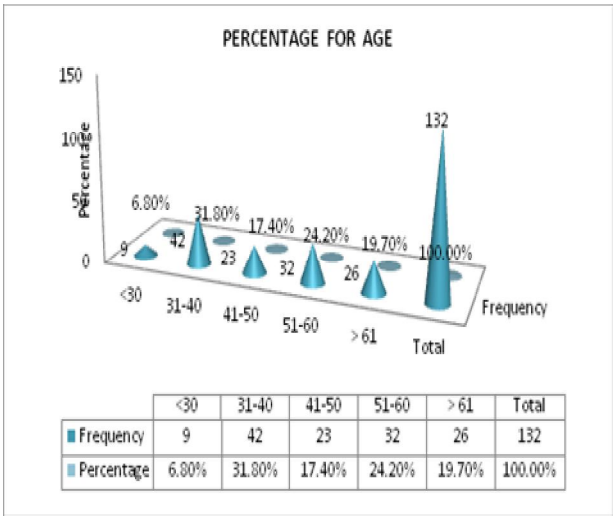


Table 2.3 Community Wise Classifications of the Respondents

S. No	Community	Frequency	Percentage
1	ST	2	1.5%
2	OBC	104	78.8%
3	Others	26	19.7%
	Total	132	100.0%

Source: primary data

From the above table it is clear that 78.8% of the weavers OBC. 19.7% of the weavers are other community. Only 1.5% of the weavers ST. this shows that majority of the weavers were OBC community. This is will be explained below.

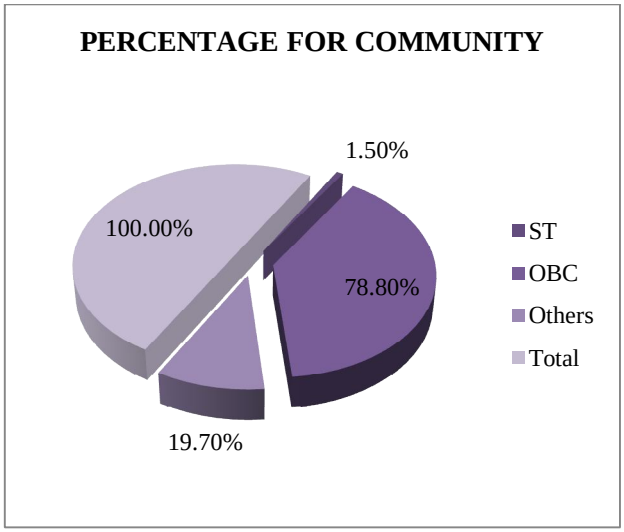


Table 2.4 Marital Status Wise Classification of the Respondents

S. No	Marital Status	Frequency	Percentage
1	Married	128	97.0%
2	Unmarried	4	3.0%
	Total	132	100.0%

Source: primary data

From the above table it is clear that 97.0% of the weavers are in the married, it is indicates that highly married people are engaged in handloom production when compare to unmarried people. Only 3.0% of the weavers are in the unmarried people.

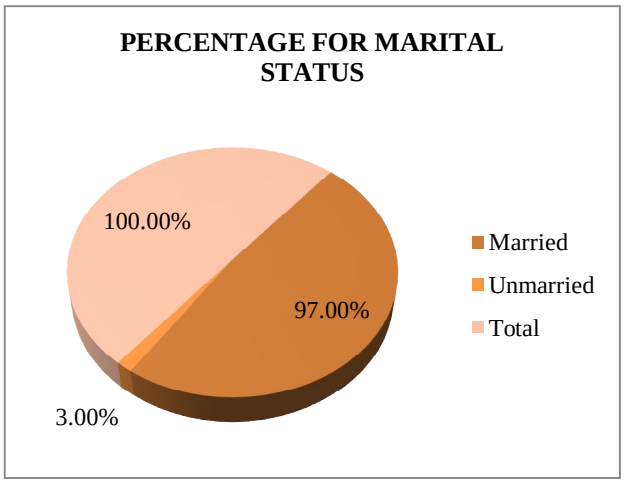


Table 2.5 Family Type Wise Classification of the Respondents

S. No	Family Type	Frequency	Percentage
1	Nuclear	68	51.5%
2	Joint	64	48.5%
	Total	132	100.0%

Source: primary data

From the above table it is clear that 51.5% of the weavers are nuclear family, it indicates that nuclear family only normally earn to live in that profession. 48.5% of the weavers are joint family; it indicates that other family members are depend upon other profession.

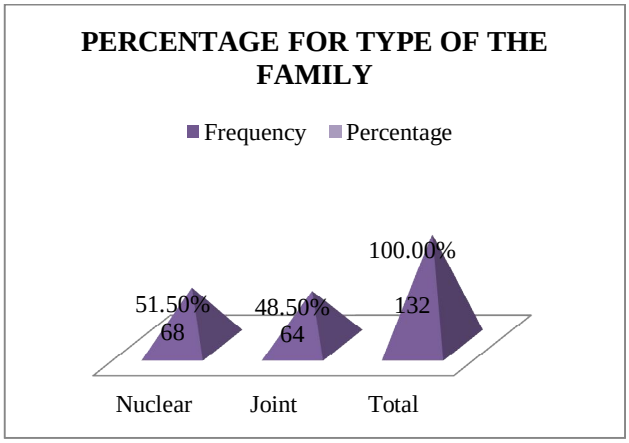


Table 2.6 Family Size Wise Classification of the Respondents

S. No	Family Size	Frequency	Percentage
1	Small (upto 3)	34	25.8%

2	Medium (4-6)	81	61.4%
3	Large more than 6	17	12.9%
	Total	132	100.0%

Source: primary data

From the above table it is clear that 61.4% of the weavers are included in 4-6 members in the family. 25.8% of the weavers are included in up to 3 members in the family, 12.9% of the weavers are included in more than 6 members in the family. This shows that majority of the weavers were had medium level of the family members.

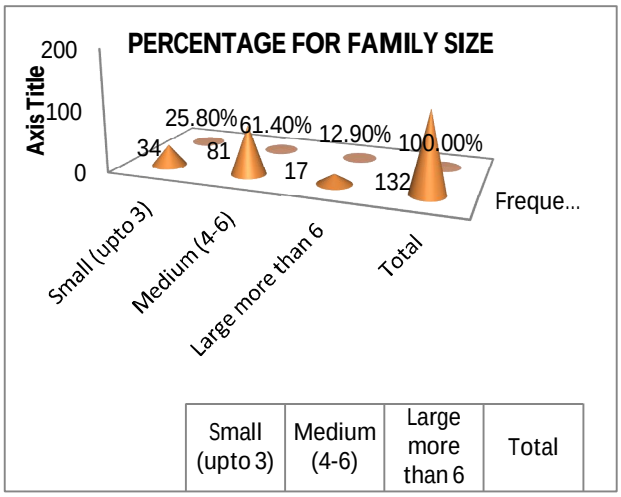


Table 2.7 Ownership of Present House Wise Classification of the Respondents

S. No	Ownership of present house	Frequency	Percentage
1	Self- owned	81	61.4%
2	State Govt.	25	18.9%
3	Central Govt.	5	3.8%
4	Privately Owned	21	15.9%
	Total	132	100.0%

Source: primary data

From the above table it is clear that 61.4% of the weavers are had self-owned house, 18.9% of the weavers are lived in state government quarters.15.9% of the weavers are lived in privately owned house. 3.8% of the weavers are lived in central government quarters. This shows result that majority of the weavers were had fulfilled their essential needs.

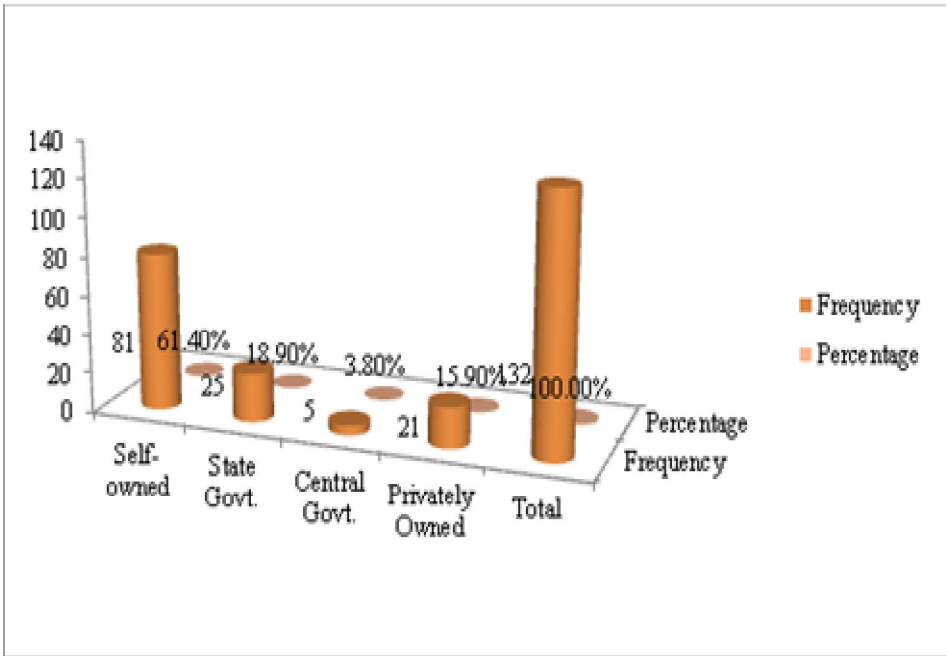


Table 2.8 No. of Rooms Wise Classification of the Respondents

S. No	No.of Rooms	Frequency	Percentage
1	1	18	13.6%

2	2	41	31.1%
3	3	51	38.6%
4	>4	22	16.7%
	Total	132	100.0%

Source: primary data

From the above table it is clear that 38.6% of the weavers are had 3 rooms in their house. 31.1% of the weavers are had 2 rooms, 16.7% of the weavers are had above 4 rooms and 13.6% of the respondents are had only one rooms. This shows that majority of the weavers were fulfilled their basic needs of the living status.

Table 2.9 Separate Room Wise Classifications of the Respondents

S. No			Frequency	Percentage
1	Separate Kitchen	Yes	112	84.8%
		No	20	15.2%
	Total		132	100.0%
2	Separate Toilet	Yes	112	84.8%
		No	20	15.2%
	Total		132	100.0%

Source: primary data

From the above table it is clear that 84.8% of the weavers are had separate kitchen and toilet and only 15.2% of the weavers are not had separate kitchen and toilet. This shows that majority of the weavers were fulfilled their basic needs.

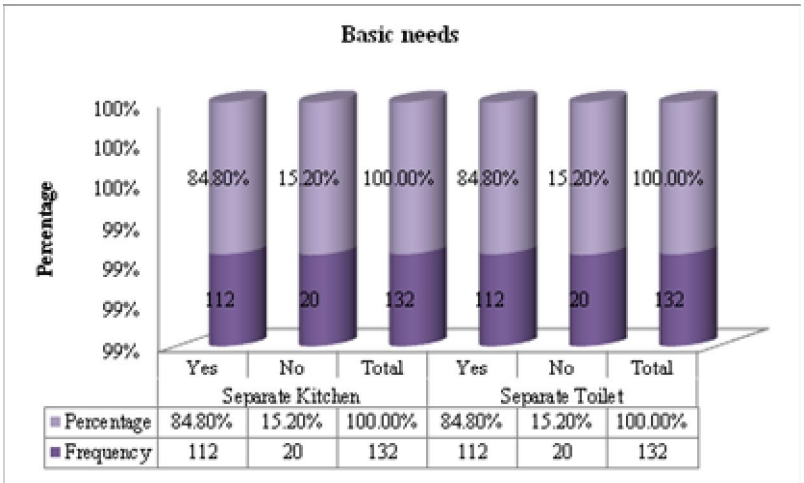


Table 2.10 Other Property Wise Classifications of the Respondents

S. No	Other Property	Frequency	Percentage
1	Agricultural land	16	12.1%
2	Another House	29	22.0%
3	Nothing	87	65.9%
	Total	132	100.0%

Source: primary data

From the above tables shows that 65.9% of the weavers are not had any other property in their source. 22.0% of the weavers are had another house and only 12.1% of the weavers are had agricultural land. This shows that majority of the weavers were not improved their financial level.

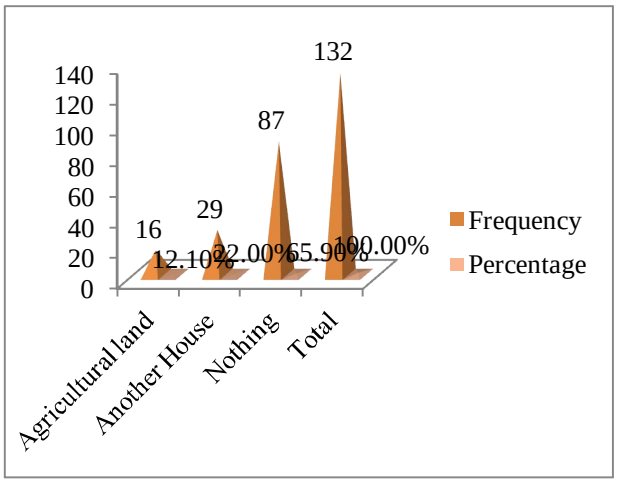


Table 2.11 Type of Dwelling Unit Wise Classification of the Respondents

S. No	Type of Dwelling Unit	Frequency	Percentage
1	Kutcha	14	10.6%
2	Pucca	93	70.5%
3	Semi pucca	25	18.9%
	Total	132	100.0%

Source: primary data

From the above table it is clear that 70.5% of the weavers are living in pucca house. 18.9% of the weaver's semi pucca house and 10.6% of the respondents kutcha house. This shows that majority of the weavers were living in pucca house.

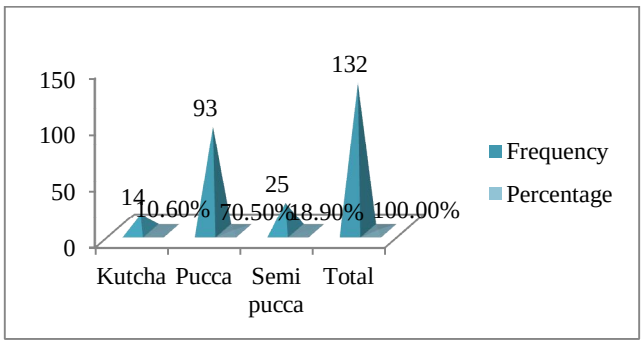


Table 2.12education Levelof the Respondents

S. No	Education level of Weavers	Frequency	Percentage
1	Illitrate	54	40.9%
2	Literacy	78	59.1%
	Total	132	100.0%

Source: primary data

From the above table it is clear that 59.1% of the weavers are literate. 40.9%of the weavers are illiterate. This shows maximum number of weavers is literate.

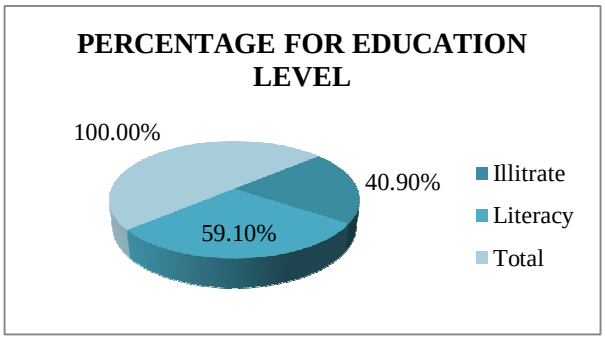


Table 2.13monthly Income Wise Classification of the Respondents

S. No	Monthly Income	Frequency	Percentage
1	3000-5000	13	9.8%
2	5001-7000	17	12.9%
3	7001-9000	31	23.5%
4	9001-11000	54	40.9%
5	>11001	17	12.9%
		132	100.0%

Source: primary data

From the above table it is clear that 40.9% of the weavers are monthly earned Rs.9001-11000. 23.5% of the weavers are monthly earned Rs.7001-9000, 12.9% of the weavers are monthly earned equally Rs.5001-9000 and above Rs.11000. only 9.8% of the weavers are monthly earned Rs.3000-5000. This shows that majority of the weavers are good package from the handloom production.

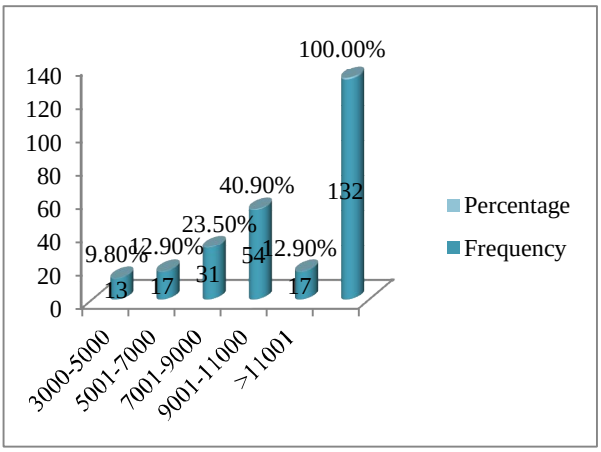


Table 2.14expenditure of Food Grains Wise Classification of the Respondents

S. No	Food Grains	Frequency	Percentage
1	500-1000	32	24.2%
2	1001-1500	14	10.6%
3	1501-2000	53	40.2%
4	>2001	33	25.0%
	Total	132	100.0%

Source: primary data

From the above table it is clear that 40.2% of the weavers are monthly spend Rs.1501-2000 for food grains. 25.0% of the weavers are spend above Rs.2000 for foods grains, 24.2% of the weavers are spend Rs.500-1000 for food grains and only 10.6% of the weavers are spend Rs. 1001-1500 for food grains. This shows majority of the weavers are spend Rs1501-2000 for food grains.

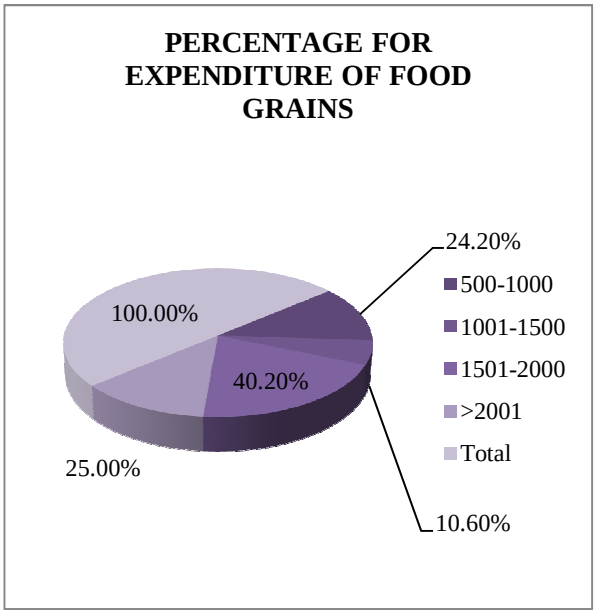


Table 2.15household Expenditure Wise Classification of the Respondents

S. No	Household Expenditure	Frequency	Percentage
1	500-1000	74	56.1%
2	1001-1500	12	9.1%
3	1501-2000	15	11.4%
4	>2001	8	6.1%
5	Nil	23	17.4%%
	Total	132	100.0%

Source: primary data

From the above table it is clear that 56.1% of the weavers are spend Rs.500-1000for household expenditure. 17.4% of the weavers are not spending for household expenditure. 11.4% of the weavers are spending Rs.1501-2000 for household expenditure. 9.1% of the weavers are spending Rs.1001-1500 and 6.1% of the weavers are spending above Rs.2001for household expenditure. This shows that majority of the weavers were Rs.500-1000.

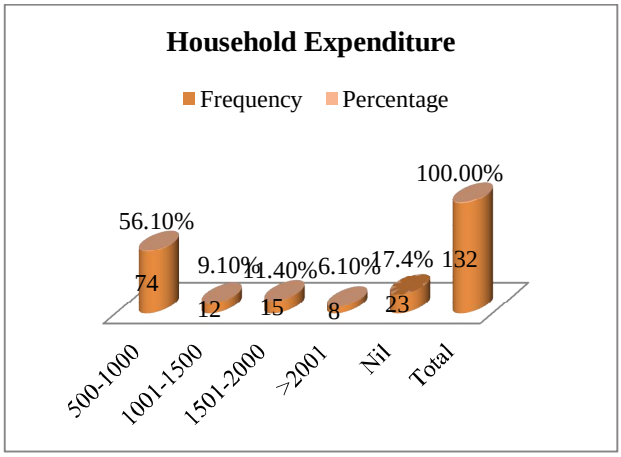


Table 2.16expenditure of Clothes Wise Classification of the Respondents

S. No	Clothes	Frequency	Percentage
1	500-1000	74	56.1%
2	1001-1500	17	12.9%
3	1501-2000	16	12.1%
4	>2001	5	3.8%

5	Nil	20	15.2%
	Total	132	100.0%

Source: primary data

From the above table it is clear that 56.1% of the weavers are spend Rs.500-1000 for expenditure of clothes.15.2% of the weavers are not spending for expenditure of clothes. 12.9% of the weavers are spending Rs.1001-1500 for expenditure of clothes. 12.9% of the weavers are spending Rs.1001-1500 and 3.8%of the weavers are spending above Rs.2001for expenditure ofclothes.This shows that majority of the weaners are spend Rs.500-1000 for expenditure of clothes.

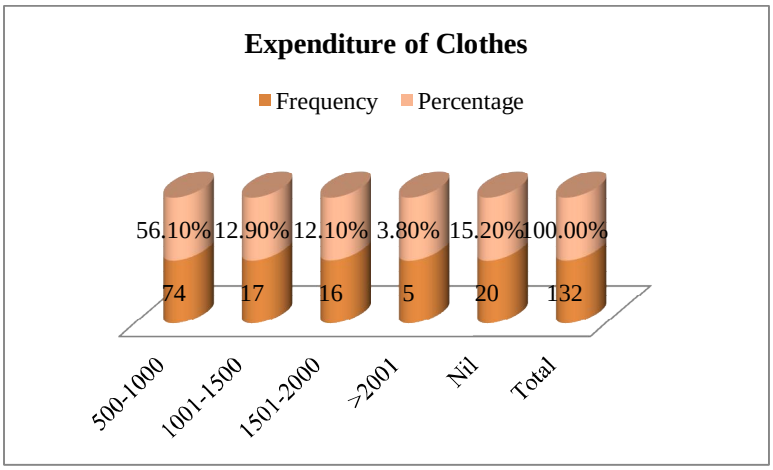


Table 2.17expenditure of Medicine Wise Classification of the Respondents

S. No	Medicine	Frequency	Percentage
1	500-1000	55	41.7%
2	1001-1500	10	7.6%
3	1501-2000	13	9.8%
4	>2001	5	3.8%
5	Nil	49	37.1%
	Total	132	100.0%

Source: primary data

From the above table it is clear that 41.7% of the weavers are spend Rs.500-1000 for expenditure of medicine. 37.1% of the weavers are not spending for expenditure of medicine. 9.8%of the weavers are spending Rs.1501-2000 for expenditure of medicine.7.6% of the weavers is spending Rs.1001-1500 for expenditure of medicine. 3.8% of the weavers are spending above 2001 for expenditure of medicine. This shows that majority of the weavers were spend Rs.500-1000 for expenditure of medicine.

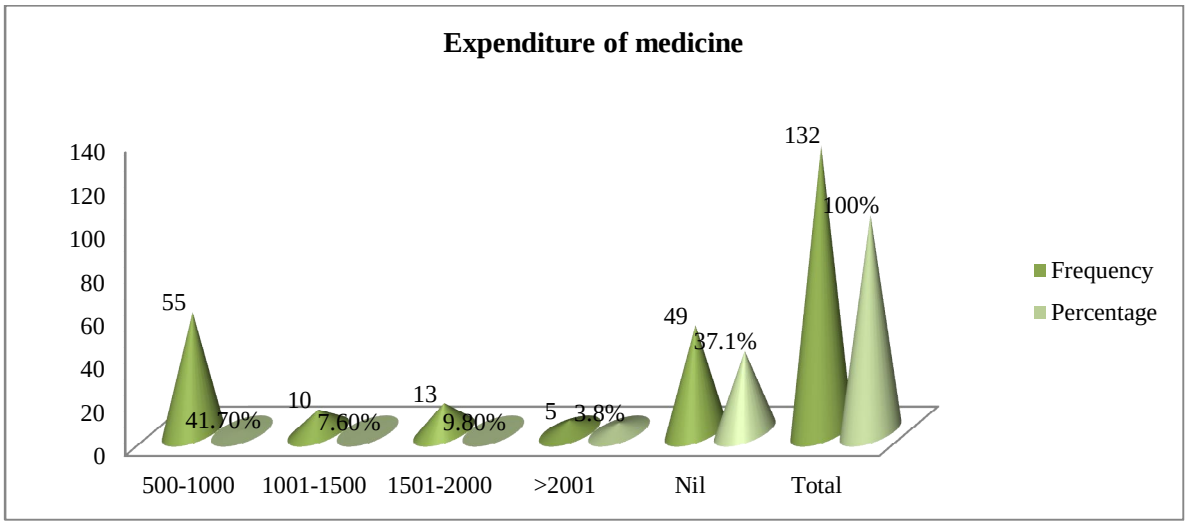


Table 2.18 Expenditure ofchildren's Education Wise Classification of the Respondents

S. No	Children's Education	Frequency	Percentage
1	500-1000	39	29.5%
2	1001-1500	19	14.4%
3	1501-2000	10	7.6%
4	>2001	9	6.8%
5	Nil	55	41.7%
	Total	132	100.0%

Source: primary data

From the above table it is clear that 41.7% of the weavers are not spending for expenditure of children's education, it indicates that most of the weaver's children have not required education. 29.5% of the weavers are spending Rs.500-1000 for expenditure of children's education. 14.4% of the weavers are spending Rs.1001-1500 for expenditure of children's education.7.6% of the weavers are spending Rs.1501-2000 and 6.8% of the weavers are spending Above 2000 rupees for expenditure of children's education.

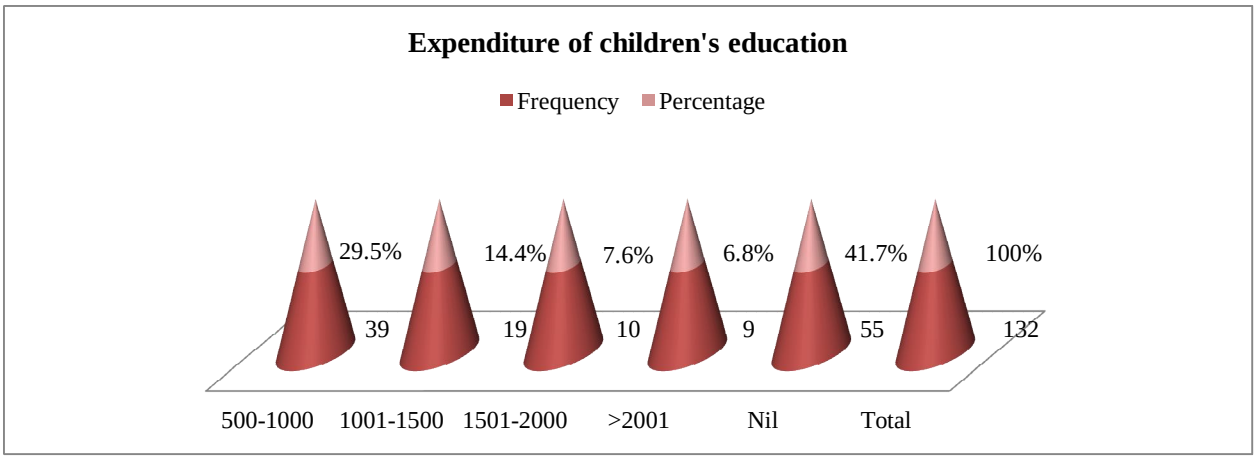


Table 2.19 Personal Expenditure Wise Classification of the Respondents

S. No	Personal Expenditure	Frequency	Percentage
1	500-1000	76	57.6%
2	1001-1500	33	25.0%
3	1501-2000	18	13.6%
4	>2001	3	2.3%
5	Nil	2	1.5%
	Total	132	100.0%

Source: primary data

From the above table it is clear that 57.6% of the weavers are spend Rs.500-1000 for personal expenditure. 25.0% of the weavers are spending Rs.1001-1500 for personal expenditure. 13.6% of the weavers are spending Rs.1501-2000 for personal expenditure.2.3% of the weavers are spending above 2000 rupees for personal expenditure. Only 1.5% of the weavers are not spending for personal expenditure. This shows that majority of the weavers are spend Rs.500-1000 for personal expenditure.

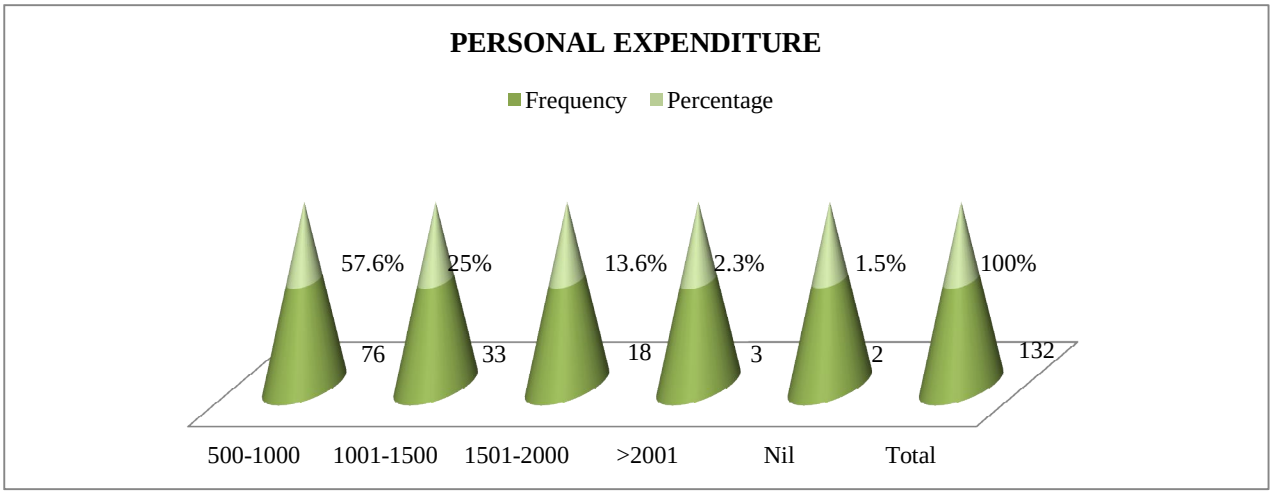


Table 2.20procuring the Raw Materials Wise Classification of the Respondents

S. No	Procuring the raw materials	Frequency	Percentage
1	Self-Procured (From Local shop)	67	50.8%
2	Through Intermediaries	27	20.5%
3	Contract basis	10	7.6%
4	Co-operative societies	28	21.1%
5	Total	132	100.0%

Source: primary data

From the above table it is clear that 50.8% of the weavers are procuring the raw materials from local shop. 21.1% of the weavers are procuring the raw materials from co-operatives societies. 20.5% of the weavers are procuring the raw materials from through intermediaries.7.6% of the weavers are procuring the raw materials from contract basis. This shows that majority of the weavers were procuring the raw materials from local shop.

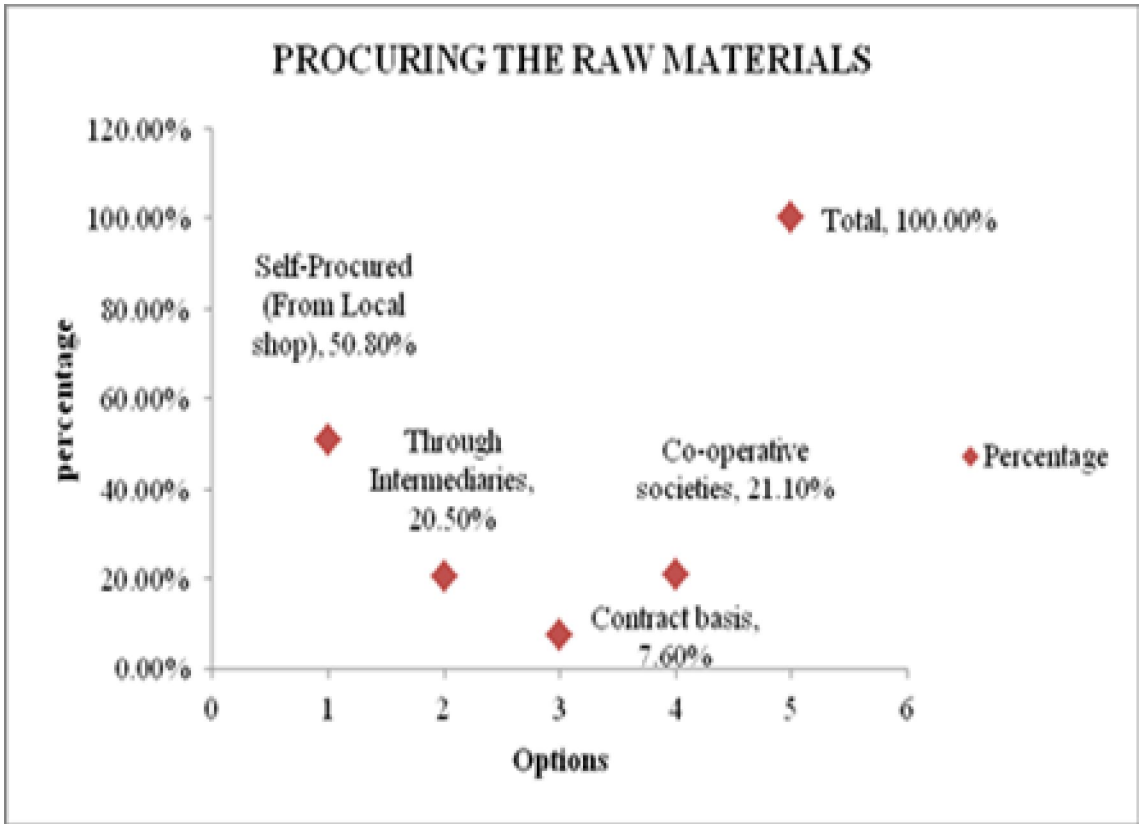
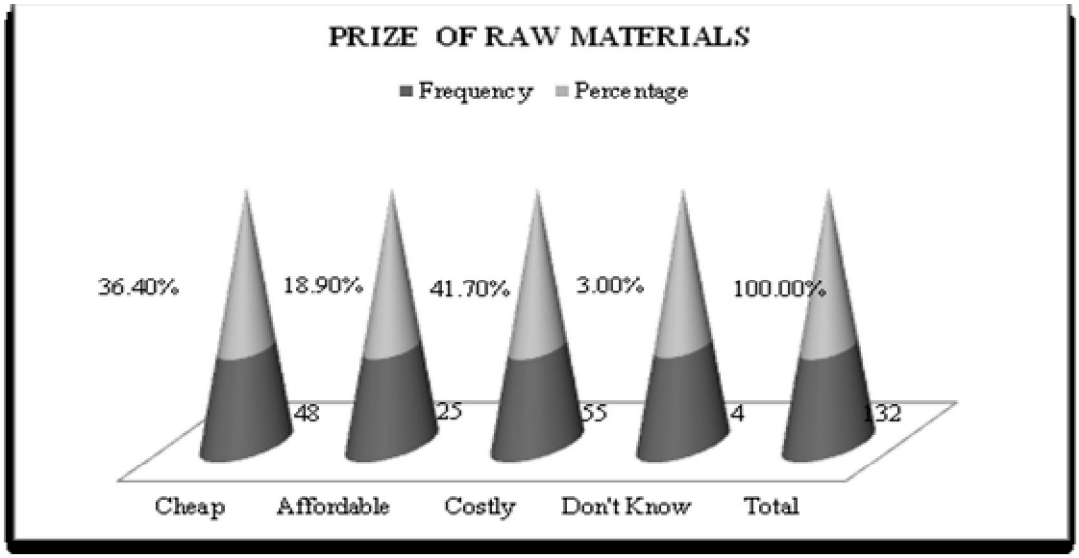


Table 2.21 Price of Raw Materials Wise Classification of the Respondents

S. No	Prize of raw materials	Frequency	Percentage
1	Cheap	48	36.4%
2	Affordable	25	18.9%
3	Costly	55	41.7%
4	Don't Know	4	3.0%
Total		132	100.0%

Source: primary data

From the above table it is clear that 41.7% of the weavers are bought prize of raw materials are costly. 36.4% of the weavers are bought prize of raw materials are cheap. 18.9% of the weavers are bought prize of raw materials are affordable. 3.0% of the weavers are said don't know about prize of raw materials. This shows that majority of the weavers are bought prize of raw materials are costly.

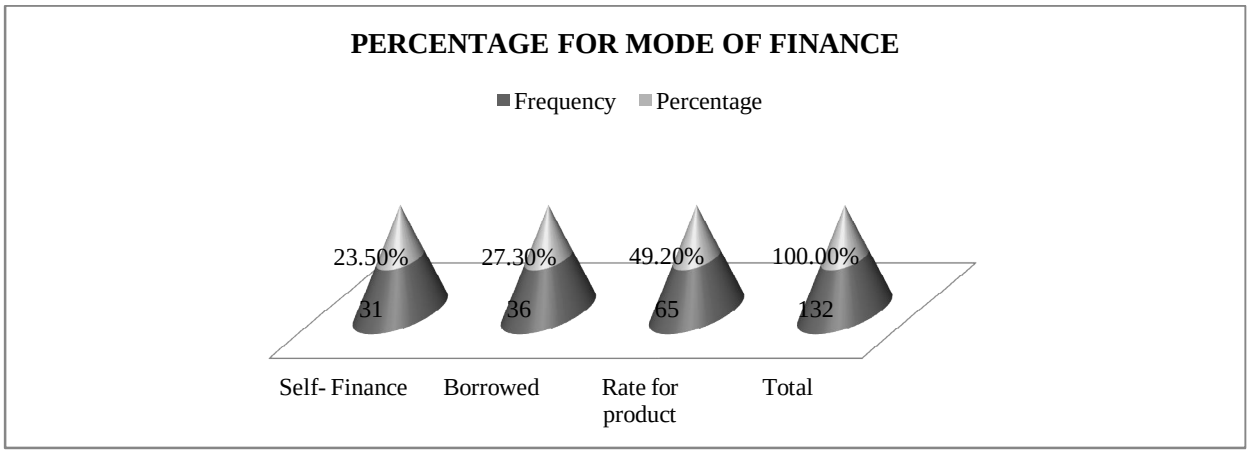


Source: primary data

Table 2.22 Mode of Finance Wise Classification of the Respondents

S. No	Mode of Finance	Frequency	Percentage
1	Self- Finance	31	23.5%
2	Borrowed	36	27.3%
3	Rate for product	65	49.2%
4	Total	132	100.0%

From the above table it is clear that 49.2% of the weavers are get earnings based on rate for product. 27.3% of the weavers are get earnings based on borrowed. 23.5% of the weavers are get earnings based on self-finance. This shows that majority of the weavers were get earnings based on rate for product.



Correlation Between Monthly Income and Working Hours

Correlations			
		Monthly Income	Working hours
Monthly Income	Pearson Correlation	1	.178*
	Sig. (2-tailed)		.042
	N	132	131
Working hours	Pearson Correlation	.178*	1
	Sig. (2-tailed)	.042	
	N	131	131
*. Correlation is significant at the 0.05 level (2-tailed).			

The calculated p value .178 is highly significant.

1. Correlation of height with itself (r=1), and the number of non-missing observations for height (n=132).
2. Correlation of height and weight (r=0.178), based on n=131 observations with pairwise non-missing values.
3. Correlation of height and weight (r=0.178), based on n=131 observations with pairwise non-missing values.
4. Correlation of weight with itself r=1), and the number of non-missing observations for weight (n=131).

Findings of the Study

This result contains the important finding of the study and suggestions. For improving socio monetary circumstances of handloom weaving communal in Salem district.

The present study was historical evidence of handloom industry with a vision to ascertaining the factors foremost to its decline. It also attempts to find on facets of the socio monetary problems in their weaving communal. The findings of this study have considerable and significance manipulation needs to run the industry on new technical strategies for all intensities and improve the socio-monetary progress.

Findings

1. 75% of the respondents reside in male.
2. Most of the respondents come under the age between 31-40 years.
3. Most of the respondents reside on OBC community (78.8%).
4. Majority of the respondents reside on married (97.4%).
5. Maximum number of respondents reside (51.5%) in nuclear family.
6. Majority of the respondents (61.4%) in medium size of the family.
7. Most of the respondents reside in self-owned house.
8. 38.6% of the respondents reside 3 rooms in their house.
9. 84.8%of the respondents reside separate kitchen in their house.
10. 84.8% of the respondents reside separate toilet in their house.
11. 65.9% 0f the respondents are nothing had any property.
12. 70.5% of the respondents reside pucca type of twilling unit.
13. Most of the respondents reside in literate (59.1%).
14. 40.9% of the respondent's monthly income 9001-11000.

Suggestions

The handloom industry forms a part of the cultural heritage of India and is unparalleled in its flexibility and versatility, blending myths, faiths, symbols and imagery. It is one of the oldest cottage industries in India. The handloom industry has periodically been enveloped in crisis particularly during the fast couple decade. This has result in the erosion of rural livelihood in weaving and shift of labour force to other sectors, thus leading to its breakdown. Having studied the socio-monetary circumstances of handloom weaving communal, an attempt has been made in this section to offer a few suggestions improving the plight of handloom weavers.

1. The government of India must strictly enforce the handloom reservation Act, 1985 to protect handloom weavers from occupation by the power loom and mill sector. Also, to avoid competition from power looms, the government will modernize some new product limits that have not yet been touched by power looms. The government should restrict the production of hank yarn by the spinning mills to be supplied to the handloom sector.
2. Competition in the power looms and mill sectors is obviously a major threat. This can be countered if the handloom sector produces high value and unique products for the overseas market and the uniqueness of the handloom products can increase.
3. The handloom sector needs a comprehensive law on occupational hygiene and safety. The main solution activities should focus on creating norms, creating awareness and providing skills development services to help weavers meet safety standards.(Subramaniya, Bharathy; Jothi, 2017)
4. The government should take necessary steps to restructure the non-operational co-operative societies. If necessary, criminal proceedings should be instituted against those responsible for maladministration.
5. The industry is facing the problem of lack of capital required for sustainable and operational. Weavers now rely mainly on private sources or the rich for sources credit. Institutionalized credit facility should be introduced on institutional basis by introducing Reserve bank schemes for financing weavers. Co-operative societies this should be followed stringently.

Conclusions

From the present study it has been concluded that the handloom weavers in Salem District, mainly the occupants of this occupation, are in a pitiable condition due to poor socio-monetary circumstances. Most of them work ten hours per day but earn meagre wage. It is noteworthy that the level of education among the weaver community is not encouraging. The majority of the community is low income category and engaged in working under intermediaries. In this study concluded that the handloom weavers are expected by the proper monetary hopefulness, direct distribution of raw materials circulation that will makes the satisfactory pay and government want to emphasis the handloom sector.

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SPIRITUAL INTELLIGENCE AS A WEAPON TO FIGHT PANDEMIC SITUATION AMONG WORKING PEOPLE: A REVIEW

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ABSTRACT

Purpose: The chief aim of this study is to trace the relation between spiritual intelligence and resilience, stress and bring positive attitude among the working people during pandemic situation. Background: WHO declared corona virus outbreak as pandemic in the month of March 2020. The working people who spend most of the times by doing some work, they are getting bored. This monotonous situation can lead into depression and growth of anxiety, lack of well being among all kinds of working people. Design: Review based qualitative paper Outcome: By study of previous workers inference and work it can be inferred that spiritual intelligence contains a strong relation with life satisfaction, stress, and burn out and promotes well-being.

Keywords: *Spiritual intelligence, pandemic, stress, resilience*

Introduction

WHO declared corona virus outbreak as pandemic in the month of March 2020. COVID 19 is a highly contagious disease. This is a kind of respiratory disorder caused by corona virus. As we all know the world is under potent threat of corona virus infection from the very beginning of 2020. The disease was first identified in the year 2019 in the Wuhan province of China. As it declared pandemic which means the disease spread throughout the world, billions of people suffering with this disease and more than a million died due to the same. To maintain precautionary measure and prevent community spread, India government declared complete lockdown from March to June. Corona virus disease includes trouble in respiratory system which ultimately leads to death when its symptoms are severe.

Due to this lockdown situation peoples are losing their jobs there's caged inside their home; jobless hopeless peoples are getting in depression day by day. This Lock down situation establishing a deep impression on human minds as now a day's most of the peoples other than medical staff are doing nothing but staying at home. Young people mostly students are suffering a lot due to this situation as they are perishing into home. Not able to play, cannot be able to go to school, even they are not able to meet their friends and teachers. This is quite frustrating situation. The working people who spends most of the times by doing some work, they are getting bored. Especially teachers, engineers, industrial workers etc who spent most of the times in school with children or in office with lots of tasks and spend their times happily with them, this monotonous situation can lead into depression and growth of anxiety, lack of well being among all kinds of working people.

Spirituality

Spirituality is a huge concept. At the beginning of introduction of the term it was considered as the religious practices which make life better and can make human being perfect.

In modern Times the idea of spirituality extended and now it referred to as a quality of being aware with bodily spirit beyond the materialistic barrier of physical world.

Intelligence

Intelligence can be defined with many phrases like self-awareness knowledge critical thinking problem solving skill understanding etc. In many times many scientists Defined intelligence in many ways some told it's the problem-solving capability, something it is the ability to deal with cognitive complexity and other told that it is a goal directed adaptive behavior.

Spiritual Intelligence

"Danah Zohar" introduced the key word 'spiritual intelligence' in the year 1997 in her book "Rewiring the Corporate Brain". Self-

awareness, spontaneity, holistic approach, compassion, positive use of adversity is the soul components of spiritual intelligence. It is the ability to imply spiritual resources and qualities to increase the quality of daily functioning and well-being. According to Sharma (2017) spiritual intelligence is the blend of psychology neurology and anthropological sciences it is dealing always with religious practices but without a concrete blind faith over religion, it is soul thing of the spirituality in a person. According to Mayer (2009) it includes low level mental mechanism like motivation cognition consciousness and emotion.

Present paper aims for establishing the fact that spiritual intelligence can be the way to fight the recent pandemic situation and can promote will be resilience and mental peace among the working people.

Study questions

1. Is there any existing relation between spiritual intelligence and job satisfaction?
2. If spiritual intelligence has the power of resilience or not?
3. If Spiritual intelligence could be the key or not to fight covid-19 situation among the working people.

Review of Literature

Zohar and Marshall (2000) conducted a research work and found that spiritual intelligence causes more intellectuality among the individuals. It causes more job satisfaction among the intellectual peoples as they have more spiritual intelligence. Kaur (2013) showed in her study with hundred school teachers of secondary level, the relationship between spiritual intelligence and job satisfaction. And found positive effect spiritual intelligence over job satisfaction. This study also reveals that gender has no effect over job satisfaction and spiritual intelligence.

Joseph and Lakshmi (2012) proved that spiritual intelligence when normally occurs at work place the working environment converted into more favorable one. The researchers tried to prove by the development of spiritual intelligence, coping with many skills are possible. One can develop his or her many skills at a time, including intra and interpersonal relationship, goal attainment, problem solving skills, team spirit, stress management etc. They also proven that spiritual intelligence is not enough instinctive, it can be achieved through some practices and with the practice; one can convert his or her life and workplace more comfortable for him or herself.

Ahmadian et. al (2013) investigated that spiritual intelligence is not inherent but it can be grown with more and more practices. According to them, study of Spiritual intelligence is a growing need in recent years. This practice is also helpful in building of effective leadership. They have taken a sample size of 198 members of National Company of oil products distribution and gave treatment through Badie spiritual consciousness questionnaire. They have drawn inference through correlation and found that there is a positive relationship between spiritual intelligence and occupational stress among the samples they have taken.

Jain and Santosh (2013) discovered significant positive relation between adjustment and spiritual intelligence similar work done by Devi (2016) with different sample and population and got same results.

Kaur et. al (2013) had conducted Cross-cultural study about the effect of spiritual intelligence and the psychological ownership and burn out among nurses of Kualalampur. They took a sample size of 550 and applied a self-developed questionnaire to get the results and found that spiritual intelligence influences emotional intelligence, psychological ownership, burnout and caring nature among nurses and over all spiritual intelligence are very much helpful in establishing resilience and well-being among the nurses.

Awais et.al (2015) investigated to know the relationship between spiritual intelligence with organizational commitment and job satisfaction. Where organizational commitment was used as the dependent variable and spiritual intelligence was taken as an independent variable for their studies. In this is review based paper, they have drawn the inference that there persists a certain relationship with job satisfaction and organizational commitment but there is no relationship pertains directly within spiritual

intelligence and organizational commitment they have also revealed that spiritual intelligence has very much significant impact over job satisfaction.

Ebrahimpour et. al (2015) tried to establish relationship between spiritual intelligence over teacher's innovative behavior. With a sample size of 210, they have conducted their study. They have used innovative behavior questionnaire and comprehensive spiritual intelligence questionnaire to contact their study. Pearson correlation and multiple regression were applied to get the results. They discovered a remarkable positive correlation within stitches innovative behavior and spiritual intelligence because spiritual intelligence also enhances skills like problem solving critical thinking etc.

King and Decicco (2015) investigated with four factor models of spiritual intelligence that includes critical thinking, transcendental awareness, production of personnel meaning and extension of conscious conditions. They developed a 24- item containing self-report measure. They named that as Spiritual intelligence self-report inventory (S.I.S.R.I. – 24). The applied the same over 619 and 304 peoples, drawn inference through correlation analysis and found superb internal reliability and good feet of their proposed model I want to conclude about the positive application of S.I.S.R.I. – 24 for future studies.

Ahmed et. al (2016) performed their work to know the relation of spiritual intelligence in holistic development and to transform human into more efficient human resource. According to their observation, present human resource development policies are incomplete without the most effective point, which is spiritual intelligence. They reviewed lots of papers and concluded that proper human resource development can be possible with the assistance of spiritual intelligence only.

Kimiyayi and Daryaee (2016) took 120 teachers as their sample and performed work to reveal the connection between spiritual intelligence along with emotional intelligence and performance in occupational sector. They have used spiritual intelligence questionnaire of King which has 24 items to measure spiritual intelligence, Shearing's emotional intelligence item questionnaire with 33 items to know about emotional intelligence and 15 item questionnaire namely Paterson's occupational performance questionnaire to measure occupational performance. We have used correlation to draw inference and found the existence of significant positive relationships among emotional intelligence, spiritual intelligence and occupational performance together. From their study, they have discovered also that spiritual intelligence has a affirmative and strong role in occupational performance among teachers.

Sharma (2017) has taken 530 senior secondary school teachers of Government High schools of four districts of Punjab as sample. She had used spiritual intelligence scale by Dhar and Dhar (2006), also other skills to measure popping up among working women in relation to spiritual and emotional intelligence with life satisfaction. Statistical analysis was done by Pearson correlation. Result found significant relationship adjustment with spiritual intelligence and life satisfaction. Another work of same author (2018) established the phenomenon that emotional and spiritual intelligence is related to occupational adjustment.

Conclusion

The chief aim of this study is to trace the relation between spiritual intelligence and resilience, stress and bring positive attitude among the working people during pandemic situation. Study results can be inferred to the inductor analysis of review papers and these are as follows:

By study of previous investigators inferences and works, inferences can be drawn that spiritual intelligence shows affirmative or negative relation with life satisfaction, stress, burn out and promotes well-being. By these studies it can be easily assumed that spiritual intelligence can be surely helpful to fight pandemic situation. It is found in most of the work that peoples with higher emotional intelligence higher efficiency in work much better growth rate in different skills like communication skill problem solving skill critical thinking power adjustments etc.

Analysis of previous studies also prove that the power of adaptation gradually in persons with higher spiritual intelligence. So, it is very much

necessary to have higher order spiritual intelligence as an asset to fight the pandemic situations especially in working peoples.

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INTRAPRENEURSHIP CONSTRUCT AND ITS IMPLEMENTATION IN SME SECTOR

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ABSTRACT

The aim of the paper is to build a conceptual model of corporate intrapreneurship (CE). The intrapreneurship can represent both a competitive advantage and a company's survival. Intrapreneurship has had its aspects explored more by the authors in recent years, however there are no conceptual standards designed that can pass off as a unanimous view. Based on the assumption that intrapreneurship can be grounded on pillars of various themes, the more important dimensions found in the literature were gathered. These dimensions, such as innovation capacity, resources, risk taking, etc., are considered essential for corporate entrepreneurship. The paper proposes to discuss the nine points raised and compress them into one model. By the development of the subject, it was possible to obtain a concrete model with the key practice points of the intrapreneurship in large corporations. All dimensions were clustered in three core aspects (Structure, Management and Agents) in an intersection model, representing the interdependence between them.

Keywords: *Intrapreneurship, Dimensions, Innovation, Small and Medium Sized Enterprise (SME)*

I. Introduction

Entrepreneurship and intrapreneurship are the hip terms of the last two decades. The prominence of entrepreneurship and intrapreneurship began to increase in western countries with the interest in productivity. Richard Cantillon used the concept of entrepreneurship for the first time in the midst of the 16th century as an economical term. Then came the new term 'intrapreneurship' as a sub-field of entrepreneurship which gradually has increased in importance. The concept was first used by Ginford Pinchott in 1985. While it might have raised eyebrows unequivocally during the initial days, but then several success stories over the years command the same respect for intrapreneur model .Although the concepts of entrepreneur and intrapreneur have similar qualities, there are nuances between them but still there is a colossal distinction between these two terms; the entrepreneur is defined as somebody who has an independent capacity and who can take over the risk of starting a fruitful activity and maintaining it (Luchsinger and Bagby 1987 : 10). Intrapreneurs are the creative individuals who have the entrepreneur soul within an institution, who see the opportunities for innovation and catch it, and who not only innovate but also can turn their ideas and models into increase for their institution's profits and competitive power. Pinchott defines entrepreneur as the dreamer who takes over the responsibility for each kind of creativity within an organization.

Intrapreneurs are the leaders who moves with a entrepreneurial spirit in a big organization while converting new ideas to realities (Parboteeah, 2000: 48). They are action – focused and goal oriented. Never shaky but determined to achieve the fixed aims with their optimist attitude. They are not only good thinkers, but also planners. And in regards to abortive consequences they don't run away from failures but handle it with different prospective and reciprocate with conventional administrator features like solving problems (Berber, 2000).

Pinchot states that entrepreneurs have their peculiar principles and puts forward 10 conditions related to an intrapreneur.

These are (Kuratko and Hodgetts, 2000: 14):

1. Coming to work in high excitement and willingness every day,
2. Nobody's preventing their dreams,
3. Preparing projects for work despite their not being necessary,
4. Creating networks to help people,
5. Constructing team spirit,
6. Curiosity for inventions,
7. Delicateness to work and honesty,
8. Being forgiving,
9. Being realists regarding goals, and
10. Having a strong vision.

Besides the large organizations, the concept of intrapreneurship or corporate entrepreneurship became popular through the end of 1980 in

small and medium sized enterprises also and since then, it has become a field that has attracted practitioners. Many factors have played parts for the development and expansion of the concept. Kuratko and Hodgetts (2000: 96) count some of them as follows:

- Rapid increase in the number of the existing and new competitors,
- Serious increases in the amount of rage spending,
- Some intelligent and bright people‘s leaving their organizations and becoming intrapreneurs of small businesses.
- International competition,
- The shrinking of fundamental organizations,
- Rapid changes in technology,
- The desire to make better effectiveness and production.

Hisrichetal. (2005) pulls attention towards the people having the hearts for intrapreneurship who through their actions could raise the social, cultural and working levels of SMEs. An effectual intrapreneurship in SMEs blossoms as a subject for both management and entrepreneurship research". The intrapreneurship involves different practices within a business which are meant to improve its capacity for innovation and response, while integrating risk-taking and innovation approaches, as well as the reward and motivational techniques, that are more traditionally thought of as being the province of entrepreneurship. Such benefit cultivates an important move in ever-changing intense markets where success can be determined by being more efficient and faster than the competitors, adapting and making changes to meet customers' desires.

While discussing the great innovators of the yore, we think of intrapreneurs who cultivated, fostered startups to challenge our norms and chucked what we thought was possible as they very much played an absolute role while encouraging the growth, profitability, rejuvenation and renewal, as well as ensuring survival in competitive markets. It's a theory in which the intrapreneurship had an epiphany, it came as a solution, and then scaled itself big in the market through its financial performance and several positive physiognomies, there are few new and viable beliefs related to value creation, the search for skills and capabilities inside their organizations to achieve their growth agenda and propel most competent executive to the topmost to lead new growth initiatives.

Economist Kaihan Krippendorff desperately wants this belief that intrapreneurs are just the change agent. In his paper 'Driving Innovation from Within', he debates that the best world-changing ideas of the last 3 decades were conceived within the vicinity of the homes of entrepreneurs. Of the top 30 inventions from that period, just 8 were conjured by lone entrepreneurs; only 7 were then developed by that entrepreneur, instead of a larger organization; and a mere two were commercialized by the startups or SMEs. Kuratko and Hodgetts narrate the entrepreneur actions inside companies with the facilitation of ideation process and the barriers minimization usually imposed by rigid corporate structures. Mohanty specified that companies that seek to break the standard pattern of proprietorship or owners may invest and foster the intrapreneurship within their structure so they can actually execute their innovation process leading to innovation in products, services and process, and consequently to better results. In a more individual aspect, the intrapreneurship brings to the company innumerable opportunities, tracing new paths, initiating new ventures, challenging the status quo, and thus gaining new land. "Among the many advantages of innovation from within a company is the reciprocal relationship to scale," he says. "Being an innovator working from within an established organization can enable you to scale more quickly. And growing in scale makes more innovation possible." This concept brought a revolution and set a ball rolling for intrapreneurship in SMEs.

Knowing all the important intrapreneurship dimensions facilitate innovative activities implementation in big companies through the possibility of effectiveness evaluation of the reference points. This is largely due to the multiple irrefutable advantages larger organizations tend to have when it comes to developing and scaling new ideas. There could be three primary reasons:

1. Entrepreneurs cannot match the scale of the companies
2. Companies have larger capabilities under the same roof. Examples: Finance, technology, expertise, etc.
3. Companies have better risk-taking potential

II. The Concept

Since these two imperative word; competitive advantage and intrapreneurship are recently added to the SME lexicon, this research defines the term itself and key concepts highlights and explains it in more detail. It makes no distinction between intrapreneurship and corporate entrepreneurship even though some researchers have made a distinction between the two terms based mostly on company size.

Pinchot coined the term, intrapreneurship in 1978. He points out that firms, in order to grow and prosper in a rapidly changing society and economy, need entrepreneurial thinking within the company, that is intra-corporate entrepreneurship, thus termed as intrapreneurship.

The study of Knight's research (1997) focuses on entrepreneurship on the firm level while pointing out two characteristics of major importance for this concept; innovativeness and proactiveness. Here innovativeness is defined as "the pursuit of creative or novel solutions to challenges confronting the firm, including the development or enhancement of products and services, as well as new administrative techniques and technologies for performing organizational functions" Thus proactiveness is regarded to be aggressive posturing towards competitors, emphasizing an aggressive execution and follow through with the attempt to achieve the company's goals by whatever means possible.

The main objective of this detailed study is to give a deeper insight on what the concept of intrapreneurship is and what its key dimensions are.

III. Literature Review

Multiple studies that explored the challenges of scaling up a SME have listed the above issues. Human capital, tapping into new markets, amongst others; large businesses/corporates can actually overcome such issues in a jiffy because of their wealth, mammoth talent pool, presence overseas, and experience in expansion with an effective intrapreneurship which brings entrepreneurial thinking and skills to build within the structure of an existing organization while aiming to create an entrepreneurship mindset and infrastructure that needs support and growth. It takes a system view of growth. An effectual Intrapreneurship transforms the business, helps organizations to generate new business growth.

This literature attempts to summarize the most important attributes and characteristics of the intrapreneurship concept itself, the individual intrapreneur and the entrepreneurial organization and thus clarify what defines intrapreneurship. From the reading and analysis of these authors, we review the core aspects of intrapreneurship and its characteristics and attributes comprehending the innovation adoption in SMEs and their activities effectiveness.

The literature calls for an attention to the paradigm of intrapreneurship emphasizing on several main areas.

1) The intrapreneur as an individual, focusing on his characteristics as well as his recognition and support in the organization,
2) the creation of new ventures from within the organization, with focus on the different types of ventures and their positioning in the corporate structure, and
3) The entrepreneurial organization, emphasizing its main characteristics (Antoncic & Hirsrich, 2003).

1.1.Innovation and Renewal Ability

Innovation is obviously not a piece of cake, but the challenges that arrive thence require experience to tackle. Entrepreneurs may find them difficult but intrapreneurs can gain considerably from corporate culture because it does away with slow decision-making, confined thinking, risk-taking, etc.

Now the above mentioned are big challenges for individuals, but not as big for organizations which can offer robust defenses for all of them. During the contemporary times when big organizations are finding it hard to pass off as cool in youth lingo, young entrepreneurs have a sea of experience to gain from them and the organizations can take a step ahead towards popularity & the next big innovation. Corporate

intrapreneurship is the need of the hour, this very hour.

Innovation combined with strategic management is what elevates enterprises from small business. For Drucker , innovation is the instrument by which an opportunity can become a new business or service, and in spite of the risks related to new ventures, if aligned with a good management and work methodology, these risks can be minimized. The search for new solutions to the customers' problems can demonstrate the company's innovation capacity. It can bring different results, after all, intrapreneurship refers not only to business creation from inside projects, but also to the development of new products, services, technologies, process, strategies, marketing solutions and competitive posture.

The ability to innovate is related to the tendency and frequency of engagement, the support and leadership of new ideas, and also with experimentation and creative process that can lead to new products, process or services. For this added value, both in intra and entrepreneurship, there is the need to capture ideas and resources. The company can pursue new business and markets by redefying its products and services, what is essential to its survival.

Encouraging new ideas is one of the primary characteristics of intrapreneur organizations. The opposite of what happens when the company only cares with quick return on investments and high-volume sales in the current period. They should be also worried about keeping the continuous generation of ideas.

The renewal reflects the transformation of the organization by the flexibilization of key-ideas in which it is built. It is necessary not only the creation of new products and the reach of new markets, but also the constantly renew of the business through adaptation and flexibility . For that reason, some companies have been using the intrapreneurship as a strategic tool for growth and renewal.

1.2.Risk-Taking and Management

Risk-taking is always taken as risky. The risks are in the form of chance or uncertainty. When a work is high risk, it means its return is uncertain. In other words, there is the failure chance as success chance in that work. Bosma, Stam and Wennekers , used the studies conducted in eleven countries with GEM (Global Entrepreneurship Monitor) data from various types of companies to confirm that less than 5% of the employees are considered intrapreneurs, they are daring and have risk-taking abilities. They will not hesitate in taking risks, if they see an opportunity behind it. But obviously, they will not jump blindly into each and every risky situation. They will assess the risk and think about the outcomes, only then will they dive in where rest of 95% have apprehension of taking risks that can cause status loss and the job loss. However, the risks must be considered as inherent feature to the innovation, new business formation, and aggressive or proactive actions inside the company. This big companies' behavior focused in innovation is considered risky for their big investment and commitment with uncertain projects, which even with the failure possibility, can expect a great return with success. That scenario makes the risk-taking a distinctive dimension.

Regarding the differences between intrapreneurship and entrepreneurship risks, the main factor of divergence is that the entrepreneurs' own financial resources are very present in the second one. Within the company, the employee can feel much safer to make risky decisions. By contrast, the financial rewards can be infinitely greater to entrepreneurs.

They look at decisions from a reward-perspective, not from a risk-perspective

They think outside the box to create solutions

They view challenges optimistically: as opportunities, not problems

They set goals and have a vision for what they want to accomplish.

1.3.Corporate Venturing

Corporate Venturing is the concept of large organizations either developing, sponsoring, creating or investing in startup companies in order to develop innovative products or services in order to take advantage of a market demand, small organization is called venture or corporate venturing. They do so

through joint venture agreements and the acquisition of equity stakes. The investing company may also provide the startup with management and marketing expertise, strategic direction, and/or a line of credit. Some authors classify the instigation of renewal and innovation inside a company as "venture" too.

A venture can be intern or extern. It is intern when remains part of the mother-organization structure. The extern venture has its own independent structure, even when it is known as a result of a bigger company. Corporate venturing is a crucial element of an organization's growth and digital transformation agendas, but just as each company's strategy is unique, its corporate venturing approach must be as well.

This dimension is specially associated to intrapreneurship since ventures are fruits of corporative projects of existing enterprises, by definition. The creation of a venture enhances performance by being a phenomenon that can change the company's structural organization. Bulgelman says that, in the case of internal corporate venturing, the turbocharge with innovative engine lies in each intrapreneur's strategic initiatives in their operational acts. [28] It is observed that backing for corporate startups can be accomplished through several tools including incubators, accelerators, or the development of external or internal innovation units like intrapreneurship.

1.4.Organizational Culture and Environment

A great organizational culture is the key to developing the traits necessary for success of both intra and entrepreneurship is the suitable environment. Companies with healthy cultures are 1.5 times more likely to experience revenue growth of 15 percent or more over three years and 2.5 times more likely to experience significant growth over the same period. The typical model of an organizational culture has a system of privileging conservative decisions, and this restrictive environment can inhibit creativity, flexibility, independence and risk taking. The market environment and the appropriate internal factors are both essentials for the innovation ability of the company. Menzel, Aaltio and Ulijn mention the importance of a motivating physical environment that encourages creativity and the constant exchange of ideas with, for example, the abolition of closed departments, the use of joint tables, clear environments, etc.

Products and services are not born spontaneously, but are results of a series of trials and errors. "Experimentation should be encouraged" says Hisrich, it is necessary to establish an environment that accepts errors and failures especially in the early stages of a project. Besides being a key organizational change, it can also reduce costs, since it is common that errors in more advanced stages of a project can lead to serious consequences. It must be rooted in the company's culture that the learning in the failure is also important. The success cannot be measured only by financial performance, but also with the knowledge gained with the failure. The failure can develop important skills in the intrapreneurs. With the errors, the team can engage, seek more meaningful information and internal opportunities as training, funding and mentoring.

The recognition and the reward of the involved ones in the innovation projects should be remembered within the company. For new business, it is important to have in mind that the performance measures should be different from those taken on the daily basis. This is possible by adopting performance goals more generic and open, and rewarding the intrapreneurs by project stages than by final outcome. Block and Ornati defend that the biggest motivation and reward that can be received is a high position or a percentage of the new established business.

The reception of the changes that the organization goes through when practices the intrapreneurship is something that has to be managed. Rank, Pace and Frese suggest that psychologists can help to support the innovation and change climate by predicting and managing its effects. In fact, there are departments in the big companies that specifically take care of high impact projects that can cause major

organization innovationsDrejer defines these innovations as important changes that happen in the company's structure. To innovate, the company itself must be open to change. Organizational culture relates to the collection of values, expectations, and practices that guide and inform the actions of an intrapreneur that surely lead to improved performance, while a dysfunctional company culture brings out intrinsic attributes that can hinder even the most successful organizations.

1.5.Proactivity

Intrapreneurs are progressive, dynamic and they represent critical sparkplugs for economic vibrancy of organization, whom they represent (Zachary & Mishra, 2011). They are presumed to possess a unique set of beliefs, attitudes and personal characteristics, which act as motivators for enterprise development with their entrepreneurial intention. They do not react but act with their intrinsic skill they want to innovate. Their tendency to lead instead of only follow the competitors, considered as pioneering, and actively compete against the rivals are some of aspects of intrapreneurs. The companies with Intrapreneurs are progressive, dynamic and they represent critical sparkplugs for economic vibrancy of organization, whom they represent (Zachary & Mishra, 2011). They are presumed to possess a unique set of beliefs, attitudes and personal characteristics, which act as motivators for enterprise development with their entrepreneurial intention.

Different than only react to the market, the innovative company always tries to anticipate itself by pursuing new opportunities in emergent markets and proactively bringing innovations.

This posture is reflection of the actions taken by the top management and its strategic orientations for the company. As in entrepreneurship, pioneering brings great advantages for those who explore market opportunities. There are authors that clarify that an organization can be proactive without necessarily be the first to take advantage of an opportunity , however, generally the authors connect proactivity to the causes of a company being innovative.

Lumpkin and Dess affirm that proactivity refers to market opportunity. It is how the companies can take advantage creating an environment or suitable initiative to meet demand through self-initiated behavior that endeavours to solve a problem before it has occurred. Proactive behavior involves acting in advance of a future situation, rather than reacting.

1.6.Competitive Aggressiveness

Competitive aggressiveness refers to how companies relate to competitors. (Lumpkin & Dess, 1996). They describe competitive aggressiveness as the inclination to directly challenge opponents by taking competitive actions. Stalk and Lechenauer (2004) talks about few companies those who are intensely competitive, more focused on outperforming rivals, and willing to attack those rivals to improve their own performance.

Many people closely relate competitive aggressiveness to pro activeness, since they both are dimensions of intrapreneurship, still there is an important distinction between it and pro activeness. Pro activeness refers to how a company relates to market opportunities in the process of new entry, so it is to influence trends and even create demand while the competitive aggressiveness refers to the organization's challenging posture towards its competitors. Differently from proactivity also, the company with competitive aggressiveness is concerned with responsiveness. While proactivity seeks to respond to opportunities, competitive aggressiveness seeks to respond to threats.

This dimension is a characteristic very strong in entrepreneurship and in the ventures, since the risks are much greater for them than for established business, which makes aggressive attitudes critical to the survival and success of new entrants.

Integrating these insights into our study of competitive aggressiveness, we attempt to understand a vital link between orientations and performance of an intrapreneur or an organization as a whole (Covin & Slevin, 1991) which propels firm's propensity to take competitive actions by directly and intensely challenging its competitors to achieve entry or improve position, that is, to outperform industry rivals in the marketplace" (1996:148).

1.7.Structure and Process for Autonomy

The prerequisite for autonomy is a key competency of an intrapreneur. It is mainly a need that comes deep within; a desire for freedom. A positive motivation, manifestation of independence or self-governing traits with the capacity to make an informed, unsourced decision creates a victorious intrapreneur for any organization. That is why many companies now a days emerge with such structure and processes that facilitate opportunities for intrapreneurs with more effectiveness in functioning.

An organizational structure that supports intrapreneurship emerges slowly but it is extremely important for the company, although it is always considered a secondary activity. Carvalho lists a framework of procedures that can facilitate the existence of innovation in the company. It is important to ensure that the intrapreneur finds a process that is not deterrent to his innovation and decision making.

In a way autonomy is the degree to which an organizational structure promotes intrapreneurship, reduces hierarchies & bureaucracy, offers the discretion, motivation and independence to an intrapreneur to schedule his/her action and determine how it is to be done, make an informed, unsourced decision, subsequently the personality traits (specifically conscientiousness and extroversion) impel a stronger impact on his/her performance and organizational growth. In general, entrepreneurship and intrapreneurship relate to many common characteristics in regards to Autonomous organizations or institutions; independent or self-governing structure which denotes a (relatively high) level of discretion granted to the person in-charge. In such cases, autonomy comes with self-actualization to operate autonomously of external expectations. It is proven that layers of bureaucracies and traditions rarely contribute to innovation in big companies as well. The ideal setting for intrapreneurship would be a flat structure that could reduce hierarchy and bureaucracy by giving employees autonomy for decision-making.

Van Everdingen & Waards ; Rejeb, Guimarães, Bolv & Assiélou; Cooper; Baruah & Ward; Hisrich; stresses on an efficient communication channel as essential in the culture and structure of the company concerned with innovation. Building a suitable structure to give autonomy to the intrapreneur is just one of the phases of the corporate entrepreneurship management. It is a process of innovation, identification and opportunity-taking which should remain constant and easy. Ireland, Hitt & Sirmon have identified that small enterprises can usually identify opportunities with more effectiveness although building competitive advantage is more difficult; while for large established companies it is easier to exploit chances for market advantage although they are less able to identify opportunities.

1.8.Resources

We recognize the roles entrepreneurs or even corporate intrapreneur play in the development of economy, it is equally important to understand what constrains them from taking effective entrepreneurship and investment decisions. According to Labich and deLlosa (1994). Resource constraint is one of the biggest deterrent in the growth of any organization.

A lot of studies demonstrate that liquidity constraints have substantial effect on intrapreneurial behaviour. Evans and Leighton (1989) posited that well quipped in-charges are more inclined to become victorious intrapreneurs. In their assessment, Blanchflower and Oswald (1998) declared that inheritance or asset revenue predicts the increase of probability of becoming successful intrapreneurs and amount of capital engaged in the new enterprise.

Intrapreneurship requires money. It is not uncommon for funds to be allocated for the resolution of recurring or immediate problems. In addition, when there are resources available, they are difficult for the employee to achieve. The requirements list is so extensive that frustration overcomes the possible satisfaction of obtaining resources and discourages the intrapreneur. And depending on the purpose of the release of resources, it is necessary that the top management is aware that the investment returns only after a certain period of time.

Entrepreneurial or even corporate intrapreneur resources often refer to the resources owned and needed by the person to function and run the firm. They are the specific resources needed

by firms to create value, as well as the necessary conditions for the foundation and operation of any firms. Sometimes tangible resources represent itself as a personal investment of the entrepreneur. Unlike the intrapreneur, who usually don't participate in raising funds personally for his organization. It is seen that the entrepreneur has more independency, in regards to access to finance and its usage while the intrapreneur often has no authority to decide the expenses alone. he is required to apprise and accord consent regularly on its expenses and decisions, it can become a merely operational service and diverge from the kind of work an intrapreneur should seek because of liquidity constraints .

1.9.Multidisciplinary Team and Personal Competences

Prerequisite of any successful Organization is its multidisciplinary team and a leader who drives collectively towards a common goal to obtain success. No task can be held alone but a well-equipped troop with competencies are must to be involved with strategic planning. Multidiscipline traits means existence of people with different roles and knowledge in a team that facilitates the exchange of information and abilities. Any victorious intrapreneur seek some personal competencies; creativity, determination, integrity, tenacity, emotional balance, persistence, commitment to perform, risk-taking, demand for efficiency and quality, goal seeking, curiosity of information seeking, able of systematic planning and monitoring, persuasion and networking, self-confidence and ready for self-criticism and self-motivator to contribute his share in the success of his team as a whole .

Hisrich compares entrepreneurship and intrapreneurship: accumulation of functions and stakeholders. Generally, the intrapreneurs come from other internal team with its entrepreneurial skills, performing the job with innovation as a parallel project to their daily activities of their area of origin. Sometimes this becomes difficult to the development of a good team as the employees will accumulate functions and their performance will be impaired or not reflected. Other problem is seen in regards to the rewards and promotion analysis which become much more complicated if the work gets mixed up, and especially if the person's original tasks get more attention. Organizations genuinely interested in maintain strong intrapreneurship cannot overburden an intrapreneur and must recognize its contribution as innovative.

For intrapreneurship formation of the team is extremely important. There should be holistic development of the team Each one of them needs to be developed to be in their best version and bring positive results to the company. The physiognomies desired for an intrapreneur should be clear to avoid future foiling, not only for the team but also personal.

Innovation, problem solving, or simply, the creativity, resilience allows those who work with innovation to cope with the risky environment and possible failures, it brings emotional stability among the team as well.

Williamson, Lounsbury & Han's opinion. state that a rigid structure may require more reactionary and adaptive behavior of the intrapreneur. And finally, the ability to build and use people networks is one of the characteristics present in both entrepreneurs and intrapreneurs. The fact that any innovation project is multidisciplinary requires those involved to relate to the most diverse possible departments. The intrapreneurs' advantage is that they have already existing networks for many of the cases. Heterogeneity facilitates the exchange of information.

"Ability to sustain goal-directed action and energy described as perseverance or tenacity propels intrapreneurs to create an environment where integrity and homogeneous culture prevails For that reason, tenacity, constantly put to the test, is important for the intrapreneur.

Intrapreneur is also responsible for making the corporate culture effective where team feels free and comfortable to adopt such behavior, knowing that their innovative ideas will be supported even if risky. where in large companies having entrepreneur scenario, the employee rarely realizes and feels the impact of the total risk and responsibility because the company itself absorbs a large part of them because the organization holds the concept and intellectual rights to decide financial upshots.

McClelland states about behavior that were later improved and finalized in 1990 by Management Systems International (MSI). He

developed a consistent and popular Entrepreneurial Behavioral Theory. which brought together ten of the main personal competencies of the entrepreneurs (search of opportunities and initiative; persistence; persuasion and networking; commitment; quality and efficiency requirement; calculated risk taking; goals establishing; information search; systematic planning and monitoring; and independence and self-confidence).

1.10. Top Management Support

This is one of the utmost important dimensions of intrapreneurship, without the management support it will be an utter failure as intrapreneurship is a top-down process, a strategic function of the company. Management support systems focus on managerial uses of information resources. These systems provide information to manage for planning and decision making. The information provided by these systems is based on both the internal and external facts using various meta-analysis tools. George & MacMillan state that support from management is not just a matter of words. It means allowing workers to develop and use their skills and abilities. Managers inadvertently signal a lack of support when they fail to do this. It indicates the willingness of the managers to facilitate, promote and institutionalize the entrepreneurial spirit and activity within the organization's systems and processes (Hornsby et al., 2002) which would encourage the intrapreneurs to engage in innovative efforts.

2. Literature Review Considerations

After the literary review, the listing of intrapreneurship dimensions was done and organized in table;

	ConventionalAdministers	Entrepreneurs	Intrapreneurs
Main motivation factors	Promotion and other conventional company rewards (buro general staff, power, etc.)	Freedom, opportunity to be created and money	Freedom and the ability to develop in terms of the company rewards
Activity	Assigning rather than direct participation	Direct participation	Direct participation instead of assigning
Risk situation	Careful	Taking over reasonable risk	Taking over reasonable risk
Status	Focused on statussymbols	Has no relation with status symbols	Not focused on the conventional company status symbols, willing freedom
Mistake and failures	The exertion to run away from mistake and failure	Tackling mistakes and failures	The tendency not to consider risky projects until being ready
Decisions	Generally in accord with his/her superiors	Follows his/her dreams with his/her dreams	May persuade others to reach a dream
For whom	Satisfies others	Satisfies him/herself and customers	Satisfies him/herself, customers and sponsors
Family background	Generally family members having worked in tremendous organizations	Generally family members that are entrepreneurs, smallbusiness owners	Generally family members that are entrepreneurs, smallbusiness owners
Relations with others	Mostly hierarchical	Mostly based reciprocal relation and respect	Based on reciprocal relations in a hierarchy
Focusing	Intraorganizational relations	Priorly technology and market	Both inner and outer conditions
Style to solve a problem	Solving problems within a system	Running away from the solution of huge problems by leaving them or restarting the solution	Solving problems within a system

The Management pillar refers to all dimensions linked to organizational culture and company behavior, which are not tangible or formalized in processes, such as innovation ability, proactivity, among others. These dimensions are extremely important for intrapreneurship and are represented by activities and actions that the company takes. However, if the organization wishes to improve in these aspects, a simple methodology will not solve fully the problem because it requires long term changes that demands behavioral efforts by the company.

The Structure is the pillar that categorizes all dimensions and actions that a company can provide procedurally to intrapreneurs, for example, a formalized innovation process, the reduction of bureaucracies and hierarchies, and the facilitation of the granting of resources. Structural characteristics of the company can greatly facilitate or hamper the results of intrapreneur projects. Mainly because intrapreneurship refers to innovation within the company, the barriers imposed by the organization are capable of sabotaging its own interests.

No innovation can be purely produced by a machine, for the power of creative transformation is linked with the thinking capacity of the human being. Therefore, agents are an important part of intrapreneurship. From top management support, to investing in each person's competencies, and wisely building an innovation team are dimensions related with the care needed with the people directly responsible for making intrapreneurship work or not within a company.

3. Research Methodology

The research synthesizes the familiarity with a phenomenon of intrapreneurship in SMEs. To portray accurately the characteristics and distinction of entrepreneur and intrapreneur, hypothesizes of national and international articles have been contemplated. The bibliographic references have been reviewed with an objective to achieve insights into the term corporate entrepreneur; explicitly illustrated 'intrapreneur' with individual autonomy as leader to impel innovation into organization in order to improve their competitiveness and grow vertically as well as horizontally. The research focuses on an exploratory study and formulates the dimensions and physiognomies of intrapreneur. Eventually this is a study aggregates a selection of key themes in context with the topic and shapes a fresh, original perspective through both the research design and the combination of texts explored.

4. Data Description and Analysis

Innovation is not only based on the three main areas studied (Management, Structure and Agents), but it cannot exist with only two of them. Intrapreneurship, then, can be seen as an intersection of these pillars.

The final model (figure 1) represents the need for the three pillars raised, without the exclusion or classification of importance of any of them. The innovation in a company with a good management and structure but without capable agents is non-existent, since all intrapreneur actions are linked to specific skills and abilities. The whole core of an innovative project lies in the creative capacity and integration of a team and the individuals that make it up. Likewise, without the presence of a structure conductive to innovation, despite competent agents and incentive management, projects will be limited by the lack of methodology in their processes, resources and by excessive bureaucracies. If the company is concerned with establishing a good procedural structure with capable people, but in its day-to-day it does not strengthen the innovation culture in its small acts and way of behaving in the market, intrapreneurship does not find spaces to develop.

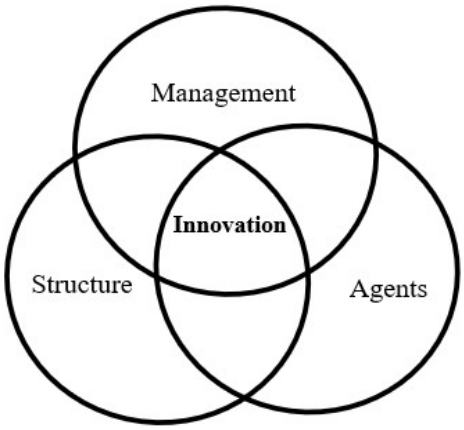

Fig. 1: Intrapreneurship intersection model

5. Conclusion

The aim of this abstract is to define the concept of entrepreneurship, management and intrapreneurship and describe the need of intrapreneurship. Via a systematic literature review an integrated framework has been constructed that integrates the definition, dimensions, antecedents and determinants of intrapreneurship. It also integrates the organizational factors that influence the intrapreneurship in small medium sized enterprises. Besides this, a new definition is proposed that includes the different aspects of intrapreneurship and does reflect the importance of the multilevel nature of intrapreneurship.

Some additional insights have been gained from the reference articles, in a way they are sufficient to support the conclusions. Second, the search lexes are mostly synonyms for the term 'intrapreneurship'. strategic importance of intrapreneurship. It shows the multilevel nature of intrapreneurship by emphasizing the link between individual intrapreneurial behaviour and organizational outcomes, thus implying that employees do have a direct impact on the organization's strategic direction (Alt and Craig 2016; Hart 1992; Heinze and Weber 2016; Peters and Waterman 1982). It also reflects that an intrapreneur acts within the constraints of an organization, constraints that could be beneficial or detrimental to the behaviour and attitudes of the intrapreneur. The result is that the level of intrapreneurship in small and medium sized enterprises could be consistent and unfailing to greater extent. Along with this, based on an analysis of the different definitions of intrapreneurship found in the literature the dimension of intrapreneurship are studied; Innovation and renewal ability; risk-taking and management; Organizational culture and environment; proactivity; competitive aggressiveness; structure and processes for autonomy; resources; multidisciplinary team and personal competences; and top management support.

This review confirms the that intrapreneurship is a complex, multilevel construct. The intrapreneur is not a single actor within the environment, but acts as part of an organization and will thus be influenced by it. In addition to individual characteristics and behaviour, it is important to take into account the relationship with the organization and other attitudes. This research also shows that it is not sufficient to focus only on the behavioural aspects of innovativeness, proactiveness and risk-taking when researching the employee. Intrapreneurship is a broader construct and should also include opportunity recognition/exploitation, networking, and perception of employees' own capabilities, skills, knowledge and past experience.

With this study we could evaluate the prominence of intrapreneurship in terms of demographic characteristics. Notwithstanding, it was possible to draw a conceptual intersection model to make it clear that besides dependents, no pillar is more important. Innovation cannot exist outside the intersection of them. The agents will carry the intrapreneur actions with their creative abilities and integration, while the structure conciliates innovation with its processes, and the management creates a culture and environment that finds spaces for the development of intrapreneurship in SMEs as well as at large organizations. Besides the basic theoretical foundations rooted in the related concepts of intrapreneurship, more than 40 articles are referred for meta-analysis of intrapreneurship construct and its implementation in small and medium sized enterprises.

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THE POTENTIAL OF POST-COVID DIGITAL TRANSFORMATION IN THE INSURANCE INDUSTRY

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ABSTRACT

Many small-scale businesses have suffered because of the Coronavirus and the lockdown which followed the pandemic. The small and micro enterprises which were responsible for close to 30% of the total GDP of India, were affected negatively. Due to the pandemic, around 59% of start-ups and small and micro enterprises either decided to scale down their operations or shut down completely. The Insurance Industry also suffered losses because of several claims, unpaid premiums, and lapsed policies. However, to recover, most of the Insurance companies took various steps in the digital field and made a lot of their processes online. The consumers also favored such a step towards digitization. This research was undertaken with an aim to study the potential of post-Covid Digital Transformations in the Insurance Sector and the consumer sentiments towards it.

Introduction

Early 19th century marked the beginning of the Insurance Industry in the country. The industry can be divided into two sub segments – life and non-life insurance. The entry of the industry was followed by various rules and regulations, acts and amendments and the establishment of an Insurance Regulatory and Development Authority (IRDA). Today, India has 34 general insurers and 24 life insurers and the industry had a speedy growth rate of 15-20%. Together with the banking sector, it accounts for about 7% of the total GDP.

In 2016, Reliance Industries backed Jio entered the telecommunication market with cheaper data plans and voice calls. Along with this, the Government of India undertook various initiatives like DigiLocker, Digitize India Platform (DIP), in order to boost the digitization process and increase the internet penetration. Today, there are 624 million users of the internet in India alone, with around 572 million active users. The internet penetration rate has shot up to 45%. People started buying, communicating, and selling online because they found it convenient. This led to a digital revolution. Various Indian and multinational companies started selling their products online as they found a new marketplace with users ready to accept their products. With the Covid induced pandemic hitting the country in 2019, most of the businesses were compelled to switch their entire business model online. Due to Covid, the industry as a whole had lost 4 million policies and 15,000 crores of new business premiums. A lot of insurance companies had to embrace the digital route in order to survive and earn revenues. Apart from that, various government initiatives like Start-Up India and Stand-Up India gave a boost to the InsurTech Industry. InsurTechs like Acko, Go Digit, and Policy Bazaar saw a massive rise in their sales as people increased their internet usage and started buying insurance policies online.

Research Objectives

The objectives to proceed with this topic were as follow :

- To study the consumer sentiments regarding the digitization process in the insurance industry.
- To study how the insurance companies are adopting digital means to minimize agent-customer contact.

Literature Review

In Germany, Hecht *et al.* conducted a research in 2010 and concluded that the marital status, number of children, financial literacy, and number of dependents all affect the insurance demands favorably.

In India, Bodla and Verma conducted a research in 2007 and concluded that insurance agents are an important source of information and influencers for taking life insurance.

Manohar Giri conducted a research in 2018 and concluded that households which had bank accounts were more likely to be insured. He also concluded that the lapsation probability

was high in those cases where the policyholder did not know the kind of policy he held and those who had bought the policy because they had been convinced by their insurance agents, which results in the possibility of mis-selling of insurance policies.

Research Methodology

This research was done using both primary and secondary data. Primary data was collected by a convenient sampling method. A questionnaire was circulated to 56 respondents. Apart from the survey, certain credible websites and research papers were studied.

Findings

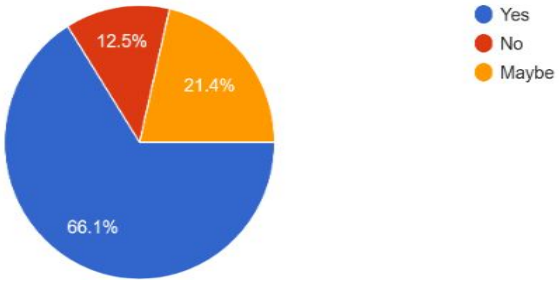
Primary

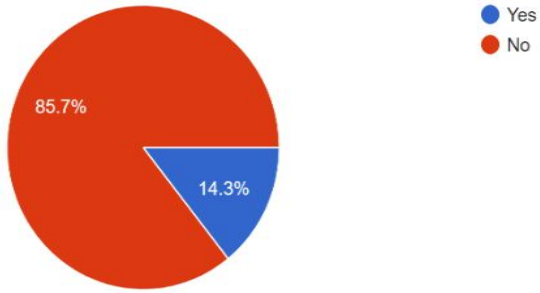
The survey was taken by 56 respondents, all under the age of 30.

The following were the questions asked in the survey:

Q1: Do you think you have become more health conscious during the pandemic?

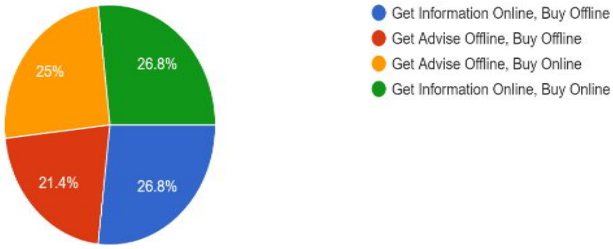
Q2: Have you ever taken an insurance online?

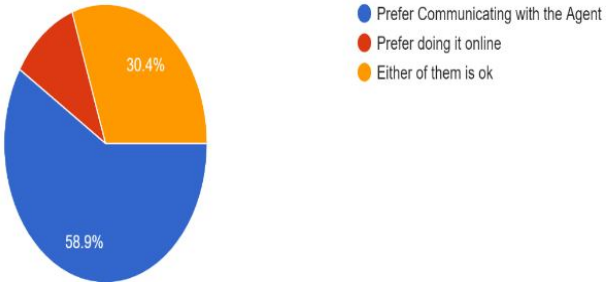




Q3: Among the following options regarding buying insurance, which one would you prefer?

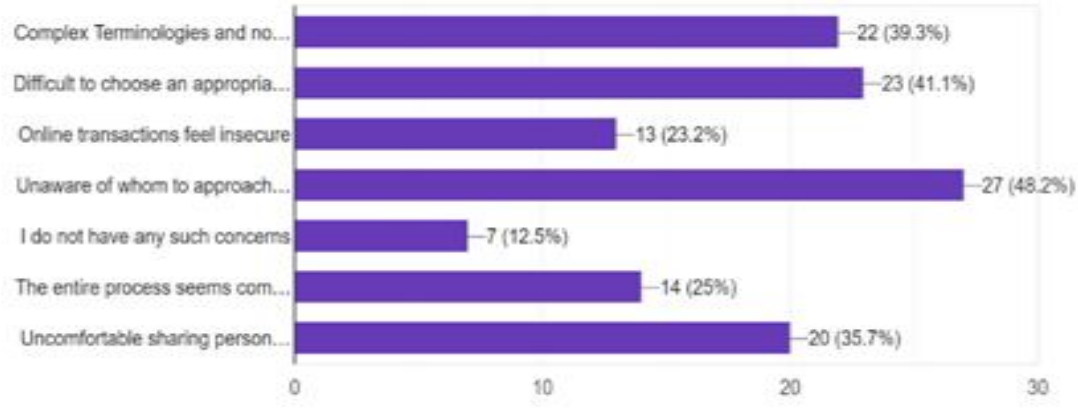
Q4: Whom would you prefer communicating with during claim settlements and premium payments?





Q5: What kind of concerns do you have when you think of buying an insurance online?

The concerns given to the respondents as options were as follows:



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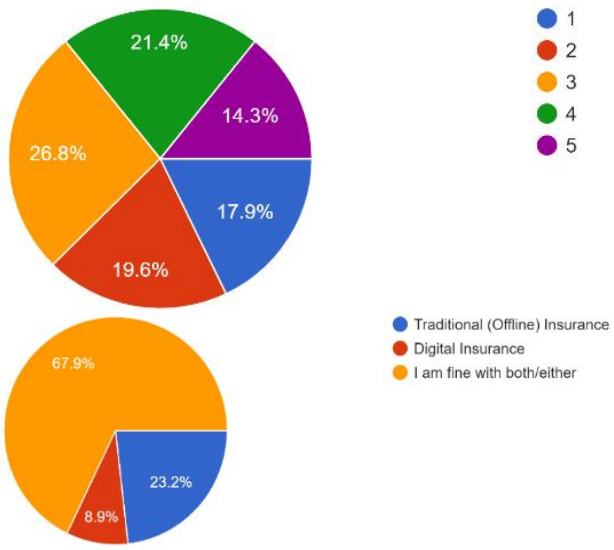
1 – Complex Terminologies and no one to explain them; 2 – Difficult to choose an appropriate insurance for you and your family; 3 – Online Transactions feel insecure; 4 – Unaware of whom to approach for help; 5 – I do not have any such concerns; 6 – The entire process seems complicated; 7 – Uncomfortable sharing personal information and bank details

Q6: Are you in favor of buying an insurance online? (1 – Least Preferred)

Q7: What would you prefer among the two?



Secondary

With the Covid-19 hitting India, the insurance sector, which had a market penetration of 3.7% and was growing at a steady rate, was severely affected by it. The lockdown acted as a catalyst in moving things online. To function efficiently and increase their market share, the insurance companies had to take various bold stops in their digitization process. They had to switch from an 'employee-centric' organization to a 'customer-centric' organization. A study by Bain and Company in 2013 concluded that around 40% of the customers were willing to switch towards digital ways of handling their insurance and around 60% of them considered that web-based communications will be the future.

The Insurance Regulatory and Development Authority of India (IRDAI), launched the Regulatory Sandbox System on 26th July 2019. This was launched with an aim to strike a balance between development in the Insurance Sector and the protection of shareholders, while at the same time facilitating innovation. This helped InsurTech companies to test their products or solutions before getting the necessary regulatory approvals for the mass launch. This helped them to try new things and save time and money. They got close to 170 proposals under the Regulatory Sandbox System. The IRDAI also made some policy changes and introduced Standardization of Insurance policies. This helped the insurers to launch uniform and simple to understand policies digitally.

The Life Insurance Corporation Of India (LIC), an insurance giant in India, launched a digital application for agents by the name of 'ANANDA'. 'Atma Nirbhar Agents New Business Digital Application' or 'ANANDA', is an application that helps the policyholders and agents to carry out their job through a paperless module. The agent need not meet the policyholder. From KYC to issuance of new policies, the entire process can be done online. This app has specifically been developed for agents to enhance their productivity and substitute physical contact with their customers.

Bajaj Allianz Life, which collected 70% of their premiums through cheques, now collected 70% through various digital means, due to Covid. Bajaj Allianz Life used to invest 70% of their total investments in digitizing their back end of the office, but due to Covid, almost 50% of their total investments are directed towards the frontal end, focusing more on safer technologies.

SBI General Insurance is developing and enhancing its website and apps which will be rolled out soon. They are also working with web aggregators and marketplaces to connect digitally. They are also leveraging the technology platforms of existing partners such as YONO to have a digital presence. Along with that, they are developing a customer risk score that will help them to offer customized pricing, that is, better price for customers with low risk.

Even Max Life in India, during Covid, digitally trained more than 9,000 sellers and 25,000 agents in just half a month to make virtual sales. Around 80% of their employees were able to switch to remote work in few days. They were equipped with desktops and the salesforce sold 24,000 policies in a single week during the lockdown.

Conclusion

The Insurance Sector in India is showing signs of recovery and is on the right track of developing itself. With more and more people becoming financially literate and with a high population of youngsters entering the workforce every year, the future of the

Insurance Industry is bright. Also because of the pandemic, a lot of people have become health conscious, which might push the insurance sales as well. Due to the Covid-19 Pandemic, a lot of digital changes are underway. The introduction of Blockchain technology with its advanced techniques for transaction verification is going to make payments and information transfer much more secure. Currently, India has close to 110 InsurTechs in all sub-segments ranging from claim settlements to aggregators, and with the various initiatives by the Government and the IRDAI, this number is going to rise in the near future. Traditional companies are also looking for various ways to launch new products online and make the communication between agents and customers easy and accessible.

To say that the intermediaries and agents would no longer be necessary for the chain is a bit premature, especially in a country like India, where people are still getting introduced to Insurance as a concept. Also, the survey done suggests that insurance agents will be an important link between the companies and the customers, hence their presence would be crucial. The Government of India also increased the limit of foreign investment in the insurance sector to 74%. The share of web aggregators within digital insurance has been increasing, which now accounts for close to 30% of digital insurance origination. Researches show that a person is more likely to buy an insurance policy if he has a bank account and today 80% of Indians have a bank account, due to increased financially literacy and various government policies. These changes are going to have a positive impact on the sector in the long run.

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RELATIONSHIP BETWEEN LEVERAGE AND EPS: WITH REFERENCE TO SELECTED POWER COMPANIES OF INDIA

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ABSTRACT

This study is to analyze the relationship between leverage and earning per share of selected power companies of India. Time period of the study has been taken from 2016 to 2020.The present study used mean, standard deviation, kurtosis, skewness, correlation coefficient and, 't' test to measure the variables. The findings revealed that there is no significant relationship of DOL, DFL and DCL with EPS. Thus, fixed operating expenses and the financing mix decisions of the firm are not significantly impact the earning capacity of the selected power companies.

Keywords *- Earning Per Share, Leverage, Power Companies*

Introduction of Leverage

Leverage

Leverage is any technique that amplifies investors' profits or losses. Its most commonly used to describe the use of borrowed money to magnify profit potential but it can also describe the use of fixed assets to achieve the same goal. Leverage is the use of various financial instruments or borrowing capital, to increase the potential return is termed as leverage. Business owners can use either debt or equity to finance or purchase the company's assets. Using debt or leverage increases the company's risk of bankruptcy. It also amplify the companies return-s specially its return on equity and boost up the company's ability to increase the profitability. In another words, only where there turn on investment is greater than the cost of outside borrowing ultimately the effect of leverage will be favorable. This will ensure maximization of shareholder's wealth.

Operating Leverage

Operating Leverage refers to the use of fixed cost in the operations of the firm. A firm has to bear the fixed cost expenses irrespective of output. Even if there is zero sales, the firm has to incur those expenses. The firm can use higher amount of operating Leverage i.e. using of higher amount of fixed cost when compared to variable cost only when the sales are rising because even a small change in sales will bring a proportionate change in operating profit.

Financial Leverage

The employment of fixed source of funds such as debt and preference share in the capital structure of the firm along with owner's equity is called financial Leverage or trading on equity. Financial Leverage may be favourable or unfavourable. If a company is able to earn more return than the cost of borrowing, then the Leverage is said to be favourable. On the other hand, if the company earns a return which is less than the cost of borrowing then the Leverage is said to be unfavourable.

Combined Leverage

Combined Leverage is a use of operating Leverage and financial Leverage in an appropriate proportion in the business. Operating Leverage affects the firm's operating profit and financial Leverage affects the earnings of the shareholder or EPS. Firm has to use a correct mixture of both the Leverages to take the fullest possible advantage of growing business opportunities.

Review of Literature

Elangkumaran.P and Nimalathasan. B (2013): Leverage and its Impact on Earnings and Share Price: A Special Reference to listed Companies of Colombo Stock Exchange (CSE) in Sri Lanka: investigates the impact of leverage on earnings and share price of listed companies on Colombo

Stock Exchange (CSE) in Sri Lanka. The study was identified 20 companies listed on the CSE for the period from year 2007/2008 to 2011/2012.The Degree of Operating Leverages (DOL), Degree of Financial Leverage (DFL) & Degree of Combined Leverage (DCL) are the independent variables and Earning Per Share (EPS) and Share Price (SP) are the dependent variables for this study. The present study used the correlation coefficient and linear regression to measure the variables. The findings revealed that only 4% earnings can be explained by DOL, DFL and DCL and there is no significant relationship with EPS. It is also found that 3% SP is attributed by DOL, DFL and DCL and there is no significant relationship with SP. Thus, fixed operating expenses and the financing mix decisions of the firm are not significantly impact the earning capacity of the listed companies in CSE.

Tooba Raheel, Faiza Maqbool Shah (2015): A Study That Identify the Relationship between the Financial Leverage and Firms Profitability:Empirical Evidence from Oil and Gas Companies of Pakistan Listed in KSE: identifies the relationship between the financial leverage and Firms profitability of Oil and Gas marketing companies of Pakistan listed on Karachi Stock Exchange (KSE). The study was identified 05 companies listed on the KSE for the period starting from year 2007 to 2012. The Degree of Operating Leverages (DOL), Degree of Financial Leverage (DFL) & Degree of Combined Leverage (DCL) are the independent variables and Earning per Share (EPS) is the dependent variable for this study. The present study used the correlation coefficient and linear regression to measure the variables. The findings revealed that there is no significant relationship of DOL, DFL and DCL with EPS. Thus, fixed operating expenses and the financing mix decisions of the firm are not significantly impact the earning capacity of the listed companies in KSE.

Objective of the study

The prime objectives of the study are as under.

- To examine the relationship between degree of operating leverage and earning per share.
- To analyze the relationship between degree of financial leverage and earning per share.
- To assess the relationship between degree of combined leverage and earning per share.

Hypothesis of the study

Ho1: There is no significant relationship between the degree of operating leverage and earning per share of selected power companies of India.

Ho2: There is no significant relationship between the degree of financial leverage and earning per share of selected power companies of India.

Ho3: There is no significant relationship between the degree of combined leverage and earning per share of selected power companies of India.

Research Methodology

Sample

In present research, researcher has selected 3 power companies of India.

1. Tata power
2. Adani power
3. JSW Energy

Sources of Data

The study is based on secondary data. The researcher has gone through various journals, magazines, newspapers, publications and websites for obtaining information.

Period of Study

Time period of the study has been conducted during 2015-2016 to 2019-2020.

Tools for Analysis

In this study, for interpreting the results, the statistical and financial tools that have been used are Leverages, Mean, Standard Deviation, Kurtosis, Skewness, Correlation analysis and 't' test, to determine leverages relationship with EPS value. All calculations are done in Excel.

Limitation of the Study

The present research study is subject to following limitations.

- Present research study is limited to only selected Power Companies of India.

- Present research study is limited to only selected Power Companies for a period of five year only.
- The financial statement does not keep pace with the changing price level.
- Conclusions are made on the basis of information obtained from Power Companies of India.

Analysis and Interpretation

Degree of Operating Leverage

Degree of Operating Leverage = Percentage change in EBIT/Percentage change in Sales

Year	Tata power	Adani power	JSW Energy
2015-2016	55.81	1.51	-1.85
2016-2017	1.78	13.10	1.95
2017-2018	-22.48	6.86	-18.81
2018-2019	-32.74	0.69	16.38
2019-2020	8.06	2.00	0.45
Mean	2.09	4.83	-0.38
S.D.	34.42	5.21	12.54
Kurtosis	1.06	0.75	1.83
Skewness	1.04	1.30	-0.33

Source: Secondary data

It is observed from the above table that in the year 2015-16 Tata power has highest DOL i.e.55.81 and JSW Energy has lowest DOL i.e.-1.85.In the year 2016-17 Adani Power has highest DOL i.e.13.10 and Tata power has lowest DOL i.e.1.78.In the year 2017-18 Adani Power has highest DOL i.e.6.86 and Tata power has lowest DOL i.e.-22.48.In the year 2018-19 JSW Energy has highest DOL i.e.16.38 and Tata power has lowest DOL i.e.-32.74.In the year 2019-20 Tata power has highest DOL i.e.8.06 and JSW Energy has lowest DOL i.e.0.45.Further it is noticed that Adani power has highest value of mean i.e.4.83 and JSW Energy has lowest value of mean i.e.-0.38.Tata power has highest value of standard deviation i.e.34.42 and Adani power has lowest value of standard deviation i.e.5.21.All selected power companies have positive value of kurtosis. All selected power companies have positive value of skewness except JSW Energy.

Degree of Financial Leverage

Degree of Financial Leverage = Percentage change in EPS/Percentage change in EBIT

Year	Tata power	Adani power	JSW Energy
2015-2016	3.16	-7.28	1.46
2016-2017	2.12	27.23	1.38
2017-2018	6.22	0.60	4.09
2018-2019	0.48	-40.21	-0.44
2019-2020	1.96	-3.14	-13.98
Mean	2.79	-4.56	-1.50
S.D.	2.14	24.07	7.16
Kurtosis	1.94	1.82	4.06
Skewness	1.16	-0.39	-1.95

Source: Secondary data

It is observed from the above table that in the year 2015-16 Tata power has highest DFL i.e.3.16 and Adani power has lowest DFL i.e.-7.28.In the year 2016-17 Adani Power has highest DFL i.e.27.23 and JSW Energy has lowest DFL i.e.1.38.In the year 2017-18 Tata power has highest DFL i.e.6.22 and Adani power has lowest DFL i.e.0.60.In the year 2018-19 Tata power has highest DFL i.e.0.48 and Adani power has lowest DFL i.e.-40.21.In the year 2019-20 Tata power has highest DFL i.e.1.96 and JSW Energy has lowest DFL i.e.-13.98.Further it is noticed that Tata power has highest value of mean i.e.2.79 and Adani power has lowest value of mean i.e.-4.56.Adani power has highest value of standard deviation i.e.24.07 and Tata power has lowest value of standard deviation i.e.2.14.All selected power companies have positive value of kurtosis. Only Tata power has positive value of skewness. Other than Tata power Adani power and JSW Energy have negative skewness.

Degree of Combined Leverage

Degree of combined leverage = Degree of operating leverage x Degree of Financial leverage

Year	Tata power	Adani power	JSW Energy
2015-2016	176.36	-10.99	-2.70
2016-2017	3.77	356.71	2.69
2017-2018	-139.83	4.12	-76.93

2018-2019	-15.72	-27.74	-7.21
2019-2020	15.80	-6.28	-6.29
Mean	8.08	63.16	-18.09
S.D.	112.74	164.50	33.12
Kurtosis	1.91	4.90	4.74
Skewness	0.44	2.21	-2.16

Source: Secondary data

It is observed from the above table that in the year 2015-16 Tata power has highest DCL i.e.176.36 and Adani power has lowest DCL i.e.-10.99.In the year 2016-17 Adani Power has highest DCL i.e.356.71 and JSW Energy has lowest DCL i.e.2.69.In the year 2017-18 Adani Power has highest DCL i.e.4.12 and Tata power has lowest DCL i.e.-139.83.In the year 2018-19 JSW Energy has highest DCL i.e.-7.21 and Adani power has lowest DCL i.e.-27.74.In the year 2019-20 Tata power has highest DCL i.e.15.80 and JSW Energy has lowest DCL i.e.-6.29.Further it is noticed that Adani power has highest value of mean i.e.63.16 and JSW Energy has lowest value of mean i.e.-18.09.Adani power has highest value of standard deviation i.e.164.50 and JSW Energy has lowest value of standard deviation i.e.33.12.All selected power companies have positive value of kurtosis. All selected power companies have positive value of skewness except JSW Energy.

Earning Per Share

Earning per share = Net profit to equity shareholders/Number of equity share outstanding

Year	Tata power	Adani power	JSW Energy
2015-2016	4.59	0.32	7.27
2016-2017	1.06	-17.48	1.2
2017-2018	-12.05	-0.06	-2.71
2018-2019	5.9	-1.24	1.53
2019-2020	-0.08	-5.77	3.03
Mean	-0.08	-4.85	2.06
S.D.	7.11	7.47	3.60
Kurtosis	2.81	2.81	1.34
Skewness	-1.60	-1.72	0.29

Source: Secondary data

It is observed from the above table that in the year 2015-16 JSW Energy has highest EPS i.e.7.27 and Adani power has lowest EPS i.e.0.32.In the year 2016-17 JSW Energy has highest EPS i.e.1.2 and Adani power has lowest EPS i.e.-17.48.In the year 2017-18 Adani power has highest EPS i.e.-0.06 and Tata power has lowest EPS i.e.-12.05.In the year 2018-19 Tata power has highest EPS i.e.5.9 and Adani power has lowest EPS i.e.-1.24.In the year 2019-20 JSW Energy has highest EPS i.e.3.03 and Adani power has lowest EPS i.e.-5.77.Further it is noticed that JSW Energy has highest value of mean i.e.2.06 and Adani power has lowest value of mean i.e.-4.85.Adani power has highest value of standard deviation i.e.7.47 and JSW Energy has lowest value of standard deviation i.e.3.60.All selected power companies have positive value of kurtosis. All selected power companies have negative value of skewness except JSW Energy.

Correlation and 't' test for degree of Operating leverage and EPS

Company Name	'r' value	Correlation Result	't' calculated value	't' table value	Hypothesis Result
Tata power	0.34	Positive	-0.1401	2.776445	Accepted
Adani power	-0.80	Negative	-2.37626	2.364624	Accepted
JSW Energy	0.39	Positive	0.418242	2.570582	Accepted

Source: Calculated

From the above table it is showed that correlation between degree of operating leverage and EPS is positive for Tata power and JSW Energy and it is negative for Adani power. As per 't' test results, it is clear that the table value is greater than the calculated value. Therefore, the null hypothesis is accepted. Hence, there is no significant relationship between operating leverage and EPS for all companies.

Correlation and 't' test for degree of Financial Leverage and EPS

Company Name	'r' value	Correlation Result	't' calculated value	't' table value	Hypothesis Result
Tata power	-0.88	Negative	-0.87456	2.570582	Accepted

Adani power	-0.72	Negative	-0.02538	2.570582	Accepted
JSW Energy	-0.26	Negative	0.9936	2.446912	Accepted

Source: Calculated

From the above table it is showed that correlation between degree of financial leverage and EPS is negative for all selected power companies. As per 't' test results, it is clear that the table value is greater than the calculated value. Therefore, the null hypothesis is accepted. Hence, there is no significant relationship between financial leverage and EPS for all companies.

Correlation and 't' test for degree of Combined Leverage and EPS

Company Name	'r' value	Correlation Result	't' calculated value	't' table value	Hypothesis Result
Tata power	0.75	Positive	-0.16216	2.776445	Accepted
Adani power	-0.94	Negative	-0.92352	2.776445	Accepted
JSW Energy	0.73	Positive	1.352471	2.776445	Accepted

Source: Calculated

From the above table it is showed that correlation between degree of combined leverage and EPS is positive for Tata power, Torrent power and JSW Energy and it is negative for Adani power. As per 't' test results, it is clear that the table value is greater than the calculated value. Therefore, the null hypothesis is accepted. Hence, there is no significant relationship between combined leverage and EPS for all companies.

Findings and Conclusions of the study

Findings

Operating Leverage

The study reveals that Adani power has highest value of mean i.e.4.83 and JSW Energy has lowest value of mean i.e.-0.38.Tata power has highest value of standard deviation i.e.34.42 and Adani power has lowest value of standard deviation i.e.5.21.All selected power companies have leptokurtic pattern. All selected power companies have positive value of skewness except JSW Energy.

Financial Leverage

The study reveals that Tata power has highest value of mean i.e.2.79 and Adani power has lowest value of mean i.e.-4.56.Adani power has highest value of standard deviation i.e.24.07 and Tata power has lowest value of standard deviation i.e.2.14.All selected power companies have leptokurtic pattern. Only Tata power has positive value of skewness. Other than Tata power Adani power and JSW Energy have negative skewness

Combined Leverage

The study reveals that 18.09.Adani power has highest value of standard deviation i.e.164.50 and JSW Energy has lowest value of standard deviation i.e.33.12.All selected power companies have leptokurtic pattern. All selected power companies have positive value of skewness except JSW Energy.

Correlation Analysis and Test of Significance

Correlation Results

- Correlation between degree of operating leverage and EPS is positive for Tata power and JSW Energy and it is negative for Adani power.
- Correlation between degree of financial leverage and EPS is negative for all selected power companies.
- Correlation between degree of combined leverage and EPS is positive for Tata power and JSW Energy and it is negative for Adani power.

Test of significance

For all selected power companies, 't' test result reveals that there is no significant relationship between DOL, DFL, DCL and EPS.

Conclusion

This research study scrutinized the relationship between leverage and EPS. Leverage is an important factor which is having an impact on profitability of the firm which in turn affects the wealth of the shareholders. The study

concluded that there is no significant relationship between DOL and EPS, DFL and EPS, DCL and EPS. Thus, fixed operating expenses and the financing mix decisions of the firm are not significantly affect the earning capacity of selected power companies.

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IMPACT OF ADVERTISEMENT ON A FARMER'S DECISION TO SELECT A BANK TO AVAIL AN AGRICULTURE LOAN

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ABSTRACT

Competition amongst banks is prevalent today in all the segments of banking including agriculture funding and inclusive banking. Every bank need to lend 18% of the overall bank credit (ANBC) towards agriculture sector as mandated by RBI and hence lending to farmers by banks has gained importance to the benefit of the farmers. The farmers can now select a bank which can give them better benefits as compared to other banks. Banks induce the farmer to avail loan with them through various methods and forms like village meeting, unique offers and also marketing and advertisements. This article focuses on the impact of advertisement on the farmers and the various advertisement components like hoardings, brochures, Media (TV, movies, radio), digital media like Messages, email and internet banking and compares their relative impact and significance on influencing a farmer to avail a loan with that bank. This article is based on the primary data collected in 2 select districts of Karnataka.

Keywords : *Advertisement, PSL norms, farmer, agri loans, banks*

Introduction

Lending towards agriculture is an important function of any bank in India. While there are many financial institutions and money lenders in the agriculture sectors, the Banks which are governed by the rules, guidelines and policies framed by the RBI and NABARD in agricultural lending are the most trusted source of finance to the farmers in terms of charging interest on the loans, recovery processes and providing timely banking services. Reserve Bank of India has mandated that 40% of the total loans of any banks should be towards overall priority sector out of which 18% should be towards direct agriculture. So every bank which wants to increase its business as a whole in India and increase its total loans portfolio, has to increase the loans into the priority sector in parallel. As per RBI guidelines upto 40 per cent of the Adjusted Net Bank Credit (ANBC) or credit equivalent of off- Balance Sheet Exposure, whichever is higher has to be funded towards Priority Sector Lending (Source: RBI Circular on PSL Norms April 2010 onwards).

In view the above PSL guidelines, the competitive environment amongst banks has stretched to the agriculture sector also to the advantage of the farmers to take loan from banks. The farmer now has a choice to select a bank to take a fresh agri-loan, or to shift his existing agri-loan to some other bank, for some benefit he derives from the other bank in comparison. There are various factors which influence a farmer to take a loan with a bank, like the rate of interest, loan amount available, service excellence of the bank, speed of loan sanction etc. Keeping all these factors in mind, the banks put across many advertisement strategies in the rural market. This study is focused on the impact of 'Advertisement by Banks' in the farmer segment in inducing the farmer to take an agri loan with that bank. This article focuses on the various advertising tools and methods used by the bank and analyses the relative significance of each of these tools. This study is based on primary data collected from the farmers belonging to two districts in Karnataka state, who bank with the various banks in these areas.

Review of Literature

Shani Bashir & Alhassan Bunyaminu have examined the various advertisement channels and practices of banks in their research paper "A Critical Analysis on Advertising Banks Products and Services in Ghana" (2013). The impact of advertisement as a tool to generate business is tabulated under Table 2.28 below:

Table 1: Impact of Advertisement by Banks, study at Ghana

Impact of bank advertisement	Very high	High	Reason - able	Not high	Not at all high
Influences me to operate with this bank	25.60%	65.10%	9.30%		
Influence others to operate with bank	32.10%	53.60%	14.30%		
Has positive impact on the bank product	15.20%	41.00%	36.20%	6.70%	1.00%
Does banks advertise, to what extent	11.70%	29.30%	36.70%	20.80%	1.70%

This article lists out the various types of advertisements by banks like, TV advertisement, radio, advertisement, magazine advertisements, internet advertisement, outdoor visible advertisements, direct mailers etc. It also lists out the benefits and drawbacks of these set of advertisement and its effectives. In the current study, the types of advertisement are considered to the extent it is suitable to farmers in the select districts

Arshad Mehmood in his article influence of banking advertisement on bank customer satisfaction: an examination of Pakistani bank Customers' choice – 2018, has done an study on the impact of advertisement and has concluded that advertisement has strong impact on bank customer satisfaction.

Dr. Subho Ray in the article 'Digital Advertising in India'(2012) have done a very detailed study on the concept & role of digital advertising in India, its features, importance and growth numbers which is very much applicable to banking industry and gives a full brief of the same.

In another research article "Advertisement in the banking sector: analysis and comparison between private and public limited banks in India" by Anita Ramrakhyani and others (2020), the authors examine the effectiveness of advertisement and its components/strategies used in private and public sector banks in India. The components of advertisement examined were Exhibitions, Sports sponsors, Newspapers& magazines, TV & movies, internet & mobiles, hoardings, pamphlets & posters, and sales persons. Based on the survey conducted with 600 customers of ICICI bank and SBI, this article concludes that the TV Advertisement, newspapers and internet play lead role in attracting new customers as compared to other means of advertising.

Dr Deepak Jarolia in his article during 2014 has made a study on internet advertisement of banking products and its effectiveness. He has compared the advertising modes like SMS, MMS, ATM, TV etc for banking products with advertisement on internet. He discusses about the various dimensions in which an internet advertisement works, like relevance to the particular viewers , the confusion factor it creates when the advertisement pops up, the entertainment impact of such advertisements etc in brief, which attributes to the success of the advertisement. The recent advertisement trend is on internet banking, which is backed by analytics and artificial intelligence. Products are advertised on internet through a click of the mouse and pop ups. Based on the observations in these articles and taking clues wherever possible, we have taken the relevant advertisement strategies which are prevalent in the agri finance in the state of Karnataka.

Vinod Vaishnav has analysed the impact of advertisement methods adopted by 2 major banks in India in his article 'Impact of promotional strategies on Indian Banking Sector,- 2018.

Anil Kumar in his article , Scope and Impact of SMS Advertising in India: The Case of Bundelkhand Region (2013) has made a study of SMS advertising.. He concludes that majority of the respondents are in favor of receiving SMS ads if their preferences are taken into consideration before sending the ads. Those who disagree, have a negative attitude toward SMS, which is a smaller number

Ani Bencollins & Anyasor Okwuchukwu in their article 'Radio and television advertising of commercial bank products in Anambra State' (2018) have investigated the extent of influence of radio and television advertising on customer's choice of a particular bank in the state of Anambra in Nigeria and study

concludes these both are effective advertisements to influence customers

Israel Kofi Nyarko in his article 'Effects of Electronic Media Advertising on Rural Banking' (2013) examines the influence of electronic media advertising on rural banking in Ghana & concludes that radio advertising is an effective tool adopted by the Unity Rural Bank .

Research Methodology

This study is on the impact of advertisement by banks on farmers hence basically this research is based on the primary data collection. Study was conducted in two districts of Karnataka namely 'Chitradurga' and 'Koppal' wherein primary data was collected through questionnaire survey from 430 farmers of these 2 districts who have taken loans from 7 banks in the district, including public sector banks, private sector banks, regional rural banks and co-operative banks. Stratified random sampling technique was used and the sample size was determined based on the sampling formula. The data collected was analysed using SPSS and Smart PLS software to obtain the desired results

Objectives of the research

After review of literature, the study proposes to achieve the objectives as indicated below:

1. To identify significance of advertisement as in influencing factor in the decision making of a farmer to select a particular bank to avail an agriculture loan
2. To compare the relative significance of the elements of advertisement in influencing the decision making of a farmer to select a particular bank to avail an agriculture loan.
3. To analyse the change in the significant impact of 'Advertisement' on the willingness of the farmer to select a bank to avail an agriculture loan when moderated by other demographic/categorical profiles of the farmers as moderators

Scope of the Research

- The study is conducted in two districts of Karnataka State Chitradurga and Koppal) and hence the scope of the study in terms of area is restricted to these 2 districts only
- This research is limited to the study on loans granted to the farmers for the purpose of agriculture. This study does not cover loans taken for any other purpose by farmers.
- This study is restricted to the farmers who have taken loans from the selected Banks only, which includes public sector and private sector banks, regional rural banks and co-operative banks. Other lending institutions or MFI are not included in this study

Research Hypothesis

There are 2 hypothesis formulated for the study as given below

Hypothesis 1: Significance testing of ' Advertisement' as in influencing factor

The Null Hypothesis (significance level p >0.05) and alternate hypothesis are stated as below :

H0 : There is NO significant impact of 'Advertisement by Banks ' on the willingness of a farmer to avail an agri loan with that bank

H1: There is a significant impact of 'Advertisement by Banks' on the willingness of a farmer to avail an agri loan with that bank

The significance testing of advertisement as a variable and the relative importance of its components are tested under the above hypothesis itself

Hypothesis 2 – Impact of Moderation

A moderator is a variable that affects the direction and/or strength of a relationship between an independent and dependent variable (Henseler, 2010). Under this study we have analysed the effect of few demographic (categorical) variables as 'Moderators' on the relationship between the independent variable ' Advertisement' and the depended variable willingness using Smart PLS -3 software.

Table 2: List of the Moderating (category) variables considered for analysis:

Variable	Category -1	Category -2
Age of Farmer	Up to 45 years	45 years and above

Education of farmer	Up to 10th standard (including illiterate)	Above 10th std (including Graduates, PG &Professionals)
Type of the farmer	Small & Marginal Farmers (holding up to 5 acres land)	Large Farmers (holding above 5 acres of land)
District of Farmer	Chitradurga District	Koppal District
Loan amount availed	Up-to Rs.3 lakhs	Above Rs.3 lakhs
Type of Bank-1	Public Sector Banks	Private sector banks
Type of Bank-2	Regional Rural Banks	Co-operative banks

Testing of hypothesis -2- impact of Moderator on IV-DV Relationship

As we have taken 7 demographic variables we have considered as moderating variables and hence there are 7 hypothesis which are developed and tested below. The first hypothesis statment is given below for clarity. Other hypothesis are also drawn in the same way for all the demographic variables mentioned above under Table : 2

H0: Age Does Not moderate the relationship between Advertisement (IV) and Willingness of the farmer to avail and agri-loan with a bank (DV)

Ha: Age Moderates the relationship between Advertisement (IV) and Willingness of the farmer to avail an agri-loan with a bank (DV)

The results of the hypothesis testing are given below

Data Analysis Results and Conclusion

Hypothesis 1: Significance of IV on DV:

The significance of 'Advertisement by Banks' on the willingness of the farmer is tested with the significance level kept up to 0.05 p value. If p value is greater than 0.05 the null hypothesis is accepted. Null Hypothesis testing results are given below under Table 3 :

Table 3: Testing of hypothesis H1

Tag	Hypothesis	B - value	T- value	P - value	Significant*	Result	Interpretation
H1	Advertisement -> Willingness	0.342	6.217	0.000	Yes	H0 Rejected & H1 Accepted	Advertisement has a significant impact on the willingness of the farmer

(Source: Primary Data from output Smart PLS-3) , (*Significant at p-value<0.05)

As the p-value=0.000 which is <0.05 indicating a significance up to 0.05 level, null hypothesis is rejected and the alternate hypothesis is accepted. Hence it is concluded that Advertisement by bank has a significant and positive impact on the willingness of a farmer to avail an agri loan with the bank with a B value of 0.342.

The comparative analysis and relative importance (significance) of each component of advertisement given in the table below, basis regression analysis done on the given sample.

Table 4: Comparison of Variables under 'Advertisement by Bank'

Model	Unstandardized Coefficients	
	B	Std. Error
(Constant)	2.455	.141
Leaflets distributed on loans by this bank at village	.254	.055
SMS sent by the bank on the agri loan facility	.095	.067
Hoarding of the bank in the Village on agri loans	.094	.070
Media - TV/Movie theatre advertising & scrolling	.069	.065
Info of this Bank on loan facility on Internet websites	.042	.063

Email sent by this bank on the agri loan facility	-.002	.057
Info in radio /radio jingle about this bank loan	-.059	.074

Out of the 7 factors which form part of the variables 'Advertisement' based on the regression co-efficient table depicted below, the highest impact on the farmers is from 'leaflet and brochures distributed in villages'(B= 0.254). The leaflets are distributed either door to door to every farmer's house by the bank or as newspaper inserts, both are shown as very effective advertising tools. It is followed by 'SMS' sent by the bank to the farmers mobile (B=0.095), which remained quite impactful, being a personal communication to the farmer. This followed 'Hoarding placed at villages' (B=0.094) and then 'TV Scrolls and Movie advertisement at villages' (B=0.069) which have remained impactful in the village to influence the farmers to select a bank to avail an agri-loan. The next in line is the advertisement on internet websites on agri loan (B=0.042). With the extended us of mobile technology for browsing in villages as well, the pop ups displaying the advertisement of banks have shown positive impact among the farmers. The impact of the other 2 factors, email sent to the farmers (B= -0.002) and the radio jingles and information (B=-0.059) seem to be negligible and does not seem to have any recall value with the farmer and hence with least impact amongst the advertisements in inducing the farmer to take a loan with that bank as per the data analysis:

Hypothesis -2 , Impact of Moderation of Demographic variables :

Table 5 : Results of testing of components of Hypothesis-2

Sl No.	Moderating Variable (MV)	Moderating/ Demographic variable split	Path coefficients of the 2 grouping variables		Difference	t-Value	p-Value
1	Age	Upto 45 yrs & above 45 Years	0.501	0.337	-0.163	2.180	0.030
2	Education	Upto 10th Std & above 10th std	0.392	0.387	-0.006	0.078	0.938
3	Farmer Type	Small & Marginal Farmer /Big Farmers	0.436	0.338	-0.098	1.200	0.231
4	Loan Amount	Upto Rs.3 lakhs & above 3 lakhs	0.409	0.381	-0.028	0.364	0.716
5	District	Chitradurga & Koppal District	0.314	0.479	0.165	2.283	0.023
6	Type of Bank-1	Private Bank & Public Sector Bank	0.358	0.483	0.124	1.376	0.170
7	Type of Bank-2	RRB & Co-op Banks	-0.606	0.312	-0.918	2.848	0.005

(Source: Primary data: Output of SmartPLS-3) (IV-Advertisement, DV- Willingness)

As per the table above, the impact of 3 moderating variables is seen to be significant where the 'p' value of the moderation is significant (<0.05), which are 'Age of the Farmer' and 'District' and 'Type of Bank-2) . Hence the Null Hypothesis is rejected and alternate hypothesis is accepted for these three moderations of IV-DV path relationships. For all other relationships, the impact is non-significant and hence the Null hypothesis is accepted and alternate hypothesis is rejected, which means the IV-DV relationship between advertisement and willingness of the farmer does not significantly change under the other different demographical/categorical conditions

Conclusion

The decision of a farmer to take a loan with a bank is subject to the 'demographic factors' which he belong to like the district, his age, educational qualifications etc, which is given and the 'external factors' like agents in the market, his family and friends who influence him to take loan and the external government policies which have an impact on the behaviour of the farmer. Also there are 'individual requirement' of each farmer like 'need of a higher loan amount', 'not willing to pay higher rates of interest', 'convenient and nearby location of bank' and to provide digital and other convenient facilities. All these factors are analysed in this study giving how important each factor is and to what effect it is effective,

before inducing the marketing factors from the bank's side.

The banker need to consider these important factors and accordingly strategies their marketing plan as a combination of various inducing factors. Depending on the analysis of the farmer demographic strata, which they can get from the available data and split up further though Data analytics and Artificial Intelligence techniques need to go for a personalized marketing plan, which will be the next level marketing. The decision whether an e-mailer will work to this farmer, or a SMS message will be sufficient or a relationship manager is to allocated to the farmer need to be dependent on the importance of the factor derived through AI algorithms based on his demographic profile and preferences. While the mass advertisements on TV and internet shall continue and meetings have their impact, the recent trends show that these strategies are going to be taken over by personal communications based on data analytics supported by artificial intelligence (through his account data and web browsing history of the farmer on mobile etc), on which the bankers need to focus, keeping in view the importance and significance of the influencing factors as a weightage for this analysis.

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CLASSIFICATION OF PERFORMANCE INDICATORS FOR DESIGNING A RESILIENT SUPPLY CHAIN WITH SPECIAL REFERENCE TO THE MUMBAI REGION

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ABSTRACT

The global pandemic situation due to the COVID-19 crisis crippled the economic growth of many countries in terms of both the livelihood of the people and the survival of the business community. The pandemic has resulted in shifts in the economic, social, cultural, political and business environments of various countries throughout the world. It is evident that many countries have faced economic turmoil as a result of rising inflation and decreasing GDP, leading to poverty, unemployment, food crisis, lack of transportation, shortage of medicine & health equipment, shortage of natural resources, lower productivity, etc. The various categories of sectors, like FMCG, Agriculture, Manufacturing, Health care, Hotels, Tourism, Automobiles, Real estate, Electrical & Electronics, etc., have recorded diminishing profits due to the disruptions in the supply chain. The supply chain disruptions of these sectors incur more risks right from procurement of raw materials to the delivery of final products/services to the customers.

An analysis has been conducted through this research paper to classify the performance indicators through the application of structural equation modelling and other statistical tools. The research paper also highlighted the importance of determining performance indicators for designing resilient supply chains through the support of primary and secondary data collection methods.

***Keywords** : Pandemic, Supply chain, Disruptions, Performance*

1. Introduction

Resilience of the supply chain is a network for sharing information on various aspects of business operations. Resilience is the process of having the ability to adapt to changes in order to mitigate the risks and improve the performance of the supply chain. It requires structural changes in all aspects of the supply chain so that it can acclimatize to technological changes through automation in view of the pandemic situation due to COVID-19. Resilience is the tool of the supply chain to improve the productivity of the organisation through the anticipation of circumstances and flexibility to overcome the challenges of delivering value-added products/services to customers. It can confront contingencies in the supply chain by transforming risks into opportunities for both companies and their customers.

2. Literature Review

The study by (Mahesh Veerina, 2021) found that the current pandemic situation has severely affected the growth of the pharmaceutical industry. The pharmaceutical industry largely depends on the cold storage system. The products manufactured by these companies have lost visibility as they have incurred spoilage. The delivery system is crippled due to this crisis and it has made these firms incur losses in their inventory management system. (Audere Team & A. Concilio, 2021) identified the new risks in the supply chain are experienced due to this unexpected plague situation. The performance of the supply chain has been reduced and organisations are finding it difficult to cope with this situation. The study revealed that the present risks can be reduced by updating and integrating cross-functional systems of communication and upgrading their technology for better performance in their sales and operational planning systems.

FTL and LTL are the two main methods used in the freight management system. FTL refers to a full truck load and LTL refers to less than a full truck load. When multiple shipments are used on the same truck, LTL is used. It is most economical for small business organisations to minimise the space utilisation in their trucks. FTL is the fastest delivery freight management system suitable for large business organisations. FTL & LTL should be balanced strategically for an effective freight

management system, which is the need of the hour to overcome contingencies faced by organisations (Hadleigh Reid, 2021). The pandemic arising due to COVID-19 damaged the livelihoods of both people and businesses. The organisations which are able to identify the risks in their supply chain manage their functional units successfully through innovations in process design. The pandemic situation forced major businesses like pharmaceuticals, FMCG, food & beverages, electronics, clothing, footwear, etc to redefine their supply chain through digitalisation. The risks are converted into opportunities for those who are adaptable to mitigate the circumstances and have been able to overcome the challenges due to this situation (Michael Wilson, 2021). According to Olivia Montgomery(2020), the disruptions in the supply chain have blocked the exports of various product categories, like medicine, food items, cotton clothing, computer accessories, shoes, electrical items, detergents, etc. The study identified disruptions in the supply chain like fluctuation in demand, shortage of raw materials, shortage of manpower, lack of accessibility to transportation, problems with storage and reduced productivity. The research also reveals that disruptions in the supply chain can be converted into positively by identifying the risks and changing according to the situation to improve productivity.

Businesses around the world have triggered vulnerabilities and have experienced both fluctuations in demand and supply in their countries due to the pandemic crisis. The lockdown restrictions and trade barriers also affected the production process throughout the world. In addition to the lockdown and trade barriers, the economic and political environment of their respective countries have changed, resulting in a shortage of manpower, raw materials, food items, medicines, automobile equipment, electrical and electronic items etc. To overcome this situation, companies have to develop a strategy for designing their supply chain with more flexibility through diversification and innovation, so that it will adapt to any circumstances for their survival (Willy Shih, 2020).

The complete lockdown imposed by India to tackle the COVID-19 crisis has resulted in shifts in both demand and supply for various products/services. During this time, most companies, despite having sufficient inventory, delayed their production schedules and couldn't meet their delivery commitments to their customers. Organisations have to change their business development strategies by making their supply chains more flexible through the use of sophisticated technology. The pandemic situation has forced them to transform their supply chain to customisation through delivering online mode. The traditional supply chain has been converted into an innovative supply chain through digitalisation to meet the growing demands of customer(Anvar Jay Varadaraj, 2020).

The global supply chain has experienced vulnerabilities due to the increasing operational risks in their business. The pandemic started in China and affected most countries in the world. The pandemic has resulted in the loss of employment, shortage of raw materials, shortage of manpower, shortage of food items and people in most countries have also lost their livelihood. The operational risks affected the optimisation process of the supply chain for most companies. As a result of this, the supply chain could not function effectively globally. To overcome the operational risk in their supply chain, companies have digitalised their supply chain for survival and strengthened their networks to resist this pandemic situation (Financier Worldwide, 2020).

It is evident that during pre-COVID-19, manufacturers faced hurdles in launching new products/services and delivering them to customers. Companies have difficulty developing new products as per the expectations of the customers due to intense competition and other global factors. When the pandemic affected our country, the supply chain risks increased incessantly. The companies which started developing new products experienced major difficulties in obtaining the right information about the suppliers, customers, warehouses, transportation, and origin of destination. The health risks arising due to this pandemic restricted the supply chain from going beyond cross borders, which resulted in security threats

to both software and hardware for electronic data interchange(Nathanel Richmond, 2020).

Economic growth has been affected globally due to the pandemic crisis. The high risks triggered in the supply chain led to a shortage of resources in various manufacturing aspects of the business. The entire supply chain, right from the procurement of the raw materials to the delivery of finished products/services, incurred disruptions to all the entities. Companies have to develop new mechanisms for managing the risk of the supply chain by integrating their resources from both the supplier end and the customer end comprehensively for survival and to enhance profit margin(Arash Shahin, 2020).

In view of the global pandemic situation, it is imperative to develop supply chain risk management strategies as a performance indicator. The attitude of the customers changed predominantly to the pandemic situation through changing their lifestyle from traditional to healthy. This has redefined the company's strategies in learning to anticipate the changing needs of customers. The supply chain risk can be addressed through the process of automation by integrating both the resources of manpower and data, as indicated by the study (Jordan Speer, 2020).

The instability and lack of transparency in the supply chain hampered the efficiency of the organisation in delivering its products/services to customers. It is apparent that due to the non-availability of data related to acquisition of raw materials, supplier information, warehouses, type of transportation, customer locations etc., most organisations are creating difficulties in managing the supply chain. The application of big data analytics in the relevant areas of the supply chain can transform the risks into opportunities by delivering the right products/services to the right customers at the right time(Spend Analysis, 2017).

3. Objectives of the Study

1. To understand the role of performance indicators in designing a resilient supply chain
2. To classify the performance indicators to overcome the risks and disruptions through designing a resilient supply chain
3. To analyse the performance indicators to overcome the risks and disruptions through designing a resilient supply chain

4. Hypothetical Statements(s)

1. There is a significant association among Customer retention & Worker retention, Digitalisation and Resilience
2. There is a significant effect of Resilience on Customer retention & Worker retention and Digitalisation
3. Designing the resilient supply chain is highly influential in overcoming the challenges of any crisis situation arising due to COVID-19

5. Study Limitations

1. The research did not focus on all the risk factors disrupting the supply chain.
2. The results of the study determined by the data collected from only a specific region and cannot be used to relate to the other regions.
3. The opinions expressed the respondents can't be considered as the final solution to the study due to prevailing circumstances.

6. Methodology of the study

6.1.Sources for the Data

➢ **Primary data**

- An organized questionnaire was distributed to collect information from the suppliers who are experiencing the difficulties in the supply chain due to the pandemic situation.
- On a scale of 1-5, the questionnaire was developed using scaling techniques consisting of the Interval Scale and the Likert-Rating scale.

➢ **Secondary Data**

- The literature have been reviewed from Journals, Online Newspaper articles and websites regarding the disruptions in supply chain

6.2. Research Design

Descriptive Cross-sectional design

The opinions expressed by the suppliers are primarily based on their inclination to share and exchange information is a onetime study. It can be referred as a descriptive cross-sectional research design.

6.3.Sampling Design

Sample Size: A total of 300 suppliers have been contacted to obtain the information from both Central and South Mumbai.

Sampling Method

Quota Sampling: The information obtained from the respondents has been specifically involved in the supply & distribution business in the Mumbai region. The sampling method is termed as Quota sampling as the information has been collected from those suppliers facing hurdles in the supply chain due to this pandemic situation.

6.4.Statistical tools

The statistical techniques like Simple Percentage Method, Multiple correlation, Multiple Regression, Chi-Square test Cluster Analysis and Structural Equation Modelling have been exclusively used to analyse and interpret the data using Excel & SPSS.

7. Results

Hypothesis Testing

Hypothesis 1

Null Hypothesis ($H1_O$): There is no significant association among Customer retention & Worker retention, Digitalisation and Resilience

Alternative Hypothesis ($H1_A$): There is a significant association among Customer retention & Worker retention, Digitalisation and Resilience

The following table depicts the Multiple Correlation for Customer retention & Worker retention * Digitalisation* Resilience

Table 1: [Customer retention & Worker retention * Digitalisation* Resilience]

Description	Customer retention & Worker retention	Digitalisation	Resilience	N	Sig. Level
Customer retention & Worker retention	1.000	-0.285	0.542	300	0.000
Digitalisation	-0.285	1.000	0.148	300	0.000
Resilience	0.542	0.148	1.000	300	0.000

Inference: The significance level less than 5% infer that there is a significant association among Customer retention & Worker retention, Digitalisation and Resilience. There is a negative low association between Customer retention & Worker retention and Digitalisation. The negative value(-0.285) indicates that as the customer & worker retention decreases, the efforts to digitalise the supply chain also decrease. The workforce and customers are the major human capital for any organisation to strengthen the network of supply chain. There is a positive moderate association between Customer retention & Worker retention and Resilience. The value(0.542) indicates that as customer & worker retention increases, the resilience to build the supply chain also increases. The retention of workforce and customers helps to design a resilient supply chain for overcoming the challenges of any situation.

There is a positive low association between Digitalisation and Resilience. The value(0.148) indicates that the Digitalisation should be higher to obtain higher resilience in the supply chain.

Hypothesis 2

Null Hypothesis ($H2_O$): There is no significant effect of Resilience on Customer retention & Worker retention and Digitalisation

Alternative Hypothesis ($H2_A$): There is a significant effect of Resilience on Customer retention & Worker retention and Digitalisation Multiple Regression Analysis of Customer retention & Worker retention (CWR), Digitalisation (DGT) on Resilience (RES)

Table 2: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.627	.393	.389	1.511

Inference

The dependent variable is called as Criterion which is Resilience (RES). The independent variables are called as Predictors[Customer retention & Worker retention (CWR), Digitalisation (DGT)]

The multiple correlation coefficient, R, can also be viewed as the simple correlation coefficient r, which lies between 0 to 1. The value close to 1 indicates high strength of association

The R^2 is called as coefficient multiple determination. The strength of association in multiple regression is measured by the square of the multiple correlation coefficient, R^2, which is also called the coefficient of the multiple determination

The R^2 value of a model tells you what percentage of the variation in the dependent variable is explained by all the independent variables in the model. The dependent variable's total variation can be measured by its variance. In this model, the value of R square is .393. It shows that 39.3% of the total variance in the dependent variable Resilience (RES) is explained by all the independent variables[Customer retention & Worker retention (CWR), Digitalisation (DGT)] of the model.

Table 2(a): ANOVA

Description	Sum of Squares	Df	Mean Square	F	Sig.
Regression	439.566	2	219.783	439.566	0.000
Residual	678.230	297	2.284	678.230	
Total	1117.797	299		1117.797	

Inference

The significance level less than 5% indicates that all the variables included in this model are significant. The significance level of the F-statistic (less than 5%) then the independent variables[Customer retention & Worker retention (CWR), Digitalisation (DGT)] are highly influential in explaining the variation in the dependent variable Resilience (RES).

Table 2(b) :Standardized and Unstandardized Regression Coefficients

Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Tolerance	VIF
	B	Std. Error	Beta				
(Constant)	4.001	.556		7.198	.000		
CWR	.414	.031	.636	13.483	.000	.919	1.088
DGT	.187	.027	.329	6.973	.000	.919	1.088

Inference

The unstandardized (B) coefficients are the coefficients of the estimated regression model.

The beta coefficient tells you how strongly is the independent variables are associated with the dependent variable. It is equal to the correlation between the two variables.

The significance levels less than 5% of the independent variables depicts that [Customer retention & Worker retention (CWR), Digitalisation (DGT)] are influential on Resilience (RES). The highest value of standardized coefficient(beta) has been observed for Customer retention & Worker retention (CWR). It can be further inferred that Customer retention & Worker retention are highly influential in improving Resilience (RES**)** followed by Digitalisation (DGT).

The tolerance of more than 5% and Variance Inflation Factor(VIF) of less than 10 indicates that the effect of independent variables on dependent variable can be determined effectively. VIF is a measure of multicollinearity in the set of multiple regression variables. When VIF less than 10, It can be further revealed as there is no multicollinearity. Multicollinearity is the occurrence of high intercorrelations among two or more independent variables in a multiple regression model. The high intercorrelations among the independent variables fail to assess the effect on dependent variable accurately.

When there is no multicollinearity among the independent variables, the predictor validity is also high. Predictor validity is an indication for establishing the causal relationship among the variables included in the research

The following hypothesis has been tested by using Chi Square Test

Hypothesis 3

Null Hypothesis ($H3_0$): Designing the resilient supply chain is not highly influential in overcoming the challenges of any crisis situation arising due to COVID-19.

Alternative Hypothesis($H3_A$): Designing the resilient supply chain is highly influential in overcoming the challenges of any crisis situation arising due to COVID-19

Table 3: Observed & Expected values for Resilient Supply Chain[RSC]

Category	Observed	Expected	Residual
Highly not influential	20	60.0	-40.0
Not Influential	18	60.0	-42.0
Neutral	15	60.0	-45.0
Influential	110	60.0	40.0
Highly Influential	137	60.0	77.0
Total	300		

Table 3 depicts the residual values[difference between the observed and expected values] for the resilient supply chain influential in overcoming the challenges of any crisis situation arising due to COVID-19

Table 3(a) : Chi-Square Analysis for RSC

Description	RSC
Chi-Square	215.3
df	4
Sig	.000

Inference: The significance level less than 5% and high value of Chi-Square test reveals that the null hypothesis can be rejected. It can be inferred that designing the resilient supply chain is highly influential in overcoming the challenges of any crisis situation arising due to COVID-19.

Cluster Analysis for grouping the variables for performance indicators of supply chain

The table(s) 4 & 4(a) represent Cluster Analysis, which is a Multivariate Analysis for grouping the variables having similar characteristics :

Table 4 : Agglomeration Schedule

Variables	Cluster Combined			Stage Cluster First Appears		
	Cluster 1	Cluster 2	Coefficients	Cluster 1	Cluster 2	Next Stage
1	3	4	147.000	0	0	7
2	9	10	297.000	0	0	7
3	1	2	492.000	0	0	6
4	7	8	724.000	0	0	8
5	5	6	1014.500	0	0	6
6	1	5	1616.250	3	5	9
7	3	9	2334.750	1	2	8
8	3	7	3110.917	7	4	9
9	1	3	4490.500	6	8	0

Inference : Table 1 represents the stages at which the variables are joined together. At stage 1, the variable 3 is joined with variable 4. At stage 7 & 8, the variable 3 is joined with variable 7 & 9. At stage 2, the variable 9 is joined with variable 10. At stage 3, the variable 1 is joined with variable 2. At stage 6 & 9, the variable 1 is joined with variable 3 & 9. At stage 4, the variable 7 is joined with variable 8. At stage 5, the variable 5 is joined with 6.

The following table is presented to know the cluster membership to determine the number of clusters through Ward's Method generated through SPSS output

Table 4(a) :Cluster Membership (for deciding the number of Clusters

S.No	Variables	Membership
1	Fulfilment Centres	3
2	Demand driven supply chain	3
3	Design supply chain to meet uncertainty	3

4	Balance between LTL and FTL	1
5	Enhanced workforce retention	1
6	Assurance of Customer order quality	1
7	Enhanced navigational facilities	2
8	Digital tracking	2
9	Route optimization	2
10	Reengineering	2

Inference : Table 4(a) represents the membership of the various variables. This table also determines the cluster membership. The following are the groups of variables:

Cluster 1

- Balance between LTL and FTL
- Enhanced workforce retention
- Assurance of Customer order quality

Cluster 2

- Enhanced navigational facilities
- Digital tracking
- Route optimization
- Reengineering

Cluster 3

- Fulfilment Centres
- Demand driven supply chain
- Design supply chain to meet uncertainty

The performance indicators can be classified into three clusters. In cluster 1, balance between LTL and FTL, enhanced workforce retention and assurance of customer order quality are grouped as Customer & Workforce supply chain

In cluster 2, enhanced navigational facilities, digital tracking, route optimization and reengineering are grouped as Digitalisation of supply chain

In cluster 3, fulfilment centres, demand driven supply chain and design supply chain to meet uncertainty are classified as Resilience supply chain

Structural Equation Modeling (SEM) for Resilience[RES]

The dependent variable or endogenous variable for this study is Resilience[RES] which is represented by rectangle

The independent variables or exogenous variables for this study are as follows:

Customer retention & Worker retention[CWR]

Digitalisation[DGT]

e1 is the error variance which is the part of SEM model.

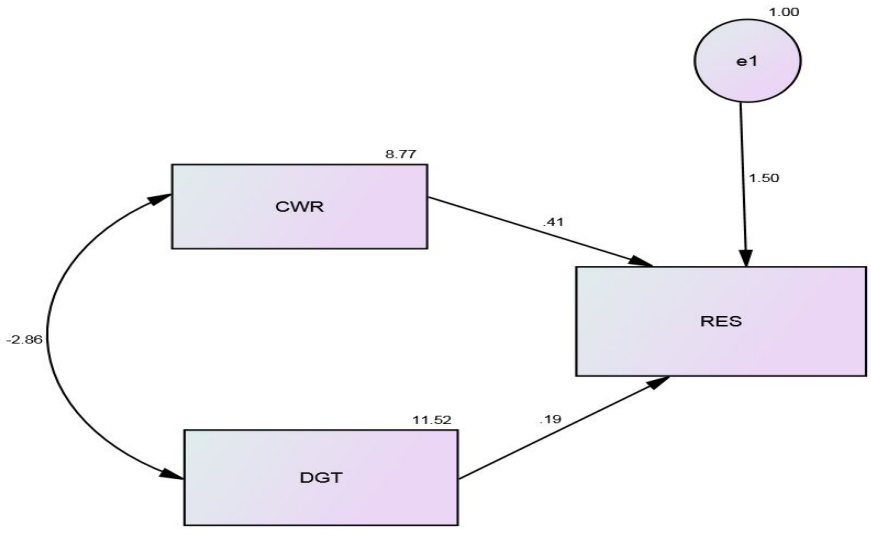

Fig 1 : Unstandardized Estimates

Inference for unstandarized estimates

The values observed for CWR(.41) and DGT(.19) are the unstandardized estimates.. The highest value has been observed for CWR(.41) indicates that customer retention and worker retention is significant in creating resilient supply chain.

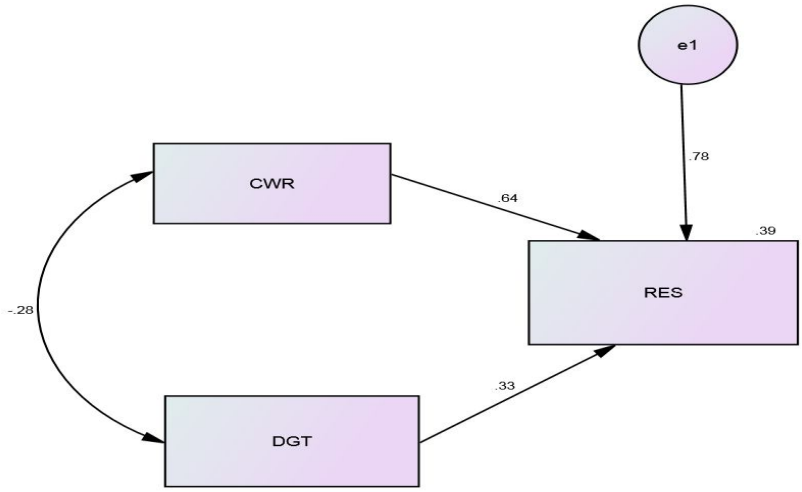

Fig 2 : Standardized Estimates

Inference for standarized estimates

The values observed for CWR(.64) and DGT(.33) are the standarized estimates.. The double arrow represents the covariance between CWR and DGT as -0.28. The negative value -0.28 infers that it shows the negative association between customer & worker retention and digitalisation. If the retention of the workers is low, it will affect the digitalisation efforts made by the company for strengthening the supply chain. The value 0.393 on RES is R square. It shows that 39.3% of the total variance in the dependent variable Resilience (RES) is explained by all the independent variables[Customer retention & Worker retention (CWR), Digitalisation (DGT)] of the model.

The highest value for CWR(.64) indicates that customer retention and worker retention is significant in creating a resilient supply chain.

Interpretation for Model Fit estimates for Resilience[RES]

Adjusted Goodness-of-Fit Index (AGFI)

It should be ≥ 0.80. The achieved value through SEM model is 0.813 which indicates the perfect fit of the model.

Normalized Fit Index (NFI)

It should be > 0.90. The achieved value through SEM model is close to one which indicates the perfect model fit

Comparative Fit Index (CFI)

It should be > 0.90. The achieved value through SEM model is close to one which indicates the perfect model fit

Tucker Lewis Index (TLI)

It should be ≥ 0.90. The achieved value through SEM model is close to one which indicates the perfect model fit

As per the SEM model, any three model fit estimates indicate the utility of the model.

Hence from all the model estimates like AGFI, NFI, CFI and TLI, it can be revealed that SEM model is suitable for predicting the significance of Customer retention & Worker retention[CWR] and Digitalisation[DGT] on Resilience[RES].

It can be summarised from the model that Customer retention & Worker retention[CWR] and Digitalisation[DGT] are the major components in building a resilient supply chain.

8. Discussion(s) from the Study

1. The hypothetical study using Multiple Correlation observed that the significance level less than 5%. It shows that there is a significant association among Customer retention & Worker retention, Digitalisation and Resilience. There is a negative low association between Customer retention & Worker retention and Digitalisation. The negative value(-0.285) indicates that as the customer & worker retention decreases, the efforts to digitalise the supply chain also decrease. The

workforce and the customers are the major human capital for any organisation to strengthen the network of supply chain. There is a positive moderate association between Customer retention & Worker retention and Resilience. The value(0.542) indicates that as the customer & worker retention increases, the resilience to build the supply chain also increases. The retention of workforce and customers helps to design the resilient supply chain for overcoming the challenges of any situation. There is a positive low association between Digitalisation and Resilience. The value(0.148) indicates that the Digitalisation should be higher to obtain higher resilience in the supply chain. The workers are de-motivated due to stringent lockdown norms and lack of employment. Some of the highly skilled workforce joined new organisations and some face harassment at the interstate borders during the process of supplying essential commodities to the people. The highest rate of Worker & Customer - satisfaction, retention, and loyalty is the outcome of the flexibility of the supply chain to strengthen the network of channel partners of the business.

2. The effect of Customer retention & Worker retention, Digitalisation on Resilience using Multiple Regression inferred that Customer retention & Worker retention are highly influential in improving the Resilience (RES**),** followed by Digitalisation (DGT).
3. The significance level less than 5% and high value of Chi-Square test reveals that null hypothesis can be rejected. It can be inferred that designing the resilient supply chain is highly influential in overcoming the challenges of any crisis situation arising due to COVID-19. The supply chain was highly disrupted due to lockdown and it has affected the transportation of fruits, vegetables, medical equipment, FMCG, Oxygen Concentrators and other essential commodities to customers. The disruption in the transportation process to supply essential commodities and emergency medical equipments, people have to face hardships and even lose their lives.
4. The analysis through Cluster Analysis classified the performance indicators into three clusters.

   In cluster 1, balance between LTL and FTL, enhanced workforce retention and assurance of customer order quality are grouped as Customer & Workforce

   In cluster 2, enhanced navigational facilities, digital tracking, route optimization and reengineering are grouped as Digitalisation of supply chain

   In cluster 3, fulfilment centres, demand driven supply chain and design supply chain to meet uncertainty are classified as Resilience supply chain
5. The Strurctural Equation Modelling[SEM] has been designed in the study to determine the impact of Customer retention & Worker retention, Digitalisation on Resilience. The values observed for CWR(.41) and DGT(.19) are the unstandardized estimates. The highest value has been observed for CWR(.41) indicates that customer retention and worker retention are significant in creating a resilient supply chain. The highest value for CWR(.64) using standardized estimates indicates that customer retention and worker retention is significant in creating a resilient supply chain. As per the SEM model, any three model fit estimates indicate the utility of the model. Hence from all the model estimates like AGFI, NFI, CFI and TLI, it can be revealed that SEM model is suitable for predicting the significance of Customer retention & Worker retention[CWR] and Digitalisation[DGT] on Resilience[RES]. It can be summarised from the model that Customer retention & Worker retention[CWR] and Digitalisation[DGT] are the major components in building a resilient supply chain.

9. Conclusion

From the research, it can be concluded that that there is a significant association among Customer retention & Worker retention, Digitalisation and Resilience. Customers & Workforce are the assets for any organisation to strengthen the network of supply chain. It can be depicted that if the rate of customer and worker retention is high, the network of the

supply chain can be strengthened and will have the skills and abilities to face any risks and disruptions arising due to any difficult situation. To overcome any challenges, risks or disruptions, the supply should be resilient. The resilient supply chain will have the potential to provide value added products/services to customers. The resilient supply chain is the integration of various stakeholders, technological innovations and available resources consisting of multiple solutions for the contingencies. The Strurctural Equation Modelling developed through this study validated the results of Multiple Correlation, Multiple Regression, Chi-Square test and Cluster Analysis reflected the role of Customer & Worker Retention, Digitalisation & Reslience for overcoming the riks and disruptions of the supply chain. The study will provide a further range of scope for conducting research into various performance indicators generated through this study for creating a resilient supply chain. It can provide a revelation to investigate the role of performance indicators for creating resilient supply chains for various types of process design consisting of continuous, semi-continuous, intermittent and project processes.

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A STUDY OF MANAGEMENT OF PRIMARY HEALTH CENTRES DURING POST-COVID DIGITAL TRANSFORMATIONS IN INDIA

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ABSTRACT

Globally, digital technologies are being used to support the public health response to COVID-19, including population surveillance cases. Detection, treatment services, and interference evaluation using mobility data and public communication. These quick responses are made possible by billions of mobile phones, large online databases, connected tools, relatively low-priced computing resources, and advances in machine learning and natural language processing. This review aims to capture the variety of technological innovations for the global public health response to COVID-19. connected devices, relatively low-cost computing resources, and advances in machine learning and natural language processing. This review aims to capture the breadth of digital innovations for the public health response to COVID-19 around the world, as well as their limitations and barriers to implementation, such as legal, ethical, and privacy barriers, in addition to organisational and labour force barriers. The future of public health is likely to be more digital., and we examine the need for international regulatory alignment, the evaluation and use of digital technologies to improve infection management and future COVID 19 and other communicable diseases preparedness..The papers should focus on digital transformation.

Keywords:- *COVID-19; Primary Health Centres; Health Care Sector; Health Systems; Pandemics; Public Health; Digital Transformation in Healthcare*

Introduction

Digital technologies are playing an increasingly important role in transforming India's healthcare sector. Everything is possible with the click of a button, from booking doctor's appointments to accessing medical reports and even getting consultations. Corona virus disease 2019 (COVID-19) is an infectious disease caused by the corona virus Severe Acute Respiratory Syndrome (SARS-CoV-2). Before the outbreak in Wuhan, China, in December 2019, this new virus and the disease it causes were unknown. COVID-19 is one of the most contagious diseases to have struck the United States in decades. As governments and public organisations scatter to contain the corona virus's spread, they need all the assistance they can get, including assistance from artificial intelligence (AI).

Over the last few decades, India has made significant strides in the delivery of healthcare in the country. It has been one of the largest sectors in terms of employment and revenue, and it is growing rapidly. In India, healthcare is primarily provided by either public or private providers. The primary goal of public healthcare is to provide primary healthcare through community-level health programmes, with the goal of reducing mortality and morbidity caused by various communicable and non-communicable diseases. The private sector is primarily concentrated in tier I and II cities. When disparities and challenges to equitable, accessible, and high-quality healthcare are compared geographically, the disparities and challenges become clear. Over the years, the National Health Policies have served well in guiding the approach towards a more inclusive healthcare system in the country, with the goal of achieving Universal Health Coverage (UHC) in a graded manner.

Objectives of the Study

- To study the digital transformation in primary health centres in post covid 19
- study of recent trends in digital transformation in health care in India;
- To study the government's initiative on the Indian health care digital transformation in India.

Research Methodology

The information in this paper is derived from secondary sources. For this research paper, secondary data was gathered from a variety of

books, journals, newspapers, annual reports, study materials, and websites.

Limitations of the study

The study is limited to the post pandemic situation in India and recent developments in the health industry. The study is also limited to digital transformation in primary health centres in India.

Literature Review

Huber and Gärtner (2018) investigate the effects of Health Information Systems (HIS) on an operating room module in a medium-sized German hospital. They investigate the differences between autonomy and control in stressful surgical situations, as well as the impact of transparent management on accountability.

Mishra et al. (2019) developed a conceptual framework to comprehend the opportunities and challenges of digitalization for future Community Health Workers (CHWs4) in social services. Opportunities include easy peer-to-peer communication and decision-making, while weaknesses in digital health literacy must be addressed.

Seddon & Currie, (2017). The study identifies three country categories based on their multivariate statistical analysis of cross-country health data and ICT infrastructure: leaders, followers, and laggards.

Result and Discussion

The COVID-19 pandemic has shaken the foundations of India's healthcare system. The overall response to the pandemic saw both the private and public sectors working together. Private hospitals and labs saw a significant drop in revenue as a result of delayed medical tourism and elective procedures. To effectively manage the outbreak, the Indian government leveraged technology and developed a variety of applications at both the national and state levels.

Investing in the Indian Healthcare Sector

Despite initial hiccups, India's healthcare system was able to withstand the pandemic. India's various efforts in the manufacturing of medical equipment, disposables, drugs, and vaccines have established us as a global leader. The healthcare industry appears to be a good place to put your money. The healthcare sector appears to be a promising investment opportunity. Shortfalls such as the required number of beds or access to advanced equipment highlighted during the pandemic highlight the need for a healthcare system that is "emergency-proof" Hospital chains and specialty centres are stepping forward to expand capacity, particularly in Tier II and III cities. Numerous hospital chains have begun to expand in these cities by establishing small clinics and partnering with local doctors.

Health Insurance Awareness

In recent years, there has been an increase in awareness of health insurance products, and more people are investing in health insurance with each passing year. The government's efforts to achieve universal health coverage under 'Health for All' and schemes such as Ayushman Bharat and the National Digital Health Mission have accelerated exponentially. Despite having been planned prior to the pandemic, the efforts to make healthcare more affordable and accessible to the general public provide opportunities for private players to expand their reach and presence.

Medical Tourism

Bangladesh had the highest number of medical FTAs (foreign tourist arrivals) in 2012, followed by the Maldives, Afghanistan, and Iraq. The healthcare sector in India is appealing to foreign patients due to the availability of high-quality services at lower costs than in Western Europe. Medical tourism is a major part of India's economic growth over the next five years. The Ministry of Health and Family Welfare launched the 'eSanjeevani' app, an incorporated web-based telemedicine solution, in August 2019. Its goal is to make healthcare more equitable by bridging the gap between urban and rural India. The eSanjeevan app will be available on all major mobile platforms, including Android and iOS.

The Government Initiatives.

By 2022, India's healthcare market is expected to be worth USD372 billion.. The government intends to increase healthcare spending to 2.5% of GDP (gross domestic product) by 2025. To

address the country's health crisis, the government has launched the NDHM (National Digital Health Mission). Telemedicine, health IDs, health records, e-pharmacy, and digi-doctor services are major components of this mission. Scotland has announced a new era of digital and technological innovations and advancements that are expected to assist communities in meeting those requirements at a much faster pace.

A viewpoint on the Union Budget 2021-22

The government has proposed an expenditure of INR 23,846 crore for health and well-being in the coming fiscal. This is a 137% increase over the previous year, with INR 35,000 crore set aside for the COVID-19 vaccine. In FY2021-22, the Ministry of Health and Family Welfare has been allocated INR 71,269 crore, a 10% increase. The government has announced a new allocation of INR36,577 crore for the National Health Mission and Ayushman Bharat – Pradhan Mantri. Jan Arogya Yojana This includes an increase of 27% in the Department of Health Research. The Ministry of AYUSH (AYUSH) has been allocated INR 2,970 crore, a 40% increase over the previous year (INR 2,122 crore) The allocation for the PMSSY is INR7,000 crore in FY2021-22, up from INR 6,020 crore compare to last year.

Primary Healthcare,

Over the next six years, nearly 64,180 crore will be invested in India's primary, secondary, and tertiary healthcare systems. The PM Atma Nirbhar Swasth Bharat Yojana is a new government initiative aimed at improving the quality of health care in India's urban areas. A portion of the budget will be allocated to the establishment of critical care hospital blocks in 602 districts and 12 central institutions.

Strengthening Primary Health Care

The pursuit of more equitable, comprehensive, and integrated models of health care was first inspired by the Declaration of Alma-Ata in 1978. The Declaration encouraged a focus on primary health care towards the progressive improvement of comprehensive health care for all, and gave priority to those most in need. Today, there is a national imperative to improve access to primary healthcare across the world, which has been described as "a national imperative." A brief highlights the opportunities created by digital technologies in achieving the vision for primary health care. Alma-Ata was an initiative set up by the World Health Organization to improve access to primary and secondary health care across the world. Years later, countries around the world are coming together to reaffirm their aspirations and collective imperative to strengthen primary healthcare.

Digital Technologies

The Declaration of Alma-Ata was agreed four decades ago, but the adoption of new technologies in health services was complex, costly and limited. By 1990, new technologies, most notably the Internet, had begun to have a notable influence. These technologies have shown tremendous value for health as they advanced, became more integrated into all sectors, and became more popular in society. More than 120 countries by 2015 will use digital technologies to advance the Sustainable Development Goals, support universal health coverage and shape the future of primary health care. Digital health technologies are having a significant impact on how health services are delivered and health systems are managed. The impressive trend in national policies for digital health1 reflects the firm commitment to using digital technology to help people manage their health better.

Shaping the Future of Primary Health Care

The World Health Organization has identified the three pillars of primary health care primary care, essential public health functions, and multispectral policy and action. Digital technologies can be used to improve access, affordability, and quality of health care for people and communities. Many examples of digital technologies, outlined below, attest to their versatility, utility, and ubiquity in supporting these pillars in the context of health development.

Primary Care is of the Highest Quality and Primary Healthcare Functions

Digital technologies of all types have become key resources in primary care. Integrating clinical support tools and referral systems into

primary health care can help coordinate care and ensure its continuity across services. Telemedicine, remote care and mobile health are already transforming primary care with home monitoring, medication adjustment, and 3-D printing. Technology can play an important role in patient safety by identifying risks and reducing harm in the primary care setting.

Multispectral Policy and Action

Digital tools are being used to boost health information systems at all tiers, from the local to the district, national, and even international. Hand-held ultrasound and pulse oximeters, for example, are examples of innovative digital technologies that can provide careful examination at the primary care level. Online technologies can also help with self-care and provide solutions to health problems.

Looking to the Future

The World Health Organization says digital health must be made a reality in primary health care. Harnessing digital technologies for health requires cross-sectoral collaboration, commitment, and strategic planning. Policymakers must suggest ways and capacity to recognise, assess, support, and monitor the integration of promising as well as demonstrated technologies into primary care and public health. There are social, economic and other barriers that affect a country's ability to take advantage of these opportunities.

The Importance of Transitioning From Physical to Digital

- In the absence of a centralised system, service providers have conducted new diagnostic tests, resulting in isolated medical records that significantly increase citizens' burden.
- India has one doctor for every 11,000 people, which is far below the WHO standard of one doctor for every 1000 patients. The vast majority of rural Indians lack access to basic health care.
- Due to a lack of infrastructure, it is extremely difficult to retain doctors in villages, as they are afraid of becoming professionally isolated and obsolete. Poor villagers must travel to specialty hospitals in the city to receive treatment. Because government hospitals are already overcrowded with local patients, these villagers must wait their turn, increasing their overall costs.

ASHA is Transforming Rural Healthcare

ASHA is supported by a number of private institutions in addition to the government. The TATA Center, established in 2012 with generous support from the TATA Trusts, has launched a project focusing on NCH (Neonatal and Child Health), a core function of ASHA workers. The centre is developing a series of smart phone apps to assist ASHAs in screening children and infants for a variety of conditions and collecting basic epidemiological health data, such as the baby's height and weight. As a result of technological advancements, the way these ASHA employees perform their duties has changed. They can now track the health of pregnant women and infants digitally and schedule home visits.

Conclusion

Digital platforms have already created a plethora of new opportunities for shaping the future of primary health care and trying to ensure effective public health activities. They have catalysed a host of changes in education, policy and practice, as well as created new patterns of communication, empowerment and engagement. The government's recommitment to the objectives of primary health care and its values of inclusiveness and equity promises more changes in the future, with communications technology central to the vision and its realisation.. The digital transformation of Indian primary health centres has received a positive response and accepted the new technology for simplifying the activities of primary health centres in post-covid 19 pandemic.

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AN ANALYSIS ON THE EMERGENCE OF CRYPTOCURRENCY POST-PANDEMIC

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ABSTRACT

Money which acts like a medium of exchange and store of value has evolved considerably since the moment it was introduced and then used into application. Post- pandemic the concept of virtual money a.k.a cryptocurrency has garnered a lot of attention. This is majorly because of the growing trends in digital technology and the acknowledgement of the fact that all sectors worldwide are severely dependent on these digital transformations. Cryptocurrency based on blockchain technology is one of these transformations that has revolutionized and digitalized the concept of transactions post-pandemic. This research was hence undertaken to understand the change in the consumer's behaviour towards growing crypto market and the advancements that have taken place within it.

Keywords: *Cryptocurrency, digitalized, technology, blockchain, virtual money, pandemic*

Introduction

Covid-19 has to a very large extent transformed the way we live our lives. We went from living our lives in the 'real' world to now living our lives in the 'digital' world. These transformations have had a great impact on several sectors including medical, hospitality, education, finance, etc. Governments worldwide are taking efforts to adapt themselves and be forthcoming of new digital technologies such as AI, 5G Infrastructure and most importantly Blockchain technology [2]. Talking about Blockchain, in simple words it's a digital ledger of transactions which has a decentralized system that helps in preventing duplication and modification of data recorded. The pandemic has in fact played a pivotal role in the increasing importance of blockchain. Several countries have issued blockchain strategies (Australia, People's Republic of China, Germany, India, Switzerland), while others (France, Italy) are developing one. One of the widest applications of blockchain is in Cryptocurrencies. As the name suggests Cryptocurrency is currency in digital format which is supported by block-chain technology. Bitcoin was the first cryptocurrency to exist and is among the most widely recognized ones. Cryptocurrency has been into existence since 2008 but it is only after the pandemic did it reach its peak. In fact, during the covid-19 pandemic, Bitcoin surged by 300% in 2020 due to speculations in the market regarding piling up of digital currencies by investors due to low rate of interests [1]. But what is it that make these digital currencies so appealing? It is the constant developments in the crypto world and its digitalized nature which in this day and era is of utmost importance. To strengthen the previous mentioned statement, following are some noteworthy instances that show how digital transformations in cryptocurrency post-covid have shaped the future of finance [1].

Currently banks are trying to keep up with the digital trend by seeking out cryptocurrencies with a new concept, "Stablecoins." They are digital currencies that are similar to crypto coinage system, but instead of being decentralized I.e. which is not overseen or regulated by governments – they are backed against secure and liquid assets in a domestic currency. Currently, over 80 per cent of countries surveyed by the Bank for International Settlements are analysing versions of stablecoins and what have become to be known as "Central Bank Digital Currency" (CBDCs), led by China and Switzerland [11].

Another notable development is decentralized finance (DeFi) which is an end result of Ethereum, a well-known crypto. DeFi modus operandi is to build a multi-branched financial system that uplifts the functionality and improves the heritage or the traditionality of financial system [7][9]. DeFi has created disturbance in the fintech space and playing a pivotal role to successfully bridge the gap

between fintech and DeFi to attract new customers. Therefore, Blockchain-based accounting holds the possibility to accredit regulators to scan their activities and manage risk management effortlessly.

Aside from this, NFTs, i.e., Non-Fungible Tokens which are formulated on Ethereum Blockchain have been in spotlight. NFT's are digital assets in the nature of tweets, a mix of collectibles and items, domain names, tickets, or anything else that qualifies as a digital asset [9]. The Ethereum blockchain permits artists to own their digital IDs and there by earn royalties through the platform which works as a payment gateway.

Objectives

The aim of conducting this research is as follows:

1. To understand the influence of digital evolution in finance by the way of growing crypto market and its increasing future trends.
2. To understand the consumer's behaviour and expectations towards the digitalized crypto industry.

Literature Review

Peter D. DeVries conducted a research on 'An Analysis of Cryptocurrency, Bitcoin, and the Future' in which he concluded that bitcoin and other cryptocurrencies can prove to be currency solutions in the future and the mechanism behind crypto which is blockchain and cryptography can be the frontier for several digital innovations

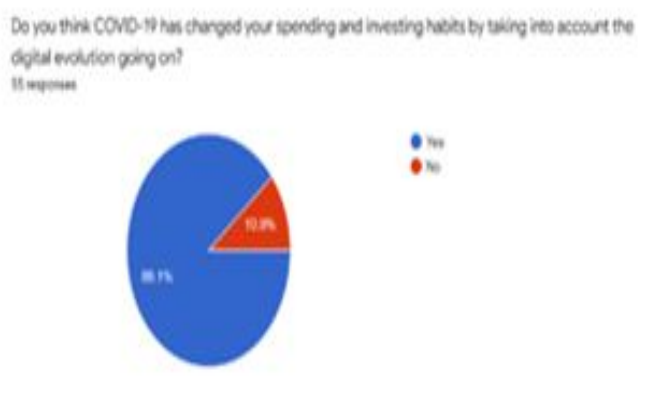
Ryan Farell conducted a research on 'An Analysis of the Cryptocurrency Industry' in which he concluded that crypto industry is ever growing and has a lot of scope because of the increasing number of coins in circulation and also the future probable developments of new coins. He also states that though Bitcoin might not dominate the industry in the future, it still is the pioneer of the digital currency and thus holds a noteworthy position in the crypto history.

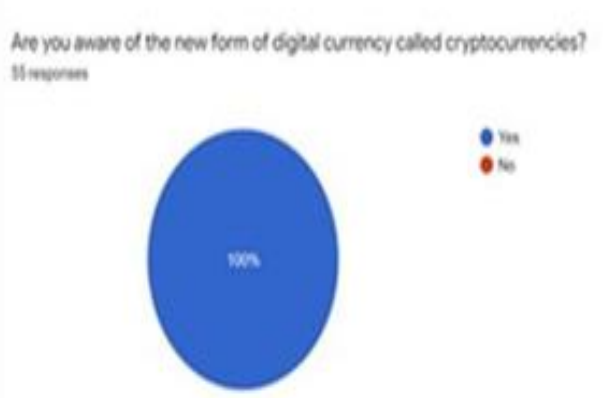
Delloite, in 2020 conducted a survey on 'Global Blockchain Survey' where it states that even though blockchain was once recognized only as a foundation of cryptocurrency and today, global leaders accept it as a strong solution that allows advancement in 3D printing, AI, digital security and many more; all of these being solid strategic investments made by businesses and individuals. Blockchain is an intrinsic and essential tool with which innovative and advanced solutions are formed and promising greater traction towards blockchain in the coming future.

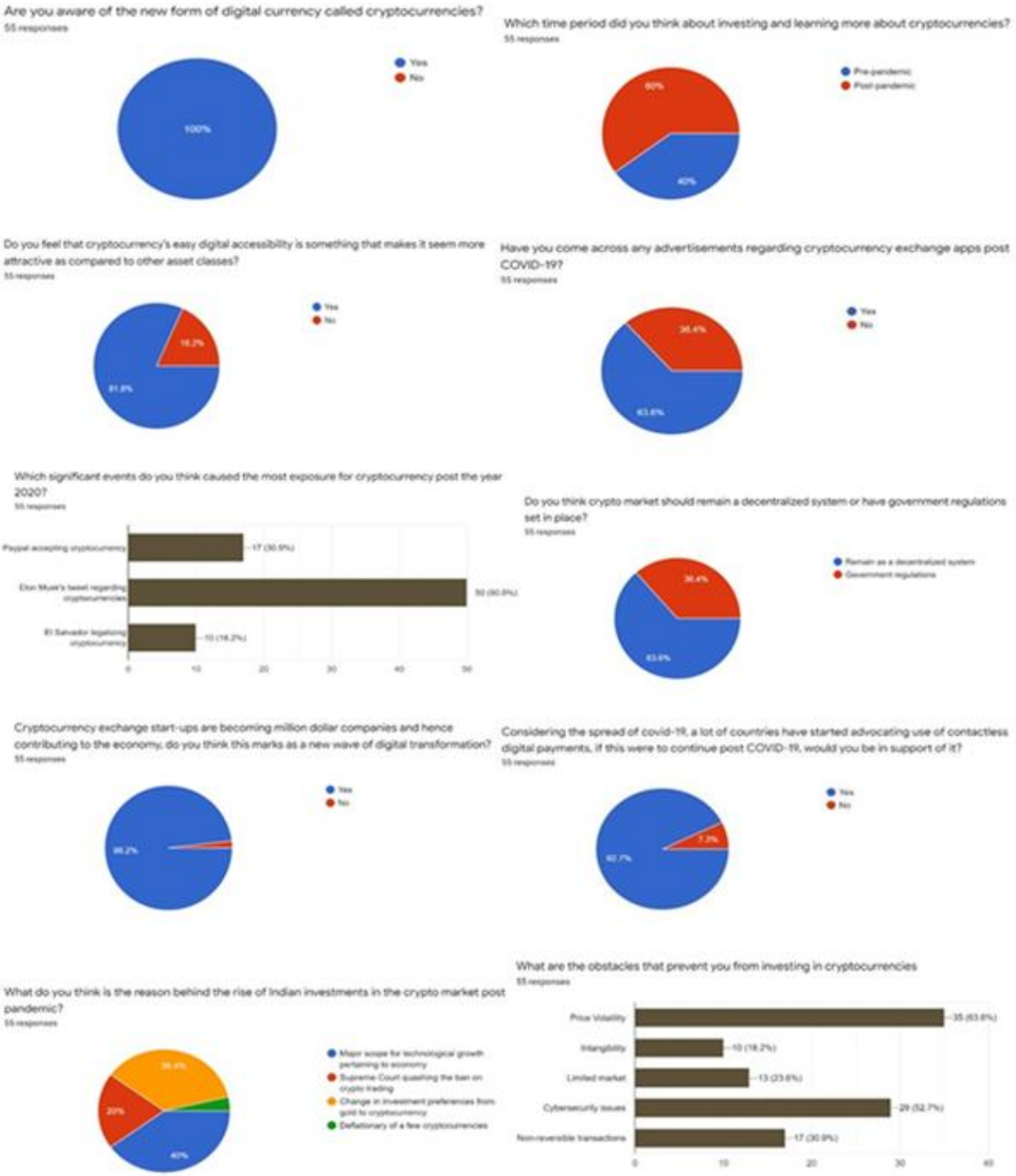
Research Methodology

The research was conducted using both primary and secondary data. Primary data was collected from the respondents through random sampling method. A structured questionnaire was circulated to 55 respondents for measuring their attitude towards the growing cryptocurrency market and its future trends. Along with this, secondary data was collected to support primary data using reliable research papers and websites. The survey conducted has been responded by 55 people, majority being under the age of 18-25 years old.

Data Analysis







Today, cryptocurrencies are the world's fastest-growing asset class with a market cap of $645 billion, up from just $15 billion in 2017. During this pandemic, cryptocurrencies have seen an all-time high along, especially Bitcoin, is now being considered as a safe-haven asset against market volatility and inflation [6]. It was in December 2017 that this cryptocurrency started reaching its peak and recently, April 2021 it reached its highest ever price due to Coinbase's debut in a direct public listing [9]. Government all over the world have been in denial about the rise and popularity of cryptocurrencies. This is because currently the

government has fiat powers, i.e., they can create as much money as they want. In case of cryptocurrencies, the government will also have to earn money like everyone else, which puts them at a significant disadvantage [11]. This is probably the reason why a lot of governments worldwide are trying to come up with their versions of cryptocurrency. A great example of this would be Iceland's national cryptocurrency called Auroracoin.

In October 2020, an American online payment company PayPal announced that it will be launching cryptocurrency buying and selling features on its platform, it also announced plans of allowing cryptocurrency transactions; PayPal is known to possess 350 million users, who will now be capable of adopting crypto as a means of payment [6]. This goes on to show the growing acceptance of crypto as not only a means of investment but also as a means of exchange.

Viewing the recent rise in the crypto market along with its various features, a lot of countries are taking active participation in promoting cryptocurrency transactions; one of them being the Swiss nation region of Zug Canton which said it would accept taxes from companies or individuals of up to 100,000 Swiss francs (about $110,000) in the form of Bitcoin or Ether starting from February 2021[10].

Furthermore, cryptocurrencies are also being used in transactions for precious cargo like, New York based firm Sotheby has announced that it will accept payment in Bitcoin or Ether for its upcoming sale of 101.38-carat pear-shaped flawless diamond. Previously too, Sotheby's sold a Banksy art for $12.9 million (roughly Rs. 95.71 crores) to a significant firm that was bought with cryptocurrency.

In India, after RBI's ban against cryptocurrency was lifted, investors had a significant surge. Many cryptocurrency exchange platforms have been launched and received funding to make crypto investing accessible. One such platform is CoinSwitch Kuber- acquiring over two million users in exactly six months after it launched [9]. As cryptocurrency is becoming more accessible to the final public, more retail investors need a share of the asset class and are willing to pay more.

Conclusion

Looking at the data collected by the authors, both primary and secondary it certainly does show that cryptocurrency and its market has taken advantage of the technological wave caused by the global pandemic. The COVID-19 pandemic has made people digitalize their investing and spending habits to a very large extent, as can be seen that 60% of the respondents thought about investing in cryptocurrencies post pandemic. From banning advertising cryptocurrencies and its exchange companies[4], to adapting the easy accessibility of cryptocurrency and having cryptocurrency exchange companies become a multimilliondollar industry; people have surely adapted well to the 'new normal'. With more than 60% of the respondents wanting cryptocurrency to be remain a decentralized system and 90% being in favour of this digital transformation, will cryptocurrency have a promising future and become the 'new normal'? Only time will tell.

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AN APPRAISAL ON ROLE OF PUBLIC HEALTHCARE POLICY IN INDIA DURING COVID-19 PANDEMIC

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ABSTRACT

Right to health is a fundamental right guaranteed by Constitution of India and correspondingly a duty on states to provide good public healthcare facilities. Ever since the spread of Covid-19, the public healthcare system in India broke down because no states adopted effective implementation mechanism to stop the spreading of virus which ultimately took away the lives of many people. This pandemic situation is an eye opener which made us to realize the significance of public healthcare. Government has framed many public health policies; the facilities provided by the government are not sufficient in India when compared to developed countries but India being a developing country able to invent a vaccine for novel corona virus and supported the developed nations to control the present pandemic situation. In the present situation, the judiciary has played a vital role by issuing directions with respect to SOP guidelines, issue of ration kit to needy people, cleanliness, etc., to control the pandemic situation. The government has made new healthcare policies to protect the interest of frontline healthcare workers who are the real soldiers saving many lives. The government of India has laid down new policy for distribution of vaccine to all on priority basis, but the question is when India will become self-sufficient to handle such situation. This research paper will throw light on the role of judicial in public health, the policies framed by the government, implementation mechanism, role of NGO.

Keyword: *Public health, Policy, Judiciary, Pandemic, Non-Governmental Organization, Fundamental right, Health workers.*

Introduction

Public health is a matter of great concern for every country. India being a developing nation and with vast population making efforts to improve the health of people through effective public health system. Public health system means improving the health of public by providing health care facilities, promoting healthy lifestyle, prevent spreading of diseases, etc. The public health system protects local inhabitants or entire country population with the help of health professionals and public health policies. India since its independence, framing national public health policies from time to time to protect public health which is also a duty of all the states as incorporated in Directive Principles of State Policy of Constitution of India. Public health is a fundamental right impliedly included in right to life under Article 21 of the Indian Constitution. The honorable Supreme Court of India has emphasized the same in many cases.

For the first time public healthcare was given importance in 1946 on the basis of the recommendations of Bhore Committee which was constituted by British India Government in 1943 to assess the health condition of India by conducting survey throughout India. The committee was headed by Sir. Joseph Bhore. The committee suggested the following recommendations:

- Integration of preventive and curative services.
- Development of Primary Health Centre at two stages with short term measures and long term programmes and establish hospitals, providing services of doctors, nurse, midwives, etc.
- Changes in medical education through training programme in preventive social medicine to prepare social physicians.

At present, the Government of India following the same measures giving importance to primary health centers to improve public healthcare system and the biggest challenge is funding of public healthcare system because public health facilities include establishing research institutions, creating health professional jobs, training infrastructures, etc. Public healthcare system which is funded by few sources is assisting middle class and upper class population in availing the health services and the low class people are not able to access the same which has divided India. To overcome this discrimination, National Health Policies have been framed to provide health

care services to all people at affordable prices specially during the pandemic situation.

National Health Policy

Development of national health policy is a dynamic process and needs to meet the changing situation in all circumstances specially an unexpected pandemic situation like COVID-19 virus spread. The WHO is continuously supporting its member's states to have strong health policies to improve the health of its people. India being a member of WHO, has framed National Health Policy in 1983, 2002 and 2017 as a part of Five Year plan.

The primary objective of health policy is to attain highest possible standard of public health and improve public health system. Health policy of 1983 concentrated on population stabilization through small family norm, medical & health education, primary health center to prevent infections, promote and rehabilitate measures to improve public health system. The 1983 policy has incorporated 20 point programmes to improve the standard of health. It concentrated on re orientation of health personnel, private practice by the government medical experts, giving importance to indigenous medicines, health education, priority for emergency needs, management information system relating to healthcare, health insurance, health legislations, medical research, inter-sectoral cooperation and review of progress. India took all possible measures to improve public health through 1983 policy and we can say that it achieved all the objectives which was planned in the health sector.

National Health Policy of 2002

As the situations changed and demanded new policy to improve the standard of health, India framed a new policy in the year 2002 with the objectives of accelerating the achievements of health sector in socio-economic circumstances which was prevailed then. The policy concentrated on financial resources where both Centre and State Governments concentrated on raising funds to expand the healthcare facilities to all people at affordable price. The policy also adopted the equity principle and tried best to distribute medical facilities to all without any discrimination between poor & rich which was not removed in 1983 policy. This policy concentrated more on providing facilities to vulnerable sections of the society including children, women and socially backward sections. The main target of 2002 policy was to extend public health infrastructure which was far away from the people. India planned to improve medical and para medical services, providing health equipment in hospitals, essential dugs, to establish more number of hospitals to reduce crowd in existing health center which was very much in need then. The Central Government askes local self-government to take initiative and adopt close supervision of health facilities in both rural and urban areas. Since 1983, medical education was not concentrated equally in all parts of India, as a result of which 2002 policy gave importance for establishing medical colleges with adequate syllabus to meet the primary healthcare needs of people in the society. The most important initiative was use of generic medicines to overcome from the fear of globalization of medicines which resulted in increase of price of drugs. For the first time mental health was given importance and measures were adopted through clinical centers to overcome from mental disorder which was called as spiritual affliction.

The increasing need of healthcare facilities, private sectors were given opportunities to join hands with government to provide good healthcare system in India. National Disease Surveillance Network was established to tackle statistical information relating to polio and HIV/AIDS which increased enormously during 1990s. The policy also concentrated on standard food and drugs for people to improve their health specially women and infants to reduce the death rate of infants.

National Health Policy 2017

The first two polices played a vital role in improving the standard of life and health of people. After a long period of fourteen years, India framed a new set of policy to tackle new challenges in public health sector. In 2017 new policy was laid down with new hopes and objectives like inform, clarify and strengthen the government, role of government in shaping the health care system in all aspects to meet the

requirements of public including investment in health sector, organization of healthcare services, prevention of diseases, access to technology, encouraging medical pluralism, building knowledge base, better financial protection strategies and strengthening health insurance.

The main mantras of 2017 policy are professionalism, integrity, ethics, equity, affordability, universality, patient centered, quality care, accountability, decentralization, reinforcing trust in public healthcare system which was lost due to corruption, negligence, etc in healthcare system. Healthy and good environment contribute a lot to improve public health. As a part of this, Government of India coordinated with the following initiatives:

- Swachh Bharath,
- Balanced health diet and regular exercise
- Addressing tobacco and alcohol abuse
- Yatri Suraksha
- Nirbhaya Nari
- Reduce stress and improved safety at work place
- Reducing indoor and outdoor pollution

The policy also initiated developmental strategies and institutional mechanism and to create Swasth Nagarik Abhiyan a social movement to create awareness about public health.

The policy also encouraged school education about health by adopting the same in syllabus to educate young generation about significance of health. To strengthen the force of ASHA women community, the policy insisted the frontline health workers to assist ASHA women to prevent spreading of non-communicable diseases and they are really playing a significant role in the present pandemic situation by pledging their lives. The government through this policy tried closing the gap between human resource and infrastructure. Many new National Health Programmes are introduced by the government to improve public health such as RMNCH+ services, child and adolescent health, interventions to address malnutrition deficiency, universal immunization, elimination of leprosy, control of TB, HIV/AIDS, supportive supervision, emergency care, disaster preparedness, use of AYUSH medicine, etc.

After completion of medical education, medical practitioners are not ready to render their services in remote rural areas which is a big hurdle in improving public health in rural area. To overcome this, the policy is giving attractive financial and non-financial incentive to doctors to serve in rural areas.

The big question before the government was legal framework for implementation of national health policy in an effective manner. The question is can we come to the conclusion that right to public health is fundamental health? The Part-IV of Indian Constitution speaks about Directive Principles of State Policy which imposes duty on all the state to fulfill their duty towards the society provided it should be economically feasible to perform them. As the research paper mentioned in beginning, the public health system means health facilities shall be provided at reasonable and affordable price and sometime for free of cost. If public health is treated as fundamental right and the violation of the same become offence and state entity can be held responsible for the same. The constitutional provisions relating to right to health and public health will be discussed subsequently.

Right to Health and Constitution of India

According to WHO right to health means right for complete physical, mental and social wellbeing and not just absence of diseases. Article 21 speaks about right to life and personal liberty which can be taken away by due process of law. Right to life includes many implied rights such as right to education, food, environment, etc. but the concept of public health which has very wider interpretation covering the whole population of India. As mentioned above providing public healthcare facilities depends upon the economic stability of state governments.

The honorable Supreme Court of India in a leading case **Paschim Banga mazdoor Samity v. State of West Bengal** while interpreting Article 21, held that as a welfare state each state has a primary responsibility to provide medical aid to all and at the same time it should provide adequate medical facilities for needy people. Article 21 imposes obligation on

all state entity to safeguard right to life of every citizen by providing healthcare facility and to preserve the human life.

All the government hospitals have obligation to provide best medical treatment at affordable price and failure of the same may results into violation Article 21.

In the above said case, the Supreme Court laid down some guidelines which are as follows:

- Adequate medical facility at government hospitals to stabilize the health condition.
- Hospitals at district and divisional level shall be improved with goods equipment and facilities to treat patients without any delay.
- Availability of sufficient beds as per the requirements through centralized communication system.
- Proper arrangement of ambulance facility at each public health centers with adequate equipment.

As mentioned above, Directive Principles of State Policy plays a significant role public healthcare system in India. Article 38 imposes liability on all the state governments to secure social order for the welfare of the society and same is incorporated in preamble which says securing economic and social justice to all. Article 39 (e) deals with workers right to health at work place and Article 41 imposes duty on state to provide public assistance to those who are sick and disabled. All the health policies ensure good health of infants and mother, to protect this Article 42 provides maternity benefits to all mother through labour laws.

Article 47 says it's a primary duty of state to improve public health, secure justice, human condition of work, extension of sickness, old age, disablement and maternity benefits and it also imposes obligation on state to prohibit consumption of intoxicate substances. Article 48A ensures that state shall provide pollution free environment for good public health by constructing public parks, growing more trees, etc. As per the decision of the Supreme Court it is a fundamental right impliedly included under article 21. If these obligations are not fulfilled, the court can enforce duty against the public authority to pay penalty for dereliction of duty as per the prescribed law regardless of the financial resource of the state.

The Food Corporation of India being a state agency should implement Article 47 to improve the health and should not allow substandard food grains to reach public for consumption and serious action should be taken against the defaulter.

Under Article 243 G the local self-governments have duty to improve public health by providing following facilities:

- Clean and safe drinking water
- Health and sanitization
- Family welfare
- Women and child development
- Social welfare measures for physically disabled people

Health Policy and Pandemic

Pandemic situation is not new to the world, since time immemorial the world is facing such situation because of many new diseases like plague, H1N1 and now COVID 19 virus which has shaken the entire world and India is not exempted from such unexpected and unprecedented health emergency which took away many lives and shaken economy to the core. When compared to developed countries, India fought very effectively against the said virus and big thanks to all the health workers who saved many lives without caring for their life and family. When whole world was with their family, these frontline health workers dedicated themselves to overcome this pandemic situation. Because of this pandemic situation India is moving towards a universal health system and supporting & contributing for R& D in drugs to cope up the situation. The Covid-19 related health services issues like hospital beds, ICU facility, research on vaccine is addressed in large scale. When compared to other countries, India made good efforts in tackling these issues with expert experience and able to minimize the spreading of virus which even developed countries could not do it. At present, the second wave of the virus has started and Indian Government is trying best to handle the situation without damaging the economy of the country.

Since March 2020 and till date new SOP and lock down guidelines are issued by governments to prevent spreading of virus and to protect public health, but the few people are

not following the instructions as a result of which government deputed police officials and marshals to enforce strict SOP guidelines. Because of lack of health facilities in government sector, assistance from private entity is need of the hour. To implement this, health policy underwent a drastic change and paved way to purchase of healthcare equipment from private player is allowed. On the other side, private corporate players started taking advantage of the situation through creating monopoly in selling healthcare products such as mask, sanitizers, etc and they made huge profit out it. To curb this corporate monopoly, government framed policy and started purchasing the same from corporate entities and supplied it to public. As a precautionary measure, government conduct free Covid -19 random test for free of cost which going on still. All these measures shows that India's health policy is really a dynamic which is meeting the requirements of public.

The Union Budget 2021 placed by the Finance Minister Smt. Nirmala Sitaram said 137% increase in healthcare spends to address the increasing need of healthcare facility and additional spend will be there to go towards vaccination, preventive health and to meet the national medical infrastructure focusing on critical care to handle such situation in future.

As per Ministry of Health & family Welfare by April 2020, the number of ICU beds stood at 27,360 and by January 2021 this increased to 36,008 and oxygenated bed count rose by over 152% in the same period to meet the pandemic situation. The Central government procured nearly 38,867 ventilators for Rs. 1,850 crores and same was distributed in state to treat infected people. This proves that India is really moving towards good public health policy.

Health Policy and Vaccination

To cope up with the present situation vaccines are developed by many countries to reduce the health risks which caused by various types of virus and vaccines reduces infectious diseases and improve the quality of health. Invention of vaccines is not possible in all countries because of non-availability of funds and technology. To overcome this, Universal Immunization Programme has been adopted in the world through which vaccine will be made available in free market through decision making framework which confers both economic and health benefits to public. In the recent time many R&D were made to invent vaccine to defeat corona virus which was supported by Government of India. The Serum Institute of India got permission from Drug Controller General of India to conduct clinical trials and another company Bharat Biotech in collaboration with US based company also tried for clinical trial of new vaccine. In India two vaccines namely Covishield and Covaxin were approved as an emergency drugs to fight the virus. The national vaccine drive started from 16 January, 2021 establishing 3,006 vaccine centers across India. On the first day nearly 1,65,714 people received vaccine and government facilitated this through a vaccine web portal by giving information about vaccination. By 1st March 2021, 14 million healthcare and frontline workers received vaccine but it did not reach the expected target. Through web portal government made people to register to receive vaccine with two dose having 8 weeks of gap period. After vaccination of health workers, subsequently senior citizens received vaccines. By adopting this preferential treatment government consider the requirement of people who are more vulnerable to the virus. The procedure followed for vaccination is a part of policy framework which India adopted and India also exported drugs and vaccines to other countries which are in need of it but subsequently same was criticized in order to meet the demands for vaccine increased due to second wave of infection in India.

To conclude, since ancient period public health policy has been playing a vital role improving the health standards of people. Many legislations and policy are being framed to provide good healthcare system but drawbacks of the existing system are corruption at every stage, negligence by hospital authorities, lack of accountability, lack of quality care, unethical practice, poor cooperation between public & private sectors, hurdles in accessing healthcare services and important drawback is people are not aware about the healthcare facilities available to them. To overcome these lacunas, government should take stringent action against defaulter and create awareness among

public about healthcare facilities provided by the government only then the purpose of framing national health policy will be fulfilled.

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A STUDY OF ATTRITION IN IT INDUSTRIES IN PUNE

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ABSTRACT

Growth & Survival, under present dynamics, uncertain business environment, of an organization depends upon the talents and efforts of these human resources. People prefer to work in an Organization to satisfy their needs and to have better career opportunities. Now a days companies find that, it has become very difficult to get a right type of a person to be placed at the right place, at the right time. Organizations have to face competition, by way of accepting modern technology which is developing at a faster rate than the development of the person to use them effectively. So the candidates having potential to learn new skills are recruited and trained for doing the job, but there is no guarantee that the employees, who are in the search of better job opportunities, will remain engaged. As a result employees have to face the problem of attrition and in order to retain the employees they have to have effective attrition management strategies to be implemented effectively. This study analyzed the responses from 128 employees; who were employed in IT organizations. This study focused on exploring the various reasons of employee attrition in IT Industry in India with special reference to Pune City along with an attempt to identify the factors / causes which tend to increase employee attrition in IT sector. It also suggest remedial measures to control the attrition and steps to reduce the rate of attrition in future.

Keywords: *Attrition, IT Sector, Digital Service, Employers*

Introduction

India has become one of the reliable destination for the diversity of the digital service in the global IT market by way of contributing to 75% of deliveries for the companies located outside India. It has also been estimated that the growth of IT to reach 310 Billion USD by 2021, from the present 180 Billion USD. However the Indian IT industry has to face the challenge of employee attrition. In order to overcome the problems of attrition, Employers and Human Resource Managers of the IT industry are trying to solve this problem on priority basis, as it is adversely affecting Organization's profitability. There is need to identify reasons of attrition among IT professionals, so that effective steps can be taken by the employers and HR managers not only to overcome the present problem but also plan for avoiding problems like attrition/turnover. Thus this study focused on exploring the various reasons of employee attrition in IT Industry in India with special reference to Pune City along with an attempt to identify the factors / causes which tend to increase employee attrition in IT sector. It also suggest remedial measures to control the attrition and steps to reduce the rate of attrition in future.

Literature Review

Several research scholars have identified various causes of attrition in IT industry in India. Dhillon Manju (2016) has found these causes which include ambitions or career aspirations, personality factors, inadequate training and ineffective management, parental & family mobility, conflicts between work strategy and goals, wrong perception of MNCs, lack of motivation, job related factors. Devika P (2016) has stated such causes as Employees skills are in demand, non-challenging jobs, work timings, family pressure and personal reasons, health problems due to imbalance in work life pattern, salary and other benefits, work environment, lack of promotions, higher level of stress, and attitude of employees. Palanivel (2017) concluded that the specific reasons for attrition are varied in nature, although "the main reason even today, for changing jobs is for higher salary and better benefits. Other reasons of attrition in IT sector were found, which include rude behavior of employees, work-life imbalance, the job not meeting expectations, employee miss alignment, feeling under developed, coaching & feedback are lacking, decision making ability, inadequate people skills of managers, instability of organization, raises & promotions

are frozen, faith & confidence shaken, unavailability of growth opportunities. Sunanda K (2017) investigated the factors which increase the attrition rates in IT companies which were grouped under five main headings namely working conditions, career growth, organizational culture, trust factors and work pressure. Rama Devi and Sangeetha (2019) conducted research to find out the main causes which increase the employee turnover in BPO companies.

Impact of attrition can be discussed under direct and indirect categories, where direct impact is the result of neglect by the organization that human resources are the key factor of the success of the company. So it is necessary to take care and develop & implement effective human resources policy in the interest of employees and the organization. Attrition of talented and experienced employees result in a great loss for the organization. Indirect impact can be loss of popularity of brand image of the organization, resulting attracting talented people, and poor image in the society. Effective employee retention is a systematic effort by employees to create and foster an environment that encourages current employees to remain employed by having policies and practices in place that address their driver needs. Compensation can shape who leaves and stays. Job design and customization can tailor jobs to employee needs. Encouraging social ties among colleagues and selecting appealing locations for work places are other ways to retain talented workers". Based on the literature review, the study formulated following hypothesis as:

H1: The age of the employee is negatively associated with their tendency for attrition (H_0)

H2: There is no difference in the reasons of attrition among IT employees. (H_0)

H3: Companies effectively match the Job Specification (Requirements) with the Profiles (Skills) of the candidates applying for the job.

Design and Methodology

The study collected responses from the sample employees of sample IT organizations located in and around Pune city, with the help of questionnaire after pretesting, interviews from some respondents who were not able to spare time for filling questionnaire and observation. Sampling frame covered 128 employees; who were employed in IT organizations. Sampling method used for the study was convenience sampling since data was to be collected from those respondents who were interested about topic of the study. The data was interpreted with the help of statistical tolls like percentage, mean values and for the purpose of hypotheses testing; two test were applied, to arrive at conclusions which provided base for giving suggestions.

Results and Discussion

Table 1 Gender-wise Classification of the Respondents

Gender	>35	<= 35	Total	%
Male (%)	32 (100%)	60 (62.5%)	92	71.87
Female (%)	-	36 (37.5%)	36	28.13
Total (%)	32 (100%)	96 (100%)	128	100

When the Gender-wise classification of the respondents from IT industry is considered, it is observed that out of 128 total respondents, males accounted for 71.87%, where as female respondents accounted for 28.13 percent. When composition of total population is classified into senior employees age group of 35 years & more and those employees from the age group of less than 35 years of age which is known as millennium population, it is observed that males continued their jobs even after 35 years of age as females preferred to get settled and to serve family members. The composition of millennium population reflects, a different picture as male employees accounted for 62.5% and female employees were 26 out of 96 (37.5%), as a result of favorable attitude of modern society which is aiming at achieving socioeconomic development of the country. (Table 1)

Table 2 Age-GroupWise Classification of the Respondents

Age Group (Years)	Sr (x)	Jr (y)	Total	%
Up to 30	-	56 (58.33%)	56	43.75
31-35	-	24 (25%)	24	18.75
36 and above	32 (100%)	16 (16.67)	48	37.5
Total	32 (100%)	96 (100%)	128	100

Table 2 deals with age-wise classification of the population covered by the study, when those who are aged up to 30 years are accounted for 43.75% of the total 128 respondents and those from 31-35 years age group covered 18.75% which reflects that younger employees prefer to join employment for achieving rapid progress in career and achieving higher standard of living through earning level of income.

Table 3 Educational Qualifications of the Respondents

Qualifications	Sr (x)	Jr (y)	Total	%
Graduate	-	64 (66.66%)	64	50
Post Graduate	32 (100%)	28 (29.17%)	60	46.88
Professional		04 (4.17%)	4	3.12
Total	32 (100%)	96 (100%)	128	100

Regarding educational qualification, graduates account for 66.63% in case of younger employees where as all the respondents from senior employees were having post graduate educational qualifications. (Table 3)

Table 4 Experience of the Respondents

Experience (Yrs.)	Gen X	Gen Y	Total	%
Up to 3	-	04 (4.17%)	4	3.12
4-6	-	40 (41.66%)	40	31.25
7-10	-	20 (20.83%)	20	15.62
11-15	20 (62.5%)	28 (29.17%)	48	37.5
16 and above	12 (37.5%)	04 (4.17%)	16	12.51
Total	32 (100%)	96 (100%)	128	100

Regarding experience of the respondents, it can be observed from Table No.4 that 62.5% of senior employees had 11-15 years where as in case of younger employees, 41.66% of them had 4-6 years of experience only. (Table No. 4)

Table 5 Department-wise Classification of the Respondents

Department	Sr (x)	Jr (y)	Total	%
IT	20 (62.5%)	16 (16.67%)	36	28.13%
Development	-	32 (33.34%)	32	25%
Systems	-	08 (8.33%)	8	6.25%
Quality	-	20 (20.83%)	20	15.62
Software	-	20 (20.83%)	20	15.62
Engineering	12 (37.5%)	-	20	15.62
Total	32 (100%)	96 (100%)	128	100

The respondents covered by the study were from different departments, of which 68 out of 128 (53.13%) were from IT and Development department where senior employees accounted for 62.5% of total 32 and 50% from Jr. employees, followed by quality and Software departments. (Table No 5)

Table 6 Salary of the Respondents

Salary (INR 1000 Per Month)	Sr (x)	Jr (y)	Total	%
Up to 30	-	20 (20.83%)	20	15.65
31-50	-	48 (50%)	48	37.5
51-70	04 (12.5%)	24 (25%)	28	21.85
71-100	04 (12.5%)	04 (4.17%)	8	6.25
100 and above	24 (75%)	-	24	18.75
Total	32 (100%)	96 (100%)	128	100

Regarding salary income of the respondents, in case of the senior employees it ranged from 5100 to 1 lakh and more and for Jr respondents it ranged from 30000 to 70000 INR where as almost 50% of them had it in the range of 30 to 50 thousand INR.

Table 7 Marital Status of the Respondents

Status	Sr (x)	Jr (y)	Total	%
Unmarried	-	36 (37.5%)	36	28.12
Married	24 (75%)	60 (62.5%)	84	65.63
Divorced	08 (25%)	-	8	6.25
Total	32 (100%)	96 (100%)	128	100

When marital status by the respondents was considered 74% of the Sr respondents were married and the rest of them were having diverse status whereas in case of juniors 37.5% of them were unmarried and the rest were married (Table 7)

Table 8 - Number of family member dependents on the Respondents

No of member	Sr (x)	Jr (y)	Total	%
Up to 2	20 (62.5%)	44 (45.83%)	64	50
3-5	12 (37.5%)	20 (20.84%)	32	25
Nil		32 (33.33%)	32	25
Total	32 (100%)	96 (100%)	128	100

In the context of number of family members of the respondents, 62.5% and 45.83% of Sr and Jr respondents respectively had family members up to 2, and one third of Jr respondents were not having family members dependency on them. (Table 8)

Table 9 Respondents having other source of income

Source	Sr (x)	Jr (y)	Total	%
Yes	04 (12.5%)	52 (54.17%)	56	43.75
No	28 (87.5%)	44 (45.83%)	72	56.25
Total	32 (100%)	96 (100%)	128	100

Table No. 9 shows respondents other sources of income, where 56.25% of the total respondents had no such sources, but in case of Jr. respondents 54.17% of them had other sources of income, which reflects tendency of the Jr respondents to earn more income so as to have better standard of living.

Table 10 - Condition for employees to serve notice period

Condition	Sr (x)	Jr (y)	Total	%
Mandatory	-	48 (50%)	48	37.5
Non-Mandatory	32 (100%)	48 (50%)	80	62.5
Total	32 (100%)	96 (100%)	128	100

In case of IT industry to control hopping of the employees even during the notice period, some companies make condition for an employee to serve for notice period, especially in case of Jr employees, in order to reduce cost of recruiting and training of such employees. (Table 10)

Table 11 Matching of job specification and profile with those of the respondents

Response	Sr (x)	Jr (y)	Total	%
Yes	32 (100%)	20 (20.83%)	52	40.62
No	-	44 (45.84%)	44	34.38
Don't know	-	32 (33.33%)	32	25
Total	32 (100%)	96 (100%)	128	100

Table 11 shows whether there is matching of job specification and profile with role of the respondents. In case of Sr respondents, all of them have responded positively as against 20.83% of Jr respondents, while 33.33% of junior responded as they do not know about it. So majority of the Jr respondents feel that there is a mismatch of the clear job specifications with the profile of the respondent.

Table 12 Equal Treatment for all the employees by the Company

Response	Sr (x)	Jr (y)	Total	%
Yes	24 (75%)	16 (16.67%)	40	31.25
No	08 (25%)	24 (25%)	32	25
Don't know	-	56 (58.33%)	56	43.75
Total	32 (100%)	96 (100%)	128	100
(Source - Primary Data)				

Regarding equal treatment for all the staff as requested, 75% of the Sr employees and only 16.67% of the Jr employees were aware of it and the rest of them were not knowing (58.33%) about it and 25% of them responded negatively about it (Table 12).

Table 13 Employees discrimination in the Company

Response	Sr (x)	Jr (y)	Total	%
Yes	08 (25%)	24 (25%)	32	25
No	24 (75%)	16 (16.66%)	40	31.25
Don't know	-	56 (58.34%)	56	43.75
Total	32 (100%)	96 (100%)	128	100
(Source - Primary Data)				

In case of employee discrimination in the company, 25% of the respondents from Sr and Jr categories responded positively whereas 75% of the Sr respondents and 16.66% of Jr categories responded negatively, and 58.34% of them were not knowing about it. (Table 13)

Table 14 Adoption of HRM strategies to control attrition by the Company

Response	Sr (x)	Jr (y)	Total	%
Yes	24 (75%)	16 (16.66%)	40	31.25
No	08 (25%)	20 (20.83%)	28	21.58
Don't know	-	60 (62.5%)	60	46.87
Total	32 (100%)	96 (100%)	128	100

Regarding adoption of HRM strategy, 75% of the Sr respondents and 16.67% of Jr category responded positively while the rest of them responded negatively and 62.5% as not knowing about it. (Table 14)

Table 15 Conducting exit interview of the employee by the Company

Response	Sr (x)	Jr (y)	Total	%
Yes	16 (50%)	48 (50%)	64	50
No	16 (50%)	32 (33.34%)	48	37.5
Don't know	-	16 (16.66%)	16	12.5
Total	32 (100%)	96 (100%)	128	100

While responding about conducting exit interviews 50% of them from each category of the respondents responded positively and the rest of them either negatively or not knowing about it.

Table 16 Attempt by the Organization to retain resigning employees

Response	Sr (x)	Jr (y)	Total	%
Yes	20 (62.5%)	68 (70.83%)	88	68.75
No	12 (37.5%)	16 (16,67%)	28	21.88
Don't know	-	12 (12.5%)	12	9.37
Total	32 (100%)	96 (100%)	128	100
(Source - Primary Data)				

Regarding attempt made by the company for retaining the resigning employees (62.5%) of Sr and 70.83% of the Jr category of the respondents responded positively and rest of them responded negatively and not knowing about it. (Table 16)

Table 17 No. of Organizations served by the respondents

No of Organizations	Sr (x)	Jr (y)	Total	%
Nil	-	16 (16.67%)	16	12.5
Up to 2 Years	20 (62.5%)	32 (33.33%)	52	40.63
3-6 Years	12 (37.5%)	32 (33.33%)	44	34.37
7 Years and above	-	16 (16.67%)	16	12.5
Total	32 (100%)	96 (100%)	128	100

While responding to number of organizations served by the respondents, 62.5% of the Sr and 33.33% of the Jr category of the responded up to two organizations and 37.5% of Sr and 33.33% of them, for the period of 3-6 years. In case of Jr respondents 16.67% of them had served either for 7 and more organizations. (Table 17)

Hypothesis Testing

H1: Employees 'age has significant impact on their tendency for attrition (H_0)

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	17.902[a]	8	.022
Likelihood Ratio	18.590	8	.017
Linear-by-Linear Association	1.912	1	.167
N of Valid Cases	128		

Chi-square test with 95% level of confidence was done to test the hypothesis related to impact of age on employees' tendency of attrition. As the calculated value of the Chi-square (0.022) was less than the level of significance (0.05). Thus the study concluded that the age have significant impact on the tendency of attrition among employees.

H2: There is no significant impact of gender on attrition among IT employees. (H_0)

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	58.401[a]	4	.000
Likelihood Ratio	60.642	4	.000
Linear-by-Linear Association	53.156	1	.000
N of Valid Cases	128		

Chi-square test with 95% level of confidence was done to test the hypothesis related to impact of gender on employees' tendency of attrition. As the calculated value of the Chi-square (0.00) was less than the level of significance (0.05). Thus the study concluded that the gender have significant impact on the tendency of attrition among employees. With comparison of mean, it was found that the female employees has shown low tendency of attrition than male employees.

H3: Companies effectively match the Job Specification (Requirements) with the Profiles (Skills) of the candidates applying for the job.

One sample t-test with 3 as test value and 95% level of confidence was done to test the hypothesis related to match the Job Specification. As the calculated sig value (0.21) was more than the level of significance (0.05). Thus the study concluded that the Companies does not effectively match the Job Specification (Requirements) with the Profiles (Skills) of the candidates applying for the job.

Conclusion

Career Growth - is one of the criteria for the age group < 35 years as compared to senior employees. This shows with the age getting settled and not much interested in hopping the job. Salary - Biggest criteria for both the age groups indicates that salary is the main reason for job hopping. Work Culture - One of the finding in the survey was work culture of the organization and typical life cycle tempts people to change the job. Employees look for opportunities, challenges in their job as compared to monotonous work. Even though companies try to match the skills with job requirement, still there are gaps and companies need to work on these gaps and carry out recruitment in more effective way. Senior employees are more stable than junior employees.

From the observations, we can state that stability, social responsibility and work culture has great effect on age group > 35 years (Senior Employees) whereas money, on site opportunities, and career growth for < 35 years (Junior Employees). So companies can recruit senior people for Managerial and coordination

activities and junior employees for developmental work where more productivity and challenges are involved. Companies need to use technologically advance, AI based tools for recruitment of candidates where the skills and interests of the candidates can motivate them for more productivity.

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OBSERVATION ON THE NON-HOMOGENEOUS BIQUADRATIC EQUATION WITH FIVE UNKNOWNS $(x^4 - y^4) = 10(z + w)p^2$

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ABSTRACT

The purpose of this paper is to obtain the non-zero distinct integral solutions of quinary bi-quadratic non-homogeneous diophantine equation $(x^4 - y^4) = 10(z + w)p^2$ *. In this paper, we present some different patterns of integral solutions to the above bi-quadratic diophantine equation in five variables*

Keywords: *Quinary bi-quadratic equations, Non-homogeneous diophantine equation, Integer solutions*

Introduction

In the Number Theory and Mathematics, to find solutions of equations in integers is one of the oldest and significant mathematical problem since the second millennium B.C. ancient Babylonians who managed to find solutions of the equations systems with two unknowns. Different types of equations and systems were started to extend by Diophantus in third century A.D. Since then, many mathematicians have been working on the different types of Diophantine equations. Working on non-linear Diophantine equations of degrees higher than two worthy of notice success was acquired just in the 20th century.

In the literature, there are lot of specific type of Diophantine equations with high degree as open problem. Gopalan and his co-authors ([2]-[7], [10] and [11]-[19]) considered a lot of different types of homogeneous bi-quadratic diophantine equations with five variables and obtained non-zero different sets of the solutions for such equations. One may read [1] and [9] books if their interest is in Pythagorean numbers and Nasty numbers as well as their characterizations. Besides, the Gopalan's book [8] is useful and include a number of significant results on higher degree diophantine equations for readers.

In this paper, we consider one of the such non-linear high degree diophantine equations as $(x^4 - y^4) = 10(z + w)p^2$ and try to find the different sets of integer solutions to this diophantine equation by using elementary algebraic methods. The outstanding results in this study of diophantine equation will be useful for all readers.

Method of Analysis

The Diophantine equation representing the non-homogeneous biquadratic equation with five unknowns under consideration is

$$(x^4 - y^4) = 10(z + w)p^2 \quad (1)$$

Introducing the transformations

$$x = u + v, y = u - v, z = 2vu + 1, w = 2vu - 1, u \neq v \neq 0 \quad (2)$$

in (1), it simplifies to

$$u^2 + v^2 = 5p^2 \quad (3)$$

The above equation (3) is solved through different ways and thus, one obtains distinct patterns of integer solutions to (1).

Way-1

Let $p = a^2 + b^2$ (4)

Write 5 as

$$5 = (2 + i)(2 - i) \quad (5)$$

Using (4) & (5) in (3) and employing the method of factorization, define

$$u + iv = (2 + i)(a + ib)^2 \quad (6)$$

Equating the real and imaginary parts of (6), we get

$$u = 2a^2 - 2b^2 - 2ab$$
$$v = a^2 - b^2 + 4ab \quad (7)$$

Substituting the values of u and v given by (7) in (2), the non-zero distinct integral solutions of (1) are seen to be

$$x(a,b) = 3a^2 - 3b^2 + 2ab$$
$$y(a,b) = a^2 - b^2 - 6ab$$
$$z(a,b) = 2(2a^4 + 2b^4 - 12a^2b^2 + 6a^3b - 6ab^3) + 1$$
$$w(a,b) = 2(2a^4 + 2b^4 - 12a^2b^2 + 6a^3b - 6ab^3) - 1$$
$$p(a,b) = a^2 + b^2$$

Note:1

Write 5 in (5) as

$$5 = (1+2i)(1-2i) \quad (8)$$

For this choice ,the non-zero distinct integral solutions of (1) are given by

$$x(a,b) = 3a^2 - 3b^2 - 2ab$$
$$y(a,b) = -(a^2 - b^2) - 6ab$$
$$z(a,b) = 2(2a^4 + 2b^4 - 12a^2b^2 - 6a^3b + 6ab^3) + 1$$
$$w(a,b) = 2(2a^4 + 2b^4 - 12a^2b^2 - 6a^3b + 6ab^3) - 1$$
$$p(a,b) = a^2 + b^2$$

WAY-2:

(3) can be written as

$$u^2 + v^2 = 5p^2 * 1 \quad (9)$$

write 1 as

$$1 = \frac{(r^2 - s^2 + i\,2rs)(r^2 - s^2 - i\,2rs)}{(r^2 + s^2)^2} \qquad (10)$$

Using (5) and (10) in (9) and employing the method of factorization, define

$$u + iv = (2+i)(a+ib)^2 \left[\frac{r^2 - s^2 + i\,2rs}{r^2 + s^2}\right]$$

Equating real and imaginary parts, we get

$$u = \frac{1}{(r^2+s^2)}[(r^2 - s^2)(2a^2 - 2b^2 - 2ab) - 2rs(a^2 - b^2 + 4ab)]$$

$$v = \frac{1}{(r^2+s^2)}[(r^2 - s^2)(a^2 - b^2 + 4ab) + 2rs(2a^2 - 2b^2 - 2ab)]$$

As our interest centers on finding integer solutions, take

$$a = (r^2+s^2)A, b = (r^2+s^2)B \quad (11)$$

in the above values of u and v.Employing the resulting values of u and v in (2) and (4) ,the corresponding integer solutions to (1) are obtained.

WAY-3:

Rewrite (3) in the form of ratio as

$$\frac{u+2p}{p+v} = \frac{(p-v)}{u-2p} = \frac{\alpha}{\beta}, \beta \neq 0 \qquad (12)$$

which is equivalent to the system of double equations

$$\left.\begin{aligned} \beta u - \alpha v + p(2\beta - \alpha) = 0 \\ \alpha u + \beta v - p(\beta + 2\alpha) = 0 \end{aligned}\right\} \quad (13)$$

Solving (13) by applying the method of cross-multiplication and employing (2), the corresponding non-zero integer solutions to (1) are found to be

$$x(\alpha,\beta) = \alpha^2 - \beta^2 + 6\alpha\beta$$
$$y(\alpha,\beta) = 3\alpha^2 - 3\beta^2 - 2\alpha\beta$$
$$z(\alpha,\beta) = 2(-2\alpha^4 - 2\beta^4 + 12\alpha^2\beta^2 + 6\alpha^3\beta - 6\alpha\beta^3) + 1$$
$$w(\alpha,\beta) = 2(-2\alpha^4 - 2\beta^4 + 12\alpha^2\beta^2 + 6\alpha^3\beta - 6\alpha\beta^3) - 1$$
$$p(a,b) = \alpha^2 + \beta^2$$

Note:2

(3) may also be expressed in the form of ratio as

$$\frac{u+2p}{(p-v)} = \frac{(p+v)}{u-2p} = \frac{\alpha}{\beta}, \beta \neq 0$$

Repeating the process as above ,the corresponding integer solutions to (1) are obtained as

$$x(\alpha,\beta) = -3\alpha^2 + 3\beta^2 + 2\alpha\beta$$
$$y(\alpha,\beta) = -\alpha^2 + \beta^2 - 6\alpha\beta$$
$$z(\alpha,\beta) = 2(2\alpha^4 + 2\beta^4 - 12\alpha^2\beta^2 - 6\alpha^3\beta + 6\alpha\beta^3) + 1$$
$$w(\alpha,\beta) = 2(2\alpha^4 + 2\beta^4 - 12\alpha^2\beta^2 - 6\alpha^3\beta + 6\alpha\beta^3) - 1$$
$$p(a,b) = \alpha^2 + \beta^2$$

WAY-4

Rewrite (3) as

$$5p^2 - u^2 = v^2 * 1 \quad (14)$$

Assume

$$v = 5a^2 - b^2 \quad (15)$$

Write 1 on the R.H.S. of (14) as

$$1 = (\sqrt{5}+2)(\sqrt{5}-2) \quad (16)$$

Using (15) & (16) in (14) and employing the method of factorization, define

$$\sqrt{5}p + u = (\sqrt{5}+2)(\sqrt{5}a+b)^2$$

Equating the rational and irrational parts of (16), we get

$$u = 10a^2 + 2b^2 + 10ab$$
$$p = 5a^2 + b^2 + 4ab$$

Substituting the values of u and v given above in (2), the non-zero distinct integral solutions of (1) are seen to be

$$x(a,b) = 15a^2 + b^2 + 10ab$$
$$y(a,b) = 5a^2 + 3b^2 + 10ab$$
$$z(a,b) = 2(50a^4 - 2b^4 + 50a^3b - 10ab^3) + 1$$
$$w(a,b) = 2(50a^4 - 2b^4 + 50a^3b - 10ab^3) - 1$$
$$p(a,b) = 5a^2 + b^2 + 4ab$$

Note:3

It is to be noted that 1 on the R.H.S. of (14) may be taken as below :

$$1 = \frac{(\sqrt{5}+1)(\sqrt{5}-1)}{4}$$

$$1 = \frac{(5\sqrt{5}+2)(5\sqrt{5}-2)}{121}$$

$$1 = \frac{(5\sqrt{5}+11)(5\sqrt{5}-11)}{4}$$

Following the above procedure ,one may obtain three different sets of integer solutions to (1).

WAY-5

Introduction of the linear transformations

$$p = X + T$$
$$u = X + 5T \quad (17)$$
$$v = 2V$$

in (3) leads to

$$V^2 = X^2 - 5T^2 \quad (18)$$

which is satisfied by

$$V = 5a^2 - b^2$$
$$X = 5a^2 + b^2 \quad (19)$$
$$T = 2ab$$

Substituting (19) in (17) and employing (2), the integer solutions of (1) are given by

$$x(a,b) = 15a^2 - b^2 + 10ab$$
$$y(a,b) = -5a^2 + 3b^2 + 10ab$$
$$z(a,b) = 4(25a^4 - b^4 + 50a^3b - 10ab^3) + 1$$
$$w(a,b) = 4(25a^4 - b^4 + 50a^3b - 10ab^3) - 1$$
$$p(a,b) = 5a^2 + b^2 + 2ab$$

WAY-6

(18) may be written as the system of double equations as presented in Table:1 below:

Table : 1 System of double equations

System	1	2	3
$X+V$	T^2	$5T^2$	$5T$
$X-V$	5	1	T

Solving each of the system of equations in Table : 1, the corresponding values of, X,T and V are obtained. Substituting the values of X,T & V in (17) and using (2), the respective values of x ,y ,z, w and p satisfying

(1) are determined. For simplicity and brevity, the integer solutions to (1) obtained through solving each of the above system of equations are exhibited.

System :1

$$x = 6k^2 + 16k + 4$$
$$y = -2k^2 + 8k + 12$$
$$z = 1 + 16(k^4 + 7k^3 + 9k^2 - 2k - 4)$$
$$w = -1 + 16(k^4 + 7k^3 + 9k^2 - 2k - 4)$$
$$p = 2k^2 + 4k + 4$$

System:2

$$x = 30k^2 + 40k + 12$$
$$y = -10k^2 + 4$$
$$z = 1 + 16(25k^4 + 75k^3 + 75k^2 + 30k + 4)$$
$$w = -1 + 16(25k^4 + 75k^3 + 75k^2 + 30k + 4)$$
$$p = 10k^2 + 12k + 4$$

System :3

$$x = 12k$$
$$y = 4k$$
$$z = 64k^2 + 1$$
$$w = 64k^2 - 1$$
$$p = 4k$$

Note:4

One may also consider the linear transformations

$$p = X - T, u = X - 5T, v = 2V$$

leading to a different set of integer solutions to (1).

Conclusion

In this paper,an attempt has been made to obtain different sets of integer solutions to (1) through employing the transformations

$$x = u + v, y = u - v, z = 2vu + 1, w = 2vu - 1, u \neq v \neq 0$$

It is worth to mention that ,the readers of this paper may consider the

transformations given by

$$x = u + v, y = u - v, z = 2^{2k+1}vu + 1, w = 2^{2k+1}vu - 1, u \neq v \neq 0$$

and

$$x = u + v, y = u - v, z = 2^{2k+2}vu + 1, w = 2^{2k+2}vu - 1, u \neq v \neq 0$$

to determine varieties of integer solutions to (1).

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WORK STRESS AND INSECURITY AMONG FOOD - DELIVERY EXECUTIVES

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ABSTRACT

There has been a dramatic increase in the meal delivery services over the last decade due to the development of technology and a change in people's eating habits. Food ordering through online is ordering food through a restaurant's website or through a mobile app. In a recent study, it was shown that one out of every four customers uses a restaurant ordering app on their mobile phone. India's food business saw a new wave of growth because to online food delivery. Food ordering on the internet has left a powerful impression in people's minds, and several variables are drawn, including purchasing rights, there is a variety of payment options, internet connectivity is omnipresent, and the company provides special deals and offers.. Regardless of compensation, workers in this area face numerous challenges, which contributes to work stress. The study investigated the stress and insecurity experienced by workers in the food delivery industry. 150 employees were surveyed using convenience sampling.

Keywords: *Food Delivery, Work Stress, Work Insecurity, Work Satisfaction*

1. Introduction

Technological advancements and an increasingly hectic lifestyle have opened the path for Online Food Delivery services will grow and extend their businesses. These food delivery firms communicate with their consumers via websites and mobile applications, where customers can place orders. Meals ordering online is a method of ordering food through a restaurant's website or through food delivery apps. Customers' preferences are the primary criterion for meal selection. When placing an order for meals, consumers always select their favourite restaurant, several menu choices, the items of their choosing, and ultimately, delivery and pick-up options. Typically, clients can pay via debit or credit card, cash on delivery, or payment apps,. The app will provide information about the food's quality, preparation and completion times, as well as pick-up and delivery data. Customers can track the delivery's progress and estimated delivery time via a website or mobile app. Google maps is used to provide information about the customer's location, nearby restaurants, and hotels, which is also the heart and success of those service providers. When a customer places an order, the information is sent to the mainframe. It is then delivered to the individual who is closest to both the pick-up and delivery locations.

2. Statement of the Problem

A significant part of the meal delivery sector is the method of ordering food using a website or smartphone app, or both. In recent years, online meal delivery services have enjoyed rapid expansion. As a result, this sector's growth rate is increasing by up to 15 percent every three months. This is due to an increase in not reusable income, expansion, and a change in consumer lives, among other reasons. This is also due to the increase in internet usage and smart phone usage. In urban places and in certain rural areas, this sector has risen tremendously in recent years. With the explosive growth of this service, employment in this industry has also risen significantly. The online food delivery service employs a large number of full-time and part-time workers. The employees in this area, however, confront a lot of challenges. Common difficulties include illogical payments for the amount of work done, a lack of career advancement, work insecurity and rude customers. the amount of work stress and instability among food delivery business workers.

3. Research Methodology

Swiggy, Uber Eats and Zomato are three of the top online meal delivery providers analysed for this study. The employees of the companies listed above have been taken as a sample. In this study, 150 employees of food delivery services were interviewed. The sample was

selected using a convenient sampling technique.

4. Data Analysis

4.1 Demographic Profile

- Out of 150 employees, 91.8% are male, 52.4% are single, and 57.8% are undergraduates. Of the responders, 46.7% hold a degree in engineering.
- Among the respondents, 43.8 % earned between Rs.20, 500 and Rs.29, 500 per month as their monthly income.
- Swiggy employees make up 63.8% of the survey respondents. Zomato and Uber eats personnel make up 18.3% and 17.9%, respectively.
- Most responders work full-time shifts, and 47.3% work ten to twelve hrs each day.

4.2 Descriptive statistics

To discover work stress An employee's stress level is based on 14 job-related characteristics that have been analysed. Statistics have been used to determine the many elements affecting their stress levels.

According to Table -1, the greatest mean values were found for the criteria " Intense pressure to work quickly" and " Challenges to keep up with time limits ". Comparing these two factors to other ones, the respondent's stress level is higher in these two areas. "Customers' unkind/hurtful response " and " Low self-esteem and low self-confidence " have the lowest mean values of 1.81 and 1.83. A higher level of stress is attributed to these two elements than to other factors that measure the respondent's tension.

Table.1. Factors Affecting Work Stress

Work Stress	Mean	S.D
The workload is heavy	2.6402	.52175
Arguing with irate customers	1.8934	.49255
Customers' unkind/hurtful response	1.8134	.62806
Harassment and violence at work	2.0801	.61873
Intense pressure to work quickly	2.8134	.42390
Challenges to keep up with time limits	2.7668	.49721
Tiredness and a lack of physical energy	2.4201	.60502
Inhumane treatment by hotel employees/owners	1.9468	.63232
Fear of selecting the wrong job/profession	2.0468	.72665
Low self-esteem and low self-confidence	1.8334	.64939
Skipping meals and loss of appetite	1.9334	.72044
Getting frustrated by traffic	2.5266	.66249
Inadequate sleeping habits	2.0666	.70154
Operating in bad weather	2.5866	.59286
Rash driving resulting in an accident	2.0868	.85088
Finding customers' addresses can be difficult	2.4532	.66136

4.3 Work Insecurity

Employees' level of insecurity has been determined by taking into account ten different elements. To determine the various factors causing work insecurity, descriptive statistics were applied. Factors with highest mean values are "prior knowledge about the changes that may affect their career" and "no worry of losing a job in the near future." Hence, respondents' level of uneasiness towards these two factors is higher than their level of insecurity towards other factors. 2.240 and 2.413 are the lowest mean values for the criteria 'No trouble in getting a new work' and 'Stable income' Hence, the respondents' level of insecurity towards these two indicators is lower than their level of insecurity towards other measures that measure their work instability.

Table – 2 Descriptive Statistics- work Security

Work insecurity Factors	Mean	S.D
No trouble in getting a new work	2.4534	.59738

Power to manage job-related events	2.4867	.54015
Satisfactory employment agreement	2.5201	.64215
No issues finding a new work/job	2.2401	.83289
Job security and safety are assured.	2.4532	.58603
My presence/contribution is valued by the company.	2.4666	.64158
Stable income	2.4134	.74354
No danger of alterations in incentive scheme	2.7466	.53327
No worry of losing a job in the near future	2.7734	.46556
Prior knowledge about the changes that may affect their career	2.8001	.43351

4.4 Correlation

To determine whether there is any substantial association among work stress and work insecurity, Pearson's correlation has been employed.The Pearson's value of correlation is 0.278. Between work happiness and work instability, a positive association has been discovered. The significant level of 0.01 is smaller than 0.05. As a result, as job uncertainty grows, the respondents' job stress also rises as well.

Table-3 Correlation - Work Stress and Work Insecurity

		work insecurity	Work stress
Work insecurity	Pearson Correlation	1	.278**
	Sig. (2-tailed)		0.001
Work Stress	Pearson Correlation	.278**	1
	Sig. (2-tailed)	0.001	

5. Suggestions

A grievance appraisal committee should be formed to help workers with work-related concerns. Employees should also be trained to lower their stress levels. Weighing up the vast quantity of traffic jams that occur during peak hours in city centres, the timelines assigned to the workers can be extended.

In order to notify the employees about the changes to be made in their jobs, a good communication channel must be set up. The personnel of the food delivery service should be treated with respect by the society without being degraded.

6. Conclusion

In this survey, the occupational stress and work insecurity of workers in food delivery businesses were examined. In any organisation, the most important asset is its people. Whether an organisation is a success or a failure depends on how satisfied its people are. This is particularly more important in industries that are just getting started, such as food delivery services. In this industry, job satisfaction is lower due to the lack of recognized, career advancement, and the inability to make suggestions. Employees need more than just compensation and incentives to be happy. Stress and job insecurity are the two other significant elements that influence job satisfaction. It is therefore possible to boost employee satisfaction and security by implementing tactical steps. This will lead to a rise in employee morale and security, which will ultimately lead to the growth of the sector.

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ACCESSIBILITTY & USAGE OF ONLINE WALLETS IN NATIONAL CAPITAL REGION (NCR)

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ABSTRACT

Online wallets were introduced in India few years before. It works electronically and also which is used for transactions made online through a computer or a smartphone. Its utility is same as a credit or debit card. Virtual cash or Cashless Transaction is an upcoming technology that has seen a tremendous growth in the past year. Cashless payments are now becoming a popular trend in almost every field. Demonetization has forced a lot of places to accept digital payments. Use of e-wallets helps in moving away from a cash based economy. In the process, all the transactions get accounted in the economy, which has the effect of reducing the size of the parallel economy. The presence of mobile wallet spreading from urban to rural areas on a large scale. Hence, wallet money sees a high bright future in near time. The present study tries to study and analysis of the usage of E-wallet.Few years back mobile wallet was something majority in India did not hear about but its use saw a huge leap in last couple of years with the surge of smart phones, high speed internet connectivity using 3G and 4G and the lucrative offers mobile wallets provide. This research paper is an attempt to study the usage of online wallets in the different cities of NCR

Keywords: *NCR, Online wallets*

Introduction

In today's world smart phone has become an important part of life. Number of smart phone users has increased dramatically as it has become more affordable. According to data released by TRAI (Telecom Regulatory Authority of India) there are around 300 million users of mobile phone in India. Besides providing the basic function of communication there are plenty of services a smart phone provides. These services includes entertainment (music, movies, games etc.), socialization (social networking applications like Facebook, twitter and instant messaging services like whatsapp, messenger),internet access services and even payment services. For using payment services on smart phones an application for the same is required to be installed in it. This application is called the Online or Digital wallet or electronic wallet or popularly mobile wallet. Its functions of keeping and paying the currency are same as of traditional leather wallet with the only difference of performing the same digitally and more number of parties directly or indirectly involved in performing the same on digital platform. For using mobile wallet service customer needs to register him with that mobile wallet and preload a certain amount of money in it which can be used for shopping, recharge, utility bill payments etc. Obviously it does not depend only on the smart phone and mobile wallet installed in it.

The entire process of sending and receiving money requires a complex network of intermediaries including banks, payment gateways and mobile network operators. As per the "Master Circular Policy Guidelines of Issuance and Operation of Prepaid Payment Instruments in India" published on RBI website Mobile wallets are one of the prepaid payment instruments other being smart cards, magnetic stripe cards etc. There are three types of mobile wallets

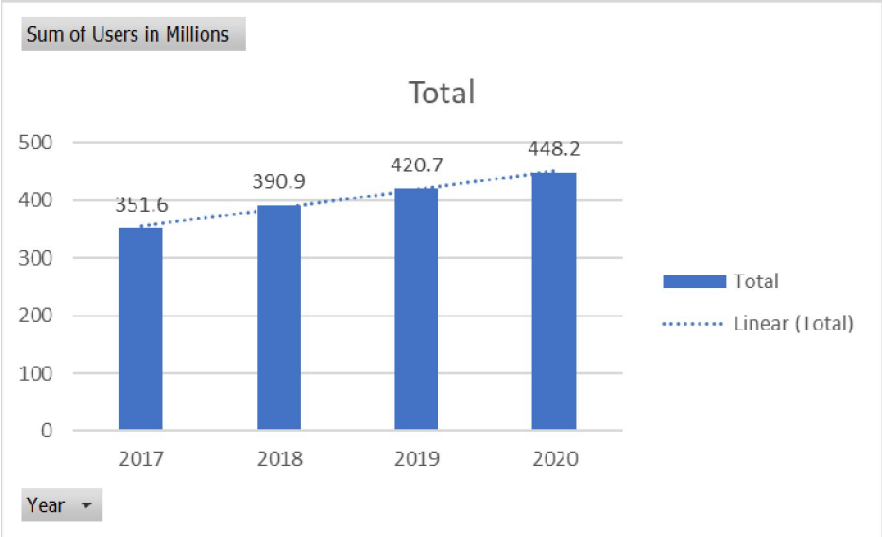
1. Open wallets- Open wallets are part of Open System Payment Instruments and can be used for purchasing goods and services including financial services and also allow customers to withdraw cash at ATMs/BCs. Such type of wallets can only be jointly launched with a bank. For instance:- M-pesa by Vodafone is an example of Open wallets.
2. Closed wallets- Closed wallets are the part of Closed System Payment Instruments which can be used for buying goods and services from the entity which issued that payment instrument. Example is- Amazon pay balance.

3. Semi Closed wallets- Such type of wallets are part of payment instruments which can be used for purchasing goods and services only from selected merchants. Cash withdrawal or redemption cannot be performed using semi closed wallets.

For examples:- Paytm wallet, SBI Buddy ,Citrus wallet

Market of Online Wallet in India

As per data shared by Internet and mobile Association of India, there are 448.2 million users in 2020 and there were around 351.6 million internet subscribers in India. Due to tariff rates of 2G and 3G coming down and 4G hitting the Indian market, ASSOCHAM expects the mobile internet users to grow at a compound annual growth rate of 30% during the period 2020 -2025



Source: Internet and mobile Association of India (IMAI)

Majority of Indians have a tendency to save so they are getting attracted towards mobile wallets due to the cashbacks, discounts and coupons they provide to their customers which can be availed at online as well as offline stores. Paytm for example is giving 10 to 100% cashback discounts on various products in 2021 for new/old Online Wallet customers

Anyone specially youth easily gets attracted with such types of offers and thus presents a huge market for Online wallet and the merchants associated with them

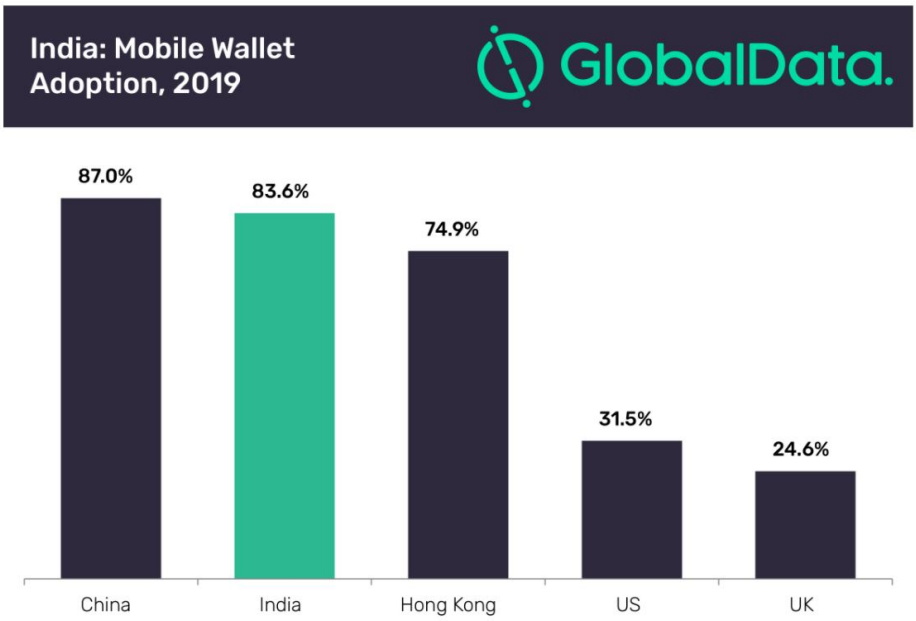
List of Paytm Add Money Offers & Promo Codes April 2021:

What's more? The Paytm wallet offers for adding money to your wallet in April 2021 are all set to woo you too. Linger no longer and get set to earn oodles of cash back returns to shop more and more.

Add Money Offer	Promo Code	Users
10% Cashback	GETNOW10	All Users
Rs 50 Cashback	GETNOW50	All Users
100% Cashback	PFADDMONEY25	New Users
Rs 10 Cashback	REWARD10	New & Old Users

According to the Global Data, Online wallet adoption in India is 2nd largest in the world. India is only 4% behind China in adopting the user of Online wallets. It also said that greater adoption of digital payment tools such as mobile wallets, Unified Payment Interface (UPI), mobile banking and transactions through cards at point of sales terminals could affect the share of ATM withdrawals. According to a research study conducted by

trade body ASSOCHAM and business consulting firm RNCOS mobile wallet market in India is expected to grow by 190 percent and will reach the level of 1512 Rs. by the year 2022.Drivers of this rapid expected growth are increasing usage and penetration of smart phones, mobile internet penetration with 3G/4G connectivity, increased presence of electronic commerce sector and higher disposable income in the hands of middle income group which forms a big and lucrative market.



Statement of the Problem

Online wallets are changing the traditional ways of making and receiving payments, doing shopping, paying bills etc. The new generation has grown up in
a world with technology, connected with social media networks using their smart phones and tablets. Though lot of research work has been conducted on the use of mobile wallet minuscule amount of research has been done on the same with students as the respondents. This research study is a humble attempt in this direction to know the preference of user towards mobile wallets.

Research Objectives

 To study the preference towards the usage of Online wallets among the different cities of NCR City:-

 To find out the impact of various demographic variables on the opinion regarding the future of Online wallets.

Hypothesis

HO1 There exists a significant difference of the usage of online wallet used by the people belonging to different age groups between 18 and above.

HO2 There exists a significant difference of usage of online wallet used by the people belonging to different occupation where internet is predominantly used like people who belong to Software companies with comparison to other occupation

HO3 The major benefit is discount on purchases and payments rather the convenience not to carry cash

HO4 People of Under developed city like Jind (Haryana) are not much aware about the online wallet with comparison to Developed city Gurgaon

There is no significant relationship between respondents gender and the usage of Online wallets.

There is significant association between respondents age and opinion regarding the usage of Online wallets.

There is significant association between respondents occupation and usage of the Online wallets.

There is significant relationship between the respondents about the benefits why they are using Online wallets.

Research Methodology

Population of the study: Population of the study consisted of the users who are using Online wallets in different cities of NCR. The respondents were the users of the who are using online wallets over mobile.
Sample size: Initial sample size of the study is 100 users across NCR but it shall increase to 200 users in subsequent study.
Sampling technique: Sampling frame of the users using mobile wallets was considered.
Data collection tools: This research was basically based on primary data collected using a structured questionnaire administered to 100 respondents during a period of 2 month from 1st November to 31st December. Small amount of secondary data collected from various sources was also used.
Data analysis tool: Collected data was analyzed using T Testing and SPSS software by using statistical tools like descriptive statistics, pie chart etc.

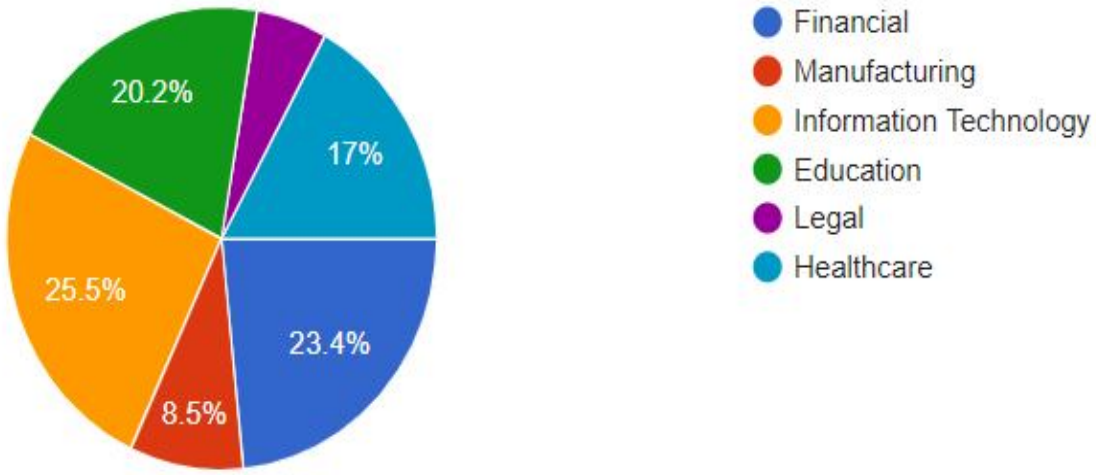
Data Analysis and Intrepretation

Table-1 Demographic Profile of the Users

	Categories	Count	Percentage
Gender	Male	61	61%
	Female	39	39%
Age	18 - 24	16	16%
	25 - 34	40	40%
	35 - 44	33	33%
	45 and above	5	5%
	Under 18	6	6%

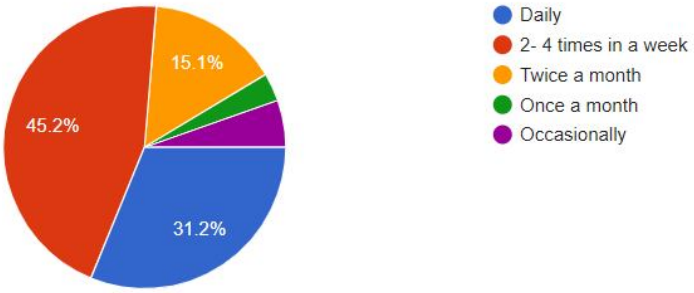
16% of the respondents are in the age group of 18-24 years,
40% of the respondents are in the age group of 25-34 years,
33% of the respondents are in the age group of 35-44 years,
5% of the respondents are above than 45 years and
6% of the respondents are under 18 years.
61% of the respondents are male, 39% of the respondents are female.

Table-2 Occupation Vise Usage of Online Wallets



5% of the respondents are working in Legal sector.
17% of the respondents are working in Healthcare sector.
23.4% of the respondents are working in Financial sector.
8.5% of the respondents are working in Manufacturing sector.
25.5% of the respondents are working in Information Technology sector.
20.2% of the respondents are working in Education sector.

Table-3 Frequency of Usage of Online Wallets



3% of the respondents use the online wallet once a month.

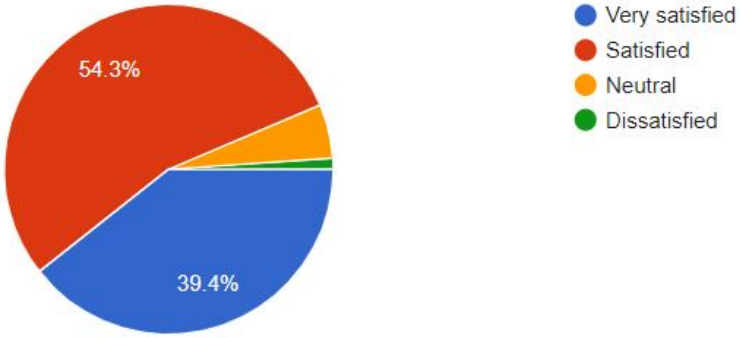
5% of the respondents use the online wallet occasionally.

15.1% of the respondents use the online twice a month.

31.2% of the respondents use the online wallet daily.

45.2% of the respondents use the online wallet 2-4 times in a week.

Table-4 Satisfaction Level of Users Using Online Wallets



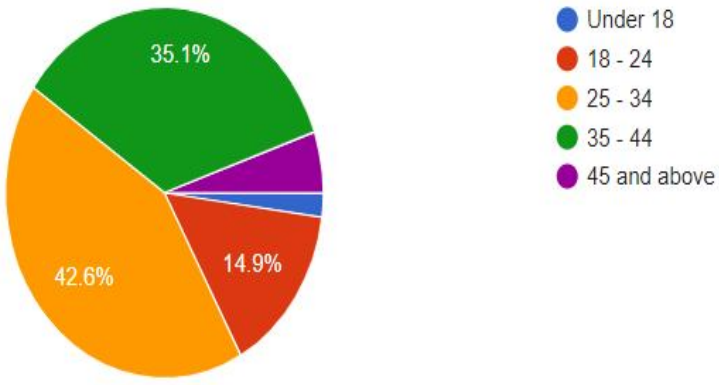
The satisfaction level of 5% of the respondents was neutral.

The satisfaction level of 39.4% of the respondents was Very Satisfied

The satisfaction level of 54% of the respondents was Satisfied

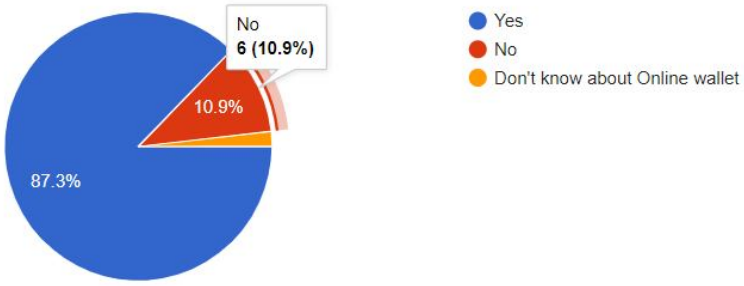
1% of the respondents were not satisfied.

Table-5 Usage of Online Wallets by Age Groups



The 42% users are from Age group 25-34 years
35% users are from age group 35-44 years
15% user are from age group 18-24 years
5% users are from age group 45 years and above
2% users are from under 18 years

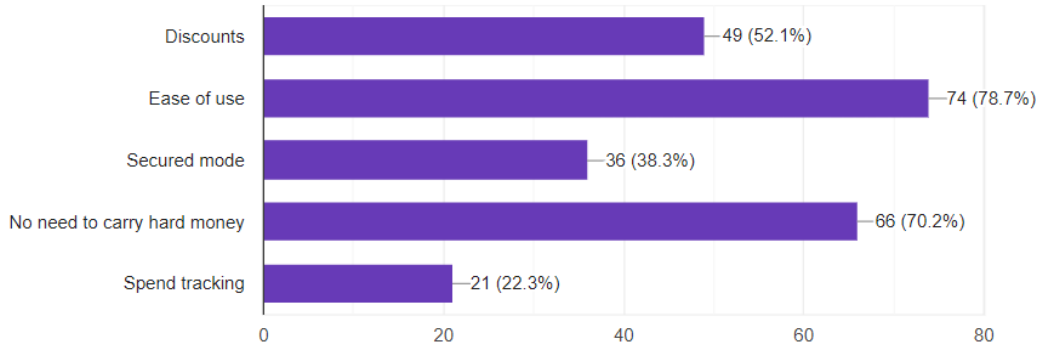
Table-6 The Usage of Online Wallet by Under Developed City (Jind)



87% of the users uses Online wallet for financial transactions

11% of users do not use Online wallets
1% of users do not about Online wallets

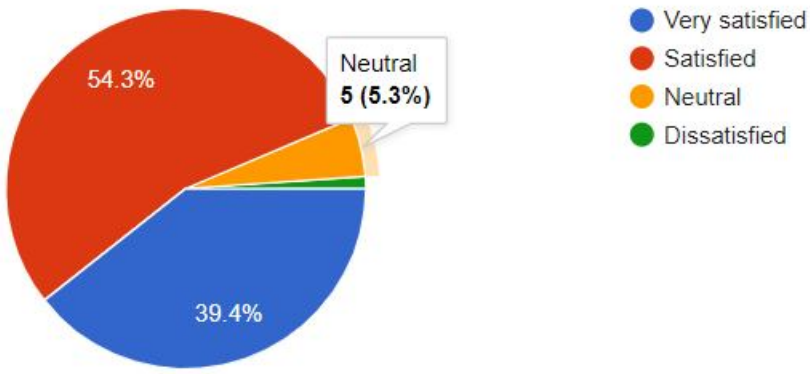
Table-7 The Benefits Why Users Uses The Online Wallet



52% of the users uses Online wallets only to get Discounts
70% of the users uses Online wallets so that they dot carry hard money

22% uses Online wallets as it is good tool to spend tracking
38% of the uses feels that it is secure to carry money in Online wallet

Table-6 Satisfaction Level of Online Wallet Users

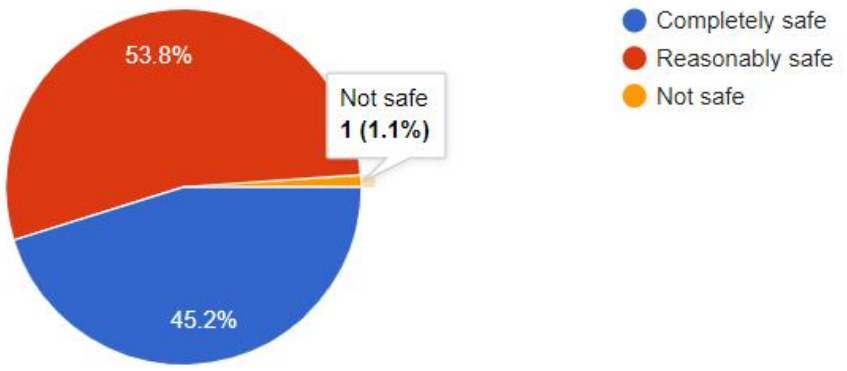


54% of the users are satisfied using Online wallets

39% of the users are more than satisfied with Online wallets

5% of the uses are neither satisfied nor dissatisfied

Table-7 Safety Level of Online Wallets



54% of the users are of opinion that Online wallets are completely safe

45% of the users feels that Online wallets are reasonable safe

1% of user feel that Online wallets are not safe

Research By Hypothesis: There is a significant difference between the age group and usage of Online wallets.

Conclusion: It has been found that there is a direct relationship between between the age group and the usage of Online wallets. The young generation less than 40 years old prefer to use Online wallets due to its significant benefits.

Research By Hypothesis: There exists a significant difference of usage of online wallet used by the people belonging to different occupation where internet is predominantly used.

Conclusion: The Online wallet usage is used predominantly by the Information technology industry as compared to education and legal

Research By Hypothesis: The major benefit is discount on purchases and payments rather the convenience not to carry cash

Conclusion: It has been found that Online Wallets is preferred by users to avail the discounts and other benefits rather the convenience not to carry cash

Research By Hypothesis: people in under developed city are not much aware about the online wallet with comparison to Developed city

Conclusion: The comparison shows that the penetration of Online wallets is not as deep in under developed cities as compared to Developed cities

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EFFICACY OF LYCOPENE ON PERIODONTAL HEALTH A META-ANALYSIS

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ABSTRACT

Background: Antioxidants have been widely explored in the field of medicine, and the latest trend involves them being used as adjuncts to surgical (flap surgeries) or nonsurgical (scaling and root planing) dental procedures. Aim: To explore and investigate the efficacy of Lycopene on periodontal health. Study design: A Meta-Analysis on the efficacy of Lycopene on periodontal health was carried out. Electronic and hand searches revealed 665 articles, of which 625 were screened. The interventions and outcomes were assessed following the scrutinization of the articles to be considered for detailed analysis in this study. Results: Three Systematic Reviews were included in this Meta-analysis which involved the use of Lycopene as a treatment modality for periodontal diseases. Conclusion: Out of the three reviewed studies, it is concluded that Lycopene has excellent antioxidant properties and can be a potential adjunct to various periodontal treatments.

Keywords: *Lycopene, periodontitis, gingivitis, antioxidants, periodontal health, dental adjunct*

Introduction

A key indicator of overall health, well being and quality of life are Oral Health. Good oral and dental hygiene not only elevates an individual's self-confidence but also remarkably improves the quality of life [1]. A wide range of diseases, including Dental Caries, Periodontal Disease, tooth loss, oral cancer, oral manifestations of HIV and other infectious diseases, or - dental trauma and various congenital disabilities, including cleft lip and palate, are a few of the various other oral conditions which call for attention and treatment. Of all the diseases mentioned above, periodontal diseases and infections have shown plausible evidence in affecting the general health of an individual .

Periodontal Disease is a cumulative term used to characterize all diseases causing destruction and degeneration of the tooth's supporting structures, including the periodontal ligament, the cementum, and the alveolar bone. Although the evidence mostly points towards bacterial organisms, periodontitis is best described as a multifactorial infection, and isolating the aetiology plays a key role in managing and restoring the oral tissues.

Of all the possible causes of periodontal disease, oxidative stress is one of them [3]. It occurs when Reactive Oxygen Species (ROS) are produced. These often form due to inflammatory response when the polymorphonuclear leukocyte undergoes phagocytosis and eventually tends to engulf the body's endogenous antioxidant defence. Therefore, one of the conservative ways to treat this precarious dental infection can be through exogenous antioxidants to reinforce the body's immune system.

A carotenoid antioxidant with an extensive scientific interest in the recent few years is Lycopene. It is one in 600 carotenoids found in nature and has a characteristic red pigmentation. In nature, it is found in pink grapefruit, watermelons and principally in ripe tomatoes. Due to its antioxidant activity is also being genetically manipulated into crops for increasing its intake.

In normal human physiology, ROS and antioxidants are in a dynamic equilibrium. Lycopene, being an antioxidant, has the property of scavenging the reactive oxygen species and neutralizing them and preventing any direct or indirect tissue damage. Therefore, this property of Lycopene can be used as a potential treatment modality when used either locally or systemically. Various clinical studies have revealed the effect of Lycopene on substantial improvement in periodontal health and reduced inflammation without any adverse effects or reactions to Lycopene.

This Meta-analysis aims to understand the role of antioxidants and their therapeutic effects, particularly that of Lycopene in the prevention and treatment of periodontal disease. Although it's an extensively researched topic and robust literature exists, a more meticulous and collective investigation is carried out to conclude from the pre-existing scientific-based evidence.

Materials and Methods

Objective

A Meta-Analysis on the efficacy of Lycopene on Periodontal Health.

Search Words

Specific keywords used for each electronic database can be found in Table 1.

Table 1: Search Database

S.NO	DATABASE	SEARCH TERMS	ARTICLES FOUND
1.	PubMed Central (Advanced search)	("lycopene") AND "periodontitis "	0
2.	Cochrane	"lycopene" AND "periodontitis."	12
3.	Google Scholar	lycopene AND periodontitis AND treatment of periodontitis AND in vitro AND in vivo study AND "clinical study "	507
4.	Science Direct	"Lycopene" AND "periodontitis" AND "treatment of periodontitis"	85
5.	Wiley Online library	"lycopene" AND " periodontitis."	27
6.	Ovid Medline	(Lycopene AND periodontitis)	34
7.	LILACS	"lycopene" AND " periodontitis."	0
8.	Prospero	"lycopene" AND " periodontitis."	0

Inclusion Criteria

1. Articles with "Lycopene" as the compound for the treatment of periodontitis
2. Only systematic reviews
3. Records available only in English
4. Only full-text articles

Exclusion Criteria

1. Records that did not have " lycopene" as the compound for the treatment of periodontitis
2. Theoretical reviews
3. Records available in any language other than English
4. Abstract only articles
5. Unrelated articles
6. Case reports
7. Editorials

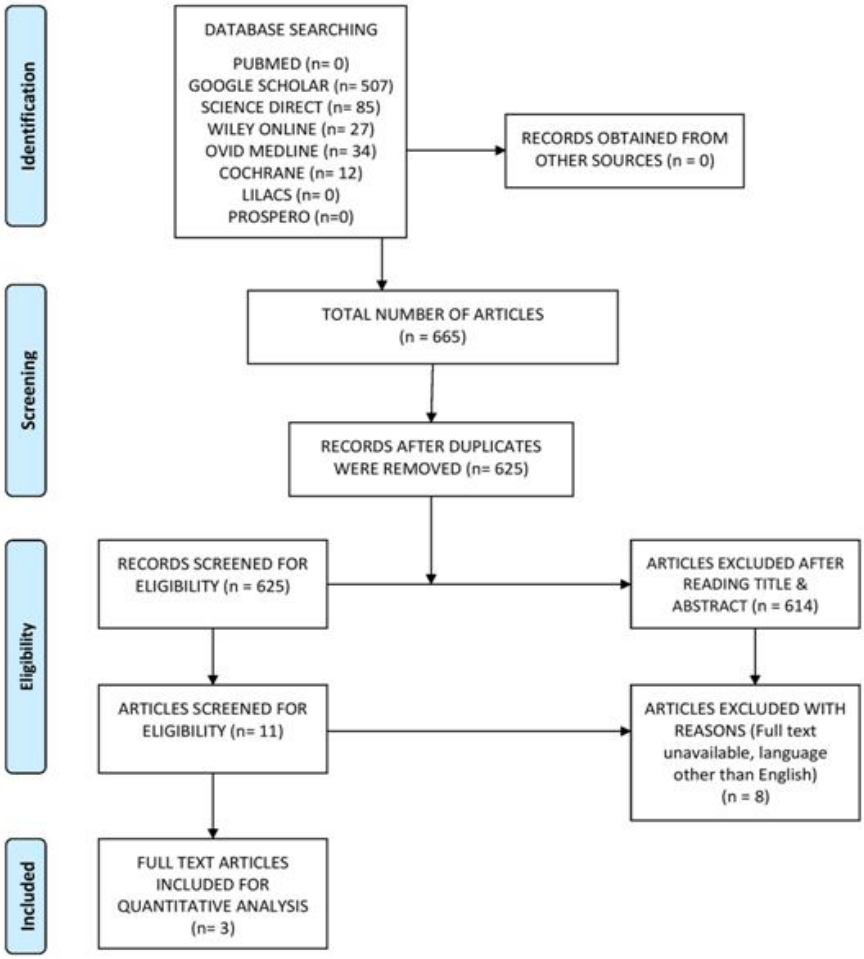
Search Strategy

A systematic computerized search was performed on electronic databases such a PubMed, Cochrane, Science Direct, Google Scholar, Wiley online library, Ovid Medline, LILACS and Prospero. A total of 665 articles were collected. These articles were scrutinized based on the inclusion, exclusion criteria, out of which three relevant systematic reviews comprising seven articles were chosen for this comprehensive analysis.

Below is the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)

Flow chart indicating the number of articles obtained and scrutinized.

Figure 1: PRISMA Flow Chart



Result

Authors Name and Published paper details

A. Francisco Wilker Mustafa Gomes Muniz et al. [14],2015 The impact was of antioxidant agents complimentary to periodontal therapy on oxidative stress and periodontal outcomes: A systematic review

1. Study Design

Systematic Review

2. Eligibility Criteria

Inclusion Criteria: 1. Randomized clinical trial Intervention group: studies which treated gingivitis / periodontitis with supragingival plaque control/nonsurgical periodontal therapy and administered antioxidant agents in one of the following manners:

A. Systemically
B. Locally
C. through any diet intervention.

2.Control group: studies that used one of the following control groups:

a. A placebo agent with nonsurgical periodontal therapy
b.nonsurgical periodontal therapy only
c.absence of periodontal therapy
d. healthy periodontal subjects.

Exclusion Criteria:

1. Observational and animal studies.
2. Case reports, letters and reviews.
3. Included subjects only younger than 18 years old.
4. Used experimental gingivitis in their study.
5. Oxidative stress outcome was not assessed

3. Materials and Methods

No. of articles: 3

3.1a Study

Study 1[9]

3.1b Intervention

Lycopene 8mg/day

3.1c Group

Negative control group:2 quadrants no treatment+placeb-o,Positive control group:oral prophylaxis in 2 quadrants+ placebo,Test group 1:2 quadrants no treatment+lycopene,

test group 2:oral prophylaxis in 2 quadrants+lycopene.

3.1d Outcome

Lycopene shows great potential as a treatment modality.

3.2a Study

Study 2[8]:

3.2b Intervention

2% lycopene gel locally applied

3.2c Group

Control group: healthy periodontal patients, Smokers group: subjects diagnosed with CP and treated with SRP + placebo gel/ lycopene gel, Nonsmokers group: subjects diagnosed with CP and treated with SRP + placebo gel/ lycopene gel

3.2d Outcome

It was successful in reducing the probing depth and increasing CAL. Has potential in reducing periodontal inflammation.

3.3a Study

Study 3[15]

3.3b Intervention

2% lycopene gel locally applied

3.3c Group

Sham group: treated only with SRP, Placebo group: treated with SRP + placebo gel, Lycopene group: treated with + lycopene gel

3.3d Outcome

Lycopene shows promising results as an adjunct to conventional periodontal treatments.

4. Results (Supporting and Contradictory Articles)

All studies show significant improvement in periodontal health after the intervention. ($p<0.001$), statistically significant

5. Limitations

The study had controversial articles.

Insufficient Randomized Controlled Trials

B. Castro MML et al. [16], 2019 Antioxidants as Adjuvants in Periodontitis Treatment: A Systematic Review and Meta-Analysis.

1. Study Design

Systematic Review

2. Eligibility Criteria

Inclusion Criteria:

1. Adult human intervention studies with periodontitis.
2. Studies that compared conventional periodontal treatment with the addition of antioxidants.
3. Studies compared patients who have undergone only conventional periodontal treatment to observe periodontal treatment effects.

Exclusion Criteria:

1.Case reports
2.Descriptive studies
3.Review articles
4.Opinion articles
5.Technical articles
6.Guidelines
7.Animal studies
8. In vitro studies.

3. Materials and Methods

No. of articles: 3

3.1a Study

Study 1[17]

3.1b Intervention

Lycopene (4 mg/day; Lycotas Pharma. Co.)

3.1c Group

n = 10, source: UI Age: >10 Gender: UI Control: 5 Intervention: 5

3.1d Outcome

Lycopene shows promising results in the treatment of periodontitis.

3.2a Study

Study 2[18]

3.2b Intervention

Lycopene (8 mg/day, LycoRed, JAGSONPAL Pharmaceuticals

3.2c Group

n = 42, Andhra Pradesh, India Age: 25-52 Males: 21 Females:21 Control: 21 Intervention: 21

3.2d Outcome

Significant improvement in all clinical parameters confirming the potential use of Lycopene as an adjunct to conventional treatment

3.3a Study

Study 3[19]

3.3b Intervention

Lycopene softgel (6 mg/dose)

3.3c Group

n = 20, Udaipur, Rajasthan Age: 30-60 Gender: UI Control: 10 Intervention: 10

3.3d Outcome

Lycopene significantly reduced inflammation and can be used in the treatment of periodontitis.

4. Results (Supporting and Contradictory Articles)

Results show that Lycopene is a promising antioxidant and can be used as an adjunct to conventional scaling and root planing in treating periodontal disease.

5. Limitations

A smaller number of studies in the quantitative analysis.

The use of different types of antioxidants and distinctive administration methods leads to a discrepancy in outcomes.

C. Polak D et al. [20], 2015, Are anti-inflammatory agents effective in treating gingivitis as solo or adjunct therapies? A systematic review.

1. Study Design

Systematic Review

2. Eligibility Criteria

Inclusion Criteria:

Randomized controlled trials and prospective cohort studies were included. Studies need to be conducted in humans with gingivitis and should be older than 18 years and in good health, who did not suffer from any form of periodontitis. A minimum of 10 subjects per group was taken in an attempt to minimize publication bias.

3. Materials and Methods

No. of articles: 3

3.1a Study

Study 1[9]

3.1b Intervention

Lycopene softgel: Lycopene

3.1c Group

Test Group: lycopene softgel

Control Group: Placebo filler material

3.1d Outcome

Lycopene shows great potential as a treatment modality.

4. Results (Supporting and Contradictory Articles)

Due to its strong antioxidant properties, Lycopene showed a significant anti-gingivitis effect.

5. Limitations

The inclusion of unconventional anti-inflammatory drugs other than NSAID's.They were included in a separate analysis due to the presence of in vitro/in vivo studies in literature. It is observed that the anti-inflammatory effect may be due to the indirect effect of anti-plaque agents; however, they did not specifically include any evidence in this paper.

Discussion

The current Meta-Analysis examined the efficacy of Lycopene, a widely used antioxidant in the prevention and treatment of periodontal diseases. Although the literature search revealed robust scientific evidence, three systematic reviews were compatible with the inclusion criteria. The reviews were thoroughly analyzed by experts, and the studies within the review were individually assessed.

In the first systematic review conducted by Francisco Wilker Mustafa Gomes Muniz et al , three

Trials were included. The review evaluated the impact of antioxidant agents in adjunct to periodontal therapy on oxidative stress and periodontal outcomes.

The study by Chandra RV et al was a placebo, randomized controlled trial. The study revealed oral lycopene group showed statistical reduction in periodontitis when compared to the non-op lycopene group . Therefore, Lycopene shows promising potential in the treatment of periodontal disease.

Another study conducted by the same author had a similar study design which evaluated the efficacy of Lycopene as a locally delivered antioxidant in the treatment of chronic periodontitis revealed Lycopene can definitely be used as a treatment modality which is at par with result of another study conducted by the author subsequently. It focused on the efficacy of locally delivered lycopene gel on periodontal health revealed that Lycopene is effective in reducing disease-causing oxidative stress.

A systematic review conducted by Castro MML et al [17] had three studies pertained to our topic of interest. This review aimed at observing Antioxidants as an adjuvant in Treatment of Periodontitis.

In a study conducted by Babaei et al, the results were found to be similar to the study conducted by Alkadasi et al [20] which was a randomized controlled trial and advocated that

Lycopene is an effective antioxidant in treatment of periodontal disease.

Another trial by A. P. Marawar et al revealed a significant reduction in inflammation in both the gingivitis and periodontal groups after intervention of Lycopene.

The systematic review done by Polak D et al had only one study pertaining to the topic of interest. The review evaluated if anti-inflammatory agents were effective in treating gingivitis as solo or when combined to other therapies.

The study of interest was conducted by RV Chandra et al and was analyzed previously in the systematic review conducted by Francisco Wilker Mustafa Gomes Muniz et al

The WHO promotes the consumption of at least 400 grams of fruits and vegetables per day due to the elevated content of Lycopene in them [21].Oxidative stress has proven to increase the risk of cancer and chronic disease including periodontitis. Therefore, Lycopene being an antioxidant should be further researched in the field of dentistry and medicine to implement it for the treatment of longstanding diseases.

Conclusion

Out of the 3 selected systematic reviews, it is evident that Lycopene has excellent antioxidant properties with no adverse systemic or local effects and can be used as a potential adjunct to surgical (flap surgeries) or non – surgical (scaling and root planing) procedures in the treatment and prevention of periodontal diseases by reducing oxidative stress eventually plummeting periodontal inflammation.

Conflict of Interest

NIL

Funding

Not Applicable

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SPEED CONTROL OF DC MOTORS BY USING MULTILAYER NEURAL NETWORK PARAMETER TUNER FOR PI CONTROLLER

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ABSTRACT

A multilayer neural network parameter tuner (NNPT) for PI controllers is employed in this project to improve Dynamic response of DC motors in terms of speed and torque. The DC motor is subjected to intensive development, but it still has nonlinear properties which require more complex control systems. By developing adaptive motor control systems, the problem of nonlinear structures can be solved. A traditional PI controller's working performance cannot be relied upon to control the speed of DC motors. A multilayer neural network parameter tuner for PI controllers is developed in this project to adjust the speed and other parameters of the DC motor by making adjustments of the values like Ki and Kp. In comparison with traditional PI controllers, the NNPT is expected to provide superior performance

Keywords: *matlab, NNPT, jupyter notebook , PI controller*

I. Introduction

A deep learning system uses layers of neural networks in order to accomplish its task. Deep learning adopts a conceptual approach similar to the way the human brain processes data in order to identify speech, translate languages, recognize objects, detecting objects and for making the decisions. In order to simulate human intelligence, Deep Learning uses NN. Neurons are arranged in three layers of a neural network: the Input Layer, the Hidden Layer, and the Output Layer. A feedforward NN is a network where there is no cycle in the connections between nodes. Here nodes are nothing but neurons. In this network, the information moves in one direction i.e from the input nodes, through the hidden nodes and to the output nodes. The weights applied to the inputs are then applied to an activation function, along with the bias, of the signals that are transmitted between neurons. The delta rule is Backpropagation algorithm. Backpropagation algorithm calculates the error based on a known and desired output for each input value, it is usually classified as a type of supervised-learning . This project uses back propagation algorithm to train and implement the feed forward neural network tuner.

II. Literature Survey

Tuning pid controllers for dc motor by using microcomputer .(ali hussein mohamed alhili):international journal of applied engineering research 2019:
This paper present a review study of tuning of PID controller for speed control of DC motor. PID parameters like kp ,ki ,kd are tuned using the different methods. Here in this paper, Tuning is done by the Ziegler-Nichols method using MATLAB programming as well as python programming technique. Raspberry pi is one of the microcomputer ,was taken into consideration as it supports Linux based operating system and it is programmed using python. As part of the conventional closed loop control system, the User Interface Unit, Feedback Circuit, Error Detector, PID controller circuit, and the control signal generator are integrated into the hardware circuits. Here, all these hardware functions are integrated using a single Raspberry Pi. The logic for the PID controller can be implemented on Raspberry Pi by using Python.. When Python programming was compared to other techniques, the results showed that the former had better parameters for performance.

B. Artificial neural network for adaptive pid controller. (frantisek kudlacak) ieee conference 2018:

The paper explains the design of adaptive PID controller and back propagation. Here PID controller is tuned by perceptron neural network and back propagation is done. As the simplest neural network, the perceptron represents a representation of a single neuron. Each perceptron connection is weighted by calculating the weight.. It is generally used an online approach to learn, where weights on artificial neural networks are updated after each sample, causing them to adapt over time It is possible to use gradient descent for differentiable error functions Single-layer neural network tuners are only capable of approximating linear functions, and not solving non-linear problems.

C. Performance comparison of fuzzy logic and pid controller for speed control of dc motor(odidem altun) irjet 2019

The performance of fuzzy logic and PID controllers is compared in this paper for separate excited DC motor speed control implementation in MATLAB/Simulink.. It demonstrates how to adjust the fuzzy logic controller and PID controller by setting the steps accordingly. A fuzzy logic controller is developed to keep shaft speeds constant in varying loads by employing the IF-THEN rule and the speed errors are lowered to acceptable amounts as a result. Similarly, the PID controller's gains are adapted according to the ZN method. A comparison is made between the performance of FLC and PID based on their settling times and overshoot rates at the end of this paper

D. Speed control of dc motor by optimization techniques . (santoshkumar suman) ieee conference 2016

A DC motor speed controller is illustrated in this paper by using a GA decision. It is a stochastic global search technique that mimics the natural evolution . Achieving better tuning PID using evolutionary algorithms was the purpose of this project. The genetic algorithm was initialized with several number of population started with 20. It then initialized with population size of 40, 60, and 80. After updating determined values to GA some iterations have been done , after iterating four to five values precise gain values are obtained. On the other hand, PID controller is tuned with the help of Ziegler-Nichols method and ki , kp , kd ,values are determined .Finally ki , kp , kd values obtained from Ziegler-Nichols and genetic algorithm are plotted in graph and variations can be seen. This paper concludes that Genetic algorithm tuning technique gives least zero steady state when compared to Zeigler-Nichols method.

III. Block Diagram

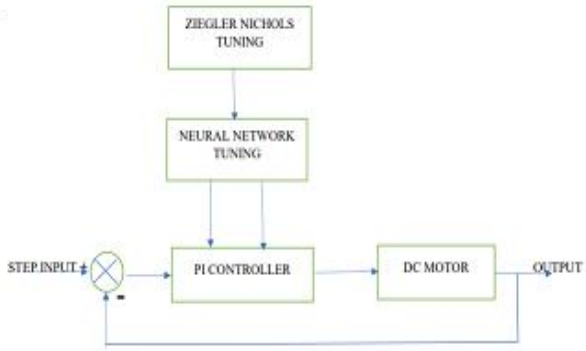

Fig.1.Block diagram

IV. Methodology

Initially the PI controller is tuned by ZN method .During this tuning process, the step response values and ultimate gain values are noted, which later used as reference values for training neural network Tuner for PI controller based on neural network parameters is developed. Because of its high learning speed, efficiency, and simplicity, feed-forward neural networks are used in this application for the control system of DC motors. The reference tuning method is used to train neural networks.. The NNPT can correct the steady-state error of PI controller after successful training.

- **PI Controller**

PI controllers calculate the error signals by comparing the system outputs to the set point obtained through a feedback control loop. A negative feedback proportional integral controller, and a closed loop unity negative feedback system are mapped onto the block diagram above

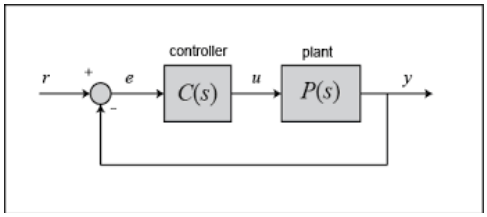

Fig.2. System of closed loop control

This is accomplished by combining the proportional and integral controllers to produce an output.

$u(t)=Kp\ e(t)+Ki \int e(t)dt$

- **Ziegler Nichols Method**

The ZN tuning method is a traditional form of tuning the controller. This method was built by G Ziegler and N B Nichols. PID tuning rule attempts to produce good gain values for tuning the controller, the gain parameters are: Kp - the controller path gain. Ti - integrator time constant. Td – derivative time constant. Controller tuning means adjustments of the tuning parameters (proportional gain, integral gain and derivative gain) to ensure the best response of the controller. In this project, initially PI controller tuned using this method in matlab and gain values are determined.

Controller Parameters

	Tuned	Block
P	165.7921	449
I	491.8475	269
D	n/a	n/a
N	n/a	n/a

Performance and Robustness

	Tuned	Block
Rise time	0.368 seconds	0.22 seconds
Settling time	1.42 seconds	3.8 seconds
Overshoot	10.4 %	0 %
Peak	1.1	0.998
Gain margin	Inf dB @ Inf rad/s	Inf dB @ Inf rad/s
Phase margin	60 deg @ 3.55 rad/s	65.7 deg @ 7.08 rad/s

Fig.3.Tuned parameters

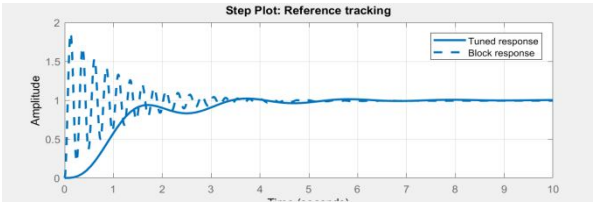

Fig.4.Tuned response from matlab

- Introduction to deep learning and neural networks:

An extension of machine learning, deep learning makes use of multiple-layer neural networks. An artificial intelligence is deep learning that mimics the working of the human brain in processing data to recognize the sounds, translate languages, and detect objects in real time. The three layers of neurons are Input Layer, the Hidden Layer and the Output Layer. In a feed-forward neural network, nodes are not connected in a cycle. Here nodes are nothing but neurons. In this network, information is passed from input nodes to hidden nodes and then from hidden nodes to output nodes. Weights are applied to inputs and used in conjunction with bias when the inputs are transmitted between neurons. In this demonstration, one delta rule is the only learning rule utilized by neural networks. The delta rule is Back propagation algorithm. Backpropagation algorithm calculates the error based on a known and desired output for each input value, it is usually categorized as supervised learning. Here in this project ,the feed forward neural network tuner is developed and trained using back propagation algorithm and this gives out controller gain values.

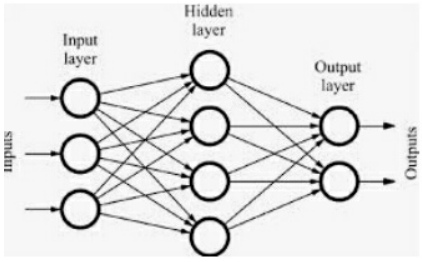

Fig.5.Neural Network

- Jupyter Notebook

Researchers can use Jupyter notebook to convey the combination of software code, computational output, and explanation in a single document using free, open-source software. In this project Gekko package is imported to jupyter notebook.

GEKKO is a package of python for machine for learning and optimization problems .GEKKO Python is developed for large-scale optimization and accesses solvers of unconstrained, constrained, discrete , and continuous problems.

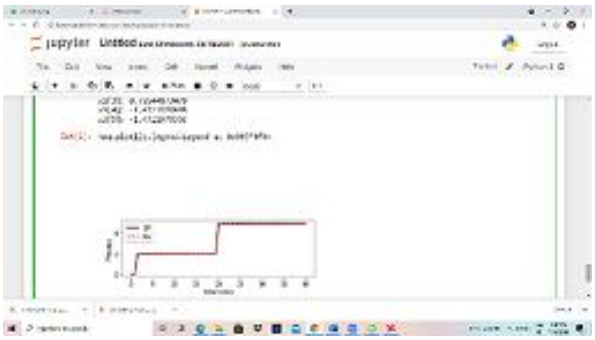

Fig.6.Tuned response from neural network model

V. **Hardware Implimentation**:

Components Required:

1) Arduino board: It is an open-source electronics platform which has physical programmable circuit board and IDE, which is used for writing and uploading code to the boards.
2) Motor driver: A motor driver is responsible for interfacing the motors with control circuits. Unlike motors which require high current, controllers operate under low current signals.
3) Motor encoder : Various sensors, such as encoders, detect rotations or linear displacements. Encoders are used in devices that need to operate in high speed and with high accuracy.

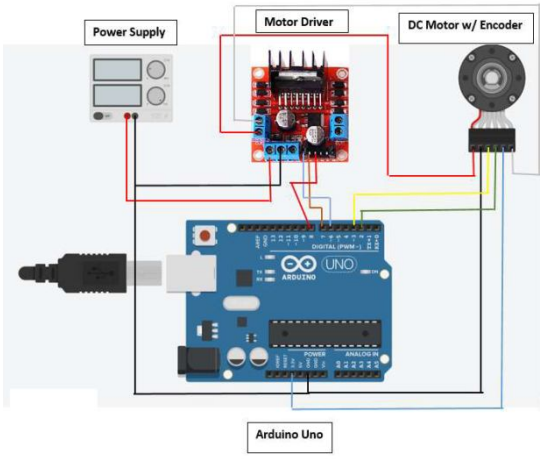

Fig.7.Connection Diagram

VI. Result

A multi layer Neural Network Parameter Tuner (NNPT) is used to implement DC motor control using the PI controller. After successful training ,the NNPT gives the value of ki and kp of the PI controller which reduces the steadystate error, settling time and overshoot.
Simulated results indicate that the NNPT PI controller has better dynamic characteristics than ZN PI controllers. The comparison brings to light the various disadvantages of the existing methods and how they can be rectified. Hence drawbacks of ZN matlab tuning method are completely eliminated by this neural network parameter tuner .

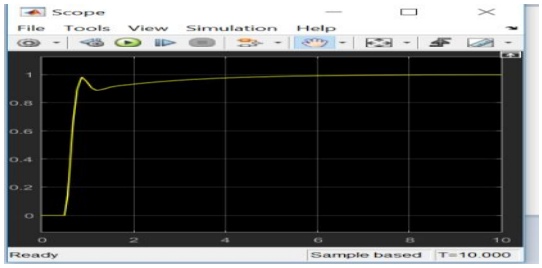

Fig.8.Speed response from matlab

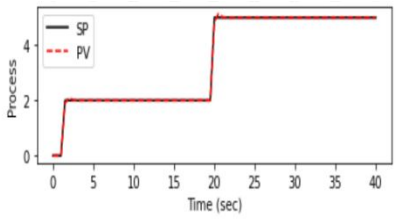

Fig.9.Tuned response from neural network model

VII. Conclusion

The results demonstrate how machine learning, and in particular neural networks, can be used to extend existing systems. Furthermore, we make neural network design and implementation as simple as possible to make it easy to implement this technology. When the implementation is implemented as a library, this technique can be employed without extensive knowledge of either control engineering or neural network theory. As far as we know, this is the first study to use neural networks, pushing the state-of-the-art in neural networks for tuning PI parameters. We show that our approach performs better than the traditional PI controller in a detailed analysis .
So this project is a critical step towards increasing the acceptance of real-world applications based on machine learning

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ENERGY LOW MOBILITY ROUTING PROTOCOL PERFORMANCE EVALUATION (ELMRPP)

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ABSTRACT

Because nodes are assumed to have small capacity for their batteries to be restored, Energy is a finite resource. concern in the prospective implementation of Ad-hoc networks. Investigating the Wireless communication's energy expenses and the tactics used in ad-hoc networks to reduce these costs. One of the most important considerations while developing Wireless Sensor Applications for MANETs is power consumption. As a result, a variety of methodologies for analysis the power consumption of this type of application have been offered. These tactics can assist nodes in Wireless Sensor Networks (WSNs) last longer, and they're also advised to application designers since they can reduce the amount of energy used by WSN applications. While measuring is a well-known and exact approach for determining power consumption, it is time-consuming, expensive, and may be impractical given the enormous number of WSN nodes. Furthermore, because WSNs consume so much energy, the equipment required by quantity systems makes them challenging to utilise in a variety of situations [1]. In this context, we suggest developing an unique algorithm for energy performance routing protocol (EPRP) with Low Mobility in sensor networks to enhance power consumption,PDR, throughput, and end-to-end delay are all factors to consider analysis. Extension Throughput-delay Guaranteed Routing for Reliability (ExTeGaR), Ant-AODV, and improved energy–buffer aware reliable routing (EEBABR) protocols are compared with this protocol.

Keywords: *MANET, ExTeGaR, Ant-AODV, EEBABR.*

Introduction

The Wireless Network has grown in popularity over the last few years. Wireless networks can be divided into two categories: those with infrastructure and those without Previously, centric controllers acknowledged and saved communications between terminals. A network is constructed ad-hoc when terminals can self-connect and interconnect without the use of In a multi-hop way, static infrastructures are used. Ad-hoc networks can be easily set up in a given region and run successfully due to their infrastructure-free nature. Emergency services, misadventure rehabilitation, wireless sensor networks, and homegrown networking are among the applications. Contact has become extremely vital in in order to send information between people at any time and from any location. A MANET is a network made up of mobile nodes that does not require centralized management. Because mobile gadgets run on batteries, extending their life has become a priority. The bulk of researchers have only lately began to look into how to build well-organized MANET protocols that are power-aware. The "death" of even a small number of nodes in a MANET owing to power sleepiness completes the routing feature of each mobile node in a MANET for initiating contact with other mobile nodes. As a result, the battery determines the location of mobile nodes in MANETs. As a result, they have partial energy levels, and when the link between them is disrupted, the nodes in the network frequently shift out of control. As a result, in such a circumstance, there are two main causes of connection breakage: node death and energy exhaustion. Node speed and pause time changes Variations in mobility As a result of the change in mobility, the link to nearby nodes breaks down, resulting in a decrease in network performance. At various layers of the network, a number of packets are discarded [8].

II. Related Work

The two types of energy management are energy conservation during productive dialogue and energy conservation during idle chat. One of the key strategies used in an ad hoc network to facilitate communication is the use of energy-efficient MAC and transmission protocols, while the other focuses on minimising the energy consumed when the

node is lazy and does not contribute to communication by putting the node in a low-power state. [5].

For ad-hoc network energy utilisation, we offer three modules here. The first is that energy is consumed during per packet transmission. Second, energy is consumed in the transmission of specific packets across the network. Finally, rather than packets that interact, energy is wasted on lazy nodes. Accepting these charges for data packets sent across the network as well as control packets required to govern the network is crucial to understanding how and when energy is drained from ad-hoc networks. Several protocols use energy-saving methods, which are included in these communication charges. [5].

Hop count is commonly used as a routing metric in ad-hoc network routing protocols, although this does not lessen the energy required to route a packet [2]. At the network layer, transmitting algorithms should choose routes that use the least amount of overall power to move packets through the network, a technique known as minimal energy routing (MER). MER may not be optimal in terms of network duration and long-term connection, resulting in node energy exhaustion and work panels along frequently used routes.

The per-hop least power level P(i, j) required for node I to reach node j is the transmission statistic utilised by least energy routing. The sum of all power levels P(i j) along route r, Pr, is the overall power level:

$$P_r = \sum_{i=0}^{D-1} P(xi, xi + 1)$$

The source and destination nodes are x0 and xD, respectively.

The minimum total transmission power routing (MTPR) algorithm [3-4][6-7] finds a power path that:

$$P_s = \min_{r \in R} P_r$$

Where R denotes the collection of all potential paths. The extreme power level for all nodes is defined by a specific least energy topology. MTPR optimises the power level for each hop to discover the least energy routes.

III PROPOSED WORK

From figure1, the nodes are received information fr**o**m different source layers, the node will generate the packets with energy-efficient path form MAC and routing protocols. It will check the energy level of each node before transmit, then it will partition the transmitting nodes and non-transmitting nodes and deliver the content.

Pseudo code: Local repair mechanism

```
if (cha->num_forward() >tr->tr_hops) {
l_tr_repair(tr, q);
return;
  }
else
   #endif // LOCAL REPAIR
  {
dropped                                    (q,
DROPPED_RTRR_MAC_CALLBACKK);
while ((q = ifqueuee->filtered (brokenn_nbrr)))
{
dropped                                    (q,
DROPPED_RTRR_MAC_CALLBACKK);
 }
nb_delete(brokenn_nbrr);
  }
```

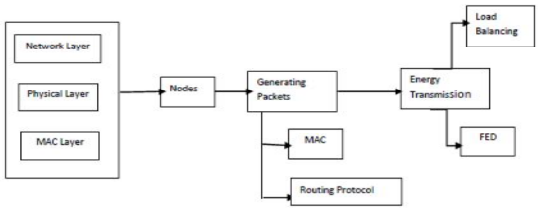


Figure 1: Block Diagram of EPRP

Results:

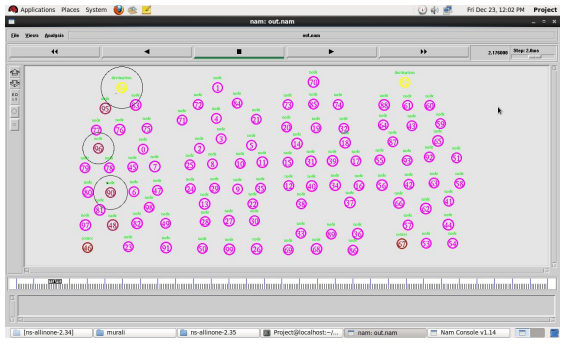


Figure 2: Identify the source and destination nodes in simulator

From figure 2, we can find the source and destination node among the various nodes.

From figure3, we can find the efficient path from source node to destination node.

Figure 4: Finding the lifeless nodes (red nodes) in the specific path.

From figure 4, we can absorb the lifeless nodes in red colour in the specific path. The source node is shown in brown in colour and destination node is in yellow colour.

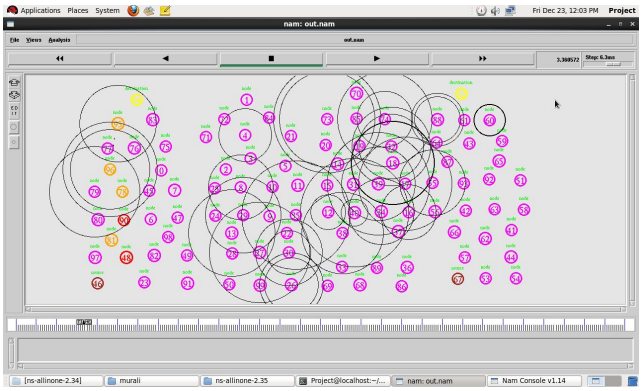
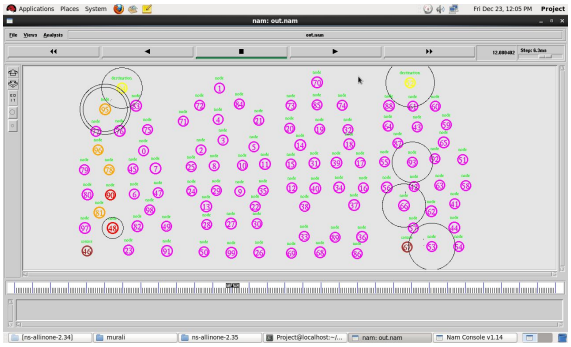


Figure 3: Finding the path from source and destination



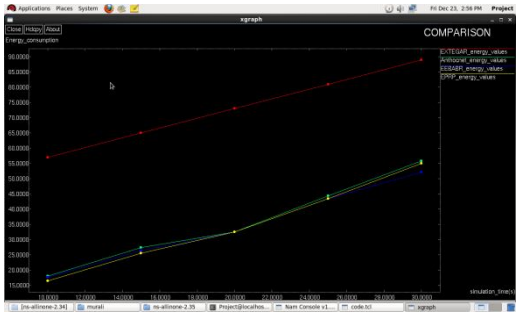


Figure 5:Power Consumption Comparison of EPRP with ExTeGaR and EEBABR

From figure 5, will shows the power consumption comparison of EPRP with ExTeGaR and EEBABR. The y axis represent the energy in joules and X – axis represent the simulation time.

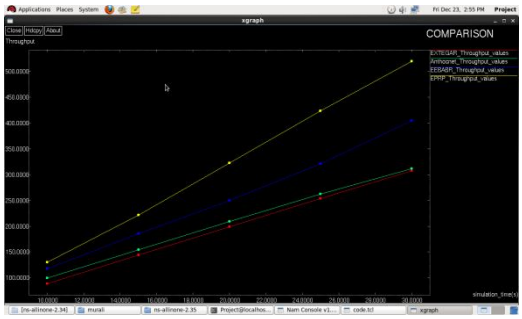


Figure 6: Throughput of EPRP with ExTeGaR Ant-colony and EEBABR

From figrure 6, will shows the throughput comparison of EPRP with ExTeGaR Ant-colony and EEBABR. The throughput of EPRP is good than the other protocols.

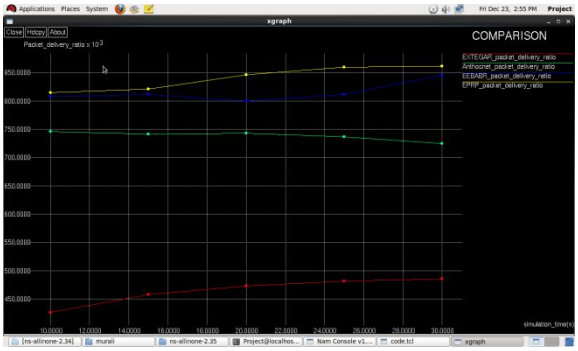


Figure 7: PDR of EPRP with ExTeGaR Ant-colony and EEBABR

From Figure 7, will shows the PDR comparison of EPRP with ExTeGaR Ant-colony and EEBABR. The PDR of EPRP is high than the other protocols.

IV CONCLUSIONS

The EPRP protocol is discussed in this paper, and it is compared and assessed against other energy-efficient protocols using criteria such as Power Consumption, PDR, and Throughput. The suggested work will use less power and have a high PDR and throughput. The EPRP will operate with little mobility, ensuring that the topology remains stable.

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HEALTH SYSTEMS PERFORMANCE IN AN INTERNATIONAL CONTEXT

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ABSTRACT

Measuring the performance of health systems has become an objective of special relevance in recent years due to the increasing health spending and the higher level of people requirements in each country. Additionally, the COVID-19 crisis has given them a greater role, if possible, highlighting the importance of an effective and efficient functioning of the different health systems. Thus, defining and calculating the outcomes achieved and to compare their results internationally becomes an important mission that can offer important information for the assessment and the improvement of the different health systems.

Keywords: *Health system performance, avoidable mortality, cluster analysis, typologies of health systems*

Methodology

In the present work, avoidable mortality indicators are calculated, both preventable and treatable, as representative of these outcomes. For its calculation, the methodology agreed by the OECD and Eurostat based on the International Classification of Diseases, ICD-10, is applied. Starting from the mortality database of the World Health Organization, the standardized indicators of avoidable mortality has been calculated for those countries that have available data based on this classification. Based on the outcomes obtained, a cluster analysis is applied to identify and characterize the different clusters or typologies of countries that present similar results to find out possible affinities and detect benchmarking possibilities.

Preliminary Results

The results obtained show important heterogeneity among countries in terms on the level of avoidable mortality and the combination between preventable and treatable mortality. Countries can be aggregated on 5 clusters corresponding to different types of health systems.

Conclusion

The indicators obtained are particularly relevant as a tool to offer a first general orientation on the performance, as well as a first step to identify possible areas for improvement within health systems.

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INFLUENCE OF FAMILY INCIVILITY ON EMPLOYEE CREATIVITY

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ABSTRACT

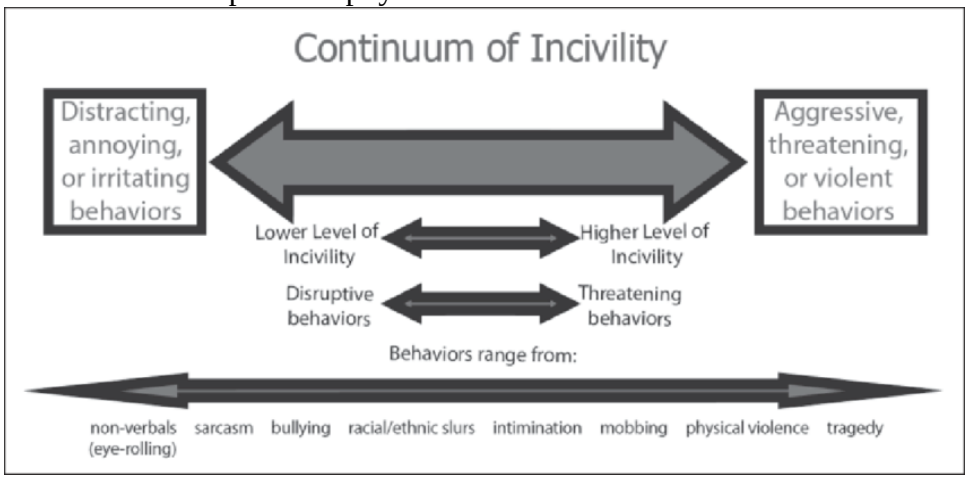
Creativity is an inner state of mind possesses by an employee to solve issues and every organization want to explore creativity of their employees upto tip point. In present scenario family incivility has great impact on creativity of an individual specially working person of family. In this manuscript, researchers are trying to expose the impact of family incivility on creativity of an employee or working member of a family because most of the times a person faces uncivil behaviour in family but could not able to recognize it.In this study researchers also try to make a bridge between family incivility and employee creativity through intrinsic motivation. To validate such issue researchers have reviewed the literature to establish the relation between family incivility and creativity of an employee. In reviewed literature most of the theories have suggested that low-intensity behaviour in the family could affect creativity of an individual. Hence this study contributes to the organizations as well individuals to identify the relation between family incivility and creativity of an individual.

Keywords: *Incivility, Family Incivility, Motivation, Intrinsic motivation, Creativity*

Introduction

Mental fitness of an individual plays a vital role in creativity and most of cases it is found that people are not as creative as they can due to stress, anxiety and other mental stress which create imbalance between capacity of a person and their performance. Such stress, anxiety and other mental stress may arise due to uncivil behaviour like rudeness and lack of mutual respect in the families. Many people are not aware about this family incivility and ignorance of it can affect a person's physical and psychological health (e.g., De Longis et al., 1988; Lazarus & Folkman, 1984). If a person finds himself in stress or in a disturbing situation, they will not able to concentrate on their work and waste their energy in dealing with these issues (Yozgat & Kamanli, 2016).

Cynthia M. Clark in her study of "Faculty and Student Assessment of and Experience with incivility in Nursing Education" has given a continuum of incivility in which she describes the intensity of uncivil behaviour from low level incivility to high level incivility.



Secondary source- Continuum of Incivility by Clark

Workplace incivility and its impact on work outcomes have been studied in various studies (Allen, Herst, Bruck, & Sutton, 2000; Ford, Heinen, & Langkamer, 2007; Michel, Mitchelson, Kotrba, LeBreton, & Baltes, 2009) but very few have been focused on family

incivility. Family incivility is not very visual as abuse or aggression (Pearson, Anderson, &Wegner, 2001). At starting it is hard to identify family incivility but gradually it become suffocating to the victim and leave negative impact on their personal and professional life. (Lim & Tai, 2014). In various studies it is found that a person with unhappy personal life also found to be uneasy in professional life (Ford et al., 2007; Cooke & Rousseau, 1984; Crouter, 1984; Leiter & Durup, 1996). Researchers have found that employees facing family incivility were not fully engaged in their professional duties and responsibilities. In most of the cases family incivility found as a communicative activity as if the person faces uncivil behaviour in the family environment starts behaving uncivil with the third person at work. Such type of negative attitude decreases their confidence and motivation (Robert & Hockey, 1997). The persons facing uncivil behaviour are found to be emotionally exhausted and they are not able to focus on their work and their job performance starts decreasing (Porath & Pearson, 2010; Schilpzand, Leavitt, & Lim, 2016; Van Jaarsveld, Walker, & Skarlicki, 2010). Incivility has huge impact on mental and psychological state of a person. It slows down the thinking process and blocks the imagination and creativeness of an individual.
According to the oxford dictionary, creativity is an art which is produced by a person by using their skills and imagination. However, when an employee faces problems like ruthless behaviour and bullying, the opportunity for the out of the box thinking i.e., creativity is jeopardised as the brain goes into an acute stress response instead of a state which promotes creativity. In the book of Hennessey and Amabile (2010) creativity defined as a novel product, idea or problem-solution that is value to the individual and the social group. Hur, Moon and Jun (2016) found that employees' creativity decreases due to uncivil behaviour of customers and co-workers by mediating emotional exhaustion and intrinsic motivation.

Need of the Study

Incivility is not as intensive as violence and abuse. Most of the time sufferer and attacker both are not able to identify the uncivil behaviour. Literature related to incivility have enough evidence regarding relationship between employees' incivility and creative performance (Hur, Moon and Jun 2016; Porath and Erez 2007; Sharifirad 2016) but there are very few studies have been done on family incivility and it is also a reason of unawareness among people about uncivil behaviour among family members. The present study is trying to contribute for individuals, organizations and society by making them more aware about family incivility. Along with that researchers also try to identify that how family incivility can lead to a negative impact on its members which effects creativity at workplace.

Objective

The main objective of the study is to make an understanding about the term family incivility and to understand the relationship between family incivility and intrinsic motivation. Along with that researchers also try to explore the impact of intrinsic motivation on employee creativity.

Research methodology

This study is based on secondary source of data which helps us to understand the holistic relationship between family incivility and creativeness of an employee.

Literature Review

To achieve the above mentioned objective a review of literature has been performed to know the relationship between family incivility and intrinsic motivation and to understand the impact of intrinsic motivation on employee creativity.

Relation between family incivility and employee creativity:

Family incivility can be defined as insolent and discourteous behaviour by the family members **(Lim & Tai, 2014)**. Uncivil behaviour by family members is not as intensive as family abuse or violence (**Pearson, Andersson, & Wegner, 2001)**. Sarcasm, ignoring others, using misuse of power could be the part of family incivility (**Finkelhor, Gelles, Hotaling, & Straus, 1983; Lachs & Pillemer, 1995**). Violence and abuse in a family can be

identified easily but incivility is not evident easily due to unawareness. The act of incivility may be ignorance of member's opinion in family decisions, not showing interest in their lives, beliefs and statements. Previous studies have found that sufferers of uncivil behaviour have to face mental stress which has huge impact on their health (**Holmes & Rahe, 1967; Kobasa, 1979)**. An employee who is fronting mental stress generally found to involve in discretionary work (**Podsakoff et al., 2009**). Incivility has impact on employees' psychology which declines the job performance (**Wright & Bonett, 1997; Wright & Cropanzano, 2000**). Due to incivility many people face emotional exhaustion, helplessness and feel depletion in their emotional resources (**Maslach and Jackson, 1986**) and who face incivility are found less creative and sometimes even leave the organisation (**Porath & Pearson,2013**). Creativity means to the person's behaviour that creates something new and valuable for the business (**Amabile, Conti, Coon, Lazenby, & Herron, 1996; Woodman, Sawyer, & Griffin, 1993**).

Relation between family incivility and intrinsic motivation

Porath and Pearson (2013) revealed that incivility has negative impact on employee productivity. Behaviour like criticism, avoidance, exclusion and sarcasm become the obstacle in fulfilling the employee's basic psychological needs. Such inabilities of fulfilling basic needs reduce intrinsic motivation. Incivility has a direct impact on intrinsic motivation (**Halbesleben and Bowler, 2007)**. Incivility leads to emotional execution and increases weariness (**Maslach and Jackson, 1986**) and who are emotionally exhausted are found to have less intrinsic motivation. Emotionally exhausted employees found less goal-oriented and more involved in reducing their hurt feelings and worrying about future failure (**Barrick et al. 2003; Malouff et al. 1990**). Incivility impacts an employee and organisational performance in many ways like withdrawal behaviours (**Deery et al., 2002**), work stress and low job satisfaction (**Wright and Cropanzano, 1998**).

Relation between intrinsic motivation and employee creativity

Porath and Pearson (2013) have been studied 800 managers and employees and found that intrinsic motivation positively affects employee creativity (**Elsbach and Hargadon, 2006)**. Intrinsically motivated employees are found to be more inquisitive and have a great curiosity in learning (**Ryan and Deci, 2000**). Simultaneously, people facing uncivil behaviour are conflicting within themselves and decreasing their intrinsic motivation which progressively affects creativity (**Amabile's 1996)**.

People with a high intrinsic motivation have great concentration, curiosity and desire to learn (**Ryan and Deci, 2000**). Intrinsic motivation develops confidence, risen the openness of mind and increases risk taking ability. These potentials collectively lead to creativity (**Shalley et al., 2004). Bagozzi (1992**) suggested that intrinsic motivation is a serial mediator between incivility and creativity. People who face incivility may feel a lack of energy **Kjellberg Hans and Hagberg Johan (2010)** as they spend most of their time and energy in resolving their mental hassles (**Han et al., 2019**).

Discussion

This manuscript is written on the basis of literature available on incivility, motivation and creativity. Incivility such as rude behaviour, not considering someone opinion, trying to controlling behaviour according to self-choice, sarcasm, ignoring others, misuse of power can create self-doubt and various mental & physical illness in related person. Literature has suggested that the person who is going through incivility can feel more emotionally exhausted and not found fit themselves with others. They try to withdrawal from the work and may resign from their job. Person with high intrinsic motivation are willing to learn new and do new things. So the people with high intrinsic motivation found to be more creative as they like to do work and have curiosity to learn new things. On the other hand people with low intrinsic motivation feel exhausted and may face mental as well as physical unfitness.

Conclusions & Suggestions

Usually we found that people try to make gap between professional and personal life but in actual it is not possible. This study defines the uncivil behaviour in families and its effects on working persons. Such uncivil behaviour is so thin that we usually neglect them. Researchers are trying to find such small uncivil behaviour in families and its impact on employee professional life. In previous sections researchers have discussed that how family incivility impact on employee intrinsic motivation and further on their creativity. Uncivil behaviour in family such as ignoring and commenting create various mental distresses and gradually it results in low interest and concentration on work.

To avoid such circumstances, organizations can adopt following practices which can reduce the effect of incivility and can increase motivation and creativity of the employees:

- Low-intensity behaviour like family incivility can impact on employees' psychological health. Managers should take care of this and try to reduce their task related issues.
- Managers should closely observe the employees' negative behaviour like absenteeism, late coming, not fully engaged at work to identify stress and psychological struggle of the employee.
- Most of the time it is found that employees are not aware about their stress and stressors but its impact can be seen at work. Organizations should create support system at work to reduce such impacts.
- Organizations can arrange therapist to create awareness and to reduce the stress of the employees.
- There should be seminars and workshops to create awareness regarding such topics which have great impact on employee's personal and professional life. In various situation people are not aware while facing or behaving uncivil.

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THE INFLUENCE OF DEMOGRAPHICS ON ATTITUDE TOWARDS WEB BASED INTERACTIVE ADVERTISING (WIA) AND INTENTION TO REVISIT THE SITE WITH SPECIAL REFERENCE TO FINANCIAL SERVICE SECTOR

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ABSTRACT

In this study the author has tried to identify the influence of demographic factors on Attitude towards web based interactive advertising (WIA) and intention to revisit the site with special reference to financial service sector. Although it is generally accepted that the active role of consumer should be emphasized in the computer-mediated environment, WIA researchers have devoted their efforts to examining the effectiveness of various WIA formats. The main purpose of the study was to identify and weigh the criteria that market researchers typically use in evaluating information provided by secondary sources found on the Internet. In this study the author has adopted a quantitative based approach. The data was collected through primary sources like questionnaire and personal interactive and secondary sources like web-site or any print sources like magazines, journal publications etc. A systematic data analysis and interpretation was done using SPSS and AMOS software was used for developing model for the study.
Findings: This study examined how customers consider about and relate with various WIA in their daily lives. Though, the study does not answer all queries connected to this research story, and greatest precise consequences need additional inquiries. Relatively, this study offers the complete impression of consumer behavior with WIA in accurate circumstances.The study produced some valuable implications for a variety of stakeholders. Researchers can take full advantage of the findings in helping their theory building, and marketing professionals can apply the consumers' voices to their strategic planning for interactive marketing. College teachers can integrate the findings into their Internet advertising classes as they develop consumer-based modules in these newly popular classes.The findings from this study will be useful to find and purchase the products based on the types of different channels companies have, which may affect the consumers' buying behavior. Future research is suggested that should take into account the different options for retail venue combinations and consumers' buying behavior in harmony with those. This research paper is the original contribution of the author. The academicians or researchers can use the conclusions of this research to further study the changing behavior of customers and use for further examination with some more perspectives.

Keywords: *WIA, Financial services, Online Consumer Behavior, buying behavior and internet browsers*

Introduction

The Financial services sector in India is blooming and has become one of the lucrative areas to professionalism. The sector has undergone metamorphosis since 1990. Indian economy got liberalized during 1991 and the financial sector was kept open for private and foreign players. During the late eighties, the financial services industry in India was dominated by commercial banks and other financial institutions governed by the Central Government. The economic liberalization has brought in a complete transformation in the Indian financial services industry.

Prior to the economic liberalization, the Indian financial service sector was characterized by various other factors, which was related to the growth of this sector. Some of the factors of significance are as follows:

- Too much of control and regulation by the apex bodies in the form of interest rates, money rates etc.
- Controller of capital issues used to regulate the prices of securities
- Absence off independent credit rating and credit research agencies.
- Strict regulation of the foreign exchange market
- Restrictions on foreign investment and foreign equity
- Non-availability of debt instruments on a large scale.

However, after the economic liberalization the entire financial sector has under gone a sea-saw change and now new financial instruments are entering the capital market on a daily basis. The present scenario in the Indian Capital market is characterized by financial innovation and financial creativity.

Financial services basically mean all those kinds of services provided in financial or monetary terms, where the essential commodity is money. These services include; Leasing, Hire purchase, venture capital, Merchant banking, Insurance, housing finance, Mutual funds, factoring, stock broking and many others.

Online Consumer Behavior

According to Belch and Belch, whenever need arises; a consumer searches for several information which would help him in his purchase.

Following are the sources of information:

- Personal Sources
- Commercial Sources
- Public Sources
- Personal Experience

Perception also plays an important role in influencing the buying decision of consumers.

Buying decisions of consumers also depend on the following factors:

Messages, advertisements, promotional materials, a consumer goes through also called

Selective Exposure.

- Not all promotional materials and advertisements excite a consumer. A consumer does not pay attention to everything he sees. He is interested in only what he wants to see. Such behavior is called **selective attention**.
- **Consumer interpretation** refers to how an individual perceives a particular message.
- A consumer would certainly buy something which appeals him the most. He would remember the most relevant and meaningful message also called as **selective retention**. He would obviously not remember something which has nothing to do with his need.

Literature Review

1. In the study conducted by author **Catalina Chirica,** Academy of Economic Studies, Bucharest, Romania, "Relationship Marketing - Best Practice In The Banking Sector**"** this paper aims to highlight best practice in relationship marketing because of adjusted companies' strategies in a turbulent, unstable, and dynamic economic environment. By best practice, we understand specific marketing tools and strategies built upon real needs and heterogeneous consumer preferences, addressed directly in a relevant way, aiming at clients' long-term retention. Best practice in relationship marketing proves that this cannot be applied in any way and at any time, this paper highlights the main components of building and implementing such a system.
2. In the study conducted by **Prof. Rajesh C. Patel , Dr. Chirag J. Trivedi , "CRM Customer Preferential Study On Financial Services For Public And Private Sector Banks With Reference To Ahmadabad District".** Customer Relationship Management (CRM) was developed as a popular tool in today's competitive business environment. The technique enables the business firms to identify and target their most profitable customers. For applying CRM technique in any business process, a systematic analytical study is required. In this paper an attempt is made to compare the various financial services provided by private and public sector banks of Ahmadabad district. Also concluding summery is given about effects of demography factors on CRM for both types of banks.
3. In the study conducted by Malte Geib, Lutz M. Kolbe and Walter Brenner **, "CRM collaboration in financial services networks: a multi-case analysis".** The paper finds that key issues of CRM in financial services networks are redundant competencies of partnering companies, privacy constraints, CRM process integration, customer information exchange, and CRM systems integration. To address these issues, partnering companies have to agree on clear responsibilities in collaborative processes. Data privacy protection laws require that customer data transfer between partnering companies has the explicit approval of customers. For process integration, companies have to agree on process standards and a joint integration architecture. Web services and internet-based standards can be used for inter-organizational systems integration. Data integration requires the development of a joint

data model. Either a unique customer identification number or a matching algorithm must be used to consolidate customer data records of partnering companies. The findings of this paper can be used by financial services networks to improve their collaborative CRM approaches.

In the study conducted by **Joao F. Proenc¸a and Luı´s M. de Castro, "Stress" in business relationships: a study on corporate bank services".** The paper aims to discuss the interaction processes and short-term behaviours and motives in long-term relationships between banks and their corporate clients. The discussion is based on findings from four Portuguese case studies. Interviews made to major actors on both sides of each relationship were transcribed and analysed to investigate the buyer-seller interaction process, and the interplay between the actors involved. The paper contributes to knowledge concerning the nature of business banking relationships, provides insights about instability and stress therein, and suggests some factors that can generate or intensify that instability. Short-term irregularities and stress are found to arise in the context of relationships' longer-term continuity and stability.

Research Methodology

Rationale of Study

The Internet as an advertising medium has been much examined for the last several years. Specifically, Internet-related research work has increasingly dominated many academic conferences and major journals associated with consumer behavior and advertising. Nevertheless, Web-based interactive advertising (WIA) research has evolved in a few specific areas without broadly expanding the body of knowledge in the field.

Although it is generally accepted that the active role of consumer should be emphasized in the computer-mediated environment, WIA researchers have devoted their efforts to examining the effectiveness of various WIA formats. Moreover, much effectiveness-oriented research implicitly assumes the passive role of consumers. However, consumers, when they are "surfing" as active participants in the natural environment of the Web, are less likely to be forced to view what they do not want to see. Considering the important role of consumers in the Internet, it is necessary for WIA researchers to understand consumers' view toward WIA at this infant stage of the field.

Importance & Significance of Study

Even though the likely practicality of the Internet as a standard for traders to gain and recall clients, little experimental training has spoken the portion of Internet websites in starting consumers' purposes to buying particular brands or at specific stores. Because many customers feels that the Internet as a shopping method, making an actual website may finally add to marketers' ability to recollect customers for their necessities or brands. Research engaged on the result of website storefronts on consumers' online buying behavior could offer financial service companies with helpful data about the problems and likely answers in founding websites. By establishing effective websites, financial service companies could retain customers through the Internet and build long-term relationships with them.

1. This study has the following objectives:
2. To study the effect of demographics on attitude towards towards Web based interactive advertising (WIA).
3. To identify and weigh the criteria that market researchers typically use in evaluating information provided by secondary sources found on the Internet.
4. To explore the impact of consumer related factors on consumer response towards WIA.

Research Hypothesis

Following is the hypothesis of this study:

Null Hypothesis

H01: The consumer demographics has no effect on consumer attitude towards WIA and intention to revisit the site.

Research Question

The study aims to find out the answer of the following research question:

Question: 1

What are the consumer related factors that account for consumer attention towards WIA?

Universe of the Study

A) **Definition of Nagpur City -** Nagpur is a city in the central part of India. In Maharashtra State.

B) The division of the Nagpur city according to zones with the selected retail outlets is as follows:

1. North Nagpur – Koradi Rad, KT Nagar, Sadar, Hazari Pahad, Godhni, Gorewada and Zingabai Takli
2. South Nagpur – Besa, hanuman nagar, Manewada, Sakkardara, Somalwada, Trimurti nagar, Pratapnagar, Narendra nagar, Chinchbhavan
3. East Nagpur - Nandanwan, Pardi, Surya nagar, Wardhamannagar
4. West Nagpur – Bajaj nagar, Laxmi nagar, Dharampeth, Ravi nagar, Shivaji nagar, Amravati road, Jaitala, Swavalambi nagar, Hingna road Central Nagpur – CA Road, Civil lines, Dhantoli, Mahal, Ramdaspeth, Sitabuildi.

C) Given below are the various types of financial services considered for this study –

1. **Banking** – Under this an individual can deposit his or her money and can get return in the form of interest and also borrowers can get loan by paying interest to bank periodically.
2. **Insurance** – By using this one can get peace of mind as one can buy insurance policies like life insurance, fire, marine, health and general insurance which ensures that person in the event of any mishap can get his or her money back from insurance company.

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

Banking

List of Public Sector Banks	List of Old Private Sector Banks	List of New Private Sector Banks
Allahabad Bank	Catholic Syrian Bank Ltd.	Axis Bank Ltd.
Andhra Bank	City Union Bank Ltd.	Development Credit Bank Ltd
Bank of Baroda	Dhanalakshmi Bank Ltd.	HDFC Bank Ltd.
BOI	Federal Bank Ltd.	ICICI Bank Ltd.
BOM	ING Vysya Bank Ltd.	IndusInd Bank Ltd.
Bharatiya Mahila Bank Limited	Jammu & Kashmir Bank Ltd.	Kotak Mahindra Bank Ltd.
Canara Bank	Karnataka Bank Ltd.	Yes Bank Ltd
Central Bank of India	Karur Vysya Bank Ltd.	
Dena Bank	Lakshmi Vilas Bank Ltd.	
Oriental Bank of Commerce	Nainital Bank Ltd.	
PNB	Ratnakar Bank Ltd.	
Syndicate Bank	South Indian Bank Ltd.	
Union Bank	Tamilnad Mercantile Bank Ltd.	
UCO Bank		
Vijaya bank		
IDBI.		

Total Banks - 36

1. Insurance

List Of General Insurance Companies	Public Sector life Insurance Company
Public Sector	Life Insurance Corporation of India
New India Assurance Company Limited	
National Insurance Company Limited	List of Private Sector life Insurance Companies
The Oriental Insurance Co. Ltd.	Bajaj Allianz Life Insurance Company Ltd.
United India Insurance Co. Ltd.	Birla Sun-Life Insurance Company Ltd.

Agriculture Insurance Company of India Ltd.	HDFC Standard Life Insurance Co. Ltd.
	ICICI Prudential Life Insurance Co. Ltd.
Private Players	ING Vysya Life Insurance Company Ltd.
Bajaj Allianz General Insurance Co. Ltd.	Max New York Life Insurance Co. Ltd.
ICICI Lombard General Insurance Co. Ltd.	MetLife Insurance Company Ltd.
IFFCO-Tokio General Insurance Co. Ltd.	Kotak Mahindra Old Mutual Life Ins. Co. Ltd.
Reliance General Insurance Co. Ltd.	SBI Life Insurance Company Limited
Royal Sundaram Alliance Insurance Co. Ltd	TATA AIG Life Insurance Co. Ltd.
TATA AIG General Insurance Co. Ltd.	Reliance Life Insurance Co. Ltd.
Cholamandalam General Insurance Co. Ltd.	
	List of Public Sector Insurance Companies
	Nationalised Insurance Companies
	Life Insurance Corporation of India
	General Insurance Corporation of India
	National Insurance Co. Ltd.
	Oriental Insurance Co. Ltd.
	New India Assurance Co. Ltd.
	United India Insurance Co. Ltd.

Total Insurance Companies -31

Summary of population & sample study

S.No.	Particulars	Population	Actual Sample size
1	Financial Services:		
	Banking:		
	Public Banks	16	6
	Private Banks	20	8
	Insurance:		
	General Insurance:		
	National	5	3
	Private	7	2
	Life Insurance:		
	National	1	1
	Private	11	5
	National	7	3
	Total	67	28

The sample size taken is approximately 40% representation of the population under consideration.

Sample Element :(i) Middle level Management – Departmental head, Branch/Zonal/Regional Manager/executive
(ii) Front Level Management – Supervisor, Desk officer, Office Manager/executive
(iii) Individual contributors – Salesman, Clerical staff

Sample size

Hierarchy	Designations	No. of respondents
Middle level Management	Departmental head, Branch Manager	2
First Level Management	Supervisor, Desk officer, Office Manager	5
Individual contributors	Salesman, Clerical staff	5
	Total	12

There will be approximately total 63 leading and well-known companies from the service sector deliberately (randomly) selected by cluster sampling as a population and out of these companies 12 respondents as per the above mentioned classification will be selected from each organization.

Therefore actual sample respondents = 63 * 12 = 756

(As per the Morgn's table at 95% confidence level with 5% margin of error for the population of one lac, the sample size should be 384, according to this 756 total respondents representing a moderate percentage of the respondent population within the Nagpur city have been taken as sample for the study is highly justified.)

S.No.	Particulars	Number of branches in Nagpur	Actual Sample size	Middle	front	individual
	Financial Services:					
	Banking :					
	Public Banks	16	6	12	30	30
	Private Banks	20	8	16	40	40
	Insurance:					
	General Insurance:					
	National	5	3	6	15	15
	Private	7	2	4	10	10
	Life Insurance:					
	National	1	1	2	5	5
	Private	11	5	10	25	25
	Total	60	25	50	125	125

The sample size taken is approximately 40% representation of the population under consideration.

a) Formula for calculating sample size:

$$SS = \frac{Z^2 * (p) * (1-p)}{c^2}$$

Where:

Z = Z value (e.g. 1.96 for 95% confidence level)
p = percentage picking a choice, expressed as decimal
(.5 used for sample size needed)
c = confidence interval, expressed as decimal (e.g., .04 = ±4)

$$SS = \frac{(1.96)^2 \text{ x } (0.5) \text{ x } (1-0.5)}{\pm (.04)^2}$$

= 600

According to the formula the sample size comes to be 600.

b) According to Morgan's table:

According to Morgen's table for the population of 250000 and above we should have a sample size of 782 at 95% confidence interval with 3.5% of margin of error.
So approximately we have decided to keep a sample of 750 sample size consisting of 120 middle level employees, 315 front level employees and 315 individual level employees from the selected financial service sector of Nagpur, which nearly satisfies the criteria of all the methods of calculating sample size i.e. by formula, Morgen's table and sample size calculator.
Actual Branches branch offices from Nagpur city wise contacted. The sample size is proportionately divided according to the number of branches/ branch offices and the number of employees in the branches.

Sampling Method

Cluster sampling is used in statistics when **natural groups** are present in a population. The whole population is subdivided into clusters, or groups, and random samples are then collected from each group.

Cluster sampling is typically used in market research. It's used when a researcher **can't get information about the population as a whole**, but they can get information about the clusters.

❖ **Types of cluster sampling**

- **Single-stage cluster sampling:** where all the elements in each selected cluster are used.
- **Two-stage cluster sampling:** where a random sampling technique is applies to the selected clusters.

In this case two-stage cluster sampling is used since it is not possible to contact each and every employee of each and every cluster.

Simple random sampling technique: A random sample is a sample that is chosen randomly. It could be more accurately called a randomly **chosen** sample. Random samples are used to avoid bias and other unwanted effects. A simple random sample is a set of n objects in a population of N objects where all possible samples are equally likely to happen.

Actual Data Collected: The questionnaire was distributed to 800 respondents out of which the completely and properly filled questionnaires were received from 757 and rests were discarded since not properly filled up. So, the usable responses collected were from 757 total respondents used for data analysis and drawing conclusions.

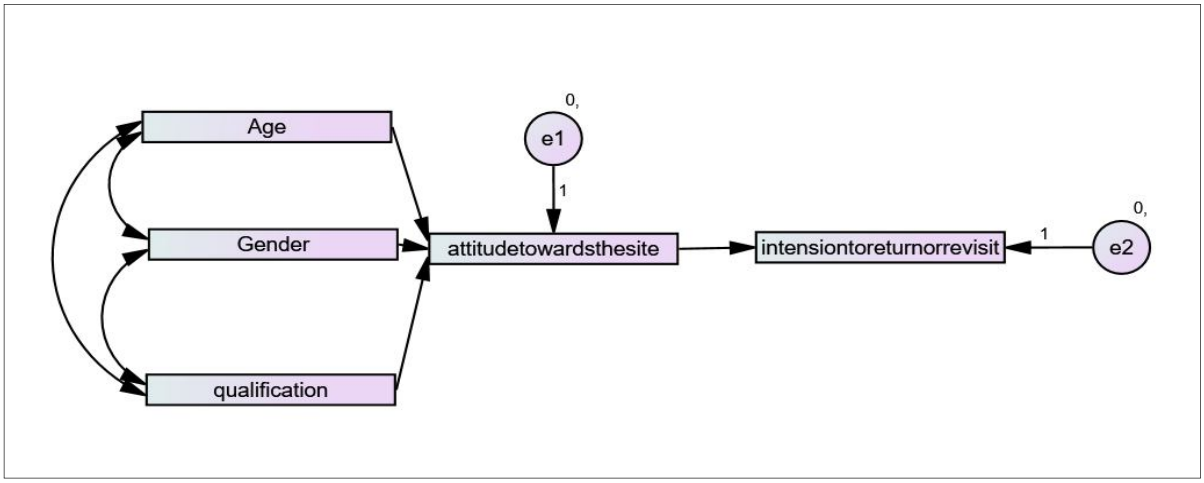
Hypothesis testing

H01: The consumer demographics has no effect on consumer attitude towards WIA and intention to revisit the site.

H011: The consumer demographics has direct effect on consumer attitude towards WIA and intention to revisit the site.

In order to test this hypothesis SPSS-AMOS software is used. A model has been developed and the model fit values are taken into consideration.

AMOS model



Source: Model is developed by researcher

For the above model the values of the variables for Absolute fit Model are as follows:

Model Fit Indices	Recommended Values	Observed Value	Authors
Chi-square (CMIN/DF)	1-5	1.295	Bollen and Long (1993) and Kelloway (1995)
Normed Fit Index (NFI)	> 0.90	0.964	Byrne, 1994
Relative Fit Index (RFI)	> 0.90	0.918	Bollen, 1990
Incremental Fit Index (IFI)	> 0.90	1.099	Bollen, 1990
Tucker Lewis Index (TLI)	> 0.90	2.127	Hu and Bentler, 1998
Comparative Fit Index (CFI)	> 0.90	1.00	Byrne, 1994
Root Mean Square Error of Approximation (RMSEA)	< 0.08	0.000	Browne and Sugawara, 1996

From the above calculation we can say that there is an impact of demographics on consumer attitude towards WIA and intention to revisit the site. Thus, we can say that the Null hypothesis is rejected and alternate hypothesis is accepted "**H11:** The consumer demographics has direct effect on consumer attitude towards WIA and intention to revisit the site.

Conclusions

This study examined how customers consider about and relate with various WIA in their daily lives. Though, the study does not answer all queries connected to this research story, and greatest precise consequences need additional inquiries. Relatively, this study offers the complete impression of consumer behavior with WIA in accurate circumstances.

- The maximum number of respondents who have participated in the study were from the age group of 24-26 years, generally this is the age group which is more vibrant and affected by internet advertising followed by the age group of 21-23 years.
- When it was asked to the respondents that whether they buy popular financial services it was observed that 26% were agree followed by same percentage of people were strongly agree.
- When it was asked to the respondents that whether they enquire around before deciding to buy financial product it was observed that 32% were agreed and followed by 25% were strongly agree.
- When it was asked to the respondents that whether well-known financial services mean good quality it was observed that 39% were strongly agree and followed by 25% were strongly agree.
- When it was asked to the respondents about the usefulness of WIA 33.47% said they find using WIA useful.
- When it was asked to the respondents about whether using the WIA can improve purchasing performance nearly 50% were agreed.
- When it was asked to the respondents about whether using the WIA can increase purchasing productivity nearly 50% were agreed.
- When it was asked to the respondents about whether using the WIA can increase purchasing effectively nearly 50% were agreed.
- When it was asked to the respondents about Attitude towards WIA 45.7% said I feel comfortable in surfing this WIA
- When it was asked to the respondents about whether WIA makes easy to build relationship with the company 50% said they strongly agree.
- When it was asked to the respondents about whether they would like to visit the WIA again in the future 45.60% were agree.
- When it was asked to the respondents about whether they were satisfied with the service provided by WIA 45.60% were agree.

Future Scope of Study

The study produced some valuable implications for a variety of stakeholders. Researchers can take full advantage of the findings in helping their theory building, and marketing professionals can apply the consumers' voices to their strategic planning for interactive marketing. College teachers can integrate the findings into their Internet advertising classes as they develop consumer-based modules in these newly popular classes. Further study can be conducted on investigating the factors that influence converting internet browsers to actual purchasers is required. Some of the companies with online stores practice only websites and catalogs as their retail channels, and others have a greater number of retail channels, such as Internet websites, catalogs, etc. Thus, customers have different occasions to find and purchase the products based on the types of different channels companies have, which may affect the consumers' buying behavior. Future research is suggested that should take into account the different options for retail venue combinations and consumers' buying behavior in harmony with those.

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EFFECTS OF DIGITIZATION ON SOCIETY WITH REFERENCE TO INCREASE USAGE OF TECHNOLOGY IN NEW NORMAL OF COVID-19 PANDEMIC

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ABSTRACT

The current coronavirus pandemic not only poses a large threat to the health of our population, but also has impacted our daily lives in a disorganized manner. Although most of the mainstream services are available through our accessibility to technology and internet, the constant isolation and loneliness has caused a silent uphill battle with emotional and mental health. This study will be observing the over-usage of internet as a current trend with a stark contrast of abrupt social changes that were caused by the pandemic.

Keywords: *Digitization, COVID-19, mental health, work from home, lifestyle, emotional distress, technology, internet*

Introduction

Coronavirus outbreak has alarmed the global population with its long-term ramifications. It will influence different spheres of life, such as the economy, industries, agriculture, global marketplace, and health generally. The emphasis of the governments and its people around the world at present is to monitor and minimize the effects of this pandemic. The world is moving towards digitization where it has seen modifications of a 2 year period within the matter of months. From E-commerce to academia, work-life to recreational has majorly shifted to online means. But a large proportion of the population is left exposed to variety of not-so-endearing factors, where mental health has been left stifling during times where isolation has become paramount.

The focus of this study will be on the contrasting relationship between the increased excessive reliability on the internet during the pandemic with factors leading to non-strenuous changes in lifestyle. Psychosocial elements such as emotional, mental, ad physical attributes have been some key factors in this study.

Literature Review

SR NO	TITLE	PUBLISHING AND YEAR	AUTHOR	FINDINGS
1	Emotional distress and associated socio-demographic risk factors during the COVID-19 outbreak in Spain (Muñoz-Navarro et al., 2020)	May 30, 2020 https://doi.org/10.1101/2020.05.30.20117457	Roger Muñoz-Navarro, Antonio Cano Vindel, Florian Schmitz, Rosario Cabello & Pablo Fernández-Berrocal	The findings indicate severe to moderate symptoms of anxiety and depression with at least one in four participants experiencing panic attacks, majority of respondents being females, and young adult. Significant risk factors were: single, unemployed, and low income.
2	Fear of COVID-19 and the Mental Health Consequences in America	American Psychological Association 2020, Vol. 12, No. S1, S17–S21 ISSN: 1942-9681	Kevin M. Fitzpatrick, Casey Harris, Grant Drawve	The findings indicate that respondents were fearful of COVID-19. As with mental health consequences (anxiety and depressive symptoms), on an average, of the sample stated

	(Fear of COVID-19 and the Mental Health Consequences in America - PubMed, n.d.)	http://dx.doi.org/10.1037/tra0000924		mediocre response to severe anxiety symptoms. Moreover detailed psychosocial study is required using countrywide descriptive samples that can aid in informing probable mental health dangers, as well as by aiming precise mental health mediations.
3	How mental health care should change as a consequence of the COVID-19 pandemic (How Mental Health Care Should Change as a Consequence of the COVID-19 Pandemic - The Lancet Psychiatry, n.d.)	Lancet Psychiatry 2020; 7: 813–24 July 16, 2020 https://doi.org/10.1016/ S2215-0366(20)30307-2	Carmen Moreno, Til Wykes, Silvana Galderisi, Merete Nordentoft, Nicolas Crossley, Nev Jones, Mary Cannon, Christoph U Correll, Louise Byrne, Sarah Carr, Eric Y H Chen, Philip Gorwood, Sonia Johnson, Hilkka Kärkkäinen, John H Krystal, Jimmy Lee, Jeffrey Lieberman, Carlos López-Jaramillo, Miia Männikkö, Michael R Phillips, Hiroyuki Uchida, Eduard Vieta, Antonio Vita, Celso Arango	The findings indicate that irrespective of the diversity of universal health systems, efforts have been made to familiarize the supply of mental health care utilities to the demands of COVID-19. Mental health issues have been talked by familiarizing mental health services, adapting admission to analysis and action, giving care to populations at high risk of mental health issues. Justifiable editions of distribution systems for mental health care should be advanced by specialists, clinicians, and service users, and should be exactly intended to moderate differences in health-care provision.
4	How Parents and Their Children Used Social Media and Technology at the Beginning of the COVID-19 Pandemic and Associations with Anxiety (#HealthyAtHome - Healthy Parenting, n.d.)	CYBERPSYCHOLOGY, BEHAVIOR, AND SOCIAL NETWORKING Volume 23, Number 11, 2020 DOI: 10.1089/cyber.2020.0284	Michelle Drouin, PhD, Brandon T. McDaniel, Jessica Pater, and Tammy Toscos, PhD	The findings indicate that mostly parents and their children have reported that since the phase of lockdown there was increased use of social media. Furthermore, structural equation models displayed that parents and children with greater level of stress were most possibly to raise their technological use and use social media and phones to connect. Among parents, greater stress was connected to using social media for both social support and information seeking.
5	The Need for a Mental Health Technology Revolution in the COVID-19 Pandemic (Figueroa & Aguilera, 2020;)	2020 American Psychological Association 2020, Vol. 12, No. S1, S55–S57 ISSN: 1942-9681 http://dx.doi.org/10.1037/	Caroline A. Figueroa; Adrian Aguilera	The findings specify how technology offers an intermediary for bringing mental health services distantly and on a large or broader scale, which is mainly significant while maintaining the social distancing requirements. Even when the extremely bad phase of the COVID-19 pandemic has diminished, probably a greater requirement for mental health support and services brought through technological know-how

				will always exists. Digital mental health tools should be reasonable, nearby, and suitable for a comparatively bigger group of people with changing demograohics.

Research Methodology

Rationale: It has become very difficult for everyone to work seamlessly without the internet. However, the adverse problems being faced by people due to the internet have become very severe. Not only the internet but also the overall digitization of the globe because of the pandemic COVID-19 has increased the level of physical, mental and emotional misbalance within the society. Henceforth, the study is carried out to explore and verify the damages done by the digitization in this pandemic.

Objectives

1. To study the impact of digitization during the new normal of COVID-19.
2. To analyze the perception of society towards all the technological changes.
3. To study the cause of health and mental problems faced by people during COVID-19.
4. Identifying the psycho-social consequences of individuals during the pandemic.

Hypothesis

H01: The time spent on internet varies according to age.

ANOVA

		Sum of squares	df	Mean Square	F	Sig.
Around 1 hour	Between Groups	3.636	1	3.636	1.196	.000
	Within Groups	145.884	98	3.039		
	Total	149.520	99			
Around 2 hours	Between Groups	1.949	1	1.949	.344	.001
	Within Groups	271.971	98	5.666		
	Total	273.920	99			
Around 3 hours	Between Groups	.158	1	.158	.053	.000
	Within Groups	143.842	98	2.997		
	Total	144.000	99			
Around 4 hours	Between Groups	.273	1	.273	.153	.002
	Within Groups	85.407	98	1.779		
	Total	85.680	99			
More than 4 hours	Between Groups	1.212	1	1.212	.105	.003
	Within Groups	555.108	98	11.565		
	Total	556.320	99			

Interpretation: The above table is the output of the ANOVA analysis and it shows whether there is any statistically significant difference between our group means. We can see that the value of significance is below 0.05, and therefore, we can accept null hypothesis that the time spent on internet varies according to age.

H02: There is relation between age, feeling of isolation and time spent on internet.

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
Feeling of isolation	Between Groups	.249	1	.249	.155	.001
	Within Groups	77.031	98	1.605		
	Total	77.280	99			
Time spent on internet	Between Groups	1.340	1	1.340	.451	.002
	Within Groups	142.580	98	2.970		
	Total	143.920	99			

Interpretation: The above table is the output of the ANOVA analysis and it shows whether there is any statistically significant difference between our group means. We can see that the value of significance is below 0.05, and therefore, we can accept null hypothesis that there is relation between age, feeling of isolation and time spent on internet.

H03: There is a relationship between level of job and mental trauma faced by people.

ANOVA						
		Sum of square	df	Mean Square	F	Sig.
High	Between Groups	49.109	5	9.822	4.304	.003
	Total Groups	100.411	94	2.282		
	Total	149.520	99			
Middle	Between Groups	116.682	5	23.336	6.530	.000
	Total Groups	157.238	94	3.574		
	Total	273.920	99			
Low	Between Groups	12.571	5	2.514	.842	.002
	Total Groups	131.429	94	2.987		
	Total	144.000	99			

Interpretation: The above table is the output of the ANOVA analysis and it shows whether there is any statistically significant difference between our group means. We can see that the value of significance is below 0.05, and therefore, we can accept null hypothesis that there is relation between level of job and mental trauma faced by people.

Sample Design

Target Population - The working individuals and students who have been operating online and have suffered due to digitization during the pandemic would be the target population.

Sample Frame - There would not be any sample frame for this research.

Sample size - 90 is the sample size taken to study the effects of digitization on the individuals.

Sample Technique - The sampling technique used for the research is snowball sampling technique.

Data Collection - The methods of data collection are primary method and secondary method.

- Primary Method - Questionnaire is used to take the responses from the sample size and it is used for the collection of primary data.

- Secondary Method - Internet, magazines, newspapers, etc. are used for the collection of secondary data.

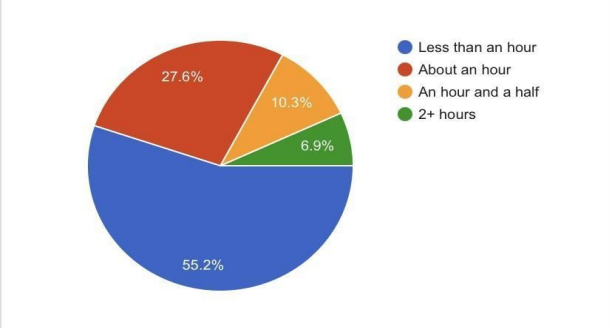
Data processing and data analysis method

- MS-Excel
- SPSS

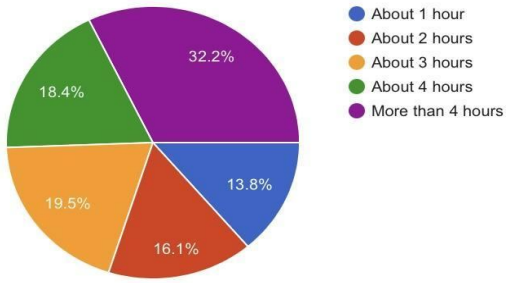
Cronbach Alpha should be less than .8, thereafter which the questionnaire will be valid to use.

Data Interpretation

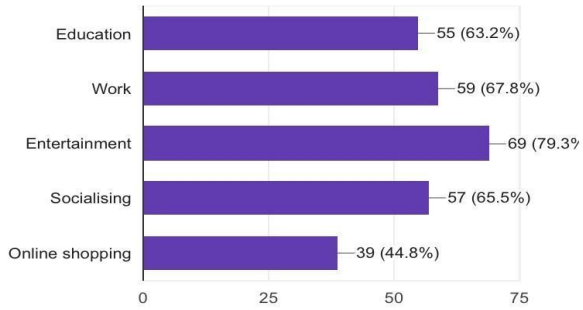
The form of data collected is primary which is through a questionnaire. All the responses have been referred consecutively and have helped us to interpret the data.



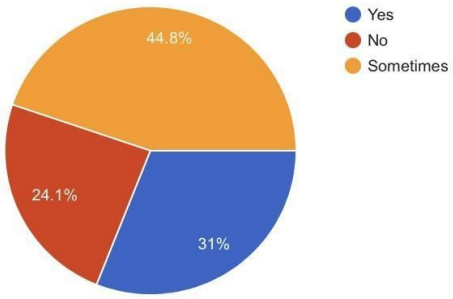
The above pie graph is a representation of the hours individuals invest in their self-care or grooming. The results are very appalling wherein majority of the individuals only are involved in self-care sessions which are less than an hour. Here, this could give a rise to unwanted problems.



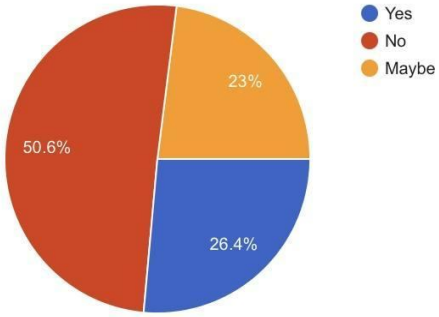
Above figure gives us a clear picture of the number of hours spent by an individual over the internet. The numbers show us the drastic change in pattern because people now have started spending excess time on the internet. Also, it has periodic changes because of the pandemic of COVID-19 where the major digitisation took place.



The bar graph figure above depicts the purposes for which the people have been using the internet. The trend visibly assures the fact of the internet being used for entertainment followed by work, and then education and socializing aspects.

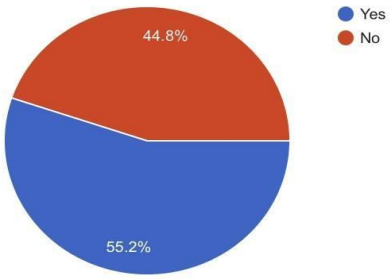


Lockdown phase during the pandemic was a life changing experience for many; the above pie graph studies the isolation and frustration that individuals felt due to the lockdown. As the percentage for sometimes factor on the graph is high, it indicates that many individuals more or less sensed the feeling of frustration and isolation during the lockdown period.

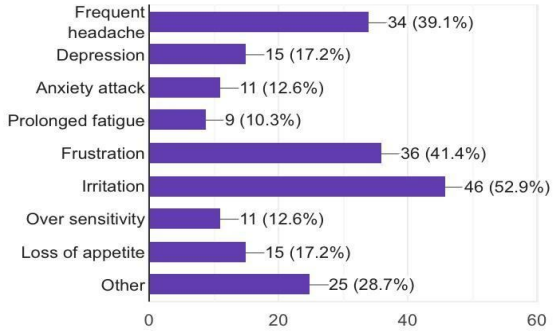


The figure above identifies whether people would have survived the quarantine without interest. The results give us a broad point view that around 50.6% of the total sample size

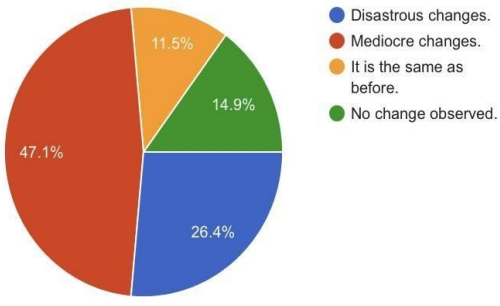
would not have survived without the internet during the quarantine.



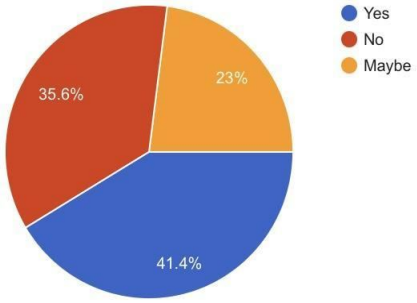
This graph pictures the stress felt at work by the people. Around 55.2% of people have had the feeling of stress when at work.



As 55.2% of people have felt stressed at work, the above bar graph will help us understand the problems these people have faced due to the stress. The major chunk of 52.9% felt irritated due to stress, 41.4% felt frustrated and 39.1% had frequent headaches. This tells us that whether irritation or headache, stress at work is responsible for severe problems amongst the people.



People have noticed mediocre changes in the atmosphere due to technology, this can be referred from the above pie graph. 47.1% of people think the atmosphere has averagely been affected by the technological updates that occur from time to time.



The graph is a representation of people feeling anxious due to everything being online, and around 41.4% of the people are affected with anxiety because of offline to online diversification.

Conclusions and Findings

The study helps understand that be it any individual, the results tend to vary with every aspect. However, based on our hypothesis and data Interpretation, age is the factor which is responsible for the problems faced by the individuals. There are several other important and critical implications from the findings.

The usage of internet varies according to the age, and the internet is used by them for various purposes which can be referred from the data interpretation. It can be concluded from the study that there is a significant relation between age, feeling of isolation and time spent on the internet.

Entertainment has been the major factor for which the internet has been used which is necessary to get beyond the feeling of isolation. Also the study gives a brief idea that the internet was very much necessary for individuals to survive the lockdown and quarantine period.

Overall the impact of digitization has made people anxious and the affected the atmosphere around them, not drastically but has brought certain changes to it.

Social Implications

The research study will bring a change in the society from the point of view of the internet usage, and will give a message of changing with technology without hampering people's physical and mental health.

Also, it will help the society understand that over usage of the internet will not benefit

everyone, but will make them lose certain factors from day to day life.

Future Scope

1. The study carried out has highlighted basic problems faced by the digitization and internet; however, in future there are many things which need to be explored.
2. The problems caused by digitization and the internet can be studied in depth along with the lifestyle changes that are caused by them.
3. Future longitudinal studies should explore the problems caused by digitization to people pre-existing with health problems.

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GROWTH AND DISPARITIES IN AGRICULTURAL PRODUCTIVITY

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ABSTRACT

The Growth in the production and productivity of total agricultural output, foodgrains, rice and pulses have been estimated for the period 1993 to 2016 to examine the trend across the districts and state of Odisha with a prima facei analysis on the existence of region disparities in agricultural productivity. Further the inequalities in the pattern of growth in the production of the specified parameters under study have also been analyzed by C.V. and Gini index. Further, the determinants of agricultural productivity across the districts of Odisha over a period of time under study have been estimated by applying Panel data regression model to determine the significance of certain factors affecting agricultural productivity. It is found that the growth trend is decreasing, inequality exists and there are factors of significant importance affecting productivity which should be taken care of by appropriate policy measures to reduce the disparities in productivity and its management practices across the regions of Odisha state.

Keywords: *Panel Data, Agriculture, Food grains, Odisha state*

Introduction

This Chapter analyses the process of growth of the agrarian economy of Odisha over a period of time (from 1993-94 to 2015-160. In order to estimate the growth simple exponential growth rates and log quadratic methods of estimates have been used. The former method suggests growth, but the latter shows the extent of instability. All four variables related to the agrarian economy of Odisha, namely, total agricultural production, production of food grains, rice and pulses, show a decline in growth over the time period under study. All variables register significant deceleration. Further, the effect of various factors on total agricultural production has been analyzed applying Panel data Regression model.

The agricultural growth rate is estimated by using secondary sources of data and based on this conclusion on the growth rate has also been drawn though some doubt had been cast regarding the validity of the official data [Datta Ray 1994]. On the contrary, Sen and Sengupta (1995) using an alternative source of data (comprehensive cost of production studies, ministry of agriculture, government of India) have estimated the growth rate. Rawal and Swaminathan (1998) also supported this method. Some economists tried to identify the factors responsible for the growth in agriculture and found that the measured input growth does not appear to be capable of explaining the magnitude of the trend break in output growth (Sen and Sengupta,1995). Further, Sen and Sengupta, (1995) found that the declining rate of growth of fertiliser use, percentage of high yield variety (HYV) area, and irrigated area, in eastern Indian states in the 1980s compared to the 1970s affected the growth of agricultural productivity. But apart from the technological factors it was found in the context of West Bengal that the Institutional factors such as institutional change in terms of Land and Panchayat Reforms an increase in productivity of rice (Mukherji and Mukhopadhyay, 1996). However, A few scholars have opined that agricultural growth can be successfully explained in terms of both the technological and institutional factors, such as the belated green revolution, personal initiative and private investment, operation barga, distribution of surplus land and panchayati raj [Sengupta and Gazdar 1998, Banerjee et al 2002]. The trend break in the growth rate during the 1980s in West Bengal was associated with the opening up of the horizon of diversified rural activities [Chandrasekhar 1993; Arun Kumar et al 1995, Lieten 1990, Rogaly et al 1999; Bhattacharyya 1996, 2003a, 2003b].

In the early 1990s, India adopted the structural adjustment programme of the International Monetary Fund (IMF) and World Bank as a loan conditionality and had to change its macroeconomic policies to a great extent.

Indian agriculture experienced some major changes, which appeared as a sudden shock to the peasantry. First food, fertiliser and credit subsidies were curbed to a great extent. As a result, the public distribution system (PDS) was virtually wiped out. Second, import liberalisation opened up the inflow of foodgrains from abroad at cheaper prices compared to the home market. The peasantry faced two problems. (a) higher costs of production owing to the withdrawal of the fertiliser subsidy; and (b) selling products at viable prices. In a country where about 60 per cent of rural population is a seller of foodgrains, it leads to a loss of income for these peasant households. Due to the government withdrawal of the PDS, there was a sudden decline in demand for foodgrains particularly from poorer households. Government economists and policymakers explained this fact as a sign of prosperity, where the rural population voluntarily demanded less foodgrains. Hence, policymakers, under market reforms, advised peasants to diversify their production from foodgrains to export-oriented crops. According to Patnaik (2005), the Indian economy like in the colonial period has already witnessed an inverse relation between an increase in export-oriented production and decline in the availability of foodgrains. On the other hand, the global price crash in export commodities, particularly cotton, led to suicides of thousands of Indian farmers. The prevailing global and local deflationary situation is a part of the global low interest rate regime, which is favourable for global finance capital and the international creditor. As a result, all the expansionary and development activities in the economy declined with the obsessed target of lowering fiscal deficit under market reforms. There was an acute increase of rural unemployment and massive increase in rural poverty. Between 1980-81 and 1989-90, foodgrains grew at the rate 2.85 per cent per annum, and crops grew at 3.19 per cent per annum. The rate of growth of population at this period was 2.1 per cent per annum. However, from 1990-91 to 2000-01 the foodgrain growth declined at 1.66 per cent per annum, while crops declined to 1.73 per cent per annum. For the first time after independence, the population growth rate (1.9 per cent per annum) remained above of foodgrain and overall crop growth rate.

In the context of factors determining the productivity of foodgrains and Paddy in Odisha R.N.Patra (2013) by applying panel data analysis found positive and significant impact of yield of paddy and fertilizer consumption whereas negative impact of cropping intensity and average size of operational holdings on productivity of food grains. Similarly, Yield of paddy he found is positive and significantly influenced by irrigation whereas the impact of the share of agriculture workers is found negative and significant on yield of paddy.

Objective

The main objectives of the chapter are

- To examine the disparities in the trends of growth of Total Agricultural Productivity, Productivity of food grains, Productivity of Rice and Productivity of Pulses across various districts of Odisha in agricultural sector during the period 1993 to 2016.
- To examine inequalities in the growth of Total Agricultural Productivity, Productivity of food grains, Productivity of Rice and Productivity of Pulses across various districts of Odisha in agricultural sector during the period 1993 to 2016.
- To analyze the factors influencing Total Agricultural Productivity across various districts of Odisha in agricultural sector during the period 1993 to 2016

Data base and Methodology

There are four parameters considered for the analysis. They are Total Agricultural Productivity, Productivity of food grains, Productivity of Rice and Productivity of Pulses. The data pertaining to these four parameters for all districts of Orissa for the perod under study (i.e. 1993 to 2016) has been collected from the secondary sources of data i.e. Indian State Level Basic Environmental Information Database- Crop Production Report for All Years for Odisha State for All Districts published in 2016 (this data base is a compilation of data derived mostly from Agricultural Statistics of the state and form Directorate of Agriculture & Food Production for various years). Productivity means the

production per hectare of land pertaining to the items considered for the study. The total agricultural production has been considered to assess the reflection of non-food crops over food crops while comparing the growth of total agricultural productivity and productivity of food grains. The productivity of rice has been considered as because rice is the staple and dominant crop in almost all districts of Orissa state accounting for a major share of its contribution towards the total food grain production. The pulses productivity has been considered as because the state is found acute shortage of Pluses production. Thus, the analysis of growth (estimating Simple Exponential growth rate and Log-quadratic growth rate supplemented by Prima facei esimates) and inequalities in the pattern of growth (estimating Gini Coefficient and Coeficient of Variation) in the productivity of these four items may provide a trend and level of disparies exist in various districts of the stae over aperiod of time under study which will ultimately be useful for policy perspectives. Similarly, an analysis has also been made to estimate the significant determinants of agricultural productivity based on the selected independent variables by considering data for all 30 districts of the state over a period of time from 1993 to 2016 with the help panel data regression.

Growth Analysis of Selected Variables

The growth rates of all the selected variables from 1993-94 to 2015-2016 with the help of the following methods.

Simple Exponential Growth Rate

Consider the following linear form: Ln Qt = a + bt, Where Qt = output, t = time, b = coefficient on time, and a = constant. The coefficient on time, b, is the continuous rate of growth. It closely approximates to the annual compound growth rates. Therefore, the estimates of b are presented as growth rates.

Log-quadratic Estimates of Growth Rates

It is obvious that growth rates cannot be constant over time as it is assumed in the exponential form. The possibility of acceleration or deceleration of growth rates over time is incorporated in log-quadratic functional form: Ln Qt = a + bt + ct^2 + ut. If there is constant growth, c = 0. On the other hand, a significant positive value of the estimate of c indicates an accelerating growth rate and a significantly negative value indicates deceleration. The log-quadratic equation is the better measure of instability than the exponential form.

The analysis of growth of the above stated variables has been made based on the results of Simple Exponential Growth Rate presented in Tables 1.3.1(a), 1.3.2 (a), 1.3.3 (a) and 1.3.4 (a) as well as the results of Log-quadratic Estimates of Growth Rates presented in Tables 1.3.1(b), 1.3.2 (b), 1.3.3 (b) and 1.3.4 (b) for the respective variables.

Growth of Total Agricultural Productivity

The growth rate of Total Agricultural Productivity for the period from 1993-94 to 2015-16 found for various districts as per the estimate of Simple Exponential Growth Rate (SEGR) as presented in table-1.3.1(a) reveals a positive growth for all the districts except Jharsugda district which may be attributed to the rapid growth of industrial activities in the last one decade with an adverse effect on agricultural activities in Jharsugda district. The positive growth is found significant (even though the percentage of growth is small but differs in magnitude) for most of the district except Bargarh, Deogarh and Sambalpur districts which may be attributed to more concentration of these districts on food crops in general and staple crop in particular relative other crops (cash/non-food crops). The result of Log-quadratic Estimates of Growth Rates (LQGR)in this context as presented in Table 1.3.1(b) reveals the similar result for Jharsugda district i.e. negative but not significant (as observed in the case of Simple Exponential Growth Rate) but positive and significant growth rates (even though the growth rate is very small) is found for all districts except Balasore, Bargarh and Puri where it is positive but not significant which may also be attributed to the same reasons as stated earlier.

Growth of Food grains Productivity

The growth rate of Food grain Productivity for the period from 1993-94 to 2015-16 found for various districts as per the estimate of SEGR

and LQGR as presented in table-1.3.2 (a) and 1.3.2(b) respectively reveals that as per SEGR estimates a positive and significant growth is found for all the districts except Dhenkanal, Ganjam, Jagatsingpur, Jharsugda, Keonjhar, Koraput, Mayurbhanj,Nawapara and Rayagada districts where it is only positive but not significant Whereas as per LQGR estimates the positive and significant growth is found in all the districts except Deogarh, Ganjam, Jajpur, Jharsugda, Khurdha and Nayagarh districts where it is found only positive but not significant. However, it is observed that even though the disparities among the district is very low and magnitude of growth rate is small the growth of food grains productivity is found positive which may be attributed to more concentration of all these districts on food crops in general relative other crops (cash/non-food crops). Further, the small magnitude of growth of productivity may not be sufficient to meet the growth demand for it for which policy framework be designed to increase the pace of its growth.

Growth of Rice Productivity

The growth rate of Rice Productivity for the period from 1993-94 to 2015-16 found for various districts as per the estimate of SEGR and LQGR as presented in table-1.3.3(a) and 1.3.3(b) respectively reveals that as per SEGR estimates a positive and significant growth is found for all the districts except Angul, Deogarh, Gajapati, Jharsugda, Kandhamal, Kendrapara, Khurdha, Malgangiri and Nawarangpura districts where it is only positive but not significant. Further, it is found negative (even though not significant) for Ganjam and Nayagarh districts. Whereas as per LQGR estimates the positive and significant growth is found in all the districts except Angul, Jharsugda, Kendrapara, Khurdha and Malkangiri districts where it is found only positive but not significant. Further, as per LQGR negative and significant gowth is found for Ganjam and Nayagarh districts which may be attributed towards the diversion of higher percentage of land for Sugarcane and other crops in these two districts. However, it is observed that even though the disparities among the district is very low and magnitude of growth rate is small the growth of rice productivity is found positive which may be attributed to more concentration of all these districts on rice crops relative to other crops . Further, the small magnitude of growth of productivity may not be sufficient to meet the growth demand for it for which policy framework be designed to increase the pace of its growth.

Growth of Pulses Productivity

The growth rate of Pulses Productivity for the period from 1993-94 to 2015-16 found for various districts as per the estimate of SEGR and LQGR as presented in table-1.3.4 (a) and 1.3.4 (b) respectively reveals that as per SEGR estimates a positive and significant growth is found for only three districts such as Boudha, Ganjam and Rayagada districts whereas it is found negative and significant for Bargarh, Deogarh and Nayagarh districts. Further, it is found positive and negative for certain districts (even though not significant) as depicted in table-1.3.4 (a). However, as per LQGR positive and significant gowth is found for Angul, Boudh, Bolangir, Ganjam, Kalahandi, Mayurbhanj, Nawapara, Rayagada and Sonepur districts whereas it is found negative and significant for Bargarh, Deogarh and Gajapati districts which may be attributed towards the diversion of higher percentage of land for rice crop in these districts. Further, it is found positive and negative for certain districts (even though not significant) as depicted in table-1.3.4 (b). However, it is observed that the disparities found among the district even though its magnitude of growth rate is small in pulses productivity. Further, the small magnitude of growth of productivity may not be sufficient to meet the growth demand for it for which policy framework be designed to increase the pace of its growth.

Table- 1.3.1(a): Simple Exponential Growth Rate of Agricultural Productivity (1993-94 to 2015-16)

Sl. No.	Districts	R^2	F-test value	Constant	t	Regression Coefficient	t-value
1	Angul	0.1532	3.44 ***	7.05	51.09*	0.0204	1.85***
2	Balasore	0.0821	1.7	7.51	55.82*	0.0140	1.30***
3	Bargarh	0.038	0.75	7.56	95.17*	0.0055	0.87
4	Bhadrak	0.2638	6.81**	7.55	65.86*	0.2384	2.61 **
5	Bolangir	0.4782	17.41*	6.71	36.77*	0.0607	4.17*
6	Boudh	0.2829	7.50**	7.21	43.54*	0.0361	2.74**
7	Cuttack	0.266	6.89**	7.56	79.82*	0.1980	2.62**
8	Deogarh	0.0771	1.59	7.24	55.02*	0.1322	1.26
9	Dhenkanal	0.5265	21.13*	7.11	61.70*	0.0422	4.60*
10	Gajapati	0.4877	18.09*	7.14	59.97*	0.0403	4.25*
11	Ganjam	0.2215	5.41**	7.17	54.93*	0.0242	2.33**
12	Jagatsinghpur	0.583	26.56*	7.26	70.40*	0.0424	5.15*
13	Jajpur	0.4039	12.87*	7.09	56.9*	0.0356	3.59*
14	Jharsuguda	0.0161	0.31	7.56	52.87*	-0.0063	-0.56
15	Kalahandi	0.3261	9.19**	6.87	36.39*	0.0456	3.03*
16	Kandhamal	0.7878	70.52*	6.84	7.74*	0.0648	8.40*
17	Kendrapara	0.2066	4.95***	7.3	63.50*	0.0204	2.22**
18	Keojhar	0.6363	33.24*	6.88	51.15*	0.0618	5.77*
19	Khurda	0.4964	78.73*	7.31	71.14*	0.0354	4.33*
20	Koraput	0.8306	93.13*	7.17	85.63*	0.0644	9.65*
21	Malkangiri	0.482	17.68*	6.98	69.21*	0.0338	4.21*
22	Mayurbhanja	0.2411	6.03***	7.23	60.33*	0.0235	2.46**
23	Nawarangpur	0.7922	72.42*	7.24	104.98*	0.0448	8.51*
24	Nayagarh	0.3302	9.37**	7.45	53.84*	0.0337	3.06**
25	Nawapara	0.3088	8.41**	6.77	59.83*	0.0262	2.90**
26	Puri	0.1386	3.06***	7.36	61.52*	0.0167	1.75**
27	Rayagada	0.7128	47.15*	6.77	76.73*	0.0483	6.78*
28	Sambalpur	0.0898	1.87	7.41	76.39*	0.0151	1.37
29	Sonepur	0.3332	9.47**	7.34	58.64*	0.0307	3.08**
30	Sundargarh	0.3842	11.85**	6.84	45.46*	0.0413	3.44**
	ODISHA	0.5522	23.43 *	7.21	86.76	0.0321	4.84*

Note: * Significant at 1%, * *Significant at 5% and *** Significant at 10%

Table-1.3.2 (a) : Simple Exponential Growth Rate of Food grains Productivity (1993-94-2015-16)

	District	R^2	F-test value	Constant	t	Regression Coefficient	t-value
1	Angul	0.0308	0.60	6.47	35.96 *	0.0111	3.16 **
2	Balasore	0.3178	8.85 **	6.9	72.83 *	0.0225	0.7800
3	Bargarh	0.1897	4.45 ***	7.25	84.47 *	0.0144	2.98 **
4	Bhadrak	0.3467	10.08 **	6.91	64.3 *	0.0272	2.1100
5	Bolangir	0.1524	3.42 ***	6.32	24.85 *	0.0374	3.18 **
6	Boudh	0.2116	5.10 **	6.53	41.34 *	0.0283	1.85 ***
7	Cuttack	0.1464	3.26 ***	6.78	65.12 *	0.0150	2.26 ***
8	Deogarh	0.0504	1.01	6.67	36.57 *	0.0146	1.81 ***
9	Dhenkanal	0.2835	7.52 **	6.45	38.77 *	0.0363	1.0
10	Gajapati	0.0024	0.05	6.72	19.53 *	0.0059	2.74 **
11	Ganjam	0.0040	0.08	6.83	43.87 *	0.0034	0.21

12	Jagatsinghpur	0.3165	8.80 **	6.62	47.99 *	0.0326	0.28
13	Jajpur	0.0879	1.83	6.68	57.5 *	0.0125	2.97 **
14	Jharsuguda	0.0095	0.18	6.95	35.39 *	0.0067	1,35
15	Kalahandi	0.4897	18.23 *	6.53	60.53 *	0.0367	0.43
16	Kandhamal	0.1960	4.63 **	6.79	93.39 *	0.0125	4.27 *
17	Kendrapara	0.0699	1.43	6.68	51.46 *	0.0124	2.15 **
18	Keojhar	0.2697	7.02 ***	6.56	51.49 *	0.0269	1.20
19	Khurda	0.0355	0.7000	6.78	39.26 *	0.0115	2.65 **
20	Koraput	0.5219	20.74 *	6.77	101.39 *	0.0242	0.84
21	Malkangiri	0.1276	2.78	6.76	53.92 *	0.0166	4.55 *
22	Mayurbhanja	0.2674	6.94 **	6.83	69.01 *	0.0207	1.67
23	Nawarangpur	0.3697	11.14 **	6.86	50.67 *	0.0360	2.63 **
24	Nayagarh	0.0034	0.07	6.7	40.74 *	0.0034	3.34 **
25	Nawapara	0.1971	4.67 ***	6.15	29.37 *	0.0360	0.26
26	Puri	0.1262	2.74	6.82	67.71 *	0.0133	2.16 **
27	Rayagada	0.5328	21.67 *	6.65	83.01 *	0.0297	1.66
28	Sambalpur	0.1970	4.66 ***	7.02	63.34 *	0.0191	4.65 *
29	Sonepur	0.3922	12.26 **	7.05	69.52 *	0.0283	2.16 **
30	Sundargarh	0.2206	5.38 ***	6.47	38.26 *	0.0312	2.32 **
	ODISHA	0.3448	10,00 *	6.82	91.02 *	0.0189	3.16 **

Table-1.3.3 (a) : Simple Exponential Growth Rate of Rice Productivity (1993-94-2015-16)

	District	R^2	F-test value	Constant	t	Regression Coefficient	t-value
1	Angul	0.399	0.79	6.70	29.05*	0.0163	0.89
2	Balasore	0.20	4.64***	7.03	61.80*	0.0195	2.16**
3	Bargarh	0.1979	4.69***	7.18	29.30*	0.0423	2.16**
4	Bhadrak	0.3226	9.05**	7.23	115.49*	0.0150	3.01**
5	Bolangir	0.1707	3.91***	6.56	23.75*	0.0435	1.98***
6	Boudh	0.2309	5.70***	6.58	23.50*	0.0532	2.39**
7	Cuttack	0.14	3.02***	7.24	78.91*	0.0127	1.74***
8	Deogarh	0.1278	2.78	6.67	30.80*	0.0288	1.6700
9	Dhenkanal	0.2229	5.45***	6.85	36.07*	0.0353	2.33**
10	Gajapati	0.0233	0.45	7.18	24.16*	0.0159	0.67
11	Ganjam	0.1252	2.72	7.88	24.73*	-0.0419	-1.65
12	Jagatsinghpur	0.6560	36.24*	7.04	105.59*	0.0320	6.02*
13	Jajpur	0.00	0.06	7.17	25.50*	0.0057	0.2500
14	Jharsuguda	0.0291	0.57	6.94	29.50*	0.0141	0.7500
15	Kalahandi	0.2546	6.49***	6.70	39.95*	0.0340	2.55**
16	Kandhamal	0.1082	2.31	6.99	72.68*	0.0116	1.5200
17	Kendrapara	0.0192	0.37	6.93	28.63*	0.0117	0.61
18	Keojhar	0.2843	7.55***	6.75	52.14*	0.0283	2.75***
19	Khurda	0.0013	0.02	7.24	47.82*	0.0019	0.16
20	Koraput	0.5313	21.54*	7.09	109.70*	0.0239	4.64*
21	Malkangiri	0.0566	1.14	6.92	4.66**	0.0145	1.07
22	Mayurbhanja	0.1991	4.72***	6.95	62.81*	0.0192	2.17 ***
23	Nawarangpur	0.0825	1.71	7.01	45.70*	0.0160	1.31
24	Nayagarh	0.0104	0.20	7.28	36.57*	-0.0071	-0.45
25	Nawapara	0.2236	5.74**	6.34	25.34*	0.0467	2.34**
26	Puri	0.2470	6.23**	7.03	76.88*	0.0182	2.50**
27	Rayagada	0.2171	5.27**	7.10	65.30*	0.0199	2.30**
28	Sambalpur	0.22	5.46**	6.78	28.18*	0.0448	2.34**
29	Sonepur	0.4470	15.36*	7.15	66.99*	0.0333	3.92*
30	Sundargarh	0.2615	6.73***	6.49	35.13*	0.0381	2.59**

	ODISHA	0.3115	8.60**	7.02	76.61*	0.0214	2.93**

Table-1.3.4 (a) : Simple Exponential Growth Rate of Pulses Productivity (1993-94-2015-16)

	District	R^2	F-test value	Constant	t	Regression Coefficient	t-value
1	Angul	0.0527	1.06	5.77	38.21 *	0.0124	1.03
2	Balasore	0.0956	2.01	5.81	40.67 *	0.0161	1.42
3	Bargarh	0.2787	7.34 **	6.31	80.04 *	-0.0170	-2.17 **
4	Bhadrak	0.1150	2.47	6.06	63.37 *	0.0120	1.57
5	Bolangir	0.0279	0.54	5.88	67.78 *	0.0051	0.74
6	Boudh	0.2126	5.13 **	5.92	75.20 *	0.0142	2.26 **
7	Cuttack	0.0004	0.01	6.14	68.94 *	-0.0006	-0.08
8	Deogarh	0.4721	16.99 *	6.34	88.57 *	-0.0235	4.12 *
9	Dhenkanal	0.0034	0.07	5.94	42.03 *	-0.0029	-0.26
10	Gajapati	0.0777	1.60	6.44	186.15 *	-0.0035	-1.27
11	Ganjam	0.1888	4.42 **	5.97	78.25 *	0.0128	2.10 **
12	Jagatsinghpur	0.0604	1.22	6.15	89.36 *	-0.0061	-1.11
13	Jajpur	0.0023	0.04	5.89	31.99 *	0.0031	0.21
14	Jharsuguda	0.1020	2.16	6.31	25.89 *	-0.0285	-1.47
15	Kalahandi	0.1676	3.82 **	6.13	58.66 *	0.0163	1.96
16	Kandhamal	0.0135	0.26	5.81	22.92 *	0.0103	0.51
17	Kendrapara	0.0282	0.55	6.10	62.44 *	-0.0058	-0.74
18	Keojhar	0.0078	0.15	6.17	54.22 *	-0.0035	-0.39
19	Khurda	0.0172	0.33	5.86	40.61 *	0.0066	0.58
20	Koraput	0.0055	0.10	5.85	37.03 *	0.0041	0.32
21	Malkangiri	0.0083	0.16	5.92	46.91 *	0.0040	0.4
22	Mayurbhanja	0.0813	1.68	6.13	97.07 *	0.0065	1.3
23	Nawarangpur	0.0372	0.73	6.22	52.61 *	-0.0081	-0.86
24	Nayagarh	0.1774	1.10 **	6.06	49.42 *	-0.0198	-2.02 **
25	Nawapara	0.0497	0.99	5.61	31.05 *	0.0144	1
26	Puri	0.0232	0.45	5.88	38.91 *	-0.0081	-0.67
27	Rayagada	0.2055	4.91 **	6.06	56.91 *	0.0188	2.22 **
28	Sambalpur	0.0233	0.45	6.11	58.48 *	-0.0056	-0.67
29	Sonepur	0.0585	1.18	6.05	76.39 *	0.0068	1.09
30	Sundargarh	0.0592	1.20	5.9700	51.78 *	0.0100	1.09
	ODISHA	0.0176	0.34	6.06	96.83 *	0.0029	0.58

Table- 1.3.1 (b) : LQGR of Agricultural Productivity (1993-94 to 2015-16)

Sl. No.	Districts	R^2	F-test value	Constant	t	Regression Coefficient	t-value
1	Angul	0.1888	4.42 **	7.12	71.72 *	0.0010	2.10 **
2	Balasore	0.0991	2.09	7.56	77.17 *	0.0007	1.45
3	Bargarh	0.082	1.7	7.57	132.67 *	0.0004	1.30
4	Bhadrak	0.2658	6.88 **	7.65	90.90 *	0.0011	2.62 **
5	Bolangir	0.04501	15.55 *	6.97	50.62 *	0.0026	3.94 *
6	Boudh	0.3256	9.17 **	7.33	62.19 *	0.0017	3.03 *
7	Cuttack	0.2687	6.98 **	7.64	109.98 *	0.0009	2.64 **
8	Deogarh	0.1761	4.06 **	7.25	79.33 *	0.0009	2.01 **
9	Dhenkanal	0.557	23.89 *	7.28	88.79 *	0.0019	4.89 *
10	Gajapati	0.3441	9.97 **	7.35	74.23 *	0.0015	3.16 *
11	Ganjam	0.1559	3.51 ***	7.3	73.05 *	0.0009	1.87 ***
12	Jagatsinghpur	0.5473	22.97 *	7.45	94.25 *	0.0018	4.79 *
13	Jajpur	0.4856	17.94 *	7.21	84.77 *	0.0017	4.24 *

14	Jharsuguda	0.0015	0.03	7.51	70.90 *	-0.0001	-0.17
15	Kalahandi	0.3111	8.50 **	7.07	50.36 *	0.0020	2.93 **
16	Kandhamal	0.7753	65.55 *	7.11	97.19 *	0.0028	8.10 *
17	Kendrapara	0.2228	5.45 ***	7.39	88.24 *	0.0009	2.33 **
18	Keojhar	0.6035	28.92 *	7.14	69.20 *	0.0027	5.38 *
19	Khurda	0.479	17.47 *	7.46	97.11 *	0.0015	4.18 *
20	Koraput	0.7828	68.48 *	7.44	106.86 *	0.0028	8.28 *
21	Malkangiri	0.4755	17.23 *	7.12	95.46 *	0.0015	4.15 *
22	Mayurbhanja	0.2632	6.79 **	7.32	84.35 *	0.0011	2.16 **
23	Nawarangpur	0.7686	63.12 *	7.44	139.04 *	0.0020	7.94 *
24	Nayagarh	0.2391	5.97 **	7.63	70.34 *	0.0013	2.44 **
25	Nawapara	0.3424	9.89 **	6.87	84.78 *	0.0012	3.15**
26	Puri	0.0951	2	7.45	82.66 *	0.0006	1.41
27	Rayagada	0.7423	54.72 *	6.96	113.13 *	0.0022	7.40 *
28	Sambalpur	0.1523	3.41 ***	7.43	108.04 *	0.0006	1.85 ***
29	Sonepur	0.3415	9.85 **	7.47	81.65 *	0.0014	3.14 **
30	Sundargarh	0.4771	17.34 *	6.98	68.46 *	0.0020	4.16 *
	ODISHA	0.5647	24.65 *	7.34	121.87 *	0.0014	4.96 *

Table-1.3.2 (b) : LQGR of Food grains Productivity (1993-94 to 2015-16)

Districts	R^2	F-test value	Constant	t	Regression Coefficient	t-value
Angul	0.076	1.56	6.47	50.12 *	0.0008	1.25
Balasore	0.341	9.84 **	6.99	102.11 *	0.0010	3.14**
Bargarh	0.273	7.14 **	7.29	122.04 *	0.0008	2.67**
Bhadrak	0.349	10,18 *	7.02	89.05 *	0.0012	3.19**
Bolangir	0.221	5.42 ***	6.42	35.84 *	0.0020	2.33***
Boudh	0.267	6.91 **	6.62	59.15 *	0.0014	2.63***
Cuttack	0.217	5.28 *	6.81	93.08 *	0.0008	2.30 **
Deogarh	0.13	2.84	6.66	51.98 *	0.0010	1.69
Dhenkanal	0.406	12.97 *	6.55	58.82 *	0.0019	3.60 *
Gajapati	0.014	0.28	6.69	26.60 *	0.0006	0.5300
Ganjam	0.0005	0.01	6.86	59.86 *	0.0001	0.10
Jagatsinghpur	0.4	12.96 *	6.72	70.82 *	0.0016	3.56 *
Jajpur	0.127	2.57	6.71	80.36 *	0.0007	1.66
Jharsuguda	0.018	0.35	6.96	48.44 *	0.0004	0.59
Kalahandi	0.456	15.93 *	6.68	81. 72 *	0.0016	3.99 *
Kandhamal	0.245	6.18 **	6.82	131.97 *	0.0006	2.49 **
Kendrapara	0.142	3.14 ***	6.69	73.06 *	0.0008	1.77 ***
Keojhar	0.37	11.13 *	6.63	76.31 *	0.0014	3.34 *
Khurda	0.06	0.28	6.8	54.31 *	0.0007	1.11
Koraput	0.64	33.20 *	6.85	160.03 *	0.0012	5.76 *
Malkangiri	0.22	5.33 **	6.79	77.93 *	0.0010	2.31 **
Mayurbhanja	0.28	7.30 **	6.91	95.71*	0.0009	2.70 **
Nawarangpur	0.46	15.96 *	6.97	75.54 *	0.0018	3.99 *
Nayagarh	0,02	0.59	6.69	55.69 *	0.0003	0.55
Nawapara	0.28	7.37 **	6.25	42.86 *	0.0019	2.71 **
Puri	0.2	4.79 **	6.85	96.79 *	0.0007	2.19 **
Rayagada	0.62	30.69 *	6.76	126.85 *	0.0014	5.54 *
Sambalpur	0.24	5.91 **	7.09	89.27 **	0.0009	2.,43 **
Sonepur	0.51	19.78 *	7.13	106.69 *	0.0014	4.45 *
Sundargarh	0.32	9.07 *	6.55	56.57 *	0.0017	3.01 *
ODISHA	0.46	14.43 *	6.89	134.29 *	0.0009	3.80*

Table-1.3.3 (b) : LQGR of Rice Productivity (1993-94 to 2015-16)

Districts	R^2	F-test value	Constant	t	Regression Coefficient	t-value
Angul	0.090	1.87	6.71	40.66 *	0.0011	1.37
Balasore	0.202	4.86 **	7.11	885.32 *	0.0009	2.19 **
Bargarh	0.235	5.85	7.32	41.66 *	0.0020	2.42 **
Bhadrak	0.267	6.92 **	7.3	152.58 *	0.0006	2.63 **
Bolangir	0.230	5.67 **	6.69	34.19 *	0.0022	2.38 *
Boudh	0.293	7.89 **	6,74	34.23 *	0.0026	2.81 *
Cuttack	0.182	4.24 **	7.28	110.89 *	0.0006	2.06 **
Deogarh	0.242	6.05 **	6.71	45.23 *	0.0017	2.46 **
Dhenkanal	0.316	8.77 *	6.95	53.06 *	0.0019	2.96 *
Gajapati	0.001	0.02	7.33	33.2 *	0.0002	0.1400
Ganjam	0.159	3.60 ***	7.75	33.75 *	-0.0021	-1..90 ***
Jagatsinghpur	0.718	48.46 *	7.16	161.50 *	0.0015	6.96 *
Jajpur	0.000	0.01	7.22	34.89 *	0.0001	0.08
Jharsuguda	0.061	1.24	6.95	40.91 *	0.0009	1.11
Kalahandi	0.349	10.17 *	6.8	59 *	0.0018	3.19 *
Kandhamal	0.160	3.62 ***	7.01	102.36 *	0.0006	1.90 ***
Kendrapara	0.050	1.01	6.93	39.59 *	0.0008	1.0
Keojhar	0.332	9.43 *	6.84	74.51 *	0.0014	3.07 *
Khurda	0.002	0.03	7.24	65.15 *	0.0001	0.17
Koraput	0.583	26.5	7.17	160.16 *	0.0011	5.15 *
Malkangiri	0.090	1.89	6.95	56.61 *	0.0008	1.3700
Mayurbhanja	0.223	5.45 **	7.02	87.66 *	0.0009	2.33 **
Nawarangpur	0.146	3.24 ***	7.03	64.72 *	0.0009	1.8 ***
Nayagarh	0.007	0.14	7.25	49.44 *	-0.0003	-0.38
Nawapara	0.310	8.52 *	6.48	37.33 *	0.0024	2.92 *
Puri	0.289	7.71 **	7.09	108.64 *	0.0009	2.78 **
Rayagada	0.294	7.90 **	7.16	94.34 *	0.0010	2.81 **
Sambalpur	0.255	6.51 **	6.94	40.09 *	0.0021	2.55 **
Sonepur	0.590	27.35 *	7.26	107.40 *	0.0017	5.23 *
Sundargarh	0.374	11.35 *	6.58	52.75 *	0.0017	3.37 *
ODISHA	0.395	12.41**	7.07	112.32 *	0.0011	3.52 *

Table-1.3.4 (b) : LQGR of Pulses Productivity (1993-94 to 2015-16)

Districts	R^2	F-test value	Constant	t	Regression Coefficient	t-value
Angul	0.1605	3.63 ***	5.76	55.11*	0.0010	1.91 ***
Balasore	0.1309	2.86	5.86	56.91*	0.0008	1.69
Bargarh	0.1816	4.21 **	6.22	100.78*	-0.0006	-2.05 **
Bhadrak	0.109	2.32	6.1	86.68*	0.0005	1.52
Bolangir	0.1372	3.02	5.86	97.55*	0.0005	1.74 ***
Boudh	0.2531	6.44 **	5.97	105.95*	0.0068	2.54 **
Cuttack	0.0006	0.01	6.12	93.66*	0.0000	0.11
Deogarh	0.3388	9.74	6.21	105.68*	-0.0009	-3.12 **
Dhenkanal	0.0199	0.39	5.86	56.90*	0.0003	0.62
Gajapati	0.1398	3.09 ***	6.44	262.11*	-0.0002	-1.76 ***
Ganjam	0.02259	5.55 **	6.01	109.82*	0.0006	2.35 **
Jagatsinghpur	0.0261	0.51	6.11	118.70*	-0.0002	-0.71
Jajpur	0.0195	0.38	5.86	43.71*	0.0004	0.61
Jharsuguda	0.0763	1.57	6.17	33.97*	-0.0011	-1.25
Kalahandi	0.16	3.62 ***	6.2	80.36*	0.0007	1.90 ***

Kandhamal	0.0325	0.64	5.81	31.51*	0.0007	0.80
Kendrapara	0.0092	0.18	6.06	83.61*	-0.0001	-0.42
Keojhar	0.0107	0.21	6.1	773.10*	0.0002	0.45
Khurda	0.0837	1.73	5.83	56.97*	0.0006	1.32
Koraput	0.0629	1.27	5.8	51.47*	0.0006	1.13
Malkangiri	0.0727	1.49	5.89	65.60*	0.0005	1.22
Mayurbhanja	0.201	4.78**	6.13	141.68*	0.0005	2.19**
Nawarangpur	0.0052	0.1	6.15	69.68*	-0.0001	-0.3100
Nayagarh	0.0642	1.3	5.93	61.66*	-0.0005	-1.1400
Nawapara	0.1419	3.14	5.6	44.39*	0.0011	1.77***
Puri	0.0004	0.01	5.78	51.50*	0.00005	0.09
Rayagada	0.2765	7.26**	6.11	81.91*	0.0010	2.69**
Sambalpur	0.0018	0.03	6.03	77.80*	0.0001	0.19
Sonepur	0.1524	3.42***	6	109.55*	0.0005	1.85***
Sundargarh	0.1252	2.72	5.98	73.19*	0.0006	1.6500
ODISHA	0.0996	2.1	6.04	137.3 *	0.0003	1.45

Prima Facie Evidence of Disparities in Productivity Growth

The prima facie evidence of disparities in productivity in agricultural sector across the districts of Odisha over a period time (i.e. from 1995 to 2015) based on the growth performance of the parameters under study has been shown in terms of ratio of growth rate of productivity of the respective parameters from richest to poorest as represented in Table-1.4. It is observed that there exist disparities in productivity of total agricultural production and food grain whereas there exist no disparities found for pulses productivity across the districts during the period under study. However, there exist mixed pattern of disparities no clear disparities) in rice productivity across the district during the periods of time under study and hence it shows rather a convergence model. It can be inferred from the above analysis that there exist negligible disparities in rice productivity across the districts irrespective several policy measures and level of development other sectors even though rice is the dominant and staple crop in all the districts. Further, the pulses productivity in all the districts is almost same despite several policy measures in this regard and differential level of overall development in different districts. However, the disparities observed in productivity of total agricultural production may be due the significant percentage share of non-rice based or cash crops grown in certain districts of the state. The disparities food grain productivity is due the variation in the composition of cereal crops and oil seed production to certain extent in some of the districts of the state. The subsequent discussions may clarify more on the inequalities in the growth trend of the productivity of the said parameters.

Table1.4: Ratio of Growth Rate of Productivity in Agricultural Sector (Richest to Poorest Districts of Odisha during 1993 to 2013)

Richest to the Poorest District	Ratio			
	Agricultural productivity	Food grains Productivity	Rice Productivity	Pulses Productivity
Top5 to Bottom 5	15.5570	5.9894	-7.7389	-0.8231
Top 4 to Bottom 4	22.4723	7.5733	-4.5444	-0.7381
Top 6 to Bottom 6	11.6440	5.1251	-14.8983	-0.8815
Top 8 to Bottom 8	7.9611	4.1330	38.3357	-1.0005
Top12 to Bottom 12	4.6596	3.1798	6.5584	-1.1388
Top14 to Bottom 14	3.8376	2.8283	4.8150	-1.2503
Top10 to Bottom 10	6.01375	3.5924	10.5322	-1.0897
Top15 to Bottom 15	3.5315	2.6355	4.2280	-1.3226

NB. If all positive then there is presence of disparities and vice versa.

Inequalities in the Growth of Selected Variables

The inequalities in agricultural development have been analyzed applying the analytical tools like Coefficient of Variation (C.V.) and Gini Coefficient (G.C.).

Gini Coefficient (G.C.):

$$G.C. = \frac{\sum_{i=1}^{n}(2i - n - 1)X_i}{n^2\mu}$$

Where,

i : individual rank order of the district,

n : number of total districts,

X_i : Agricultural Productivity the individual district

μ : Average Agricultural productivity of the districts

The Gini coefficient is a dimensionless measure of statistical dispersion that is frequently used in analyzing the inequalities in distribution of a data set. The Gini coefficient (G) of a data set ranges from 0 to 1, with 1 being the most unequal and 0 being the most equal distribution of concern data set. Gini coefficient (GC) has the following features.

- Most commonly used measure of inequality and a full-information measure, looking at all parts of the distribution
- Facilitates direct comparison between two regions regardless of their sizes
- Gini index is sensitive to change in inequality around the median/mode.
- GC: 0 ⇒ perfect equality; 1 ⇒ perfect inequality

The Gini Coefficient (G.C.) has been calculated in the similar manner as depicted above separately for the rest three variables such as Foodgrain productivity, Rice Productivity and pulses Productivity.

Coefficient of Variation (C.V.)

The Coefficient of Variation (C.V.) is also a measure of inequalities in a data set. The higher the value of C.V greater is the instability and lesser the value of C.V. lesser is the instability of the data relative to other set of data . The C.V. has measured by using the following formula

$$CV = \frac{\delta}{\mu} X\ 100$$

Where, δ= Standard Deviation and μ= Arithmetic Mean

The Coefficient of Variation (C.V,) has been calculated in the manner as depicted above separately for all the variables such as Agricultural Productivity, Foodgrain productivity, Rice Productivity and pulses Productivity.

It is observed from the analysis of the four variables drawn in aggregation from 30 districts of Odisha from 1995-96 to 2015-16 as represented in table-1.5 to analyze the inequalities or disparities in their growth that the inequalities in all these variables (in pulses the disparities is very small in magnitude) exist over the year under study even though its magnitude differs from time to time as depicted from the analysis of both GC and CV.

The Agricultural productivity shows a relatively higher inequality (i.e. erratic) during 2007 remaining the pattern of oscillation same for other periods as depicted in the table. Similarly, the inequality in food grain productivity during 2002 and 2003 is found relatively higher remaining the pattern of oscillation same for other periods. The inequality in rice productivity from 2000 to 2003 and 2010 is found relatively higher remaining the pattern of oscillation same for other periods as depicted the table. This shows that the pattern of inequalities is not clear in the case of rice productivity. The magnitude of inequality in pulses productivity is found very small and shows the same pattern of oscillation over time as depicted in the table.This reveals that almost there is an insignificant inequality in pulses productivity. Further, it is observed while analyzing the data that the C.V. and G.C.as measures of inequality depicting the same trend (downward trend)

Table: 1.5: Gini Coefficient (GC) and Coefficient of Variation (CV) of Agricultural, Food grains, Rice and Pulses Productivity over time (1995-96 to 2015-16) in Odisha

Year	Agricultural Productivity		Food grains Productivity		Rice Productivity		Pulses Productivity	
	GC	CV	GC	C.V.	GC	C V	GC	C V
1995-96	0.19	0.39	0.10	0.19	0.11	0.20	0.06	0.12
1996-97	0.14	0.34	0.10	0.19	0.19	0.51	0.07	0.13
1997-98	0.12	0.21	0.09	0.17	0.09	0.17	0.08	0.15
1998-99	0.16	0.29	0.17	0.30	0.18	0.32	0.24	0.44
1999-2k	0.13	0.24	0.16	0.30	0.12	0.24	0.16	0.28
2000-01	0.18	0.35	0.20	0.38	0.16	0.29	0.15	0.28
2001-02	0.17	0.32	0.20	0.38	0.16	0.29	0.16	0.29
2002-03	0.17	0.32	0.22	0.39	0.47	1.73	0.19	0.35
2003-04	0.17	0.32	0.11	0.20	0.24	0.42	0.16	0.29
2004-05	0.09	0.17	0.25	0.45	0.32	1.33	0.15	0.27
2005-06	0.14	0.25	0.24	0.45	0.43	1.63	0.18	0.34
2006-07	0.14	0.25	0.12	0.21	0.11	0.20	0.15	0.28
2007-08	0.15	0.27	0.11	0.21	0.10	0.19	0.15	0.22
2008-09	0.14	0.26	0.11	0.21	0.10	0.18	0.10	0.19
2009-10	0.24	0.55	0.11	0.21	0.10	0.18	0.15	0.27
2010-11	0.14	0.26	0.11	0.20	0.09	0.17	0.10	0.19
2011-12	0.13	0.24	0.12	0.23	0.10	0.18	0.08	0.15
2012-13	0.19	0.35	0.19	0.34	0.48	1.65	0.14	0.27
2013-14	0.14	0.26	0.19	0.34	0.22	0.39	0.10	0.18
2014-15	0.12	0.21	0.13	0.26	0.13	0.25	0.06	0.12
2015-16	0.13	0.24	0.19	0.36	0.22	0.40	0.05	0.11

Determinants of Agricultural Productivity – Panel Data Analysis

Agricultural Productivity is influenced by a number of factors. In this section an attempt has been made to identify the determinants and estimate their influence on productivity in respect of total production in agricultural sector. Panel data technique with pooled regression, fixed and random effect models has been applied for this purpose. Further, the results of F test, LM test, Hausman test undertaken in this model suggests the appropriateness of Fixed Effect model over the Pooled and Random Effect model in this case and hence the result of Fixed Effect model is interpreted based on the table shown as follows.

The following Equation describes the specification of the model

$$Y_{it} = \alpha + \beta X'_{it} + \in_{it}$$

Where,

Y= **Dependent Variable** = Agricultural Productivity,

i= Number of Districts = 1, 2, 3 …….. 30 (30 districts of Odisha)

t= Time Period = 1, 2, 3 …….. 21 (i.e. 1995-96 to 2015-16)

X= **Independent Variables** Such as

Cultivated Land (in Ha),

Net Area Shown (in Ha),

Net Irrigated Area (in Ha),

Area under HYV Seeds (in Ha),

Cultivated Land per Worker (in Ha),

Net Irrigated area as a percentage of Net Area Sown,

Fertilizer Consumption per Hectare of GCA,

HYV area as a percentage of GCA,

Rainfall (Average rainfall)

Percentage of Cultivator to Total Worker,

Ratio of Agricultural Worker to Total Worker and Literacy

It observed from the table-1.6 (FE model) that the Net Irrigated Area contributes positive and

significantly to the agricultural productivity in the state.It indicates that one percent increase in Net Irrigated Area leads to an increase in agricultural productivity by 5.40 per cent. Similarly, one percent increase in Net Irrigated area as a percentage of Net Area Sown is found to raise the agricultural productivity by around 9.42 per cent. Further, the HYV area as a percentage of GCA is found negative and significantly affecting agricultural productivity as depicted in the table.This may be due to low quality of Seeds (as such acute shortage of foundation seeds and inadequate availability of qualitative certified seeds that compels most farmers to use local or unauthenticated certified HYV seeds), lack of adequate irrigation facilities and inadequate or improper use of fertilizer and other plant protection measures. Similarly, Percentage of Cultivator to Total Worker is found negative and significantly affecting agricultural productivity as depicted in the table. It indicates that one percent increase in this ratio may lead to around 12 percent decrease in agricultural productivity. It indicates the existence of disguised unemployment in the agricultural sector and inadequate availability of alternative sources of employment in rural areas. Further, it is found that Literacy has a positive and significant impact of agricultutal productivity as depicted in the table indicating the fact that one percent increase in literacy leads to around 29 percent increase in agricultutal productivity. It implies that the decision making capacity of farmers on various aspects and process of productivity improvement strategies will be sharpen if they are literate. Besides this an important finding is observed from the table that the Land size is negatively associated with agricultural productivity indicating the existence of inverse farm size and productivity relationship even though it is not statistically significant. The impact of other factors (statistically not significant) on agricultural productivity can also be observed as shown the table-1.6.

It can be inferred from the analysis that irrigation and literacy are observed as two positive factors affecting the agricultural productivity. Thus the area under irrigation should be enhanced by the Government in the state through appropriate policy measures and strategies as because irrigation is found as one of the very crucial factor affecting the improvement of agricultural productivity in thr state. Similarly the Literacy of farm household should be given utmost importance in the state. Moreover the Extention service and Training of farmers should be given due importance to educate the farmers for better and judicious adoption of modern farm practices for enhancing agricultural prioductivity. Similarly Steps should be taken by the Government to make availability and accessibility of qualitative seeds to the farmers on time and at reasonable rate along with the other requirements associated with adoption of HYV seeds such as fertilizer, irrigation credit, plant protection measures etc. so as to minimize the negative effect of it on agricultural productivity. Further, the problems of disguised unemployment in the agricultural sector should be taken care of by the Government by providing adequate sources of alternative employment in the rural area as well as policy measures to be taken for seasonal unemployment problem so to check its negative effect on agricultural productivity. Further, the small farmers should be give proper attention through appropriate policy measures so as to ensure their higher contribution towards the productivity enhancement.

Table-1.6: Determinants of Agricultural Productivity - Panel Data Analysis

Dependent Variable: Agricultural Productivity			
Independent Variables	Pooled	Fixed Effect	Random Effect
Cultivated Land	-2.429016 (-1.23)	-3.639559 (-1.38)	-2.874298 (-1.39)
Net Area Shown	1.424613 (0.67)	0.4074871 (0.17)	0.0351149 (0.02)
Net Irrigated Area	-4.392347 ** (-2.18)	5.400616 ** (1.94)	2.005242 (0.80)
Area under HYV Seeds	3.491813 **	2.7942	3.295758 *

	(2.10)	(1.37)	(1.73)
Cultivated Land Per Worker	97.95939 (1.56)	-2.377863 (-0.03)	85.73822 (1.17)
Net Irrigated area as a percentage of Net Area Sown	9.662245 *** (2.40)	9.415929 * (1.71)	-4.292639 (-0.87)
Fertilizer Consumption per Hectare of GCA	4.826434 *** (3.37)	2.58996 (1.33)	4.111106 *** (2.39)
HYV area as a percentage of GCA	-11.2665 ** (-2.32)	-12.7301 * (-1.86)	-14.35166 *** (-2.42)
Rainfall	.1203123 (1.34)	-.0683819 (-0.81)	-0.0215733 (-0.26)
Percentage of Cultivator to Total Worker	-13.83064 *** (-3.53)	-11.96022 ** (-2.14)	-15.29299 *** (-3.25)
Ratio of Agricultural Worker to Total Worker	-1.749281 (-0.58)	-2.05793 (-0.64)	-0.266114 (-0.09)
Literacy	3.27156 (1.14)	29.12556 *** (5.45)	17.08195 *** (4.16)
Constant	2176.307 *** (5.26)	1773.763 ** (2.12)	2177.722 *** (3.83)
R^2	0.2104	Within=0.3336	Within=0.3256
		Between=0.0343	Between=0.0314
		Overall=0.1528	Overall=0.1815
F-Test	13.70 ***		
No. of Observations, No. of Variables	630 13		
F-Test	F(29,588) = 10.07 (P > F = 0.00001)		
LM-Test	Chi sqr(01) = 315.34 (P >Chi sqr = 0.0001)		
Hausman-Test	Chi sqr (12) = 50.88 (P > Chi sqr = 0.0001)		

Note: Against each variable, the first row represents the coefficient followed by t-statistics in the parenthesis,

*Significant at 10 Percent; **Significant at 5 Percent; ***Significant at 1 Percent

Conclusion

The growth rate (SEGR and LQGR) estimated for productivity of total agricultural produces over time (1993-94 to 2015-16) is found positive but very small in magnitude for most of the districts. However the trend of its growth over time in all the districts is found decreasing. The decresing trend may be attributed to the unbalanced growth of food and non-food crops in the districts of Orissa as well as adverse effect of industrialization on agricultural development in few districts like Jharsugda. Hence, effective and scientific agricultural policy should be made by the Government and commercial attitude of the famers should be developed besides addressing financial, infrastructural and other issues affecting productivity so that decreasing trend can be improved.

The growth rate (SEGR and LQGR) estimated for food grain productivity over time (1993-94 to 2015-16) is found positive but very small in magnitude for most of the districts which may be attributed to more concentration of all these districts on food crops in general relative to other crops (cash/non-food crops). However, the the trend of its growth in Orissa is found decreasing. Thus the small magnitude of growth of productivity with negative trend may not be sufficient to meet the growing demand for it for which policy framework be designed to increase the pace and trend of its growth.

The growth rate (SEGR and LQGR) of Rice Productivity for the period from 1993-94 to 2015-16 for various districts is found positive and significant but for some districts it is found negative and significant. Thus the disparity in the growth of rice productivity is not clear. . However, the trend of its growth is found

decreasing which may be due to the insignificant growth of rice crops in certain districts due to the ineffective agricultural policy of the Government or less remunerative nature of rice crop or any other financial or infrastructural constraints.

The growth rate (SEGR and LQGR) of Pulses Productivity for the period from 1993-94 to 2015-16 found positive and significant for some districts as well as found negative and significant for some other districts which makes the result of disparities ambiguous. The trend of Pulses Productivity reveals a positive trend of growth at a constant rate of 0.001 and 0.078 (very small in magnitude) as per the estimate of SEGR and LQGR respectively which shows that the disparities in pulses productivity exist among the districts but is very small in magnitude which may be attributed to the ineffective agricultural policy for pulses crop.

It is observed from the analysis of inequalities in the growth pattern (by CV & Gini Coff.) of the productivity growth of the four variables under study across the districts over time that inequalities or disparities exists in their growth (in pulses the disparities is very small in magnitude and no clear disparities in the case of rice productivity).. Further, it is observed while analyzing the data that the C.V. and G.C.as measures of inequality depicting the same trend (downward trend).

It is observed from the Panel data analysis that irrigation and literacy are observed as two positive factors affecting the agricultutal productivity. Thus the area under irrigation should be enhanced and Literacy of farm household should be given utmost importance by the Government through appropriate policy measures. Moreover the Extention service and Training of farmers should be given due importance to educate the farmers for better and judicious adoption of modern farm practices for enhancing agricultural productivity. Similarly Steps should be taken by the Government to make availability and accessibility of qualitative seeds to the farmers on time and at reasonable rate along with the other requirements associated with adoption of HYV seeds such as fertilizer, irrigation, credit, plant protection measures etc. so as to minimize the negative effect of it on agricultural productivity. Further, the problems of disguished unemployment in the agricultural sector should be taken care of by the Government by providing adequate sources of alternative employment in the rural area so to check its negative effect on agricultural productivity. Further, the small farmers should be give proper attention through appropriate policy measures so as to ensure their higher contribution towards the productivity enhancement.

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MARKETING EFFICIENCY AND PROFIT OPTIMIZATION OF MIXED CROPPING PATTERN

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ABSTRACT

The diversification of cropping pattern from cereal to non-cereal crops or mixed cropping pattern i.e. production of vegetable, fruits and other non-cereal crops along with cereal crops may be proved to be more profitable compared to the cultivation of cereal crop only. Despite the profitability of mixed cropping pattern the farmers under study irrespective of size class prefers to cultivate cereal crop like paddy which is found mostly due to the market/marketing, infrastructural/Institutional and attitudinal constraints.

Keywords: *Mixed Cropping Pattern, Profit Optimization, Marketing Efficiency*

Introduction

The production of fruits, vegetables and other non-cereal crops has grown at a faster pace world wide than that of cereal crops. The growth of area under horticulture crops in the world has grown more than doubled between 1960 and 2000. There are several reasons for the global increase in production and trade of such crops as the production of these crops is profitable and farmers involved in it usually earn much higher income as compared to cereal producers. However in Odisha state in general and area under study in particular the cropping pattern is dominated by cereal crops like paddy with very less percentage of area diverted toward cultivation of vegetable, fruits and other non-cereal crops due to several problems at production and marketing fronts faced by the farmers. The major problems encountered in production of these crops are inputs supply, pest & disease, low productivity, production seasonality etc. Similarly in marketing the products of these crops the problems faced are lack of cost-effect transport facilities, storage (including cold and scientific storage), lack of value added knowhow, lack of market information, lack of marketing infrastructure, lack of proper post-harvest handling facilities, lack of efficient organized market system , Lack of user friendly e-marketing system, lack of effective contract farming system, lack of policy measures as per APMC Act and apathetic attitude of institutional marketing agencies etc.

The potential benefit expected from the production of fruits, vegetables and other non-cereal crops is under challenges of imperfect marketing apart from the challenges on production front. Because the market behaviour is characterized by unethical practices and information asymmetry that led to uncooperative market behaving for phasing remunerative prices for their products to the farmers which is one of the major causes for discouraging crop diversification in the area under study even though it is profitable, Therefore appropriate remedial measures for restructuring and re-engineering the market and marketing system apart from the measures to increase productivity of these crops should be formulated nd implemented by the government so as to encourage the crop diversification which will not only phase profits but also supplement the income from cereals crops which will motivate the farmers for mixed cropping pattern. The government policy along with the institutional participation like participation of federated structure of agricultural, marketing and processing Cooperative Societies and other such institutions are required to give a concrete shape for mixed cropping pattern in the area under study for the development of farming and farmers. Thus an attempt has been made to analyze certain aspects of mixed cropping to justify the preference of farmers for cereal crops like paddy.

Literature Review

The traditional form of agriculture gradually transformed towards sophisticated arrangement of food supply chain system with clear division according to product type and market segmentation and development of transport, storage, processing, retailing and wholesaling activities for farm produce as modernization, urbanization and industrialization started to grow at a faster pace leading to increased demand for food for urban dwellers **(CIAT, 2004)**

The markets are essential in the process of agricultural commercialization but transaction costs and other causes of market imperfections could limit the participation of farm households in different markets. This implies that markets may be physically available but not accessible to some of the farm households. Under such circumstances, farm households may tend to choose crops that can easily be sold at the accessible markets. Such tendency is much stronger for households producing perishable crops like horticulture **(Moti, 2007)**

Marketing function meant for channelizing farm product from the producer to the consumer involves transport and preservation of products, classification, and packaging, development of demand and market information, financing, risk bearing and facilitation of exchange **(Cramers and Jensen, 1982,. Saccomandi 1998, Branson and Norvell, 1983)**.

Market supply refers to the amount actually taken to the markets irrespective of the need for home consumption and other requirements where as the market surplus is the residual with the producer after meeting the requirement of seed, payment in kind and consumption by peasant at source **(Wolday ,1994)**. The marketed surplus shows the quantity actually sold after accounting for losses and retention by the farmers, if any and adding the previous stock left out for sale **(Thakur et al., 1997)**.

Neway (2006) indicated two options for commercialization. The most common form in which commercialization could occur in peasant agriculture is through production of marketable surplus of staple food over what is needed for own consumption. Another form of commercialization involves production of cash crops in addition to staples or even exclusively. At the farm household level, commercialization is measured simply by the value of sales as proportion of the total value of agricultural output. At the lower end, there would always be some amount of output that even a subsistence farmer would sale in the market to buy basic essential goods and services. For this reason, the ratio of marketed output up to a certain minimum level cannot be taken as a measure of commercialization. Marketed surplus is defined as the proportion of output that is marketed **(Harris, 1982)**.

Marketed surplus may be equal to marketable surplus, but may be less if the entire marketable surplus is not sold out and the farmers retain some stock and if losses are incurred at the farm or during the transit **(Thakur et al., 1997)**. In the case of crops that are wholly or almost wholly marketed, the output and marketed surplus will be the same **(Reddy et al., 1995).**

The principal causes of shifts in the supply are changes in input prices, and changes in returns from commodities that compete for the same resources. Changes in technology that influence both yields and costs of production/ efficiency, changes in the prices of joint products, changes in the level of price/yield risk faced by producer, and institutional constraints such as acreage control programs also shift supply **(Tomek and Robinson, 1990).**

A study made by **Moraket (2001)** indicated households participating in the market for horticultural commodities are considered to be more commercially inclined due to the nature of the product. Horticulture crops are generally perishable and require immediate disposal. As such, farmers producing horticulture crops do so with intent to sell.

Horticulture production is profitable. Farmers involved in horticulture production usually earn much higher farm income as compared to cereal producers. Cultivation of fruits and vegetables allows for productive employment where the labour/land ratio is high, since horticultural production is usually labour intensive. Increasing horticulture production contributes commercialization of the rural economy and creates many off-farm jobs. However, expanding the scale of horticulture production is often hindered by lack of market access, market information, and many

biological factors (**Weinberger and Lumpkin, 2005). Bezabih and Hadera (2007**) have observed that production is seasonal and price is inversely related to supply. During the peak supply period the prices decline. The situation is worsened by the perishability of the products and poor storage facilities. Along the market channel, 25 percent of the product is spoiled.

Market performance refers to the impact of structure and conduct on prices, costs, and volume of output (**Pomeroy and Trinidad, 1995)**. Marketing efficiency is essentially the degree of market performance. It is defined as having the following two major components: (i) the effectiveness with which a marketing service would be performed and (ii) the effect on the costs and the method of performing the service on production and consumption. These are the most important because the satisfaction of the consumer at the lowest possible cost must go hand in hand with maintenance of a high volume of farm output **(Ramakumar, 2001)**.

The two approaches to measure marketing performance are: marketing margin and the analysis of market channel efficiency. A large number of studies have analyzed the marketing margins for different types of commodities to examine the performance of agricultural products marketing (e.g, **Wohlengenant and Mullen, 1987; Schroeter and Azzam,, 1991; Holt, 1993)** and (**Sexton, Zharg and Chalfant, 2005 as cited on Jema, 2008**) argued that even though variations in the margin over time might be attributable to marginal marketing costs under perfect computation, additional factors such as seasonality, technological changes, and sales volume may also explain the variations in the margin. **Mendoza (1995**) has observed that precise marketing costs are frequently difficult to determine in many agricultural marketing chains. The reasons are that these costs are often both cash costs and imputed costs, the gross and not the net marketing margin is advised to be calculated. According to **Mendoza (1995**), "marketing margins" should be understood as the gross marketing margins.

It is observed from the brief review of literatures that severe production seasonality, seasonal price fluctuations, poor pre-and post-harvest handling, prevalence of pest and diseases, lack of storage and proper marketing facilities etc. are some of the critical problems encountered vegetable marketing and other non-cereal crops in our economy. Ideally, measures commonly recommended for the improvement of vegetables marketing are better packaging, handling, and transport; sorting by quality; extending the market season and leveling out gluts and shortages by market delivery planning and storage; developing new markets; installation of refrigerated transport and processing equipment: and establishing marketing enterprises.

Objective

The main objective of this study is to analyze the cost, benefits, profitability and marketing efficiency aspects of mixed cropping pattern (i.e. the production of fruit, vegetable and other non-cereal crop along with the basic rice crop) in the area under study so as to suggest for crop diversification strategies and expected policy measures in this direction

Methodology

The data base of the study constitutes the primary data collected across various farm sizes classified on the basis of operational land holdings such as Small (upto 5.00 acres), Medium (5.01 acres to 10 acres) and Large (10.01 acres and above) of three villages with varied irrigation status(by canal irrigation status under Hirakud command area) viz. irrigated (VI), semi-irrigated(VII) and non-irrigated areas(VIII) located in three different blocks of Bargarh district of Odisha during the year 2017-18. To study the resource productivity, profitability and marketing efficiency of mixed cropping the data of 400 sample farms out of the total 474 farms have been considered for the purpose of this study. Because there are 74 farms who have not at all adopted any other crops other than paddy and hence they have not been included for the purpose of this study made. Further, in this study certain aspects are analyzed across the farm sizes and villages but for certain other aspects only the analysis has been made taking pooled data of the villages under study as the pattern and purpose of study of those aspects are homogeneous types observed for various farm sizes. The following analytical tools have

been applied for analyzing the different aspects of the study.

Estimation of PS and ME

Producers' share in consumer rupees: The Producers' share in consumers rupees can be defined as the ratio of the price received by the farmer to the price paid by the customer expressed as the percentage.

$P_s = (P_{rf} / P_{pc}) \times 100$

Where,

P_s = Producers' share

P_{rf} =Price received by farmers

P_{pc} = Price paid by consumers

Marketing Efficiency: The marketing efficiency of the farm can be measured from the ratio of total value of goods market to the marketing cost. The higher the ratio, the higher is the efficiency and vice versa. The Shephard's formula (used by Katcha,1990) has been used to measure the marketing efficiency in this case.

ME= (V / I) - 1

Where,

ME= Index of Marketing efficiency

V=Value of goods sold (at consumers' price)

I= Total marketing cost

LPP for Profit Optimization

In the present study a linear programming model has been developed to decide the optimal mix of cropping and a comparison is done between actual state and the optimal state of profit.

For a given farm situation the linear programming model requires specification of:

1. The alternative farm activities, their unit of measurement, their resource requirements, and any specific constraints on their production.
2. The fixed resource constraints of the farm.
3. The forecast activity returns net of variable costs, hereafter called gross margins.

To formulate the problem mathematically the following notation has been introduced.

X_j = the level of jth farm activity. Let n denote the number of possible activities; then j = 1 to n.

c_j= net farm income of a unit of the j^{th} activity.

a_{ij} = the quantity of the i^{th} resource (e.g. acres of land or days of labour) required to produce one unit of the j^{th} activity. Let m denote the number of resources; then i = 1 to m.

b_i = the amount of the i^{th} resources available (e.g. acres of land or days of labour).

With this notation, the linear programming model can be written as follows:

$$maxZ = \sum_{j=1}^{n} C_j X_j \quad \text{(Objective function)}$$

Such that

$$\sum_{j=1}^{n} a_{ij} X_j \leq b_i,$$

where i = 1 to m (resource constraints)

And

$X_j \geq 0$, all j = 1 to n

(non-negativity constraint)

In words, the problem is to find the farm plan (defined by a set of activity levels X_j, j = 1 to n) that has the largest possible total gross margin Z, but which does not violate any of the fixed resource constraints , or involve any negative activity levels

This linear programming model is constructed taking the pooled data of individual village understudy .All resource constraints except land are considered in terms of Rupees whereas land is considered in terms of Acre. In the present study there are two decision variables X_1 (Rice) and X_2 (Vegetables and other non-cereal crops).The objective is to Maximize the Gross Profit (Z) with respects to the following constraints such as

- Bullock and Machine Labour
- Human Labour
- Seeds
- Fertilizer
- Irrigation
- Plant protection
- Marketing cost
- Interest
- Land

Result and Discussion

The brief discussion in the introductory part of this chapter on the prospects and problems of cultivating vegetables and other non-cereal crops along with the staple crop (i.e. paddy) has been made. Keeping this in view certain aspects of the multi-crop farming in the area under study has been analyzed as follows.

Status of Vegetable and non-cereal crops

It is observed from the table-1.5.1 that the percentage of number of farms cultivating vegetables and other non-cereals crops and the percentage of area of the total cultivated area under vegetables and other non-cereals corps are found increasing with the increase in farm sizes in all the villages under study This direct relationship may be due to effect of size of farms. Further it can be observed that the percentage allocation of area under vegetables and other non-cereals crops is quite low across farm sizes and villages under study. This shows the low pace of crop diversification indicating the fact the irrespective of the farm sizes and irrigation status of the area under study the cereal crops i.e. paddy crop dominates over the cropping pattern even though the cultivation of vegetables and other non-cereals crops is relatively profitable which is discussed subsequently. The difference of net income per acre between the cereal crop like rice (paddy) and non- cereal crops is found more than 150% irrespective of farm sizes and villages under study even though the degree of variation in income varies across farm sizes. Similarly, the total cost per acre for producing the vegetables and other non-cereals crops is found higher than the cost per acre of producing rice (paddy). The cost difference represented in the table shows that the cost difference on an average is lower for small farms compared to that of other farms sizes.

The marketing channels are categorized into two channels in this study such as Channel-I Producer-Consumer and Channel-II Producer–Trader –Consumers. Because, the prevailing regulated market for vegetables and other non-cereal crops is not as systematic, structured and accessible as the regulated market for cereal crops like paddy in the state. Thus, most of the farmers irrespective of size groups and irrigation status of the villages under study use to sale the vegetables and other non-cereal crops mostly through these two channels.

It is observed from the table that the percentage of small farm size opting for Channel – I in selling their products (vegetable and non -cereals crops) is found higher compared to that of other size group of farms in all the villages under study. However the percentage of farms opting for Channel -II in selling their products (vegetable and non -cereals crops) is found is increasing with the increase of farm sizes. This may be due effect of contributing their (medium and large far sizes) labour (income-leisure trade off) to make their product reach directly to consumers instead they use to sale through traders or intermediaries (Channel-II) even though it is less remunerative relative to Channel-I which is subsequently discussed.

Cost and Income differences

A hypothesis formulated in this context i.e. Ho: there exist no significant cost and net income differences per acre between the adoption of single cropping pattern (paddy) and mixed cropping pattern (paddy along with vegetables and other non-cereal crops) across the farm sizes under study got tested by ANOVA as represented in the table- 1.5.1 (a) for cost difference and 1.5.1 (b) for income difference. The null hypothesis found rejected at 5% level of significance indicating the fact that the alternative hypothesis is H1: there exist significant cost and net income differences per acre between the adoption of single cropping pattern (paddy) and mixed cropping pattern (paddy along with vegetables and other non-cereal crops) across the farm sizes under study. In other words it implies that even though the cost is higher in mixed cropping pattern type cultivation over the single type cropping, the net income per acre is also much higher in case of mixed compared to that of the single crop cultivation. Thus it can be inferred from the analysis that mixed cropping pattern type of cultivation is profitable as compared to single crop cultivation irrespective of the farm sizes and irrigation status in the area under study. But despite profitability of mixed cropping pattern it is found that the percentage of area out of total diverted for vegetables and other non-cereal crops is quite low across farm sizes and villages under study which shows the preference of the farmers to cultivate mostly the staple cereal crops like paddy indicating a very lower pace of crop diversification which should be taken care of by appropriate policy measures.

Marketing Efficiency

The producers' share in consumer rupees and marketing efficiency are estimated across the farm sizes and villages corresponding to the

marketing channels (viz. Channel-I Producer-Consumer and Channel-II Producer–Trader–Consumers) prevailing for the marketing of vegetables and other non-cereal crops in the area under study as represented in table-1.5.2.

It is observed from the table that the producers share evaluated on consumer's price of the product (PS) is found decreasing with the increase of farm sizes corresponding to Channel-I whereas PS is found increasing with the increasing in farm sizes for Channel-II. Further, it is found that irrespective of farm sizes and villages under study the PS in Channel-I is relatively higher than that of Channel-II. It shows that the dependency of medium and large farms on channel II is more compared to that of Small farms. Thus, the small farms gain more due to their higher participation in Channel-I relative to other farm sizes. This may due to the effect of area under these crops and income-leisure off effect of medium and big farms relative to that of small farms which affects adversely the bargaining power of these farm sizes. However, the producers share in consumers price (PS) in Channel-I is found higher than that of in Channel- II in all the cases under study.

The marketing efficiency (ME) is found inversely related to farm sizes corresponding to Channel-I whereas the ME is found directly related to farm sizes for Channel II in the area under study. Further, irrespective of the farm sizes and villages the ME founder under Channel-I is higher compared to that of Channel-II. The ME for Small farm size is found higher compared to that of other farm sizes as the participation of small farms in Channel-I is found relatively higher. Thus appropriate measures should be taken to facilitate direct marketing facilities(Producers to consumers) consistently for retaining, maximizing and improving PS and ME of small farms in particular and all size groups of farms in general so as to ensure effective diversification and commercialization of crops.

Profitability of Crop Diversification

Individual farmers are repeatedly making decisions about what to, how to, when to and how much to produce. Decisions are made subject to the prevailing physical and financial constraints of farms considering considerable uncertainty in every aspects of their planning.

Traditionally, farmers have relied on experience, intuition, and comparisons with their neighbors to make their decisions. Formal techniques of budgeting and comparative analysis have been developed by farm management specialists, and these can be useful aids for making decisions in less complex situations or for analyzing selected decisions when all the other farm decisions are taken as given. But gradually computer aided or software based or mathematical programming procedures have been developed for whole-farm planning in more complex situations.

Whole-farm planning can assist farmers in efficiently adapting to a changing economic and technological environment. There are many examples of the normative use of linear programming (non-parametric technique) in resource planning, management and profit optimization of farms. Linear programming is one of the optimization methods and applied in this study to determine the optimal level of farms profit (mixed cropping pattern) with respect to a set of resource constraints so as to ascertain the difference between actual (rice base cropping pattern) and optimal level of profit which will help the farms of every size group to achieve the optimal through effective adjustment of their resources.

The pooled data (All farms) for the villages under study has been considered for this purpose as the result involves lesson from this analysis may be learned by all categories of farm sizes to optimize their profit. There may be certain degree of variation across the farm sizes in terms of resource use efficiency but it is sub-optimal at all level as evident from discussions made in preceding chapter. So instead of considering individual farm sizes the pooled data i.e. all farms have been considered for this purpose. The formulation of Linear Programming Problem (LPP) is represented by table-1.5.3and the result of optimum profit (solving LPP by using software Lindo) and the magnitude of its difference from actual is represented by table-1.5.3 (a).

It is found from the result that in all villages under study maximum profit results from the production of vegetables and other crops (X2)

and some acre of land remained unused (S2) called slack. It is suggested that this unused land can be used for production of rice by making some necessary arrangement in the other resources. This optimal result is quite contradictory with the actual production mix adopted by the farms in all villages under study. In actual practice more lands are contributed towards production of rice (paddy). It is observed from the table that the cultivation of rice (Paddy) along with certain horticultural crops (like vegetables and fruits) and other non-cereals crops is more profitable compared to the cultivation of only rice (paddy) as observed from table- 1.5.3 (a) which shows more than 60% of profit difference in al villages under study. As evident from the table the allocation of land may be said to be optimum for more profit of the farms in all the villages (irrespective of irrigation status) provided major percentage of the total cultivated land is allocated towards the production of horticultural and non-cereal crops leaving a few space only for rice (paddy) production. But despite the profitability nature of the mixed cropping pattern the farmers in the area under study are not in a position to adopt and adapt this type of cropping, they are highly concentrating on the rice (paddy) based and biased cropping. This may be due to certain constraints that discourage them to go for mixed cropping pattern in a higher scale. The constraints are discussed subsequently based on farmers' perception as follows.

Constraints or Problems of Mixed Cropping Pattern

The constraints or problems associate with the adoption of mixed cropping pattern are broadly categorized into four categories such as (i) Market/Marketing Constraints, (ii) Infrastructural/ institutional Constraints, (iii) Resource Constraints and (iv)Attitudinal Constraints. There are various factors included in the respective constrains are given below.

Market/Marketing Constraints

- Unorganized market or inaccessible regulated market
- Lack of exportability of vegetable
- Price fluctuation (price risk)
- Lack of selling strategy
- Perishability nature of products (product risk)
- Seasonality of produces
- Limited harvesting Period compared to demand
- Product bulkiness (product & price risk)
- High bargaining strength of Broker and trader compared to farmers
- Lack of access to market information
- Lack of market/marketing infrastructure like e-market, warehouse market, yard etc.
- Lack of proper Standardization and grading
- Lack of Packaging or Pack house
- Lack of avenues and infrastructure for Value addition

Infrastructural/ institutional Constraints

- Lack of storage arrangement (lack of Cold storage/ Room / Chamber)
- Lack of timely availability of adequate and accessible institutional credit facilities
- Lack of favorable government policy for its promotion
- Lack of training or access to extension service
- Lack of cost-effective transportation facilities
- Lack of strong Agricultural Marketing & Processing Cooperatives
- Lack of Access to regulated marketing infrastructure

Resource Constraints

- Lack of required quality and quantity of Land
- Lack of management skill required for vegetables and other non-cereal crops
- Lack of proper technology
- Lack of time to be devoted for these crops
- Higher cost of Inputs compared to that of paddy cultivation
- Vulnerability of climatic condition
- Lack of adequate irrigation facilities
- More Labour intensive in nature
- Lack of adequate availability and accessibility of input supply

Attitudinal Constraints

- Belief on traditional practices
- Lack of awareness

- Risk averting attitude
- Biased to rice (paddy) based cropping pattern
- Rice is the staple food and main source of livelihood

The perceptions farmers across the farm sizes and villages under study have been evaluated by two scale (agreed and disagreed) on the factors or constraints responsible for discouraging them to cultivate more vegetables and non-cereal crops even though it is profitableas represented in table- 1.5.4

It is observed from the table that the irrespective of the size groups and villages the percentage of farms agreed on market/marketing and infrastructural/Institutional constraints discouraged to go for vegetables and other non-cereals crops is found higher compared to that of other two constraints. The percent of farms agreed on market/marketing constraints is found increasing with the increase in farm sizes in all the villages under study as depicted in the table. Further, around 50% of all size groups of farms agreed upon the attitudinal constraints for diversifying their cropping pattern from cereal to non-cereal crops. The resource constraint is disagreed upon by more than 50% farms of all size groups. It can thus be inferred from the analysis that even though the cultivation of vegetables & other non-cereals crops are profitable and availability of resources for it is not a major constraint for many farms, the other constraints such as market/marketing, infrastructural/Institutional and attitudinal constraints are the major impediments towards the cultivation and production of these crops or products in the area under study. Thus, appropriate measures should be made to solve the major problems for enabling the farmers of all size groups in the irrigated as well as non-irrigated area to encourage for crops diversification which will phase more income and employment in agricultural sector.

Conclusion

The important finding of this chapter shows that despite the profitability of cultivating vegetables and other non-cereals crops, the farms of all size groups irrespective of irrigation status of the villages under study prefer to cultivate cereal crop like paddy. This may be due to fewer constraints in production and marketing of paddy relative to that of vegetables and other non-cereals. Further, the marketing efficiency of small farms dealing with vegetables and other non-cereals is found higher compared to other size groups of farms. The market/marketing constraints followed by infrastructural/Institutional and attitudinal constraints are the major impediments for crop diversification in the area under study.

Table-1.5.1 : Status of Vegetable and non-cereal crops (Crop Diversification Statistics across farm sizes)

Villages / Farms	%farms under Veg& other crops	% of Area under Veg & other crops	% difference of Net Income	% difference of Cost	No of farms under Channel-I	No of farms under Channel-II
V-I						
Small	21.69	3.75	164.46	54.48	83.33	16.67
Medium	67.74	6.81	169.02	54.49	38.10	61.90
Large	100.00	6.86	159.24	53.08	25.00	75.00
All	38.52	5.39	165.98	46.14	53.19	46.81
V-II						
Small	29.00	6.56	165.68	45.75	75.86	24.14
Medium	61.11	6.22	179.57	51.62	27.27	72.73
Large	100.00	7.78	167.41	44.47	25.00	75.00
All	36.07	6.62	169.83	46.95	59.09	40.91
V-III						
Small	19.01	7.69	187.78	36.90	82.61	17.39
Medium	39.39	6.76	165.36	74.11	30.77	69.23
Large	100.00	9.09	192.35	58.13	50.00	50.00

All	24.36	7.37	177.88	52.70	63.16	36.84
ALL-V						
Small	23.03	5.66	266.17	47.11	80.00	20.00
Medium	54.88	6.67	308.58	60.25	33.33	66.67
Large	100.00	7.28	258.99	52.21	28.57	71.43
All	32.25	6.20	281.49	53.74	58.14	41.86

Table-1.5.1(a): ANOVA (for Cost Difference)

Source of Variation	SS	df	MS	F	P-value	F crit
Rows (across Farm sizes)	5.08E+08	8	63514240	4.916075	0.018535	3.438101
Columns	1.15E+08	1	1.15E+08	8.904103	0.017494	5.317655
Error	1.03E+08	8	12919704			
Total	7.27E+08	17				

Table-1.5.1(b): ANOVA (for Net Income difference)

Source of Variation	SS	df	MS	F	P-value	F crit
Rows (across Farm sizes)	1.42E+08	8	17771191	5.729431	0.011702	3.438101
Columns	7.24E+08	1	7.24E+08	233.4577	3.34E-07	5.317655
Error	24813898	8	3101737			
Total	8.91E+08	17				

Table- 1.5.2: Producers Share & Marketing Efficiency from Existing Marketing Channels (for Vegetables & Non -cereal crops)

	Customers (Channel-I)		Traders (Channel-II)	
Villages/ Farms	PS	ME	PS	ME
V-I				
Small	90.30	337.00	80.40	80.30
Medium	90.10	334.00	84.20	98.00
Large	89.29	232.33	84.30	101.66
All	89.90	301.11	82.97	93.32
V-II				
Small	90.73	220.80	77.84	88.40
Medium	89.60	186.20	79.40	101.30
Large	88.30	169.30	85.10	117.68
All	89.54	192.10	80.78	102.46
V-III				
Small	93.86	232.33	77.54	98.60
Medium	90.45	212.70	78.80	99.00
Large	88.86	201.50	82.20	112.67
All	91.06	215.51	79.51	103.42
ALL-V				
Small	274.89	790.13	235.78	267.30
Medium	270.15	732.90	242.40	298.30
Large	266.45	603.13	251.60	332.01
All	270.50	708.72	243.26	299.20

Table- 1.5.3 Linear Programming problem (LPP) for Profit optimization

LPP	V-I	V-II
Objective function	Max $Z=8596.21x_1 + 22864.41x_2$	Max $Z=8028.44x_1+21663.05x_2$
Resource Constraints (Subject to)		
Bullock & Machine Labour	1267.76 X_1 +1849.84 $X_2 \leq$ 1668897.26	1198.32 X_1 +1741.33 $X_2 \leq$ 1022332.44

Human Labour	839.05 X_1 +1477.18 $X_2 \leq$ 1121172.50	909.37 X_1 + 1265.97 $X_2 \leq$772957.82
Seeds	783.23 X_1+1537.75 $X_2 \leq$ 1057037.00	591.13 X_1 + 1166.39 $X_2 \leq$520148.43
Fertilizer	1294.07 X_1+1810.53 $X_2 \leq$ 1698422.00	1268.55 X_1 +1765.70 $X_2 \leq$1078249.00
Irrigation	139.37 X_1+209.53 $X_2 \leq$ 183872.40	186.85 X_1 + 378.75 $X_2 \leq$164933.72
Plant protection	1114.51 X_1+1114.51 $X_2 \leq$ 976409.00	940.39 X_1 + 1293.12 $X_2 \leq$798501.40
Marketing cost	62.93 X_1+207.82 $X_2 \leq$ 90476.56	110.40 X_1 + 198.44 $X_2 \leq$96140.07
Interest	451.95 X_1+492.31 $X_2 \leq$ 583951.90	476.81 X_1 + 539.98 $X_2 \leq$398913.59
Land	X_1 +$X_2 \leq$1286.20	X_1 +$X_2 \leq$ 829.80
Non-Negativity constraint	X_1, $X_2 \geq 0$	X_1, $X_2 \geq 0$

LPP	V-III	ALL-V
Objective function	Max Z=5278.51x_1+14668.00x_2	Max Z=7701.18x_1+29378.93x_2
Resource Constraints (Subject to)		
Bullock & Machine Labour	1325.71 X1 +1871.90 X2≤813844.67	1259.22 X1 +1820.25 X2≤3505074.36
Human Labour	1438.33 X_1 +2567.61 $X_2 \leq$904985.83	990.90 X_1 +1690.89 $X_2 \leq$2799116.16
Seeds	686.15 X_1 + 1380.49 $X_2 \leq$438100.00	703.58 X_1 +1376.20 $X_2 \leq$2015285.43
Fertilizer	1278.74 X_1 +1576.65 $X_2 \leq$775622.50	1282.96 X_1 +1735.37 $X_2 \leq$3552293.50
Irrigation	96.00 X_1 +182.63 $X_2 \leq$60864.00	144.40 X_1 +257.62 $X_2 \leq$409670.12
Plant protection	1586.13 X_1 +2267.20 $X_2 \leq$974842.50	985.19 X_1 +1471.17 $X_2 \leq$2749752.90
Marketing cost	91.71 X_1 +177.55 $X_2 \leq$58272.37	83.66 X_1 +196.93 $X_2 \leq$244889.00
Interest	486.70 X_1 + 648.83 $X_2 \leq$297204.69	467.09 X_1 +548.36 $X_2 \leq$1280070.18
Land	X_1 +$X_2 \leq$ 597.00	X_1 +$X_2 \leq$ 2713.00
Non-Negativity constraint	X_1, $X_2 \geq 0$	X_1, $X_2 \geq 0$

Table- 1.5.3 (a) Prospect (Profitability) of mixed cropping pattern

Village	Optimal				Actual			% increase in optimal profit over actual
	Z	X1	X2	Slack (S2)	Z	X1	X2	
V-I	19397150	0	848.356	437.844	11995292	1220.4	65.8	61.71
V-II	12588859	0	581.121	248.679	7364183	778.3	51.5	70.95
V-III	5942234	0	405.116	191.884	3536237	556	41	68.04
ALL-V	53469699	0	1820.002	892.998	24324885	2554.7	158.3	119.81

Table-1.5.4: Farmers' Perceptions on factors discouraging cultivation vegetable/ non-cereal crops (in percentage)

	Market/Marketing Constraints		Infrastructural / Institutional Constraints		Resource Constraints		Attitudinal Constraints	
V-I	Agreed	Disagreed	Agreed	Disagreed	Agreed	Disagreed	Agreed	Disagreed
Small	60.24	39.76	66.27	33.73	36.14	63.86	50.60	49.40
Medium	64.52	35.48	70.97	29.03	38.71	61.29	48.39	51.61
Large	75.00	25.00	62.50	37.50	37.50	62.50	50.00	50.00
All	65.57	34.43	59.02	40.98	32.79	67.21	28.69	71.31
V-II								
Small	60.00	40.00	65.00	35.00	50.00	50.00	45.00	55.00
Medium	66.67	33.33	55.56	44.44	38.89	61.11	50.00	50.00
Large	75.00	25.00	50.00	50.00	25.00	75.00	50.00	50.00
All	61.48	38.52	65.57	34.43	24.59	75.41	49.18	50.82
V-III								
Small	68.33	31.67	58.33	41.67	35.00	65.00	46.67	53.33
Medium	70.59	29.41	52.94	47.06	35.29	64.71	44.12	55.88
Large	100.00	0.00	50.00	50.00	100.00	0.00	100.00	0.00
All	64.74	35.26	51.28	48.72	42.31	57.69	61.54	38.46
ALL-V								
Small	63.37	36.63	62.71	37.29	40.26	59.74	47.19	52.81
Medium	67.47	32.53	60.24	39.76	37.35	62.65	46.99	53.01
Large	78.57	21.43	57.14	42.86	42.86	57.14	57.14	42.86
All	64.00	36.00	58.00	42.00	34.00	66.00	47.75	52.25

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QUALITY ISSUES IN DISTANCE AND OPEN LEARNING EDUCATION SYSTEM IN INDIA

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ABSTRACT

Education is a mechanic that instills knowledge, skills, and attitudes in a person and makes them empowered to take up the responsibilities and face challenges confidently. This article discusses quality issues of the Open and Distance Learning (ODL) system and the most recent efforts of the Indian administrators to maintain this. This study is based upon secondary data and the researcher's on-field experiences. Various Indian government annual reports have been studied to obtain the required data. The researcher's first-hand field experience has also contributed to the analysis and findings. The article indicates that the issue of quality has been the area of concern in the Indian ODL system. The quality issues become more alarming when we see a large number of students are enrolled with this system. The study also finds that Indian administrators are taking steps to maintain quality issues in this system. Quality issues in ODL have been the area of concern for the Indian higher education system. Many students are enrolled with the Indian ODL system and that makes it imperative to maintain and monitor quality issues of this system. Recently, many steps have been taken by the administrators in this direction.

Keywords: *Traditional Education System, Open and Distance Learning System, Quality, Higher Education, Higher Education Institutions*

Introduction

Education is a mechanic that instills knowledge, skills, and attitudes in a person and makes them empowered to take up the responsibilities and face challenges confidently. Education is thus can be treated as an instrument for socio-economic, political, and cultural development. Education also provides people with required skills that increase overall productivity and efficiency of resources. Education further brings out new thinking and insights which can be used to further advancements in the existing phenomenon. Education also empowers individuals and provides them a shield from exploitations and suppressions. Highlighting the importance of education, the Ministry of Education, Government of India states-

"India will have the highest population of young people in the world over the next decade. So, our ability to provide high-quality educational opportunities to them will determine the future of our country." (National Education Policy-2020: 5)

Indian Higher Education Scenario- A Snapshot

According to University Grant Commission (UGC), Gross Enrolment Ratio (GER) in higher education in India is 26.3% for the 18-23 years of age group. GER for the male population is 26.3% and for females, it is 26.4%. It further states that, during the academic session 2018-19, the total student enrolment in all courses and levels in regular and distance education programmes was 373.99 lakhs including 181.90 lakhs women students, constituting 48.64%. The maximum number of students had been enrolled in the state of Uttar Pradesh (64.69 lakhs), followed by Maharashtra (42.30 lakhs), Tamil Nadu (34.14 lakhs) and West Bengal (20.97 lakhs), etc. (Annual Report 2018-19:102). All India Survey of Higher Education (AISHE - Ministry of Education) comments that, of these enrolments, distance enrolment constitutes about 11.1% of the total enrolment in higher education, of which 44.5% are female students (AISHE 2019-20:II)

Table 1 represents the number of schools, colleges, and universities that grown up from 2011-12 to 2018-19. It is seen that there is phenomenal growth in the numbers of these entities.

Table 1: Increase in Number of Recognized Schools, Colleges and Universities Infrastructure

Year	Primary & Upper Primary schools (in lakhs)	Secondary and Sr. Secondary Schools (in lakhs)	Colleges	Universities
2011-12	11.93	2.12	34852	642
2018-19	12.37	2.76	39931	993

Source: Ministry of Finance, Government of India, Economic Survey 2020-21 (p. 329)

Table 2 summarises the total number of universities as on 18.06.2021

Table 2: Total No. of Universities in the country as on 18.06.2021

State Universities	29
Deemed to be Universities	25
Central Universities	4
Private Universities	80
Total	88
Universities under 12(b)	
State Universities	52
Deemed to be Universities	6
Central Universities	4
Private Universities	2
Total	64

Source: https://www.ugc.ac.in/oldpdf/Consolidated%20list%20of%20All%20Universities.pdf (p. 1)

Table 3 contains the growth of universities from 2015-16 to 2019-20. Universities developed during the last 5 years have been recorded here.

As far as the number of colleges is concerned, from 307 affiliating universities, there are 42343 colleges at the end of the financial year 2020 (AISHE 2019-20, p.8). These numbers are calculated only for the affiliated and constituent institutions of central and state public universities. Constituent units of deemed/private universities, off-campus centers, and recognized centers have not been counted as colleges.

Table 3: Number of major universities in last 5 Years

Major University Type	Number of University				
	2015-16	2016-17	2017-18	2018-19	2019-20
State Public University	329	345	351	371	386
State Private University	197	233	262	304	327
Deemed to be University	79	79	80	80	80
Institute of National Importance	75	100	101	127	135
Central University	43	44	45	46	48
Deemed University-Government	32	33	33	34	36

Source: Ministry of Education, Government of India, AISHE 2019-20 (p.41)

Table 4: Enrolment in Universities and its Constituent Units through Regular & Distance mode

Level	Regular Enrolment	Distance Enrolment
Ph.D.	177775	101
M. Phil.	15805	69
Post Graduate	975105	1121446
Under Graduate	2304499	2917847
PG Diploma	48719	88966
Diploma	156098	120060
Certificate	26103	34746
Integrated	147342	3687
Total	3851446	4286922

Source: Ministry of Education, Government of India, AISHE 2019-20 (p.22)

Table 4 shows the number of enrolments in the Traditional Education System (TES) and Open and Distance Learning (ODL) system. The ODL system is also contributing a lot in providing education to needy ones.

Table 5 as taken from Economic survey 2010-21 depicts the trends in social service sector expenditure by the governments. These trends show an increasing pattern.

Table 5: Trends in Social Service Sector Expenditure by General Government (Combined Centre and States)

Item	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20 (RE)	2020-21 (BE)
As percentage to GDP							
Expenditure on Social Services	6.2	6.6	6.8	6.7	6.7	7.5	8.8
of which							
(i) Education	2.8	2.8	2.8	2.8	2.8	3.0	3.5
(ii) Health	1.2	1.3	1.4	1.4	1.4	1.5	1.8
(iii) Others	2.1	2.5	2.6	2.4	2.6	3.0	3.5
As percentage to total expenditure							
Expenditure on Social Services	23.4	24.3	24.4	25.2	25.4	26.1	26.5
of which							
(i) Education	10.8	10.4	10.2	10.7	10.4	10.4	10.4
(ii) Health	4.5	4.7	5.0	5.4	5.3	5.3	5.4
(iii) Others	8.1	9.3	9.2	9.1	9.6	10.3	10.7

Source: Ministry of Finance, Government of India, Economic Survey 2020-21 (p. 327). (Budget Documents of Union and State Governments, Reserve Bank of India)

Note: Expenditure on 'Education' pertains to expenditure on 'Education, Sports, Arts and Culture'.

Overall, Indian education system is witnessing the continuous growth over the years. Both TES and ODL system have been evolving and developing with time.

Open and Distance Education

With advancements in technologies and processes, the education sector has also seen various developments. These developments are happening at all places from instructors to learners and from resource materials to infrastructure. Such use of technology was specifically visible and augmented during the pandemic period of Covid 19. Among the various mode of learning delivery, distance education has played its role significantly over the past many years. Spread of distance education has been overwhelming in the recent past and that is the reason many universities have added this mode of academic infrastructure and programs in their academic process.

Bordoloi (2018) says that ODL can be raised as an alternative way for creating and making education as accessible as possible and for providing the scope to get skill-based education at a minimum cost. Holmberg (1999) defines distance education as follows:

"Distance education is a concept that covers the learning-teaching activities in the cognitive and/or psycho-motor and affective domains of an individual learner and a supporting organization. It is characterized by non-contiguous communication and can be carried out anywhere and at any time, which makes it attractive to adults with professional and social commitments" (p. 168).

ODL education has important dimensions like – the learner is physically separated from the teacher (Rumble, 1986), learning experience with intermittent guidance (Holmberg, 1986), and a two-way structured form of distance education which is distinct from the traditional form of classroom instruction (Keegan, 1988).

Gunawardena and McIsaac (2004) include all these dimensions in their definition.

Saykili (2018) concludes thus:

"Distance education is a form of education which brings together the physically-distant learner(s) and the facilitator(s) of the learning activity around planned and structured learning experiences via various two or multi-way mediated media channels that allow interactions between/among learners, facilitators as well as between learners and educational resources" (p.5).

Ministry of Education report highlights the importance of distance education and says that:

"Distance education has become a useful mode of obtaining degrees for a large number of students who are staying in far off and remote areas and for whom accessing universities on regular basis is still a dream" (AISHE 2019-20: 8).

Indian Open and Distance Education: A snapshot

There are 1 central Open University, 14 state open universities, and 1 state private Open University operating in India. Besides this, there are 110 dual-mode universities, which offer education through both regular and distance modes in India. Table 6 summarizes the structure of open and distance education operating in India with the help of different universities. Out of these 110 dual-mode universities, 13 are located in Tamil Nadu..

Table 6: State wise Dual Mode universities (No. in each state)

Tamil Nadu	13
Andhra Pradesh, Karnataka	8
Telangana, West Bengal	7
Maharashtra, Madhya Pradesh, Uttar Pradesh	6
Assam, Delhi, Kerala, Rajasthan	5
Haryana	4
Bihar, Punjab, Sikkim, Uttarakhand	3
J&K, Odhisa, Chhattisgarh	2
Arunachal Pradesh, Chandigarh, Gujarat, Himachal Pradesh, Nagaland, Puducherry, Tripura	1

Source: Ministry of Education, Government of India, AISHE 2019-20 (p. 8)

Presenting the enrolment scenario in distance education, AISHE states that distance enrolments constitute 11.1% of the total enrolment in higher education, of which 44.5% are female students. (AISHE 2019-20, p.21)

Table 7 has been taken from the AISHE report depicting enrolment in important programmes at UG level in distance mode of education.

Table 7: Enrolment in important Programmes at Under Graduate Level in Distance mode of Education

Programme	2015-16	2016-17	2017-18	2018-19	2019-20
B.A.-Bachelor of Arts	1672872	1709598	1651499	1790878	1890920
B.Sc.-Bachelor of Science	201265	243606	222128	219350	251489
B.Com.-Bachelor of Commerce	453274	507441	464807	458889	496244
M.A.-Master of Arts	652216	708599	677641	613161	656154
M.B.A.- Master of Business Administration	132929	127275	156911	125980	155337
M.Com.-Master of Commerce	149447	171101	171093	128801	144284
M.Sc.-Master of Science	96367	113938	105507	74103	109459

Source: Ministry of Education, Government of India,, AISHE 2019-20, (p. 52)

In general, there is an increase in enrolment through distance mode of education at various levels during 2019-2020 compared to the previous year. Distance Mode is mainly conducted by universities and the majority of the students (52.7%) enrolled in Universities

and their constituent units are studying under distance mode. At Post Graduate, Under Graduate, PG Diploma, Diploma, Certificate level share of distance enrolment in university is 13.8%, 35.9%, 1.1%, 1.5%, and 0.4% respectively. (AISHE 2019-20, p. 22)

Male and female enrolments in important courses have been summarised in Table 8. It is seen that at all levels (programme), share of female students is higher than male except under graduate, PG diploma and certificate courses.

Table 8: Level-wise Distribution of Distance Enrolment

Level	Distance Education		
	Male	Female	Total
Ph.D.	44	57	101
M. Phil.	33	36	69
Post Graduate	504711	616735	1121446
Under Graduate	1745438	1172409	2917847
PG Diploma	50863	38103	88966
Diploma	58916	61144	120060
Certificate	18795	15951	34746
Integrated	774	2913	3687
Total	2379574	1907348	4286922

Source: Ministry of Education, Government of India, AISHE 2019-20, (p. 22)

AISHE report showcases the performance of Indian states and says that:

"6 States are providing education to around 60.5% of the students. These States are Delhi 15.9%, Maharashtra 15.5%, Tamil Nadu 12.5%, Andhra Pradesh 6.2%, Kerala 6% and West Bengal 4.4%". (AISHE 2019-20, p.22)

Quality Issues in ODL system

The traditional education system is generally enclosed within a boundary where it is somewhat easy to evaluate quality aspects of learning delivery. There is a face-to-face interaction between teachers and learners and that helps the teacher to keep track of the learning progress of their students. Well-defined criteria are also there which enables administrators and management of traditional education providers to assess the quality of their system. On the other hand, the nature of ODL predicted on the separation in time and space of the teacher and the learner, demands that its quality-assurance system have a different focus. (Hopes, 2006. p. 131). He also argues that,

"whereas early ODL initiatives were motivated by a desire to expand access to education in the public good, an increasing number of emerging providers today are motivated by a desire for profit or at least an expansion of market share made possible by new technologies (p. 133)".

Different researchers have raised the issue of learners' engagement and drop-out rates in the ODL system (Grau-Valldosera & Minguillón, 2014; Fozdar, Kumar, & Kannan, 2006; Yates et al., 2014). Yates et al. (2014) further identify "enablers" and barriers to learner engagement in distance education courses through distance education staff perspectives and concluded that student-focused approaches and high-quality course and resource design were among the enablers. The study underscored the importance of catering to individual learner needs and providing social support to increase learner engagement. Although degree students overall positively evaluate their distance learning experiences; they face some learning challenges especially in regard to effective teaching practices and communication patterns (Markova et al., 2017).

Following real-life cases aptly highlight the quality issues prevailing in the Indian ODL system. These cases are self-explanatory

CASE STUDY 1: Transition from ODL to TES

One researcher of this study was a member of the team which conducted counseling sessions for the candidates who qualified entrance test of Uttar Pradesh State Entrance Examination-2017 (India) to be eligible for getting admission in MBA and MCA courses in different institutes affiliated to this university.

Total 1875 candidates reported at the counseling center, and only 13 of them were found to have obtained their qualifying degrees from distance learning mode. Although the total number of candidates who appeared in the entrance examination and belonged to the ODL System was not known to the researchers, yet it seems obvious that only a few such candidates could clear the entrance examination. One must not forget that undergraduate courses hold a very important place in the Indian education system. Successful completion of these courses makes students eligible to write different competitive exams. These courses are also important as they are a stepping stone to enter into the job market after having gained some skills in a particular field. Thus the analysis of the number of successful candidates (belonging to ODL) in competitive examinations holds merit as this will say about the learning abilities and motivation of the students

CASE STUDY 2: Students of ODL and Discrimination

A sense of discrimination has been found to prevail when students of OES appear for interviews and compete with their TES counterparts to fetch new jobs. The researcher had been a member of interview boards and found such stereotype images about the degrees obtained from the ODL system. It is seen that the degrees of TES have more acceptability during the selection process of a new job position. But, this discriminatory attitude gets a little blurred during the evaluation process to promote a candidate working within the organization. During job promotions, employers generally treat degrees obtained from any mode of the education system at the same level. They judge individuals mainly on the basis of their skills and knowledge rather than on the basis of degrees obtained.

Though, Guri-Rosenblit (1999) in a study advocates that the boundaries between distance and campus universities are in a continuous process of blurring and convergence, and it is likely that the future interrelations between them will be marked both by growing competition and growing cooperation, yet a feeling of discrimination still prevails in the Indian job market.

Maintaining Quality Standards: efforts of Indian regulators

To maintain the quality aspects in the ODL system, UGC notified the University Grants Commission (Open and Distance Learning) Regulations, 2017 in the Official Gazette on 23.06.2017. Subsequently, the First, Second, Third, and Fourth amendments in the UGC (Open and Distance Learning) Regulations, 2017 were notified in the Official Gazette on 11.10.2017, 06.02.2018, 06.09.2018, and 06.06.2019 respectively. These Regulations lay down the minimum standards of instruction for the grant of degree at the undergraduate and post-graduate levels, through Open and Distance Learning mode. (https://deb.ugc.ac.in/DEB/Regulations).

Annual report 2018-19 of UGC highlights various courses of actions taken by the government and the regulatory body to implement quality standards in the ODL system: Some of the actions taken and proposed are:

- Qualified counselor to number of students shall be 1:100 (p. 70)
- Universities running ODL programmes have to give an undertaking to the effect that it will attain a NAAC score of 3.26 on a 4-point scale by the end of academic session 2019-20, failing which, the Commission shall not accord any approval to the Open & Distance Learning Programmes of the HEI with some exception (p. 70)
- Proposal to keep IGNOU outside the ambit of UGC (ODL) Regulations, 2017 (p. 74-75)
- MBA/MCA/B.Ed/M.Ed/B.Ed (Special Education)/M.Ed (Special Education)/Hotel Management Programmes in ODL mode shall not be accorded recognition without prior approval of the respective Regulatory Authority; valid for the year 2018-19 & onwards (p. 69)
- No University; institution, Deemed to be a University and College shall conduct M.Phil and Ph.D. Programmes through distance education mode. Part time Ph.D will be allowed provided all the conditions mentioned in the extant Ph.D Regulations are met (p. 94)

Conclusions

Developed with different visions, expectations, and aspirations, the ODL system does not find much pressure from its stakeholders to adhere to the quality norms. Students are more interested in the award of degree within the stipulated time and teachers are happily fulfilling the minimum criteria of developing the resource material and providing guidance if asked for. Universities on the other hand have a larger interest in admitting students as maximum as possible. All these characteristics lead to quality taking a backstage in the overall governance of the ODL system. The problem of quality is also accentuated as students of diverse capabilities and cultures join the course making it difficult to implement standardized quality norms.

In recent times, the Indian education system has started recognizing the worth of degrees procured under the ODL system by giving them the eligibility to write various competitive examinations. This trend is also evident in the various advertisements exhibited and published by institutions/universities in India offering courses through distance learning mode where they have highlighted and equated their degrees to the ones offered by TES to the same status for undertaking the competitive examination. Though meant for different purposes and different students, ODL has to identify ways by which degrees obtained from it may also be considered to be at par in quality and standard when compared to TES in the public domain (Case Study 2). The value of these degrees can also be enhanced by the enforcement of stringent quality norms in the admission, examination, and evaluation process of the ODL (Case Study 1).

Greater involvement of students in the academic process under ODL should be encouraged to develop a positive attitude and better study habits. The role and intervention of tutors along with peer interactions are of paramount importance (Kawachi, 2006) in developing motivation among students to learn. Hartnett et al. (2010) suggest that the differing circumstances of students need to be accommodated to foster autonomous types of motivation among distance learners. All these factors need to be addressed by the planners to improve the academic motivation among students of the ODL system

Furthermore, administrators and planners should work towards the ways and strategies through which more values can be attached to the degrees obtained from the ODL system. Efforts can also be made to formulate strategies to augment extrinsic motivation in distance learners. Morgan (Srivastava et al., 2020) also argues strongly in favor of attempts to promote deep learning, acknowledging that distance learners get little support in study skills, that there is much emphasis on written assessment for which students are ill-prepared, and considerable restrictions are placed upon learners' interactions due to limitations of space and time. Thus, if we are able to increase the perceived expectations of the students of ODL from their system, there is a possibility that these students will feel more motivated and develop better study habits.

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MOBILE PAYMENT APPLICATIONS ADAPTABILITY AMONGST STREET VENDORS DURING POST COVID-19 PANDEMIC: A STUDY IN THE SILCHAR CITY OF ASSAM

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ABSTRACT

When COVID 19 pandemic attacked India and started spreading widely from one state to another, the Government of India under Prime Minister Narendra Modi announced a nationwide lock-down in five phases to curb the transmission. As the lock-down happened, all day-to-day activities came to a halt and a digital metamorphosis came into existence. Physical offices were converted to Work from Home designs, physical classes were switched to online classes and all cash transactions were converted into cashless transactions. The banks started promoting their respective Apps and requested their respective customers to perform all the requisite transactions via the app, including NEFT, RTGS, Cash Transfers, etc. Digital payment platforms like PhonePe, Google Pay, Paytm etc played a significant role in making the cash transfer seamless and comfortable. The local kirana stores, pharmacies, supermart, retail outlets, etc. started accepting payments through the digital payment platform, making cashless transactions easier and comfortable for the general public. This new trend of transferring cash via digital payment platform started gaining popularity and rigorous promotions like offering cashback, scratch cards (users can win coupon code or cashback), reward points etc. After the unlock phases started, this Digital Revolution acted as an ignition for all small shops, street vendors, bike and car mechanic shops etc. by adopting digital payment platforms. This paper focuses on the adaptability of such payments by street vendors or hawkers. It also discusses the problems faced by the hawkers at the initial stages, the benefits of going digital, perks offered by the digital payment platforms, their feedback after adopting and managing expenses. The reasons for the inadaptability of digital payment platforms by some street vendors and their willingness to shift to digital payment platforms is also emphasized. Thus, the paper aims to study the adaptability of digital payment platforms by street vendors and their outcomes.

Keywords: *COVID-19, digital payment platform, street vendors, adaptability and digital revolution*

Introduction

In December 2019, COVID-19 (originated from Wuhan, China) started spreading worldwide. The main transmission paths were through cough droplets, sneeze droplets, or speech droplets that entered the non-affected person from the affected person via the respiratory outlets. Studies have shown that the virus can spread via any surface which is contaminated by an affected person and if the non-affected person touches it and touches his/her eyes, mouth, or nose in return. Thus, maintaining a social distance of 1 meter, wearing a medically approved N95 mask and frequent washing of hands, and sanitizing hands or any doubtful surfaces is always recommended as mentioned that COVID-19 spreads from contaminated surfaces. Another contaminated joint surface is currency notes which we use for our daily expenses. During the ongoing pandemic time, we, the general public, are in constant fear of getting affected by the virus via any means and the ordinary means of transmission was through currency if used by an affected person. Henceforth, maximum ordinary people shifted to cashless transactions and started adopting mobile payment applications for their daily transactions. Soon, the shop owners, kirana stores, medical shops, street vendors, autowalas etc., also shifted to online digital wallet platforms like Google Pay, PhonePe, PayTM etc. The delivery app services like Zomato, Swiggy also integrated digital wallets in their app to ease customers' transaction and make it hassle-free. Before the pandemic, mobile payment applications existed but were only used by few public and shop owners but its utmost importance came to light during the ongoing pandemic.

In any mobile payment application, a home page consists of various options like a payment zone where all the necessary transactions are made, a window for mobile recharges, a window for electricity bill payment, and a window for DTH recharges etc. During the

transactions in the payment zone, there is always a sender and receiver wherein the sender is the general public and receivers can be local shop owners, street vendors etc. The sender scans the barcode as provided by the receiver and then the sender inputs the requisite amount in the app and initiates the transaction. The transaction gets successful and the amount is paid to the receiver only when the sender inputs his/her UPI PIN which is required for any transaction made digitally. If the barcode is not available with the receiver, the sender can initiate the transaction via entering the UPI ID of the receiver and completing the transaction as mentioned above.

Though the app provides multiple languages (all the officially spoken languages in India) features and expands its reachability to every layman citizen of the country, the steps involved in any transaction made may seem easy to an educated person but may seem complicated to a rural person, street vendor, panwalas, autowalas etc. This study is carried out to understand such other problems and examine the adaptability of mobile payment applications among hawkers who have only primary education.

This research focuses on the adaptability of mobile payment applications amongst street vendors during the post COVID-19 pandemic in the region of Silchar, Assam. This paper tries to investigate the adaptability of mobile payment applications among street vendors and find out the users and non-users among them. It also seeks to uncover reasons as to why some street vendors are yet to shift to digital wallet platforms and their lack of adaptability.

Table No. 1: Popular Digital Wallets in India

OVERVIEW OF POPULAR DIGITAL WALLETS IN INDIA					
Digital Wallet	Industry	Company	Users across India	Services Available	Rewards after Transaction (Coupons)
Google Pay	Private	Google	70 million users	Bank Transfer, Telecom Recharge, Bill payment for DTH/Cable TV, Electricity, Postpaid Mobile, Google Pay, Broadband/Landline, LPG Gas Cylinder Booking and Payment, Education, FASTag recharge, Piped Gas, Water, Insurance, Loan EMI payment, Municipal tax/service, Housing Society, Hospital, Subscription fee	Yes
PhonePe	Private	Walmart backed Flipkart	250 million users	Bank Transfer, Telecom Recharge, FASTag Recharge, DTH, Cable TV, Book a Cylinder, Piped Gas, Water, Electricity, Postpaid, Broadband, Landline, Education Fees, Donations, Donate meals, Child Welfare, Donate Oxygen, Metro Recharge, Brand Vouchers, Loan Repayment, LIC/Insurance, Municipal Tax	Yes
Paytm	Private	One97 Communications	150 million users	Bank Transfer, Paytm Payments Bank, Paytm Mall, Book Tickets: Flights, Bus, Trains, Movies. Telecom Recharge, Payment: DTH, Electricity, Book Gas Cylinder, Rent Payment, Credit Card Bill, Donate Oxygen, Pay Loan, LIC/Insurance, FASTag Recharge, Landline/Broadband, Piped Gas, Water, Google Play Recharge, Apartments, Education, Challan, Toll, Cable TV, Co-living spaces, Data Card, Depository Services, Donations, IOCL Rewards, Municipal Tax, Subscriptions	Yes

Amazon Pay	Private	Amazon	40 million users	Bank Transfer, Mobile Recharge,DTH Recharge, Google Play Recharge, FASTag Recharge, Metro Recharge. Pay-Bills: Electricity,Mobile Postpaid, Credit Card Bill, Broadband , Landline, Gas Cylinder, Piped Gas, Subscriptions, Cable TV, Water, Municipal Tax. Insure and Invest: Car Insurance, Bike Insurance, Insurance Premium, Gold Vault. Donate: Milaap, Akshaya Patra, Goonj, HelpAge India, Habitat, United Way, PM CARES, Odisha CMRF. Book Tickets: Flights, Bus, Train, Movies, Gift Cards. Partner Apps: Swiggy, Pharmeasy, Dominos, Licious, 1mg, Urban Company	Yes
Source1: https://techcrunch.com/2021/03/11/google-pay-paves-way-to-tap-pay-users-data-in-india/ (Retrieved on 23/05/2021)					
Source2: https://www.news18.com/news/tech/phonepe-clocks-250-million-users-in-india-and-clocks-835-million-upi-transactions-in-october-3032453.html (Retrieved on 23/05/2021)					
Source3: https://www.firstpost.com/tech/news-analysis/upi-registers-2-29-billion-transaction-in-feb-2021-paytm-becomes-top-payment-app-with-1-2-billion-monthly-transactions-9361461.html#:~:text=Paytm%20has%20the%20highest%20market,150%20million%20monthly%20active%20users (Retrieved on 23/05/2021).					
Source4: https://timesofindia.indiatimes.com/business/india-business/registered-5-million-merchants-via-amazon-pay-focussed-on-helping-smbs-embrace-e-payments-amazon/articleshow/82117603.cms (Retrieved on 23/05/2021)					

Need of the Study

India was is one of the most affected countries wherein people, irrespective of their ages are mainly affected. Currently, India is under the 2nd wave of COVID-19 and many deaths are reported on a daily basis. This disease can spread through contacts and any contaminated surfaces. As the currency is considered one of the most contaminated surfaces, many people have started sanitizing the money while using it. Others started using gloves for their daily transactions. At this stage, the need for mobile payment applications came into throttle and slowly it started gaining momentum and popularity.

While India is under Digital Transformation and starting from maximum common people like autowalas, panwalas, and small shops to medium and to big shops owners, everyone is adopting the digital wallet platform as their medium for daily transactions. This Digital transformation took a full swing during the pandemic and almost all residents of any state started adopting the same. But in Silchar, Assam, the case is slightly different as ordinary people have started embracing this digital transformation. Still, most of the shop owners and street vendors are yet to adopt it.

This research explores the adaptability of the two parties' i.e. users and non-users of the digital wallet. It is conducted to review the users and non-users of different age groups (among the street vendors) of the digital wallet platform. It also focuses on the benefits provided to the users and also the problem they are facing. It gives an overview of their preferences of specific digital wallets

Thus, this research is focused on understanding the lack of adaptability of the digital wallet platform among the street vendors.

Conceptual Framework and Review

E-wallets considered a hi-tech platform for money transactions and payments have been perceived as comfortable and reliable, indicating high acceptance levels. However, the e-wallet service providers need to strategize targeting students and the youth and other age groups (**Varsha & Thulasiram, 2016**). M-wallets are considered as noteworthy contributor increasing digital and electronic payments. Over time when mobile payments will represent a substantial part of retail sales,

there should be integration between different wallets. As most respondents are concerned about the security of mobile payments, the security system should be strengthening (**Sardar, 2016**). People are using a few services, primarily for recharging the DTH and paying bills, Shopping etc. The cognizance and applied usability of the e-wallet can be increased by adding more valuable features in it (**Kalyani, 2016**).

Customers use mobile wallets because of handiness, one-touch system, and time-saving technology. Risk, Challenges and factors that influenced consumers in the adoption of digital wallet platforms were also discussed in this paper (**Rathore, 2016**). Reliance and perceived ease of usage, playing a vital part in enabling embracing of digital payment solutions, motivate mobile wallet adoption (**Padashetty & Kishore, 2013**). In addition, the safety and security of payment in a mobile wallet comple customers to shift from the traditional methods (**Rai, Ashok, Chakraborty, Arolker, & Gajera, 2012**).

The consciousness and utilization of e-banking tools in the semi-rural area were identified. Various demographic factors like gender, income, education, occupation, of bank account holders have been identified as pertinent factors affecting awareness about E-Banking. It was established that the overall satisfaction towards E-Banking depended on such demographic factors (**Neha, 2015**). Preceding works on mobile payments have examined the various aspects that have a bearing on mobile payment services markets, and have proposed guidelines for forthcoming investigation. Although the consumer perspective of mobile payments and technical security and trust are covered by contemporary research, it is an emerging field. The influences of social and cultural issues on mobile payments and contrasts between mobile payment, e payments and traditional payments services appear to be unexplored issues. The result of the study was the mobile payment services need to grow from a limited proprietary solution and to necessity to build mindfulness for mobile payment (**Dahlberg, Tomi, Niina, Jan, & Agnieszka, 2017**).

Studies have been conducted on various issues faced by Paytm by mobile phone users. The research was categorized based on age, the purpose of usage, frequency of use and average monthly spending on Paytm. The study further elaborated that Paytm is quite convenient owing to a vast network of partners. The paper highlighted the payment gateway issues, suggesting to improve the transaction efficiency as 70% of people faced problems with it. To cater the requirement of maximum customers, the service needs to improvise as indicated by only 5% people respondents to have got help every time they encounter a problem in it (**Tadse & Nannade, 2017**). Digital wallets based on payment support, cashback and rewards were compared. It was found that the BHIM app helps a user to make a transaction without having an internet connection. PhonePe and Paytm provide wallet facilities with many other functions. Google Tez is a secure app to make nearby quick payments (**S., Kumar, & Shafiqueziya, 2019**). The importance of mobile wallets and some factors that positively affected the users in using these wallets were discussed in this paper. Some of these factors are perceived ease of use, compatibility, usefulness etc. It was found that the easy usage of mobile wallets is the most critical factor that affects users' attitudes. So, this determinant must be given due importance to increase the use of a mobile wallet system and its adoption among non-users (**Aydin & Burnaz**). In a study on digital payment modes in India and the customer perception it was found that the adoption of the digital payment system is mainly affected by the education level of the customer. If a person's education is higher, he will know the benefits of this system and its usage. But some other factors like age, gender, annual income do not affect the use of a digital payment system (**Singh, 2017**). The future of this payment system can be secured by using the latest technology like use of radio bar-codes with the help of which radio signals could be sent out to find out the location of the products. Out of all the factors discussed, the main concerning factor was the risk of security, data theft, fraud, etc. that need to be taken care of to increase mobile payment methods' usage (**Bezhovski, 2016**). Demonetization has helped expand the use of digital payment systems as many users have started using digital modes of

making payments instead of using plastic money. Also, the central issue of concern mentioned was security so, more security features need to be added to gain the trust of customers and for the growth of this system (**P. & S., 2019**). In the service sectors namely banking, retail, and hospitality; contactless transactions are getting very popular owing to to ease of transaction, secured profile, and convenience in handling (**Painuly & Rathi, 2016**). Transaction security is considered as one of the solid influencers for adopting the mobile wallet. In addition, earlier studies confirm that the user's family, friends, peers, and social groups significantly influence the user's intention to adapt to the mobile wallet (**A., Kumar, S., & Weber, 2017**). It has been indicated that security and privacy are a significant concern of consumers while using m-banking. Banks can reduce this by introducing and arranging different awareness programs (Shankar).

Though mobile banking is similar to Mobile wallet in its functionality, it is clarified that the Indian mobile wallet users are quite sure about the security of their transactions and privacy of data and also indicated that customers are excited to have more innovative solutions and use the wallets for more number of transactions in future (Mittal & Kumar).

Social influence refers to the degree to which opinions of family, relatives, and friends affect the decision of the consumer to use a product or service (**Riquelme & Rios, 2010**). Social influence is a significant factor in predicting behavioral intentions in respect of mobile wallet adoption. They added that social influence is perceived to have more credibility than any other source of information as it directly motivates users to adapt to the technology (**Madan & Yadav, 2016**).

It is explained that the importance of security aspects in accepting mobile payments among its users (**Saxena & Tripathi, 2021**). Mobile wallets will soon be an independent omnipresent ecosystem. They will be used to retain the customers by the marketers and digital businesses. Experts do not shy away from saying that they will become a unique marketing channel. They will soon be significant contributors to an all-in-one shopping experience (**Shukla, 2016**). In a study using unified theory of acceptance and use of technology (UTAUT) model by Shin, 2009 confirms the classical role of technology acceptance factors like supposed utility and easiness of use as key precursors to users' outlook.

It has been found that the price-related components, like cost benefits and discount benefits are considered less important although the respondents place more importance to security and privacy while choosing e-wallet. (**Thulsiram & R., 2016**). Indian users will use mobile wallets when they are convinced that many relative advantages compare to conventional leather wallets. Indian customers would decide on choosing the e-wallets only when they are completely contented with the security and privacy facets.

They will use mobile when they are confident that there will be no loss or security anxiety for using a mobile wallet. Intention to use the mobile wallet would grow if the customer believes in their service provider and the technology and thereby develops confidence in the system (**Sinha, 2016**).

A model was developed to examine the user's intention to use mobile payment based on TAM and MPTAM (Mobile Payments Technology Acceptance Model). The study investigated the moderator effect of the user's age between the subjective rules and the facility of use. The survey has been conducted among the 2012 national panel of internet users (physical & virtual). The data analysis shows that an internet user's behavior is influenced by their intention to use new tools. The study findings show that most of the younger mobile payment users are satisfied and accepted the mobile technology tools compared to older mobile users. This study has indicated that older consumers are a stronger relationship between facility to use and subjective rules. So the mobile technology provider should give more attention to older consumers to create knowledge about the usability of new tools (**Liebana-Cabanillas, Martinez-Fiestas, Rejon-Guardia, & Munoz-Leiva, 2015**).

In a study by **Ghosh & Srivastava, 2019**, a pre and post-digitization effects on cash and non-cash transactions was done. They found that three factors, namely, promotional offers, convenience facilities, and technical barriers,

impact digital payment systems in Indian scenario were studied.

The influence of trust and information sharing the intention of the customers to make payments using mobile wallets were studied using the Technology Adoption Model (**Eappen, 2019). Akhila Pai, H (2018**) in his survey on awareness, usage, and the possibility of using smartphones, found that improved distribution of internet connectivity and smartphones has directed to an increase in digital wallet users.

The assessment of the digital payments market and its various segments was done. Behavioral aspects of these segments are studied to provide insights on business opportunities for service providers (**Bhatt, 2019**). The practice of using digital wallet amongst youth in Punjab was linked with social inspiration and practicality, controllability and security, and the need for performance. Superior pricing, difficulty in understanding, an absence of critical mass, and apparent risks were found to be the barriers towards adopting digital payment systems (**Taheam, Sharma, & Goswami, 2016**).

Research Gap

As the digitization era is prevailing all over India, adopting the digital means of payment starting from e-banking and e-payment to Digital Wallet Platform payments has become a need of the hour. However, many street vendors in the Silchar ecosystem are yet to adopt digital wallet platform payments due to various reasons like insecurity regarding transactions, lack of knowledge, inability to buy smartphones, etc. And those street vendors who are using mobile payment applications are doing transactions hassle-free. Still, irregularities like one day they are using the digital wallet platform and other days won't. It is seen that both users and non-users are facing one or the other issues like the former has problems regarding payment failures and while the latter finds it complex to use.

To understand the underlying problems faced and the parties' willingness, i.e. the users and non-users regarding the online digital platform, a research study needs to be accomplished because such type of research is not yet done in the city of Silchar. Thus, this research was carried out with the primary goal to understand the behavioural aspect of users and nonusers towards mobile payment applications. Also, this research study will emphasize on the non-users view of shifting to digital wallet platforms soon.

Objectives

The general objectives of the research study are as follows:

- To understand the problems faced by street vendors in adopting online payment systems.
- To find out whether they are willing to shift to the digital wallet platform in the near future or not.

Research Questions

For Objective 1:

1. What are the different types of business done by street vendors in Silchar?
2. When have they adopted mobile payment applications?
3. While using these mobile payment applications, what are the issues they have encountered?

For Objective 2:

1. Why some of the street vendors are not using any mobile payment applications?
2. What are the reasons behind the rigidness towards not adopting digital transformation?
3. Are they willing to shift to mobile payment applications in the near future?

Research Methods

The responses were collected in Google Form, and the form was filled up on their behalf by questioning them accordingly. However, as Lockdown started from noon, it caused a constraint in collecting responses from many street vendors. Thus on a duration of 3 days, a sample size of 20 responses were collected (assuming that the total number of street vendors in Silchar is <=500). The 20 responses were collected based on the Quota Sampling. Quota Sampling is based on pre-set standards or specific attributes. Herein, the particular attribute considered is the characteristic of the Street Vendors. This type of sampling portrays that the sample chosen will have the same qualities as that of others. These responses

were converted into an excel file such that further analysis was done using R Studio. The Likert Scale ranging from 1 to 5 has been used and which represents (1) Strongly disagree; (2) Disagree; (3) Neutral; (4) Agree; (5) Strongly agree.

Scope of the Study

In today's technologically advanced era, electronic devices like smartphones, laptops, tabs, etc. have become an integral part of our daily lives. Likewise, mobile payment applications have slowly started being a vital part of our daily needs regarding transactions. This study will focus on the extent of the reach of mobile payment applications among the street vendors in the Silchar city of Assam. The scope of this research study is also to spread awareness among the street vendors and provide them a gateway to shift to mobile payment applications such that they can also contribute to the digital revolution of India.
Due to the ongoing 2nd wave of COVID-19 pandemic, all states of India, including Assam, are under lock-down and accordingly caused a constraint in questioning and interviewing many street vendors in the periphery of Silchar. Also some street vendors declined the offer to be a part of the interview and as result, a total of 20 street vendors were approached and their inputs were recorded.

Analysis

The descriptive statistics for the responses obtained using R Studio are as follows:
Name of the Respondent
Length: 20
Class: character
Mode: character

Gender of the respondent
Length: 20
Class: character
Mode: character

Age of the respondent
Length: 20
Class: character
Mode: character

Place of business of the respondent
Length: 20
Class: character
Mode: character

Users of digital wallet platform (online payment)
Length: 20
Class: character
Mode: character

Street Vendors were influenced to use digital wallet platform
Length: 20
Class: character
Mode: character

Varieties of digital wallet used by street vendors
Length: 20
Class: character
Mode: character

Preference to use multiple digital wallets
Min. : 1.000
1st Qu.:1.000
Median: 1.000
Mean : 2.571
3rd Qu.:4.500
Max. : 5.000
NA's :13
Preference for using personal account for digital wallet platform
Min. : 2.000
1st Qu.:5.000
Median: 5.000
Mean : 4.571
3rd Qu.:5.000
Max. : 5.000
NA's :13
Preference for using business account for digital wallet platform
Min. : 1.000
1st Qu.:1.000
Median: 1.000
Mean : 2.429
3rd Qu.:4.000
Max. : 5.000
NA's :13

Users registered in digital wallet platform
Length: 20
Class: character
Mode: character

Problems faced while using a digital wallet platform
Min. : 2.000
1st Qu.:3.000
Median: 3.000
Mean : 3.429
3rd Qu.:4.000
Max. : 5.000
NA's :13

Perks and benefits offered by digital wallet platform
Min. : 4.000
1st Qu.:5.000
Median: 5.000
Mean : 4.857
3rd Qu.:5.000
Max. : 5.000
NA's :13

Mobile payment applications helping the street vendors to manage expenses
Min. : 4.000
1st Qu.:4.000
Median: 5.000
Mean : 4.571
3rd Qu.:5.000
Max. : 5.000
NA's :13
Preference to use digital wallet platform after COVID-19 pandemic
Min. : 5
1st Qu.:5
Median: 5
Mean : 5
3rd Qu.:5
Max. : 5
NA's :13
Views on security provided by digital wallet platform
Min. : 1.000
1st Qu.:2.500
Median: 3.000
Mean : 3.333
3rd Qu.:4.000
Max. : 5.000
NA's :5
Preference to switch to digital wallet platform in near future
Min. : 1.0
1st Qu.:2.0
Median: 3.0
Mean : 3.2
3rd Qu.:4.5
Max. : 5.0
NA's :5

Analysis of data for Objective 1

The responses are solely primary in nature and analysis using R Studio is done using bar plot which is as below:

Fig. 1: Gender of the respondents

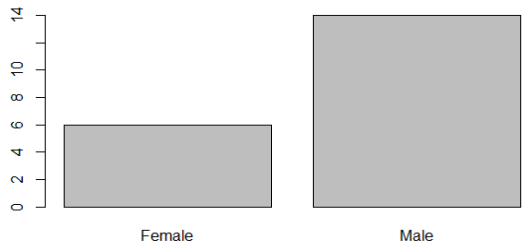

Fig. 1 portrays the number of male and female street vendors out of the sample size of 20. The total female street vendors are 6 and male street vendors are 14.

Fig. 2: Place of business of the respondent

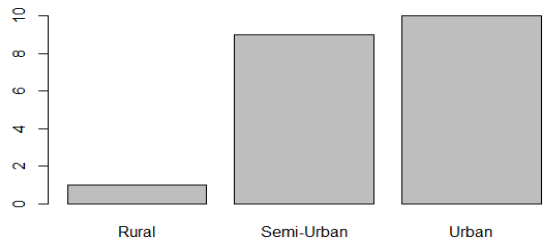

Fig. 2 portrays the place of business of the street vendors. Out of the sample size 20, 1 street vendor was from rural area, 9 from semi-urban area and 10 from urban area.

Fig. 3: Users of digital wallet platform (online payment)

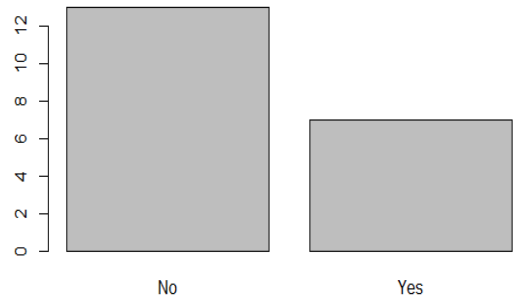

Fig.3 illustrates the numbers of users (i.e. 7 numbers) and non-users (i.e. 13 numbers) of digital wallet platforms.

Fig. 4: Street Vendors were influenced to use digital wallet platform

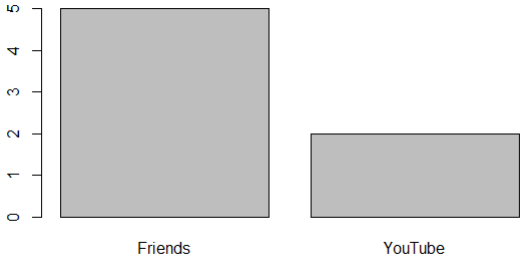

Fig.4 depicts who influenced the users (street vendors) to use the digital wallet platform. Among the users, 5 of them were influenced by friends while 2 of them were influenced from YouTube.

Fig.5: Varieties of digital wallet used by street vendors

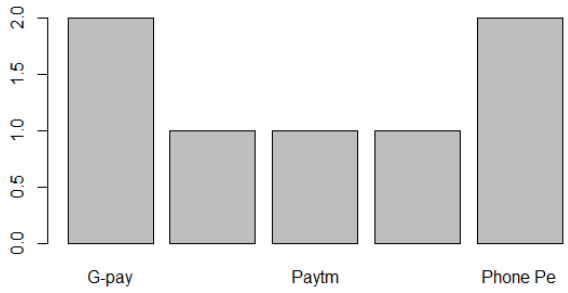

Fig.5 shows the varieties of mobile payment applications used by the street vendors' i.e.

G-Pay: 3 users

Paytm: 3 users

PhonePe: 4 users

Fig. 6: Preference to use multiple digital wallets

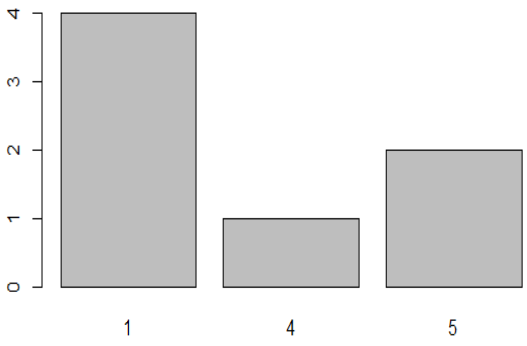

Fig.6 illustrates the preferences of street vendors for using multiple digital wallets. Among the users, 2 of them answered Strongly Agree (5), 1 has answered Agree (4) and 4 has responded Strongly Disagree (1).

Fig.7: Preference for using personal account for digital wallet platform

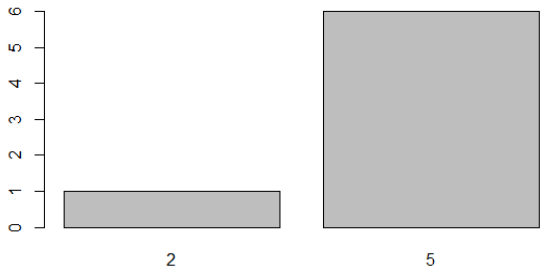

Fig. 7 illustrates the preferences of street vendors for using personal account for digital wallet platform. 2 of them responded Disagree (2) while 6 of them responded Strongly Agree (5).

Fig.8: Preference for using business account for digital wallet platform

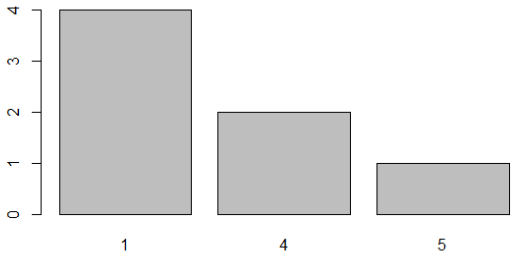

Fig.8 illustrates the preferences of street vendors for using business account for digital wallet platform. 4 of them responded Disagree (2), 2 of them responded Agree (5) and 1 of them have responded Strongly Agree (5).

Fig.9: Users registered in digital wallet platform

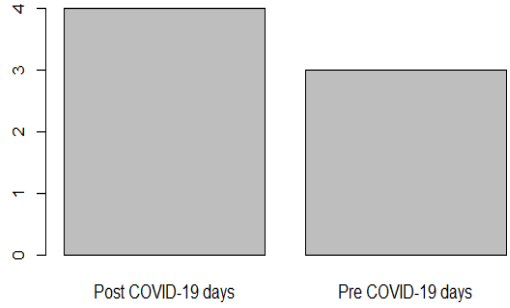

Fig.9 illustrates that 4 street vendors have registered in digital wallet platform during Post COVID-19 days and 3 of them responded Pre COVID-19 days.

Fig.10: Problems faced while using a digital wallet platform

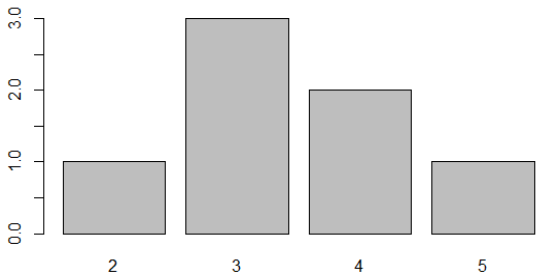

Fig.10 portrays the problems faced by the users while using a digital wallet platform. 1 of them has responded Disagree (2), 3 of them has responded Neutral (3), 2 of them have responded Agree (4) and 1 of them have responded Strongly Agree (5).

Fig. 11: Perks and benefits offered by digital wallet platform

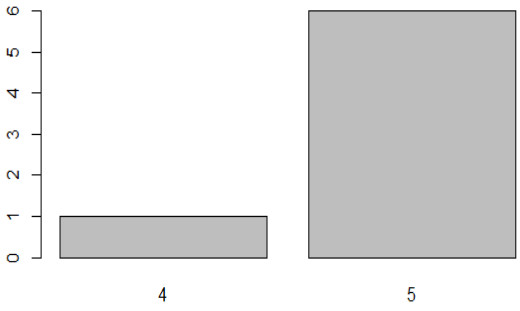

Fig. 11 shows the response of street vendors when asked if they are provided perks and benefits for using digital wallet platform. 6 of them responded Strongly Agree (5) and 1 of them responded Agree (4).

Fig.12: Mobile payment applications helping the street vendors to manage expenses

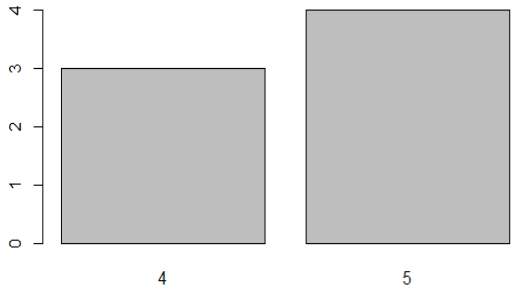

Fig.12 illustrate the responses of street vendors when they were asked that if mobile payment applications are helping them to manage expenses. 4 of them have responded Strongly Agree (5) and 3 of them have responded Agree (4).

Fig.13: Preference to use digital wallet platform after COVID-19 pandemic

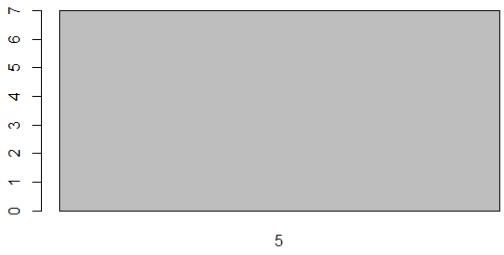

Fig.13 portrays that all 7 of the users among street have responded Strongly Agree (5) when they were asked if they will continue to use digital wallet platform after COVID-19 pandemic.

Analysis of data for Objective 2

The non-users among street vendors were asked only two questions so as to know their viewpoint underlying for not using any mobile payment applications. The analysis for the same is as below:

Fig.14: Views on security provided by digital wallet platform

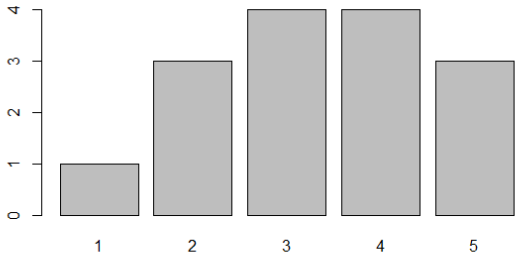

Fig.14 portrays the views on security by non-users as provided by digital wallet platform. 2 of them responded Disagree (2), 2 of them responded Neutral (3), 1 of them responded Agree (4) and 2 of them responded Strongly Agree (5).

Fig. 15: Preference to switch to digital wallet platform in near future

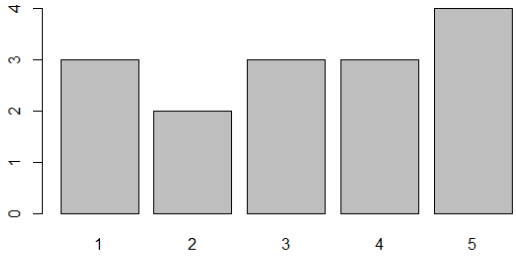

Fig. 15 demonstrates the preferences of non-users to shift to digital wallet platform in near future. 3 has responded Strongly Disagree (1), 2 has responded Disagree (2), 3 has responded Neutral (3), 3 has responded Agree (4) and 4 has responded Strongly Agree (5).

Fig.16: Scatter Plot of problems faced vs multiple digital wallets

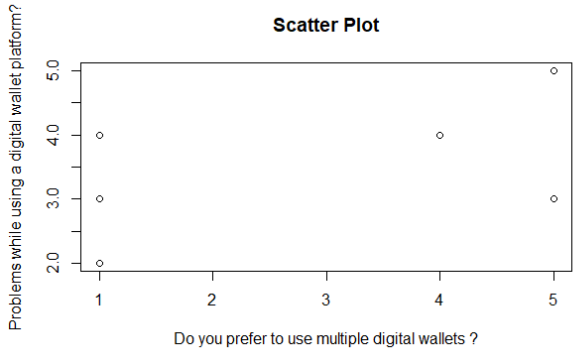

Fig. 16 illustrates the scatter plot of users of multiple digital wallets versus problems faced while using digital wallet platform.

Fig. 17: Scatter Plot of Personal vs. Business Account

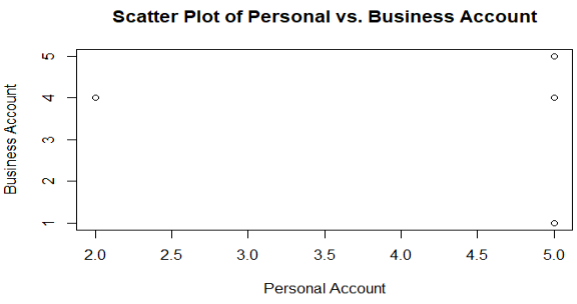

Fig. 17 demonstrates the scatter plot of users having a personal account for digital wallet platform versus business account for digital wallet platform.

Findings

It was found that the street vendors who are using mobile payment applications are very much affirmative to continue using mobile payment applications after the pandemic also. Though they face problems like server issues in bank, payment declinations, money deducted from customer but not credited to their bank account, etc., they still want to contribute in this digital transformation of India. It is also found that friends, family and social media played a significant role in making them adapt to such applications.

The non-users on the other hand, when asked about their views on security provided by the mobile payment applications, gave a mixed response but showed a positive reaction in shifting to digital wallet platform in the near future.

The interactions helped to understand that maximum responses out of the 20 answers were negative, i.e. they don't use any mobile payment applications. The same is because few have security issues related to the transactions happening online, few don't possess a smartphone for installing any mobile payment applications. At the same time, few are daily wage earners, and they focus on earning and spending simultaneously daily rather than saving the money in a bank account.

Conclusion and Suggestions

Though the street vendors are aware of mobile payment applications, they lack awareness of how they can make their daily transactions simple. For example, if a customer pays Rs. 500 to the vendor for a bill of just Rs. 50, it becomes a painful task for him to accumulate the necessary changes and return the remaining amount to the customer. This complexity can be erased if the street vendor would have used a digital wallet platform. Henceforth, the companies bearing these digital wallet platforms should be aware of them and the users (including the customers) must be mindful of them too. During the research work, it was found that many street vendors are using smartphones but they are not using any digital wallet platform and on questioning the reason for the same, the common reply which was found that they don't have a proper phone

number linked to the bank account and which is a must for digital wallet platform. For such problems, a good campaign needs to be set up for the street vendors and small-scale business owners, which would thus help in increasing the awareness of the benefits of using mobile payment applications and thus contribute mainly in making Digital India.

Those who have a smartphone are not aware of any mobile payment applications. When they were made aware of the same, they raised the questions about complexity in using as they are less educated to understand how these applications works. The process involved in making any transaction may seem easy to an educated person, but it is an arduous task for an uneducated person.

For the issues mentioned above found during the research, it is suggested that proper awareness program must be launched or the influencers in social media platforms can launch tutorial videos to teach them how to use mobile payment applications. The street vendors who use smartphones are high social media users and they can be made aware and taught simultaneously via these social media platforms. In contrast, the one who don't possess a smartphone may be encouraged to buy an affordable smartphone which would aid in making their day-to-day transactions hassle-free by using a digital wallet platform.

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ON FINDING INTEGER SOLUTIONS TO SEXTIC EQUATION WITH THREE UNKNOWNS $x^2+y^2=8z^6$

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ABSTRACT

This paper deals with the problem of finding non-zero distinct integer solutions to the non-homogeneous ternary sextic equation given by $x^2+y^2=8z^2$. *A few interesting relations between the solutions and special numbers are exhibited.*

***Keywords**: non-homogeneous sextic ,ternary sextic ,integer solutions*

Notations

$t_{3,n}$ =Triangular number of rank n

P_n^3 =Triangular pyramidal number of rank n

P_n^5 =Pentagonal pyramidal number of rank n

P_n^6 =Hexagonal pyramidal number of rank n

CP_a^6 =Centered Hexagonal pyramidal number of rank a

CP_a^{12} =Centered Dodecagonal pyramidal number of rank a

CP_a^9 =Centered Nonagonal pyramidal number of rank a

$Ct_{a,16}$ =Centered hexadecogonal number of rank a

$Ct_{a,24}$ =Centered icositetragonal number of rank a

Introduction

It is well-known that a diophantine equation is an algebraic equation with integer coefficients Involving two or more unknowns such that the only solutions focused are integer solutions. No doubt that diophantine equations are rich in variety [1-4] .There is no universal method available to know whether a diophantine equation has a solution or finding all solutions if it exists.For equations with more than three variables and degree at least three, very little is known.It seems that much work has not been done in solving higher degree diophantine equations.While focusing the attention on solving sextic diophantine equations with variables at least three,the problems illustrated in [5-22] are observed. This paper focuses on finding integer solutions to the sextic equation with three unknowns $x^2+y^2=8z^6$.A few interesting relations between the solutions and special numbers are exhibited.

Method of Analysis

The non-homogeneous Diophantine equation of degree six with three unknowns to be solved in integers is

$$x^2+y^2=8z^6 \quad (1)$$

Different ways of determining non-zero distinct integer solutions to (1) are illustrated below:

Way:1

Introduction of the transformations

$$x=m(m^2+n^2),\ y=n(m^2+n^2) \quad (2)$$

in (1) leads to

$$m^2+n^2=2z^2 \quad (3)$$

Assume

$$z=a^2+b^2 \quad (4)$$

Write 2 on the R.H.S. of (3) as

$$2=(1+i)(1-i) \quad (5)$$

Using (4) & (5) in (3) and employing the method of factorization ,define

$$m+in=(1+i)(a+ib)^2$$

from which ,on equating the real and imaginary parts,one obtains

$$m = a^2 - b^2 - 2ab, n = a^2 - b^2 + 2ab \quad (6)$$

From (2) and (6), one has

$$\left.\begin{aligned} x &= 2(a^2+b^2)^2 (a^2 - b^2 - 2ab), \\ y &= 2(a^2+b^2)^2 (a^2 - b^2 + 2ab) \end{aligned}\right\} \quad (7)$$

Thus (4) and (7) represent the non-zero distinct integer solutions to (1).

Properties:

1. $x + y$ is written as the difference of two squares
2. $\frac{y-x}{z^2} = 16 t_{3,b}$ when $a = b+1$
3. $\frac{y-x}{z^2} = 16\ P_b^5$ when $a = b(b+1)$
4. $\frac{y-x}{z^2} = 48\ P_{b-1}^3$ when $a = (b-1)(b+1)$
5. $\frac{y^2 - x^2}{2}$ is a nasty number when $a \geq b \geq 0$
6. $\frac{y-x}{z^2} = 24 P_n^6$ when $a = t_{3,n}$, $b = 4n-1$
7. $\frac{y-x}{z^2} = 8 CP_a^6$ when $b = a^2$
8. $\frac{y-x}{z^2} = 8 CP_a^{12}$ when $b = 2a^2 - 1$
9. $\frac{y-x}{z^2} = 16 CP_a^9$ when $b = 3a^2 - 1$
10. $\frac{y-x}{z^2} = Ct_{a,16} - 1$ when $b = a+1$
11. $\frac{y-x}{z^2} = 2(Ct_{a,24} - 1)$ when $b = 3(a+1)$

Note:1

As (1) is symmetric with respect to x,y and z, The triples given by

(x,-y,z) ,(x,y,-z) ,(-x,y,z) ,(-x,y,-z) ,(-x,-y,-z) ,(-x,-y,z) ,(x,-y,-z)

also satisfy (1).

Note:2

One may also express 2 on the R.H.S. of (3) as below:

$$2 = \frac{(7+i)(7-i)}{25}, 2 = \frac{(1+7i)(1-7i)}{25}$$

The repetition of the above process exhibits two more distinct integer solutions to (1).

Note:3

It is noted that ,in addition to (2),the transformations given by

$$x = m(m^2 - 3n^2), y = n(3m^2 - n^2)$$

Also reduces (1) to (3).Following the above procedure ,different sets of integer solutions to (1) are obtained.

Way:2

(3) is written as

$$m^2 + n^2 = 2z^2 * 1 \quad (8)$$

Write 1 on the R.H.S. of (8) as

$$1 = \frac{(r^2 - s^2 + i2rs)(r^2 - s^2 - i2rs)}{(r^2 + s^2)^2} \quad (9)$$

Substituting (4),(5) and (9) in (8) and employing the method of factorization,define

$$m + in = \frac{(1+i)(r^2 - s^2 + i2rs)(a+ib)^2}{(r^2+s^2)}$$

On equating the real and imaginary parts and taking

$$a = (r^2+s^2)A, b = (r^2+s^2)B \quad (10)$$

One obtains

$$\left.\begin{aligned} m &= (r^2+s^2)\left[(r^2-s^2)(A^2-B^2-2AB) - 2rs(A^2-B^2+2AB)\right], \\ n &= (r^2+s^2)\left[(r^2-s^2)(A^2-B^2+2AB) + 2rs(A^2-B^2-2AB)\right] \end{aligned}\right\} \quad (11)$$

Substituting (10) and (11) in (4),(2),the corresponding non-zero distinct integer solutions to (1) are obtained.

Way:3

Introducing the transformations

$$x = p^2 - q^2 + 2pq, y = p^2 - q^2 - 2pq \quad (12)$$

in (1),it simplifies to

$$p^2 + q^2 = 2z^3 \quad (13)$$

Substituting (4) & (5) in (13) and employing the method of factorization

,define

$$p + iq = (1+i)(a+ib)^3$$

On equating the real and imaginary parts, note that

$$p = a^3 - 3ab^2 - 3a^2b + b^3, q = a^3 - 3ab^2 + 3a^2b - b^3 \quad (14)$$

Using (14) in (12),one has

$$\left.\begin{aligned} x &= 2\left[(a^3 - 3ab^2 - 3a^2b + b^3)^2 - 2(3a^2b - b^3)^2\right] \\ y &= -2\left[(a^3 - 3ab^2 + 3a^2b - b^3)^2 - 2(3a^2b - b^3)^2\right] \end{aligned}\right\} \quad (15)$$

Thus,(4) and (15) represent the integer solutions to (1).

Note:4

Taking into consideration Note:2 and Way:2 ,three more sets of integer solutions to (1) are determined.

Conclusion

In this paper ,an attempt has been made to determine the non-zero distinct integer solutions to the non-homogeneous ternary sextic diophantine equation given in the title through employing transformations. The researchers in this area may search for other choices of transformations to obtain integer solutions to the ternary sextic diophantine equation under consideration.

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INDIAN TRIBAL LANGUAGE OF THE SANTALS OF MAYURBHANJ DISTRICT OF ODISHA: A HISTORICAL STUDY

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ABSTRACT

The aim of this article is to highlight the use of local languages of the people of Santal tribe of the Mayurbhanj district of Odisha in Eastern India. In fact, in India each tribe has its specific identity in the form of social organization, culture and language. The spoken language of each tribe is distinct and different from one another. Every one of the individuals from a tribe communicates in a typical language or vernacular. Mayurbhanj is a tribal dominated district of the state of Odisha in Eastern India. Indeed, the Santals are one of the largest tribal communities of the Mayurbhanj district of Odisha. The Santali script is a generally ongoing development. Santali didn't have a composed language until the 20th century and utilized Latin/Roman, Devanagari, Odia and Bangla composing frame work. Pandit Raghunath Murmu has initiated noble effort to develop a written script in Santali and as a result the Santali Script named as 'Ol Chiki' was invented in the year 1925. The people of Santal tribe of Mayurbhanj district speak different languages like Santali, Odia, Bengali, Hindi, Ho, Munda, etc. for their own communication. For the compilation of this article, both the primary as well as secondary sources have been utilised by the scholars.

Keywords: *Indian, Tribal, Language, Santals, Ol-Chiki, Mayurbhanj, Odisha.*

1. Introduction

In India the state of Odisha is regarded as the native soil of a series of Scheduled Tribe numbering sixty two. Each tribe has its specific identity in the form of social organization, culture and language. The spoken language of each tribe is distinct and different from one another. Every one of the individuals from a tribe communicates in a typical language or vernacular. The initial contours of tribal identity in India was shaped by the idea that tribals should be assimilated into the dominant Hindu fold or integrated as citizens of a nation state. The dominant communities wanted the tribals even to learn and speak the languages of the dominant groups over their own native languages (Mahana, 2019,pp.136-146).

In Odisha state the term *Adivasi* is usually used for the tribes. They were different types of cultural heritage, different places varieties languages, economic condition and literacy rate was very low level. Tribes of Odisha are Ethno-linguistically classifiable into three groups (*indiantribalheritage.org)*. These are 1. Munda Austro Asiatic groups, 2. Dravidian Groups and 3. Indo-Aryan Groups. The State of Odisha occupies an amazing location in our united states because it represents a completely unique union amongst numerous social groups and marginal groups. The Odishan tribals are overwhelmingly within the fold of Hindu religion, unlike in the North-Eastern states of India where Christianity is the tribal religion of the majority (Mahapatra,1993, p.10). Mayurbhanj is a tribal dominated district of the province of Odisha in Eastern India. The district of Mayurbhanj lies in the middle of 21^0 17' North and 22^0, 34' North latitudes and between 85^0, 40' East and 87^0 10' East longitudes (Senapati and Sahu (eds.) 1967, p.2). The Mayurbhanj district's literacy rate in Odisha has expanded by around 57 per cent. That is, somewhere in the range of 1951 and 2011, it increased from 15.8 per cent to 72.09 per cent. This rate of increment is generally the equivalent for all-India. Be that as it may, according to the 2011 Census of , Odisha actually positions 25th among 35 states and UT (Census report of India, 2011). Be that as it may, the literacy rate of Mayurbhanj is as yet a long ways behind than state and National average. The general literacy level of the Mayurbhanj was exceptionally low in the

immediate three to disparity between two groups used 'Sopher's Dissimilarity File'. The present article attempts to highlight the tribal languages used by the Santals of Mayurbhanj region of Odisha in Eastern India.

2. Methodology

To make a systematic study on the languages of Santals of Mayurbhanj area, both the primary as well as secondary sources are utilised in this article. The primary data have been collected from different sources viz. Gazetteers, interviewing with the people, focus group discussion, practical observations on use of the Santali language of Santals of Mayurbhanj district. However, the secondary data have collected from various books, journals and others have been used in this article. All the collected materials relating to this piece of work have been properly examined and only useful data have been utilized here.

3. Result Analysis and Discussion

3.1. Santals of Mayurbhanj

The Santals initially inhabited in South eastern Chhotnagpur plateau, where they used Santali language. Subsequently, they had migrated towards western regions of the West Bengal, Santal Pargana of the state of Bihar, northern side mountainous regions of Odisha and the tea cultivated area of Assam in various periods of time (Karua, 2014, pp.3-4). At present the Santals are found to be resided over the regions of West Bengal, Bihar, Jharkhand, Odisha, Assam, Tripura and Chhatishgarh (Debi, 2004, p.263). Santals, Sonthals, Saotals or Saontars are categorised as tribal Hindu in Mayurbhanj district. The people of Santal tribe are also residing in the present Keonjhar, Balesore, Sundargarh as well as Dhenkanal districts of Odisha. In fact, Mayurbhanj district of Northern Odisha is mostly inhabited by Santals. Amongst all the tribal people of the Mayurbhanj district, the Santals occupy a dominant place (Karua, 2008, p.95). The struggles against the discrimination pursued by the abused and subjected for most recent two centuries or more were viewed as battle for acknowledgment as equivalents. However, in recent times, as a counter to the threat posed to the tribal ways of living by the dominant groups, articulation of tribal identity has been emerging from within. The new struggle encompassed another completely new and opposite demand-the demand for recognition of difference (Mahana, 2019, pp.136-146). Santali script (Ol-Chiki) movement in Mayurbhanj district of Odisha reflects the own tribal identity of Santals, which has led to the development of sub nationalism among the Santals in Eastern India.

3.1.1. Language of the Santals of Mayurbhanj

Each language has its own way of development. So far the study of Santali language is considered, it has along back history. It was in 1867, the European missionaries first took an active interest to study the Santal language and culture (Padhi, 2009, p.142). The Santali script is a generally ongoing development. Santali didn't have a composed language until the 20th century and utilized Latin/Roman, Devanagari, Odia and Bangla composing frame work. Lars Olsen Skrefsrud, a Norwegian minister and a language scientist, distributed 'A Grammar of Santali Language' in 1873. Paul Olaf Bodding (conceived Gjovik, Norway on 2 November 1865, kicked the bucket Odense, Denmark on 25 September 1938) was a Norwegian minister, etymologist and folklorist. He served in India for a very long time (1889-1933), and worked predominantly from the town Dumka in the Santal Parganas location. Bodding made the principal letters in order and composed the main language for the Santali-talking local individuals in eastern India. In 1914 he likewise finished the interpretation of the Bible into the Santali Language (Bhadana, 2015, pp.11-12). Last few years indicates that Government of West Bengal recognized Santali language in the year 1979 as a medium of instruction of Santal Children at the primary stage of education and later on it spread up to university level. In Odisha Santali language movement has been pioneered by Adivasi Socio-Educational and Cultural Association (ASECA), which is a leading non-government, non-political organization. It is an Apex institution in this state whose work is to look after both the academic and administrative matters. As a responsible institution, it prepares

syllabus, text books, and resource materials from primary to graduation level. It also provides the certificate course to the generous learners (Patnaik, ed., 2009,p.143). Before nineteenth century's over, strict developments, relocations and instruction were significant variables of progress. To-day, Santal writing is a living wonder communicating in a scope of abstract articulations, show, verse, books, history, classic stories, enigmas, just as papers. Santal essayists arise as appealing figures ready to outline conventional culture as a wellspring of motivation, contextualizing the various issues that Santals face when they feel occupied with a globalized world. Instructive issues as educating and advancing a Santal writing have become significant stages to voice the political worries of the local area. Kids actually partake in customary society yet they include themselves to create a broadened peer culture, which is both plagued by westernization along with their development of custom (Tambslyche, 2013, p.6).

3.1.2. Santali Written Script (Ol Chiki)

Analysis of Santali script (Ol-Chiki) movement in Mayurbhanj district in Odisha, as an instance, would see the value in the battle of the Santals' interest for equivalent privileges of citizenship and appropriation alongside investing heavily in their own tribal identity has led to the development of sub nationalism (Mahana, 2019,p.138). The roots of the Santali language movement in Mayurbhanj districts of Odisha goes back to Pandit Raghunath Murmu. He was born on 5 May 1905 at Dandbose, a small village close to Rairangpur town in Mayurbhanj. He is the individual who interestingly considered concocting a content for Santali language. In 1925, while filling in as the superintendent of Badamtaliya Model School, he imagined a content for Santali language called Ol-Chiki. Ol means drawing an imaginary picture in mind without making any sound and Chiki means pictorial representation (Mahana, 2019, p.140). To find a way out from the problems of absence of any written script for their language Pandit Raghunath Murmu has initiated noble effort to develop a written script in Santali and as a result the Santali Script named as ‘Ol Chiki’ was invented in the year 1925. Initially it was hard for him to comprehend the Odia vehicle of educating. At the one phase he chose to quit perusing bit his dad Nandalal urged him to proceed and continued remaining that nothing is outlandish. For his upper essential examinations, he has conceded into Bahalda U.P. School, which was 11 Kilometers from his town. He was the place of Ananta Majhi, a Police Inspector in the village of 'Banadungri' with a portion of his companions. Pandit Raghunath Murmu was a normal understudy and thusly he was being instructed secretly (tution) by an instructor named Madan Mohan. While perusing history he ran over about the Arya and Non-Aryan developments. He discovered that Non-Aryan were unseemly and present Kolha, Kandha, Santal, Juang clans, and so on have plunged from them. He asked the instructor, "on the off chance that we have slid from Non-Arya or Anarya individuals, would we say we are individuals of ignoble local area"? The answered, "indeed, you have a place with ignoble individuals". Like a bolt, it struck his heart and he was resolved to accomplish something for the Santal society and from that very day as a matter of first importance began building up the content. Mr. Sauna Murmu, maternal uncle was his companion and specialist with whom he generally examined age making work. He was to such an extent lowered in this work that couple of letters of the content were at that point created while he was perusing in the M. K. C. Secondary School at Baripada (Murmu and Das, Vol-52, No.1 & 2, 2012, pp.86-87).

Ol-chiki script has 30 letters including six vowels (raha alang) and 24 consonants (keched alang). The letters of the Ol-chiki script are not discretionary but rather pictorial which are planned dependent on the states of a complaint or activity in their normal environmental factors (Mahana, 2019, p.140). OlChiki script has key diacritics, and the blend of diacritic 'Mu Tudah' and 'GahlaTudah' offers move to another diacritic, called 'Mu-Guhla Tudah'. As shown by notable Linguist Norman Zide, "The states of the letters are not discretionary, yet mirror the names for the letters, which are words, generally the names of items or activity addressing conventionalized structure in the pictorial state of the characters"(Murmu and J.N. Das, 2012, p.87).

In fact, Murmu has written over 150 books in Ol CHIKI script, covering conventional melodies, novel, short stories, exacting exercises, dream and legends, book on Santali language structure, fundamental books for learning OL CHIKI, books on phenomenal individuals in Santal society and Santal advancement (Mohanta, 2015, p.226). After creation of Ol-Chiki script, Santali writing has been enhanced by the distribution of various books, diaries, books, short stories, verses, melodies, strict lessons, books on Santal society and culture, key books for learning Ol-Chiki, books for learning essential math, Santali syntax and books on incredible adivasi leaders(Mahana,2019,p.143). The innovator's fundamental interest was to unite the Santals living in various States by giving them a solitary open language (Mahapatra 1983).

Fig. 1. Pandit Raghunath Murmu, the inventor of Ol-Chiki script.

Source: http://www.indianetzone.com/44/santhali_language.htm

Pandit Raghunath Murmu distributed books, books and diaries in Ol-Chiki script. Numerous associations were begun. One among them was Adivasi Cultural Association framed in 1954. The semi-political connection of the association hindered the proliferation of Ol-Chiki script. At last, an immaculate non-political association named Adivasi Socio-Educational and Cultural Association (ASECA) was shaped in 1964 and got enrolled in June of 1964. It is presently working in Odisha, Bihar, West Bengal, Assam, Jharkhand and different pieces of the country. After Pt. Murmu (died on 1 February 1982), In the 1980s, one of the pioneers, Mr. Chhutai Soren, the current President of ASECA, Mayurbhanj (Odisha) composed, portraying the reasoning and appropriateness of Ol-Chiki, to the then Prime Minister of India (Indira Gandhi), Chief Ministers of West Bengal, Odisha, Assam and Bihar for acknowledgment and selection of Ol-Script (Ol Chiki) for Santali language. Since the hour of Pt. Murmu till the current day, the main requests of the development were to remember Santali language for the Eighth Schedule of the constitution of India and to present Ol-Chiki script from Primary School to University level. Besides, the Santals presently request that their mother language should be the medium of instruction in academic institutions. In light of the interest, the Department of Education of Government of Odisha, passed a resolution on 25 February 1991 for presentation of Santali language in Primary School level in the areas of Mayurbhanj, Keonjhar and Sundargarh that got executed in 30 schools (20 in Mayurbhanj, 5 in Keonjhar and 5 in Sundargarh) on a trial premise from May 1992. The test fizzled. The report of the master advisory group set up by the Government of Odisha for examining the effect on presentation of Ol-Chiki script in 30 schools of Odisha reasoned that the guardians "are found to have confidence in contest and educational cost. They are more for learning Odia and English. Learning their own language and content is auxiliary for them" (GoO, 2001, p.13). Afterward, All Odisha Ol-Chiki Student Union (AOOSU) was shaped at Rairangpur on 10 January 1999 with a target to fortify the development for getting acknowledgment of Ol-Chiki and its execution in the instructive arrangement of Government of Odisha. Every once in a while arranging rally and dharna, the AOOSU requested for execution of Ol-Chiki in District Primary Education Program (DPEP). At last, on 29 October 2002, an Expert Committee was set up by the Department of School and Mass Education, Government of Odisha, to look at the reasonableness of the utilization of Ol-Chiki script in Mayurbhanj district of Odisha. The Expert Committee after cautious perception presented its report on 12 November 2005 proposed (GoO, 2005, pp. 26-27). "Santal language ought to be utilized as vehicle of guidance at the essential level (Class I-V). Endeavour should be made to overcome any issues between primary language (MT)-

Santali and local language/school language (RL)- Odia (Mahana, 2019, pp.136-146). "Bilingual exchange model should be tested. In the main year 80% time ought to be utilized to instruct perusing and composing of Santali and 20% time ought to be utilized for spoken Odia. In the last Primary year, the time is to be switched. 80% time ought to be utilized for talking, perusing and composing of Odia and 20% time for perusing and composing for Santali (Mahana, 2019,pp.136-146). Time in the in the middle of years ought to be changed 40-60, 50-50, and 60-40% (Mahana, 2019,pp.136-146). Utilization of Ol-Chiki content to examine Santali language be made discretionary. Getting positive criticisms from the Expert Committee, the Government of Odisha in April 2006 pronounced that Ol-Chiki would be presented in 100 schools on an exploratory basis (Mahana, 2019, pp.136-146). The Santals are presently investing wholeheartedly in their language and way of life as well as in various signs of their way of life. The Santals are sufficiently enthusiastic to resuscitate their previous traditions, customs and culture through composition, educating and festivity of social celebrations. The acknowledgment and fame of Santali language and content are demonstrated by the presence of various book shops and sound video shops solely managing Santali books, music and video tapes in Raigangpur and Mayurbhanj towns (2019,pp.136-146). Ol-Chiki development has fortified the Santal character and identity and formal acknowledgment of Ol-Chiki made a common Santal to think at standard with rest of the general public. Using Ol-Chiki script as a medium, the Santali language movement has been trying to create what N. K. Bose calls “sub nationalism” (1967) and Roy-Burman calls “infra-nationalism” (1969) of its own resisting the mainstream nationalism and domination. Really, the language movement of Santals of Mayurbhanj is a struggle for their recognition and identity.

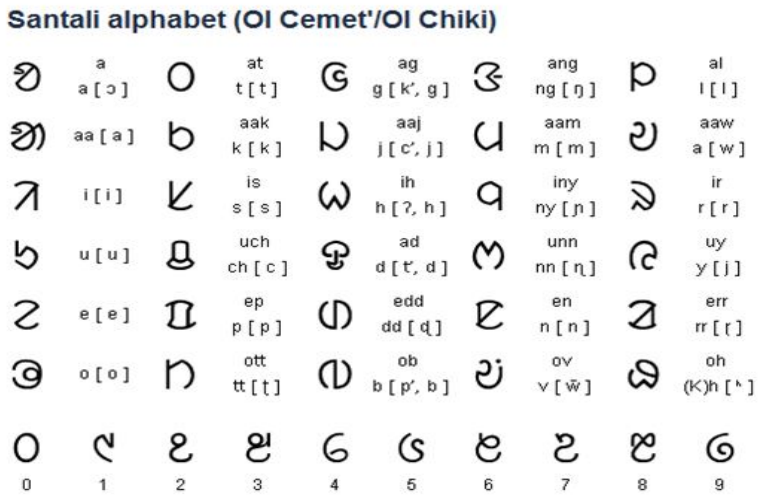

Fig.2. Ol Chiki Script and numerals of the Santals of Mayurbhanj, Odisha, India

Source: Internet- https://en.wikipedia.org

4. Conclusion

We can sum up from the above conversation that the people of Santal tribe of Mayurbhanj district of Odisha have their own cultural identity along with uniqueness in their languages. The people of Santal tribe of Mayurbhanj speak in a free language known as 'Santali'. Santals have a place with Munda bunch, language of the Austro-Asiatic family. Santals belong to Munda group, language of the Austro-Asiatic family. The Santali script is a generally ongoing development. Santali didn't have a composed language until the 20th century and utilized Latin / Roman, Devanagari, Odia and Bangla composing frame work. Pandit Raghunath Murmu has initiated noble effort to develop a written script in Santali and as a result the Santali Script named as ‘Ol Chiki’ was invented in the year 1925. Ol Chiki has 30 letters, the kinds of which are wanted to bring customary shapes. These consolidates 6 (six) vowels, (Raha Alang) just

as 24 consonants (Keched Alang). The states of the letters of Ol Chiki script are not discretionary, yet mirror the names for the letters, which are words, normally the names of items or activity addressing conventionalized structure in the pictorial state of the characters. On the whole, the languages of Santals of Mayurbhanj district are interesting aspects to know the socio-cultural life of the people of one of the largest tribal communities of Odisha in Eastern India.

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JOB SATISFACTION AND ECONOMIC PERFORMANCE: A CRITICAL ANALYSIS

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ABSTRACT

Job satisfaction motivates the employees to perform better using discretionary effort and talent to the fullest. Therefore, better performing companies are expected to have a large proportion of employees with job satisfaction. Engagement of the employee, benefits the organisation through commitment and dedication, affecting the production and economic growth. Engaged employees stay with the organisation for longer period of time with increased self-efficacy enhancing bottom-line profit and contribute in improving the driving change initiatives resulting in job satisfaction. In the present study, primary data has been used to analyse the relation between job satisfaction amongst the employees and the economic performance of the companies. An effort has been made to critically examine the results.

Keywords: *Job satisfaction, Employee engagement, Cronbach's alpha, Reliability*

Introduction

Workforce across the globe are key factor for organisational efficiency and optimum productivity. The relationship between job satisfaction and job performance is one of the most studied area in organizational psychology. Judge, Thoresen, Bono, & Patton, (2001) has established a positive relationship between them. According to Kahn (1990), personal disengagement can lead to incomplete role performance, personal engagement on the other hand leads to effort, involvement and intrinsic motivation. Estimating the extent to which the satisfaction-performance relationship is partly spurious has been studied, which is an advancement because the attitude behaviour link has not been estimated in light of personality and job characteristics. Another effort in the study is the integrated theoretical model, which illuminates mediators in some of the effects of personality and ability.

Employee engagement can be defined as an employee putting forth extra effort, as well as the likelihood of the employee being loyal and remaining in the organisation over the long period. Research shows that engaged employees perform better, put in extra efforts to help get the job done, show a strong level of commitment to the organization, and are more motivated and optimistic about their work goals. Employers with engaged employees tend to experience low employee turnover and more impressive business outcomes.

Various studies have proved that wholly engaged employees exhibit higher self-motivation, confidence to express new ideas, higher productivity, higher levels of customer approval and service quality, reliability, organizational loyalty and lower absenteeism.

During the last few years, there has been a surge in the popularity of employee engagement. There are four primary drivers.

1. People have become the primary source of competitive advantage
2. Retention and the war for talent
3. Popular appeal
4. Overwhelming impact

Opportunity for growth, learning, recognition and advancement for employees is always helpful in retaining employees. Employees participation in decision making is also a very effective engagement activity in the organization. Aligning effort with strategy, empowerment gives a feeling of job ownership.

The power of employee engagement is that it is closely connected to business results. When employees work in an environment in which they can focus their attention on their work and have a drive to do their best, organizations experience higher levels of productivity and profitability. Engaged employees look for better ways to do their work, spend less time on wasted activities, and make effective use of resources. In the end, companies deliver better products or services and have more resources left to invest in further improvements.

Although it is an important consideration, high financial compensation is not the only driver of increased employee retention. Employees decide to stay with organizations for other reasons, such as growth and development opportunities, strong leadership, and meaningful work.

Based on 50 years of employee engagement research, Gallup organisation has found the following conclusive findings:

Engaged employees feel a strong connection to their company and perform at high levels every day while looking for ways to improve themselves and the company as a whole.

Not engaged employees are those who show up every day and put in just enough effort to meet the basic requirements of their jobs.

Actively disengaged employees are those who present a big problem for businesses.

Hierarchy of Engagement for leaders to apply their leadership essence as per Penna(2007)

In addition, employee segmentation is an important method to utilize when evaluating employee engagement at each level. For instance, the factors that engage the most productive employees in an organization may not be the same as the factors that engage the least productive employees. Those employees who receive the highest rankings on their performance reviews may tend to express higher levels of job satisfaction when they are presented with challenging opportunities that allow them to grow and learn. Those that receive the lowest rankings might be more focused on issues surrounding work/life balance and job security. While some factors, such as good communication, are important among all employees, the attempt to focus on the full spectrum of factors that engage the entire work force. Employee engagement can have a direct impact on other organizational and life dimensions like job satisfaction, organizational commitment, psychological capital of employees, life satisfaction, and organizational citizenship behaviour

affecting overall organizational effectiveness. Following Saks(2006) antecedents and consequences can be summarised in figure 2.SS

Source: Penna (2007)

Figure 1: Hierarchy of engagement

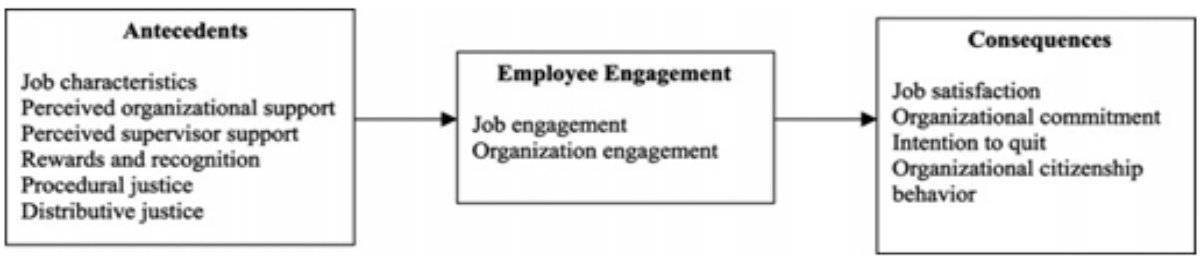

Figure 2: Antecedents and Consequences of Employee Engagement, Source: Saks, 2006

Figure 3: Measuring the impact of Employee Engagement: source IES UK, 2003

Literature Review

Employee engagement is the level of commitment and involvement an employee has towards his organization. Employee engagement is defined as the internal involvement and enthusiasm for the work, and the degree to which employees occupy themselves at workplace, and relate to the workplace according to Paul Turner (2020). It is the positive attitude held by the employees towards the organizations and its values. Employee engagement is everyone's responsibility and positive contribution can be made to enhance it across the organization. The organization must work to develop and nurture engagement, which require a two-way relationship between employer and employee. Higher productivity, reliability, higher self motivation, confidence to express new ideas, organizational loyalty, employee turnover, lower absenteeism and higher levels of customer approval and service quality are some of the characteristics of a wholly engaged employee.

Beer, Specter, Lawrence, Quinn-Mills and Walton (1984) focused on people in an organization to be the key resource. The term "engagement" stems from the work of Kahn (1990) who distinguished between being engaged and disengaged at work.

Harter, Schmidt and Hayes (2002), define engagement as "the individual's involvement and satisfaction as well as enthusiasm for work".

According to May et al (2004) engagement is most closely associated with the constructs of job involvement and 'flow'. Job involvement is defined as 'a cognitive or belief state of psychological identification. Saks (2006) argues that organisational commitment also differs from engagement in that it refers to a person's attitude and attachment towards their organisation. According to Robinson (2006), employee engagement can be achieved through the creation of an organisational environment where positive emotions such as involvement and pride are encouraged, resulting in improved organisational performance, lower employee turnover and better health. West (2005) states that when employees have positive emotions towards the organisation, they are able to think in a more flexible, open-minded way and are also likely to feel greater self-control in the workplace.

Macey and Schneider (2008), Kular et al. (2008), Smith and Markwick (2009) and Simpson (2009) described employee engagement and focuses on the determinants and consequences of engagement at work.

Ram & Gantasala (2011) and Susi & Jawaharrani (2011) examined some of the literature on Employee engagement and explore work-place culture & work-life balance policies & practices followed in industries in order to promote employee engagement in their organizations to increase their employees' productivity.

Singh & Shukla (2012) tried to find out what variables are significant to create an engaged workforce, the data was collected from a tin manufacturing industry. According to Kim-Soon & Manikayasagam (2015) the

components of employee engagement which are also drivers of engagement are the transformational leadership, transactional leadership, employee communication, organizational communication and employee involvement. Employee engagement is one phenomenon which is only going to develop when employees are more involved in their work. Satisfaction of employees have relationship with the employee engagement according to Jaiswal, Pathak, & Kumari (2017).

Methodology and Analysis

It is established fact that if employees in an organisation are satisfied with their jobs, they would be better motivated and would be performing better than their dissatisfied counterparts. This implies that the better performing companies should have a large proportion of employees who are satisfied with their jobs. The survey to measure job satisfaction was created aiming to get answers of the following questions:

- About company culture
- Meaningfulness of work
- Career advancement opportunities
- Whether the employee feels valued or not
- Infrastructure provided by the company
- Job responsibilities
- Equity in work share
- Communication between colleagues
- Skills utilised
- Support from management
- Communication and approachability of seniors
- Feedback process

Internal consistency of the data was tested using Cronbach's reliability test to make sure that there exists a strong correlation between the different items on the questionnaire that we have administered to the sample of the population. To test the internal consistency of the scale Cronbach's Alpha - Reliability Test developed by Cronbach (1951) is used because of multiple Likert questions in the survey. The closure the Cronbach's alpha coefficient is to 1.0, the greater the internal consistency of the data in the scale will be.

The general rule of thumb is that a Cronbach's Alpha value (1) of 0.7 and above is acceptable and further steps in the research may be carried out however very high reliabilities (0.95 or higher) are not necessarily desirable, as this indicates that the items may be redundant.

$$\alpha=k\left(1-\left(\sum_{i=1}^{k} S_i^2\right)/\left(S_{Tot}^2\right)\right)/(k-1) \quad (1)$$

We can see from this formula that with the increase in the number of observations Cronbach's alpha increases.

The survey was conducted with the employees of different age groups of the three companies namely, Indian Oil Corporation Limited, Tata Consultancy Services and Tata Steel using the Convenience Sampling method in conjunction with Random Sampling. A sample of 110 employees (IOCL = 30, TCS = 50, Tata Steel = 30) was used for the analysis purposes.

Apart from the responses pertaining to job satisfaction, the data was was also collected regarding their ages, positions held in the company and duration for which they have been associated with the organisations.

Cronbach's Alpha was found to be 0.889976013, 0.92653178 and 0.94335656 for IOCL, TCS and Tata Steel data respectively indicating the high consistency of the data.

The motivation of this study is to find a relation between the job satisfaction amongst the employees of a company and the economic growth shown by the organisation. Data relating to economic performance of the companies have been taken from their websites for the financial year 2016-17 and 2017-18, because employee's responses were collected during 2018-19, for the sake of consistency of the data.

Company	Profit after Tax (2016-17) in Crores	Profit after Tax (2017-18) in Crores	Growth Percentage
IOCL	19106	21346	11.72
TCS	30324	30502	0.59
Tata Steel	3445	4170	21.04

Table 1: Economic Performance

To calculate the job satisfaction scores, responses for 12 questions by each respondent was added to arrive at a total score and the average of these total scores for a company is the job satisfaction for that particular company. Job Satisfaction score = (∑(∑responses of each respondent))/number of respondents

Company	Satisfaction Scores	Profit Growth %
IOCL	41.07	11.72406574
TCS	36.54	0.5869938
Tata Steel	34.47	21.04499274

Table 2: Satisfaction scores and growth

The relationship between job satisfaction scores and economic performance of the companies are tabulated in the following correlation table.

	Satisfaction Scores	Profit Growth %
Satisfaction Scores	1	
Profit Growth %	-0.25749409	1

Table 3: Correlation analysis result

An Alternative Approach to the Problem:
Another approach to reaching a solution for this is to grade the companies in a particular sector with other competitors operating on a similar scale and then compare their job satisfaction scores to understand if there is a relationship between job satisfaction scores and the performance of a company. As competitors, following companies were chosen: Energy and Oil Sector: ONGC, IT Sector: Infosys and Manufacturing Sector: Jindal Steel Works (JSW)

Company	Profit after Tax (2016-17) in Crores	Profit after Tax (2017-18) in Crores	Growth Percentage
ONGC	17900	19945	11.42
Infosys	14353	16029	11.68
JSW	2540	6113	140.67

Table 4: Economic Performance

Sector	Company Name	Growth Percentage	Grade (Good/Better)
Energy and Oil Sector	IOCL	11.72%	Better
	ONGC	11.42%	Good
IT Sector	TCS	0.59%	Good
	Infosys	11.68%	Better
Manufacturing Sector	Tata Steel	21.04%	Good
	JSW	140.67%	Better

Table 5: Comparative grading of companies

This approach is supposed to be more qualitative in nature because here, we only compare the relative economic performance of the organisations and see if the three companies, that we have chosen have a high job satisfaction score, to corroborate that the better performing companies in the sector actually score higher in the job satisfaction survey.

Information Technology Sector companies tend to hire from all specialisations of engineering as they are seen as mass recruiters and believe in the philosophy of training their employees by themselves. On the other hand, a company from the core sector has to recruit from the specific specialisations. It is found that a company that recruits employees with specialisation of their preference has better job satisfaction score.

Results and Discussions

In the analysis the value of correlation coefficient between job satisfaction and economic performance (r = -0.2575) is indicative of the two entities being negatively linearly related. The value being negative is a result of Tata Steel having higher economic growth than IOCL despite having the lower job satisfaction score. This observation, however may not be completely true as the economic

performance of an organisation depends upon margins, market conditions, legislations, national and international trade environment, etc.

Hence, unless all of the above conditions remain comparable for each of the sectors undertaken in the study, it is really not fair to compare their economic performance without some sort of scaling to bring them at par.

From the qualitative analysis of comparative data of economic growth of similar sized companies in the same sector, it is apparent that the organisations with relatively higher performance as compared to other companies of their sector, also have higher job satisfaction scores. Although, it is not definitive of the correlation between the economic performance and job satisfaction, but it keeps the path open for future research on the topic. Also, from the data we can establish that people are more satisfied if the work they have been assigned is more aligned to their field of education and which results in them being able to apply their skills acquired more frequently.

Based on the findings, scope for improvement for more efficient results are: (i) Increasing the proportion of respondents to the number of employees in the company (ii) Increasing the number of companies in each sector for data collection. (iii) The economic growth needs to be scaled for a more realistic comparative study across sectors as different sectors have different governing factors. (iv) The sampling method needs to be more random and not based on convenience to satisfy the requirement of statistical inference.

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CHARGE TRANSPORT IN ORGANIC SEMICONDUCTORS: A BRIEF REVIEW

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ABSTRACT

Organic materials have magnetic electronic and optoelectronic properties with excessive demand in functional electrical and optical device applications.The focus of this review study is on the many ways of load transfer in organic semiconductors. For optimal functioning, regulating charging movement is essential for optoelectronic systems such as LEDs, FETs and organic solar cells. Therefore, the design of materials with enhanced structural properties needs to understand mechanisms determining charge transport. Herein, we have discussed the basics of organic semiconductors, their transformation from inorganic to organic semiconductors. After that, we debated organic materials:Molecular Semiconductors and Polymers (Organic Polymer Semiconductors),which gives better results in their charge transportation. We then elaborate on factors affecting charge carrier mobility in organic semiconductors and the charge transport in technologically relevant materials. Lastly, different approaches to charge transport are discussed here, like the Variable Range Hopping Model, MTR (Multiple Trapping and Release Theory), Bandlike transport, Hopping Transport, and Polaron model. This review paper would be eminently helpful for researchers working in this field.

Keywords: *Organic Materials, Charge transport, Hopping and Polaron model, Band-Like Transport.*

1. Introduction

Optoelectronic devices that are based on organic materials are one of the most exciting fields of electronics. Organic materials are very advantageous in their flexibility, minimum technology processing, with less sensitive processing surroundings. However, some are very air sensitive, too but, their properties can be tuned via doping according to a particular application. The main issue with organic-based devices is their stability.

In electronics, till the current era, inorganic semiconductors that are silicon and germanium-based are much dominated. Higher mobility [1], higher stability [2] are the magnificent properties of these materials, which arise from their single-crystalline structures [3].Inorganic materials processing needs extremely challenging surroundings. However, these materials are ample and are inexpensive also. But the device fabricating procedure is many complicated and has high expenses [4].Apart from these, conventional semiconductors do not give satisfactory results for flexible [5], optoelectronic [6], as well as for large-area applications [7].So, to make research more effective and suitable, searches disclose anew group of semiconducting properties and are named organic materials.Organic materials show outstanding optical as well as mechanical properties regarding current flexible electronics.Previously, the study of a single crystal small-molecule such aspentacene, anthracene, and some other acenes were in main concern.

The first conductive organic polymer polyacetylene discovery has changed the whole scenario about polymers by the three great scientists Alan J. Heeger, Alan G Mac Diarmid, and Hideki Shirakawa in 1977. After that, they are being awarded the Nobelprize in chemistry in the year 2000. This discovery and development of polyacetylene were the first-ever doping experiment in the history of organic electronics. Consequently, it has changed the perspective about the polymers that were assumed to be insulators before that.

Thus, these findings have unlocked a novel epoch of plastic science &technology to be working in the field of organic semiconductors. And also, polymers become inextricable from day-to-day life [8]. Hence this discovery recommended that organic compounds are efficient for current transportation and are relevant for molecular designing. Organic materials incorporate new semiconducting electronic properties with the scope for simple forming along with plasticsmanufacture. There are infinitely numerous organic materials whose properties can be tuned via (chemical doping) modifying their chemical composition

and making organic materials very versatile.Inorganic materials doping helps adjust the conductivity that consequently built the semiconducting materials engrossing for further potential applications [9-10]. The possibility of tuning organic semiconductors' conductivity using molecular designs has drawn significant attention and motivated many exciting properties, including flexibility & diversity, colours, low-temperature processability, and cost-effective applications. Due to the remarkable properties of these organic substances, they could be utilised to make a wide variety of semiconducting electronic devices, including lasers, solar cells, LED: "light-emitting diodes", &transistors. The three primary uses of organic semiconductors, the study on OPVs: "organic photovoltaic cells", OLEDs: "organic light - emitting diodes" and OFETs: "organic field-effect transistors", therefore, are significant.

The organic semiconductor could offer us flat and flexible electronics and light – exceptionally bright emission from such materials - a thin film of a semiconducting polymer to provide light when a voltage is added. Semiconducting polymers may be deposited to considerably easier the production process, improve flexibility, and reduce expenses [11-13].

Organic semiconductors are compounds based on carbon showing semiconducting effects. The single alternation is a typical structural characteristic of all organic semiconductors, as are the double bonds in carbon atoms termed conjugation. Organic semiconductor materials have entirely different features than their inorganic equivalents since they are composed of organic molecules linked by the van der Waals interactions. Due to the exchange of the Van der Waals, the primary differentiation is electronic coupling considerably less than the covalent coupling.Therefore organic semiconductors are often substantially less defined by hole or electron mobility than ordinary inorganic semiconductors.

Although there are various properties studied for organic semiconductors here, we explore the charge transport mechanism among these OSCs.

2. Organic Semiconductor's Electronic Structure

The main characteristic of organic semiconductors is intramolecular bonding. The covalent link that constitutes the molecular backbone is derived from the hybridisedsp^2 atomic orbit of adjacent carbon atoms that overlap to create molecular orbital antibonding and bonding.The remainder of the adjacent carbons' non-hybridisedPz orbits makes the μ-orbitals perpendicular to the¨ bonds which are relocated to the molecule. These non-hybridised atomic Pz orbitals are consequently non-binding or less binding, generating orbitals at the border of the molecule that signal the equivalent p* molecular orbitals.In these materials, the π-electrons play a significant role in intermolecular conduction. All bonding orbitals in the molecule's ground state are filled with antiparallel two electrons up to the HOMO (Highest Occupied Molecular Orbital). The antibonding orbitalsof LUMO (Lowest Unoccupied Molecular Orbital) towards are purely empty.

For organic semiconductors in the aspect of their electrical conductivity with optical properties, the energetically HOMO & LUMO are of great importance. In p-systems, they are sometimes referred to as p & p* orbitals, respectively.Physical interactions, such as electronic transport, are placed on the molecular processing in the solid that further defines physical properties. Fig 1 shows the formation of HUMO and LUMO in ethylene molecules.

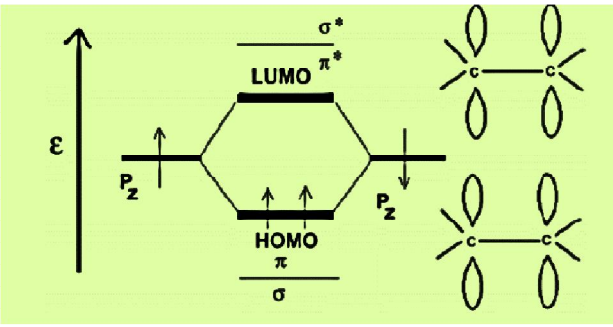


Fig 1 Formation of HUMO and LUMO in ethylene molecule [*]

2.1.Classes of Organic Semiconductors

Organic semiconductors are considerably categorised into two classes. Based on the molecular weight: firstly, combined polycyclic

compounds have a molecular weight below one thousand, and secondly, heterocyclic polymers with a molecular weight higher than one thousand [14]. Polymers are now day beautiful elements because of their easy formation of larger surface thin films. However, its low solubility in organic solvents and lack of functionality stability has prompted studies to study the use of tiny molecules as semiconductors. By altering several molecular properties, the advantage of small molecules is to facilitate loading control. In comparison to polymer semiconductors, for example, they may be packaged in well-organised polycrystalline sheets.

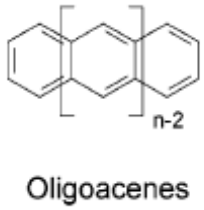
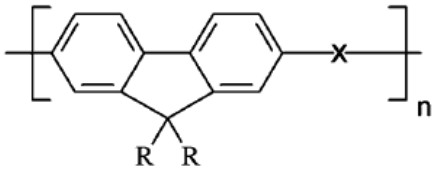
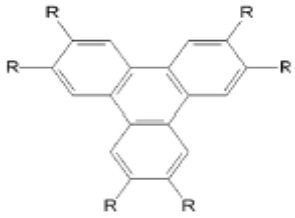
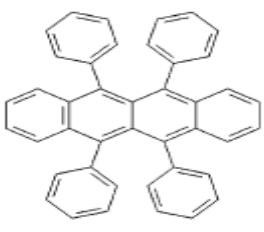
In the report of Kang and others in 2016, p-type conjugated polymers have high mobility than "n-type conjugated polymers". Polymers exhibit higherelectron mobility which is $6.50 Cm^2V^{-1}S^{-1,}$ and an on-off current ratio of 10^5. By doing some modifications, charge transport can be controlled systematically.

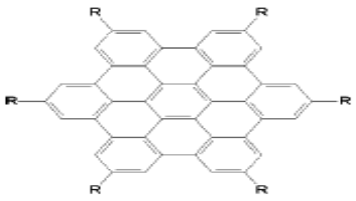
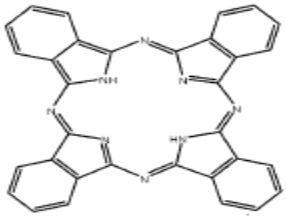
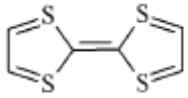
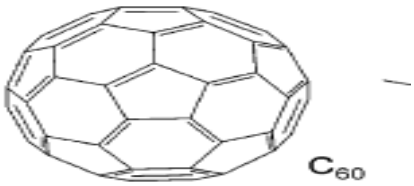
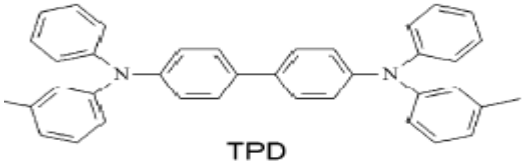
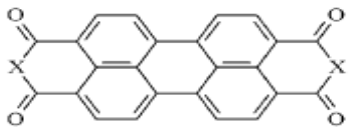
2.2.Material Overview

Recently, in optoelectronic devices, the role of organic materials is fascinating and is used as an active element in devices like FET (OFET), LED (OLED), Solar cells, and Nanoscale electronics.

Mobility of charge carriers directly explains the device price-performance ratio to a large extent and depends upon the material's morphology. Therefore, for improving device performance, there must be a basic understanding of the correlation between the charge transport mechanism and thechemical composition of the active organic materials.

Table1. Most widely investigated Molecular Semiconductors [15]

S. No.	Chemical Structure	Chemical Name
1	 Oligoacenes	Oligoacenes
2	 PF copolymer	Oligothiophenes
3	 Triphenylene	Triphenylene
4	 Rubrene	Rubrene

5	 Hexabenzocoronene	Hexabenzocoronene
6	 Phthalocyanine	Phthalocyanine
7	 TTF	Tetrathiafulvalene (TTF)
8	 C_{60}	C_{60}
9	 TPD	Triphenylamines.
10	 PTCDA (X=0) PTCDI (X=NH)	PTCDA (X=0) PTCDI (X=NH)

Organic semiconductors consist of several advantages and also have numerous characteristics as they are light in weight, have flexibility, and can be easily fabricated over an extensive area range.Although inorganic semiconductors are also very good in their high mobility, they have limitations in their flexibility and cost-effectiveness. Researchers havefound some organic materials which show a higher mobility layer than $1cm^2V^{-1}s^{-1}$in pentacene or rubrene [10, 16].OFETs, polyacenes are widely studied because of their excellent crystalline structures and promising in case of their mobility also [17, 18].

Polyacenes comprise n units of benzene fused rings which are polymerised in a line (straight) fashion, known as n-acene. From the study of Hummer and Ambrosch –Drexel [14], it is observed that the Eg: "energy gap" is almost

inversely proportional to the molecular length that is n level. Moreover, a deviation is noticed between the linear relationship in Egand 1/n when increment in their molecular size from n=3 (anthracene) to n=4 (tetracene) and correspondingly analter from monoclinic to triclinic in their crystal structure.Pentacene has characteristics of stability and good crystal structure. Due to its higher "hole mobility" of 1.5 cm^2 $V^{-1}s^{-1,}$it is assumedto be the best organic semiconductor, and further, its properties were under research [18]. Although for practical use, pentacene faces some issues related to its volatility to acid and poor organic solvents solubility [19-21].

Anthony and his co-workers [19] found an alternative to overcome this problem and observed that the stability and solubility of pentacene might be increased by using alkyne substituent groups in the middle of the pentacene benzene ring.

The electronic properties of any material are affected not only by the individual molecules but also by the crystalline form's arrangement; that is, the detailed herringbone packing structure governs the electronic properties of any crystal. The electronic conduction is due to the pi- electrons, so pi- planes within the neighbouring molecules in a crystal should be good stacking to reach good results. In the case of pentacenecrystal, the pi-stacking doesn't need to be ideal because of their herringbone mechanism (the two neighbouring molecules are tilted in opposite directions in a unit cell, and their distance between the pi-planes of the neighbourhood molecules is significant). Thus, after usingthe alkyne group, it may further enhance the pi-stacking due to the arrangement as the molecular planes become about to parallel to one another. Their stacking spacing is reduced compared to their initial pentacene crystal [19, 20]. Research is active for the synthesis and analysis of such types ofpentacene derivatives [22].

2.2.1. Oligoacenes

In organic electronics, Oligoacenes are considered the most studied and versatile semiconductors. This category of materials was researched for many decades. Tetracene (n=4), pentacene (n=5), and their derivatives have captured the attention of researchers due to their well-defined crystal structures [15].Ruberene is considered the centre of attention among all products [23-25]. Rubrene (a substitution of substituted four phenyl rings: tetracene molecule). Pentacene has gained importance due to its property of exhibiting various crystal polymorphs that are a good candidate in investigating crystal structure transport correlation [26].Pentacene crystals have higher mobility in a thin film state which better helps in charge transport than that of bulk phase.

2.2.2. Oligothiophene

Oligothiophenes have crystal structure for n= 2, 3, 4,5,6,8 oligomers with a lot of replaced derivatives. It was reported that the sparks in this field of materials came into existence when the I^{st} organic transistor was made from the active semiconducting material n=6 Sexithienyl [27]. Oligothiophenes and Oligocene compounds are primarily used as a p-type material, and these are further derivatised to make sufficiently n-type materials with fluorinated substituents [28- 30].

2.2.3. Triphenylamines

This class of materials is used in the Xerox industry as organic photoconductors [31] like "4, 4’-bis (n-m-totyl-N-phenylamino) biphenyl (TPD)" molecules. These materials also show promising results in terms of thermal and morphologic stabilities, higher glass transition temperatures, and better fluorescence quantum yield in films as a hole transport material in OLED with in the form of vacuum-deposited amorphous films [32]. These materials demonstrategood external efficiency and simplicity structure-wise.

2.2.4. Perylenes

Thesematerials exhibit an unusual crystal packing, having dimers fashioned in herringbone form [33]. The bonding of diimide (PTCDI) moieties or dianhydride (PTCDA) leads to the compounds which are having good n-type properties [34].

2.2.5. Tetrathiafulvalenes (TTF)

The study noticed that TTF has excellent electron-transport properties, which create interest to several researchers. TTF is an

electron donor and forms suitable electron-conducting cations radical complexes.

There are few characteristics of TTF:

(a) TTF has well-defined symmetry.

(b) Highly polarisable due to the presence of sulphur and other neighbouring sites.

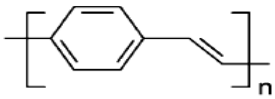
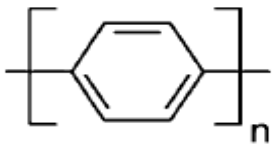
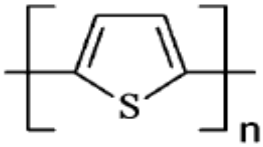
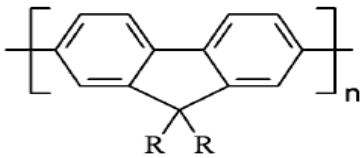
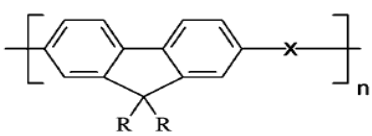
Tetrathiafulvalene (TTF) and its derivatives are investigated widely and found in highly conducting charge transfer salts as an electron donor entity [35, 36]. Further research will find some more beneficial properties for use in thin-film devices [37- 39].

2.2.6. Fullerene C_{60}

The films made up of C_{60}crystals are used as an active element in a thin film transistor that exhibits excellent device characteristics. Due to the isotropic solid's formation in $C_{60,}$ the thin film does not require any special attention to controlling molecular assembly, which is proved very crucial in organic materials [40].

The charge transport parameters: i.e., mobility is about $10^{-4}Cm^2\ V^{-1}s^{-1}$for electron and hole drift mobility, respectively. Fullerene (C_{60}) and its derivatives are extensively used in photovoltaic in the form of the organic blend as electron acceptors. In carbon nanotubes (single-wall carbon nanotubes), the ballistic (the career mean path is longer than the nanotube) charge transport parameters are also measured with mobility outcomes of the order of 80,000 $Cm^2\ V^{-1}s^{-1}$[41].

Table2. Most reviewed Polymers (Organic Polymer Semiconductors) [15].

S. No.	Chemical Structures	Chemical Name
1.	 PPV	PPV (Polyparaphenylene, Polyparaphenylenevinylene)
2.	 PPP	PPP (Polyparaphenylene)
3.	 PT	Polythiophene (PT)
4.	 PF	Polyfluorene (PF)
5.	 PF copolymer	Polyfluorene co-polymers

The transport of charge carriers in the conjugated polymer chain is also a central focus for all the researchers working in this field. The charge carriers' mobilitiesare relativelymore minor for purely disordered polymers having mobility in the range of 10^{-6}–$10^{-3}Cm^2V^{-1}s^{-1.}$ Mobilities markedly increase of self-assembled polymer chain [42]. One way to enhance the mobility values is by introducing a liquid crystal character [43].
Some of the most reviewed polymers that are discussed below:

2.2.7. Polyparaphenylene, Polyparaphenylenevinylene and its derivatives

Conjugated polymers demonstrate good characteristic properties in the fabrication of thin-film diodes (both photoconductive diodes and electroluminescent). Conjugated polymers are used for both charge transport and emission process in the operation of LEDs. From the earlier study, we observed how improvements are made for electroluminescence efficiency due to the use of selected two polymer layers for the confinement of charges between the two layers and convey electron-hole capture for excitons generation at this interface.
For the first time in 1990, The Cambridge group reported electroluminescence from conjugated polymers using Poly (PhenyleneVinylene); PPV [44]. PPV is a single semiconducting layer between metallic electrodes. It is an unmanageable material with a rigid-rod microcrystalline substance that is infusible and insoluble in common solvents. The energy gap between pi (π) and pi star (π^*) states of PPV is about 2.5 eV and producing luminescence below this energy in a band. This result gave an outstanding mechanical property with higher elastic moduli & thermally stability to 400-degree centigrade. Thus, films made by PPV have excellent properties when they are formed, but there is an issue with processing that cannot be directly carried out with this material. The results based on simpler single-layer electroluminescent indicate excellentbehaviour [26]. Hence, these materials gain attention for their superb features for light-emitting usages [44, 45].

2.2.8. Polyfluorene (PF) and Its Alternating Co-polymers

Polyfluorene and its co-polymers have high purity and stability and thus show interest as light-emitting polymers [46].
Two polymers' groups have emerged as leading candidates for PLED applications, the polyfluorenes and the PPVs within the host of materials examined. Two polymer families have achieved ease of processability, emission colourtunability, and high purity through their chemical composition fine-tuning via polymerisation differences. Many high-brightness, high-efficiency as well as long-lived devices from these materials have been constructed. Polyfluorenehomopolymers are referred to lightly primarily because of their early discovery in 1998. There have been many advances in this material class in the last few years.Polyfluorene homo and co-polymers are illustrated because they have not been well examined in the past. This material class has been significantly improved as a highly viable LED polymer of substantial commercial interest.Using Suzuki polyfluorene polymer, the improvements in LED performance considerably exhibit light emission greaterthan 10,000 cd/m^2 at less than 6 V with a "peak efficiency" of 22 lm/W. [45].
In the fluorine-based polymer family, the option of co-monomer has therefore become an outstanding synthetic device for the design of polymers with balanced hole and electron transport properties and fine colour control. The enhanced Suzuki route [47, 48] was used to create a portfolio of fluorine co-polymers that emit colours covering the whole spectrum. The highest interest is rich red, green, and blue-emitting polymers. No other polymer class provides the full-colourrange with a high lifetime, high efficiency, and low operating voltage when added to the device's configuration. Therefore, the poly fluorene-based molecules are the most suitable LEPs for marketing. When we make these materials affordable, several consumers who have validated this idea have given us great feedback.

2.2.9. Polythiophene (PT) and Derivatives

The region-regular alkyl-substituted polythiophenes display the highest holemobilities (around 0.1 cm2/Vs). Thus, polythiophene materials have higher charge carrier mobility and are relatively stable because of their packing in well-organised lamellae [42].This class of materials hasa comparatively sizeable crystalline domain, anddifferentnano-scale features can be fabricated using lithography and printing techniques [49, 50].

In addition, more recently reported polythiophene derivatives containing thiophene fused rings under nitrogen have also been made with muchgreater mobilities of the range 0.6 Cm^2/V.s [43].These findings will answer various questions regarding charge transport in single-crystalline domains in semiconducting polymers.

3. Factors Affecting Charge Carrier Mobility in Organic Semiconductors

The productive charge transportation is when charges can move from one molecule to another without disturbing trapping and scattering. Thus, the main factor which directly affects the charge transport in organic semiconductors is charge carrier mobility. Various factors that impact the charge carrier mobility are as discussed below: (a) Pressure, (b) Size or molecular weight, (c) Charge Carrier density, (d) Electric field, (e) Environmental effect or temperature, (f) Presence of chemical impurities, (g) Disorder, and (h) Molecular Packing.

(a) Molecular Packing

The molecular parameter packing plays a crucial role in assessing the charge transport properties in organic semiconductors.

In inorganic semiconductor crystals, the whole crystal behaves as a single crystal, [51] and the carriers are delocalized in the crystals, whether electron or hole. But in the event of organic crystals, it is entirely dependent on the crystal packaging characteristics to locate or relocate carriers.Some of the parameters listed thereby affect molecular packaging and ultimately the delivery of cargoestoo: (a) Molecule's electronic structure, (b) Molecule's relative position in the crystal, (c) Variations of morphology among the crystal that is produced by optimal single-crystal structure static or dynamic deviations[52]. Therefore, molecular packing motifs must have a comprehensive and robust array of intermolecular contacts to facilitate effective load transfer andenhance organic crystal performance.

It is classified into four categories of typical molecular packaging motifs, as illustrated in Fig. 1 [A–D] with their corresponding molecules in [E–H]: (a) herringbone packing motif without overlap p–p (face-to-faces) between adjacent molecules (for example, Fig. 2E; pentacene), (B) p–p p-p motif with p–p overlap (for example, Fig. 1F); (C) lamellar p-p stacking motif, one dimensional (1D) p–p stacking (for example, Fig. 1G, C8-PTCDI).

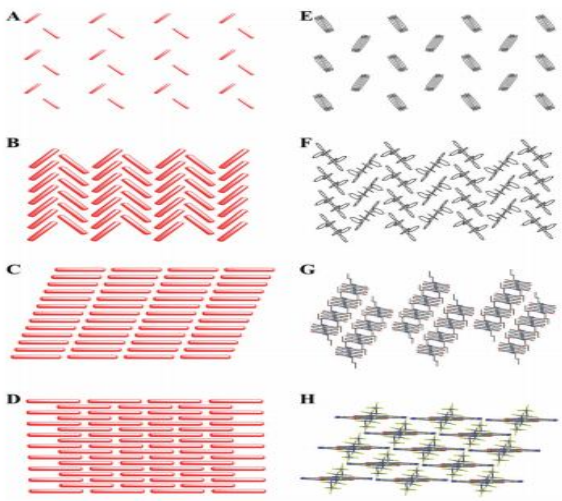


Fig.1 Organic crystal semiconductor motifs for molecular packing: (A—D) diagrams and (E–H) representing molecular structures diagrams [53].

The four different modes of packing given above showconsiderable pi-pi overlapping, which means more delocalised states, which will stabilise +1 or -1 charge states and further generates the more efficient path for charge carriers to transport from one molecule to its neighbouring molecules. The pi-pi stacking mode is assumed to be one of the most efficient modes for charge carriers transportation. In more delocalised states, the HOMO-LUMO splitting will result in a larger electron bandwidth (2f) [54]. In this situation, large polaron or band-like transport may be formed that are believed to be more promising for charge transportation.

Single crystals have the property of anisotropy which shows that in any crystal, the position of

the interacting molecules is highly related to the crystal packing. Consequently, it will affect the charge transport efficiency closely. Generally, non-substituted pi-conjugated molecules crystallise in a layered herringbone packing and thus cause two-dimensional charge transportation inside the stacked organic layers [55]. In contrast, charge transport is not sufficient in layers. Therefore, different molecules have a different rate of interaction with neighbouringmolecules, leading to diff5rent transport efficiencies and anisotropies. As an example, Oligothiophene crystals show other structures at LT: "low-temperature" phase [56] and different at HT: "High-temperature" phaseand it is also noticed that mobility at high-temperature phase acquires higher values than that of lower temperature phase [57]. Rubrene crystalsexhibit higher mobility [58, 59] than the unsubstitutedtetracene under the same conditions [60]. The reason for higher mobility values for rubrene is due to their different solid-state packing found in both systems [61].

Experimentally, it has been observed that the mobility within the coating is found to differ between 2.3 and 0.7$cm^{2/}V$ depending on the polar angle for a "pentacenecrystal" contacted with an electrode array; [62]. Moreover, single TTF crystals derivatives demonstrate a vast difference from $10^{-5}$to 1 cm^2/V. S in mobility values is a packing function. Thus,crystal packaging variations, such as crystal colour changes that have been studied extensively for perylene derivatives, are responsible for crystallo-chromy [63, 64].Also, from theoretical investigations, the demonstration of such displacements strongly affects the intermolecular electronic couplings in such a way that it would intimately depend on the frontier molecular orbitals bonding-antibonding pattern (HOMO, or LUMO) [65].

(b) Disorder

Inorganic semiconductors basically, two kinds of disorders are present, which are as discussed below:

Diagonal Disorder: Thistype of disorder arises when variations in their site energies (that is, the energy level difference of HOMO and LUMO levels of discrete molecules or chain segments) within the material itself.

Off Diagonal Disorder: This type of disorder arises because of how the interaction is strong (strength of exchange), i.e., on what type of interaction they are between adjacent molecules or in the whole chain segment. The off-diagonal disorder affects electronic coupling within the material. Generally, in polymers, the existing diagonal conditionis due to chemical impurities as their molecules have short bond lengths and the formation of finite size conjugated segments. Thus, eventually, their HOMO and LUMO have different site energies.

The diagonal disorder is induced via electrostatic or polarisation effects, whose variation is due to the fluctuation in local packing; all this occurs when their molecules have repeated local units containing dipole moments [66, 67]. The disorder can be tunned via modification in their deposition techniques which further improves the charge transport in organic semiconductors. For pentacene crystals, it has been reported that the variation in their charge carrier mobility is up to six orders of magnitude [68] by doing some variations in their deposition techniques. It was noticed that grain size and mobility vary linearly as mobility rises with the size of grain (size of grain may be changed by making some changes in the substrate temperature during deposition). Thus, the grain boundaries present in crystal structure significantly impacted charge transport for illustration; Oligothiophenes in transistors [69].Disorder highly affects the mobility and eventually charge transport phenomenon in organic semiconductors.

In charge carrier transportation, for the conduction of electrons and holes, the most responsible factor is that of HOMO and LUMO (frontier orbitals). Organic disordered semiconductors have polymeric chains with finite and different bond lengths containing kinks, twists, torsion, and other defects related to their conformation. It gets breaks the uninterrupted pi-conjugated polymer chain into various small pi-conjugated chain segments. The elements having a more significant degree of conjugation is uninterrupted and makes the formation of energetic sites (basically, a site is a collection of various site energies closer in energy and real space and are indistinguishable

concerning other energy scales like thermal energy). The amount of energetic disorder between sites highly depends upon the conformation and orientation of the polymers concerning the different polymers.

There is a more significant energy difference between site energies in organic disordered semiconductors. They can create localised sites, and their wave function does not overlap with their neighbouringareas. Thus, charge transport between sites is governed by tunnelling between them.

Moreover, the morphology of the polymeric materials also introduces the concept of disorder. Many factors influence the material in different aspects like their crystallinity, polymeric aggregation, doping, and any charged species. The energetic disorder is a collective property of morphology having chemical structure, their constituents' atoms, and their processing conditions. Though only based on morphology, functional disorder, in general, is not concluded purely.

Therefore, for whatever reason, transport of loads in organic semiconductors is generally done via electron transfer relations (hops) between localised states even if they are carried by the band, as with inorganic semiconductors [70, 15].Feng*et al.* have studied the effect of disordered on the charge mobility, and Fig 2 shows their results showing the product [71].

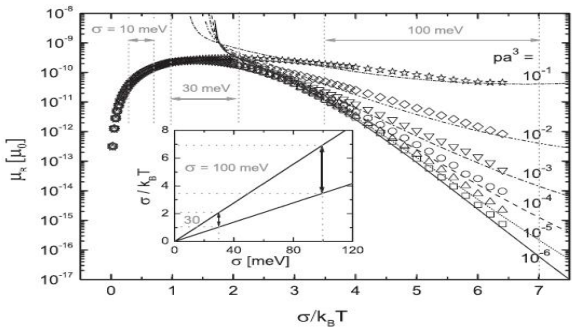


Fig 2 Disorder dependence of the reduced mobility [71]

(c) Environmental effect/Temperature

The temperature dependence is remarkably different in disordered materials or single crystals. The power-law formulation shows that the hole & electron motilities declinein single crystals with increasing temperature.

$\mu \div T^{-n}$;

the value of n lies between 0.5 and 3, and these values make a difference between various single crystals. Below room temperature, these single crystals exhibit the inverse power law dependency, i.e., μ (mobility) increase with decreasing temperature. In FET, for activated charge transport in rubrene, this type of behaviour can change at a critically lower temperature near 170- 180 K [72-74]. At above room temperature, crystals have thermally activated charge transport (Arrhenius- like) [15]. For instance, in single crystals, mobility is highly affected by temperature; mobility decreases when the substance is cooled at around 30K below a crucial temperature as perylene [75] and depends on experimental aspects. This decrement in mobility indicates traps, and these traps further decrease mobility anisotropy [72]. In herringbone layers, mobility is minimal at that level. The mobility-temperature evaluation is understood by power-law evaluation; at lower temperatures.

(d) Electric Field

Charge carrier mobilities are also affected by an electric field, and its dependence is quite distinct in disordered and single crystals. Only in ultrapure crystals where the charge carrier mobilities are higher, the support of the electric field is observed. In that case, the electric field increase reduces the charge carrier mobility [77] (at the higher electric field, there is stronger directionality and thus prevents the charge particles from moving around the defects and thus reduces mobility). But in disordered materials, at the higher electric fields, there is an increment in mobility values.

(e) Presence of chemical Impurities

An impurity here refers to compounds with slightly distinct chemical structures compared to compounds under investigation.Recently, Palstra and his team [18] have demonstrated the significant impurities of single crystals are Pentacene-quinone molecules with a concentration of 0.7%. Further, for reducing their level of attention to 0.07%, a purification process is adopted that considerablyenhances the hole-mobility of pentacene single crystals.

Much research is done on detecting further the impurities in tetracene and its derivatives andrubrene single crystals; corresponds to quinone [78].

(f) Pressure

Pressure is one of the main tools that reduce electrical resistivity by improving dimensionality. Which further helps the electrons pass and avoids the scattering site [79]. Researchers have noticed that bandwidth decreases with increasing pressure in oligoacene crystals. At hydrostatic pressure of up to 0.3GPa, Single-crystal tetracene and pentaceneshow linear increment in the photocurrent [72]. It reduces the intermolecular gap between adjacent molecules evaluated by other organic conjugated molecules [80].

Bard and his team also observed similar results by applying pressure of 0.2GPa in porphyrin derivatives. A sharp increment in photocurrent due to improvedelectronic intermolecular coupling [81] the change from hopping regime to a band regime

4. General Approach to Charge Transport In Organic Semiconductors

Inorganic solids, the source of intermolecular bonds,are their relatively weak Vander Waals interactions among the molecules. Consequently, the electronic wave functions are confined to an individual molecule or limited molecules [82].

However, some organic semiconductors are acquiring characteristics of delocalisation because of the presence of molecular conjugation, which means there are alternating single and double bonds in their end-to-end structure [83, 84]. Thus, based on these elementary properties, organic semiconductors contain several charge transport mechanisms. A well-known agent will explain the charge transport phenomenon in organic semiconductors [85- 87], i.e.,Variable Range Hopping Model, M.T.R: "Multiple Trapping and Release Theory", Band-like transport, Hopping Transport and Polaron model.

4.1.Hopping Transport

The most general approach and basics of charge transport in organic semiconductors is via Hopping. Hopping is a process of transferring electrons between molecular segments when there is weak electronic coupling. In most organic semiconducting devices, the charge transport is almost by a hopping mechanism, giving a clear concept about device behaviour [82, 88].

Organic semiconductors have weak Vander Waal interactions, hydrogen bonding, and dipole-dipole interactions among the molecules. It gives a degree of freedom to each molecule, and in this way collection of various semiconducting molecules have relatively several orientations. This structural disorder having chemical impurities and electrostatic interactions producesa static condition that performs charges to be localised. Molecular vibrations causethe localisation of leaders in organic semiconductors, creating a polaron by interacting with accounts to deform the host molecule. This deformation permits the charged particles to acquire a state that has lower energy and is more localised thanthe LUMOor HOMO level of the organic semiconducting molecules. By experiments, the formation of polaron is observed in organic semiconductors [89].

4.2.Band-like Transport

Experimentally, in the 1980s and 1990s, band-like charge transport was studied in molecular crystals.Small molecules like pentacene, tetracyanoquinodimethane (TCNQ), etc., also display high charge carrier mobility compared to polymer-based semiconductors [90, 91]. Carriers travel in a broad carrier area with a greater average free distance than their nearest neighbour in this sort of organic molecules, as a highly relocated flat wave. These carriers, however, typically have metal-like transport characteristics, which are hence dubbed tape transport. This transfer usually takes place in crystals with relocated pages.Commonly, perfect crystals due to defects (like lattice vibrations or, say, phonons) are unavoidable and thus make a disturbance in the crystal's symmetry.

Consequently, scattering these charge carriers decreases mobility. One way to increase mobility is by reducing the lattice vibrations by minimisation of temperature. Therefore, an appropriate increment in mobility values can be achieved in Band-like transport on lowering the temperature.

Moreover, band transport can be applicable where the bands are broader than the charge carrier's energetic uncertainty. For organic semiconductors for the occurrence of band transport from this formula $ea^2W/\hbar kT$, it is

estimated that the mobility value should be $\mu \approx 10$ cm^2 V^{-1} $s^{-1}$with bandwidth W=10 kT&a=1 nm where e indicates the "elementary charge", a implies the "lattice constant" [92]. The work of OanaD. et al. observed that the organic conductor,pentacene hole mobility value of μ=35 cm^2/Vs at room temperature increases and reaches μ=58 cm^2/Vs at 225K. These high mobility values result from the process purification in which the use of vacuum sublimation was eliminated by 6,13-pentacenequinone. Consequently, reducing the number of traps via two magnitude orders relative to traditional methods. And thus, temperature-dependent mobility is compatible with the band-like transport model for electronic transport [91].

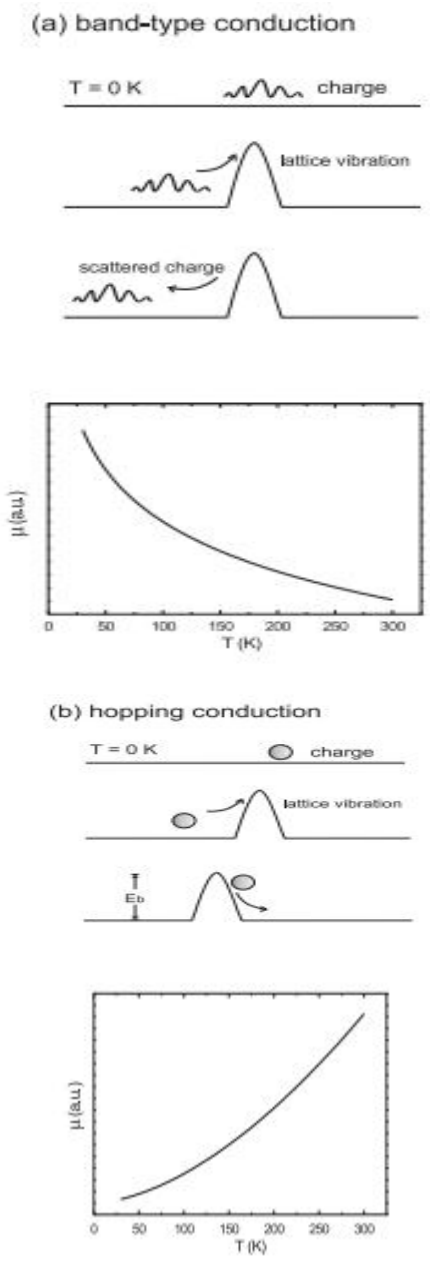


Fig.2. Mechanisms for load transfer in organic drivers. (a) Type of tapes. A free carrier is moved in a perfect crystal. The lattice vibrations disperse the charges as the temperature increase. It restricts the movement of the page. With lower temperatures, the mobility μ rises for band transfer. (b) Drive Hopping. The lattice vibrations encourage a carrier to "jump over" height barriers Eb between its located places if the carrier is located (e.g. owing to flaws). Mobility μ rises with increasing temperature for hopping transfer. The figure is from the point of view [93].

4.3.Multiple Trapping and Release Theory

One more model used to account for low mobility in organic semiconductors is MTR: "Multiple Trapping and Release" theory.Apart from crystal organic semiconductors and amorphous semiconductors, organic materials also tend to make polycrystalline films. The organic semiconducting materials exhibit a regular molecular arrangement with partial overlapping of the neighbouring molecule's delocalised orbitals. Thus these molecules facilitate more effective intermolecular charge transfer and charge carrier mobility which is far greater than amorphous films.

In this condition, charge transport is not suitably described via band-like transport or hopping transport, so another method is adopted for these kinds of organic materials.e.,MTR theory. In this theory, it is assumed that charge transport takes place in extended states, and mostly there is the trapping of charge carriers in localisedforms. The localised state's energy is separated from the significance of the mobility edge (mobility edge is the crucial point where a transition occurs in the random lattice from localised to eigenfunctions extended character). In addition, when these localised states have lower energy than the mobility edge energy, then in this situation, the localisedforms behave as a shallow trap, due to which the releasing of charge carriers by thermal excitations can be done. But, if the localised states have energy more minor than the mobility edge energy, then the state behaves as a deep trap: once trapped in a deep trap, the charge may not be released bythermal excitations. Thus,the charge

carriers are not thermally excited or say emitted. In that case, the availability of charge carriers for transportation then depends on the energy difference between trap levels and extended states band and on the temperature as well as on the applied voltage [94].

4.4. Variable Range Hopping Model

It was assumed that most carriers in the localised Member States are caught up in previously discussed models. Then the aggregation of the freed pages is expanded in the relative transportation level hugely depending on applied gate voltage, temperature, and the localised states energy levels. Eisenberg and Matters, in 1998, havedescribed the theory of VRH: "variable-range hopping", in which it has been clearly defined that there are two cases first. The load carrier can either hop (jump) or jump (jump) over a longer distance, with reduced activation energy over a small space. Charge transfer is hence considerably reliant on the localised density of the state. These carry accumulations progressively fill the smaller existing forms of organic semiconductors such that any additional charges in the accumulation area are in relatively high energy conditions.Therefore, these additional charges demand less energy for activation to spring from one site to another; this eventuallyoutcomesin greater mobility with the rising gate voltage value.

4.5. Polaron Model

In 1993, the polaron concept was proposed by landau [95] and noticed that organic semiconductors are accounted sensitive to the "polaron effect" whichis very relevant in informing and designing organic-based devices, which are significantly transported. Later in 1951, Pekaralsoand Landau examined the self-energy and the efficient mass of the polaron [96]. In 1959, Holstein studied the polaron motion in terms of the 1D molecular crystal model [97]. Recently, Blom et al. has demonstrated through their trials that a charge transport system also appears by polaron hopping in the polymers [98]. Perris and others also testified the polaron transport in molecularly doped polymers. Inorganic semiconductors and conjugated polymers, basically polaron model depends on the phonon- electron interaction. Moreover, the formation of polaron is due to strong electron-phonon coupling and is moves via hopping with mobility which declines with declining temperature [99]. Generally, a polaron is a quasi-composed charged particle and a polarisation cloud covering it [100]. After forming the polaron in every mechanism, the strong charge-phonon interaction will induce the carrier to self-trap and carry an adjacent molecule alongside the resulting molecular deformation.[101].This coupling weakens the pages and retard themotion of charge carriers. In other words, a polaron is a quasi-particle that is produced due to the charge carrier by the lattice deformation. In this model, the hopping rate of charge carriers dramatically depends on the energetic barrier height (from the occupied state to the unoccupied donor state).

Polaron is a quasi-particle in condensed matter physics. Polaron is used to understand the concept of the mutual interaction of electrons and atoms in solid materials.Two different kinds of quasi-particles are a large polaron as well as a small polaron. The polaron form is based on the electron and the lattice's primary interaction due to the long term coulombic interplay with an electronic carrier and a solid ion. Concurring influences define the radius of a significantpolaron. By comparison, a small polaron may be produced when a brief electron-gage contact happens, including the deformation-potential interaction. Both small and big polarons have qualitative differences in electrical transport properties.Large polarons travel with substantial mobilities, large polarons travel, μ> 1 cm2 /Vs that decreaseatrisingtemperature. By contrast, small polarons move with very low mobilities, μ "1 cm2/Vs,increasing temperature.In addition, the mobility is found to be field, and temperature-dependent means the charge carriers move through thermal activation from one site to another adjacent area via hops. AnamikaDey et al. has reported that by using the polaron model, the activation of mobility amount to 25-75meV, while by disordered model's activation energy was found to be 420meV.

To develop a further clear understanding about the polaron impacton organic semiconductor charge transport, investigators have suggested various theoretical models, namely 1D

Holstein molecular model, EMA: "effective medium approximation", Marcus rate based on Marcus rate, and transport mechanism based on M-VRH: "Marcus and variable-range hopping" theory, etc.[100, 102-106].

5. Conclusion

Organic semiconductors are regarded as distinctive and promising in the field of electronic materials. While considerable study has to be done to understand better the systems that control their behaviour, the materials have already taken great care of their particular characteristics. Flexibility, lightweight, and low costs for manufacturing devices are the most intriguing aspects of organic semiconductors.Organic semiconductors exhibit photoluminescence and nonlinear optical characteristics, essential for a range of optoelectronic applications such as organic photovoltaic devices, lightspeaker diodes and organic field impact transistors.Organic semiconductors exhibit novel semiconducting electronic and electrical properties like high mobility, high stability, etc. These are easier in shaping and having tunable characteristics via doping and can provide flat electronics. Synthetic polymer and small molecules have achieved considerable awareness because of their lower cost, ultra-thin, and flexibility in their products. It is expected to be very thoroughgoing in the current era. Moreover, organic semiconductors are based on pi-conjugated oligomers and polymers used as the active element in new generations of plastics optoelectronic devices. These specifications indicate that organic compounds can transport current and hence via doping conductivity also increases, which further makes these materials fascinating for potential applications.

We tried to summarise the current assessment of freight movement in organic semiconductors in this review study. It covers a transitoryexplanationof the approaches used to measure the charge transport in organic semiconductors. Besides,we also discussed the significantfactors that directly or indirectly affect the mobility of charge carriers and hence charge vehicles. How molecular packing, disorder, electric field, impurities and temperature (including dependency at lower and higher temperature and the role of traps is discussed) significantly affect the charge conveyancepossessions of organic semiconductorsalso deliberated thoroughly. Rubrene is considered the centre of attention among all derivatives. At the same time, pentacene crystals have higher mobility in a thin film state, which better helps in charge transport compared to that of bulk phase.The image in organic semiconductors looks considerably more intricate or sophisticated than traditional inorganic semiconductors while comparing these materials' electrical structures. Inorganic semiconductors typically require a therapy that considers both electron-electron and electro-phonon interaction but are readily characterised through one-electric (band-like structures). This article will hopefully be helpful for those who work in the same field.

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CUSTOMER SATISFACTION TOWARDS ONLINE SHOPPING WITH SPECIAL REFERENCE TO KANNUR DISTRICT, KERALA

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ABSTRACT

It's the era of technology where everything can be done using an online platform or internet. Technology has become a part and habit of peoples life. Busy Schedules day by day increased travelling expenses have shifted the mind set of people to prefer and do shopping using online medium. Many businesses have used this opportunity of developed technology and started to do business on online platform. The success of every business depends on retaining its existing customers, only a satisfied customer will retain in business. Therefore studying about customer satisfaction is very important for the future growth and existence of online shopping as tough competition is going on now a day's. Even though generally people are satisfied with online shopping there are certain areas where the customers have mentioned their problems where the marketers need to consider and improve for their successful continuation in future.

1. Introduction

Online shopping or retailing or Electronic purchasing is a form of online trade allowing customers to directly purchase goods and services from a seller through an online media with the help of internet. More people prefer online shopping because of its wider advantage like convenience, mind blowing discounts and offers, home delivery etc. Online shopping plays a vital role in the economic development of a country. The life style and habit of people are changing day by day it's usually the behavior of the people to complete everything within short span of time as they are very busy with their life schedules. In online shopping Sitting in a person's convenience they will be able to do their shopping activity without any outside disturbances that too at single clicks. The success of every business depends on how they can retain their customer either it may be an online or traditional mortar business, where the topic of customer satisfaction plays an important role. A customer is said to be satisfied if he could able to meet the requirement of the product as per his expectations. A satisfied customer is an unpaid form of advertisement as far a business is concerned, existing customer's positive opinion and suggestions helps in creating another pool of customers for the business. Rather than spending huge amount on part of advertisement expenses its better for a company to meet the customers' expectations through their product features by analyzing the customer's needs and implementing the same in their product features, hence it's very important to understand the customer satisfaction level in the business. This study mainly intends to understand the customer satisfaction level with regard to online shopping.

Review of Literature

Dr.Asha**,** has carried out a study based on Kerala for understanding about the customer satisfaction with regard to online shopping, it was found in the study that the level of customer satisfaction is varying based on age and income of the respondents majority of the respondents are satisfied with the product range choices offered by the online retailers.

Sino Shajan (2020) a comparative study based on Kerala was conducted to understand the level of satisfaction received between Amazon and Flip kart in Kerala. The analysis shows that comparatively male customers are more depending on online shopping and customer satisfaction is more in case of Amazon than flip kart with relating to warranty, quality of product, replacement policy etc.

Jayasubramanian.D etal (2015) has carried out a research for understanding the customer satisfaction towards the online shopping the analysis of the study exhibits that online shopping has opened new doors to the business world with wider opportunities customers have

accepted this wholeheartedly. The study shows that even though people generally go for online shopping still they are not trustworthy about online shopping because of many fraudulent activities which is effecting the customer satisfaction negatively. Considering the overall sample only 76% of them are satisfied with online shopping.

Comparing to all other industries retailing through online has improved in customer satisfaction jumping to 1.3% to an index score of 81.the success story of this shows that online retailing was able to develop an influential factors leading to higher customer satisfaction so in future it's going to open wider doors for the online retailers. There is always a chance that a satisfied customer would bring more loyalty in the online business.

Objective

1. To analyze the satisfaction level of customers with regard to different aspects of online Shopping.
2. To understand the factors influential for customers preference to rely on online shopping.

Statement of the Problem

Considering the customers view point years back they are satisfied with all the products which the business is offering as a result it's easy for the business to market their product, but now a days the situation has changed a lot each customer is unique in their needs along with which higher education, availability of all the information related to anything in the world at a single clicks make the business marketing and retaining their customer more tough in the present era. Each customer should be handled in different ways and make sure that we are able to meet the needs of the customer so that they are retained as a loyal customer. This is not a different case in online retailing as more and more online shopping sites are budding up day by day, so it's very important for the marketers to understand the level of satisfaction of the customer. Wider dependence on smart phones and internet has made online shopping a habit among people. This study would add a value to the marketers for understanding the level of satisfaction of customers with related to different aspects of online shopping.

Research Methodology

This study is mainly carried out for understanding the satisfaction level of customers through online shopping, relied both on primary as well as secondary data, primary data where mainly collected through a structured questionnaire, a total of 100 respondents have been taken for the study using convenience sampling, data related with different aspects of online shopping where collected for understanding the customers level of satisfaction. The analysis of data has been done using a percentage analysis.

Data Analysis and Interpretation

A sample of 100 was taken for the study, data were collected from respondents using a structured questionnaire, and the analysis of data is done using percentage analysis, the analysis shows different aspects collected on behalf of online shopping for understanding the customer satisfaction through online shopping.

Table: 1 Age of the respondents

Age	No of Respondents	Percentage
18-21	55	55%
22-25	18	18%
26-30	15	15%
31-40	9	9%
Above 40	3	3%
Total	100	100%

Source: Primary Data

From the above table we can understand that 55% of respondents belong to the age category of 18-21 ,while it was only 3% of respondents within age category of above 40 goes for online shopping, indicating that younger generation are more attracted towards the same comparing to the older age group.

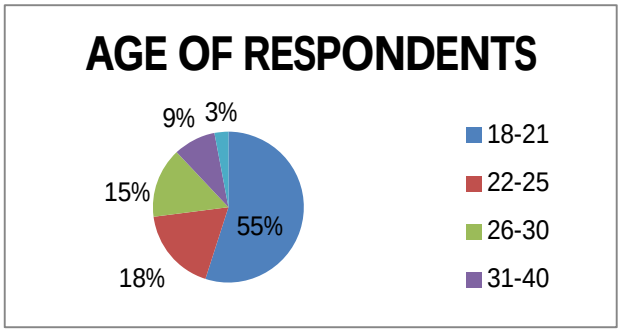


Table: 2 Genders of Respondents

Gender	No of Respondents	Percentage
Male	55	55%
Female	42	42%
Transgender	3	3%
Total	100	100%

Source: Primary Data

The above table specifies about the gender of the respondents in which 55% where male,42% female and 3% transgender which shows that male respondents are dominated in online shopping comparing to female customers.

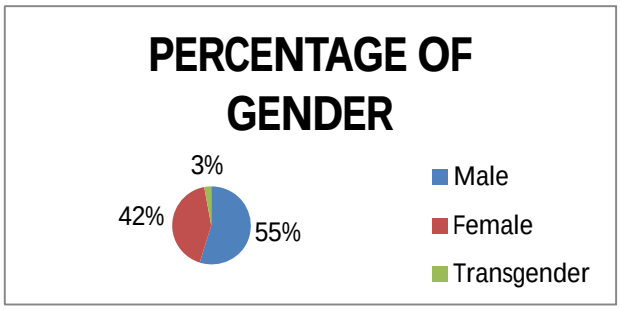


Table 3: Monthly Income

Monthly Income	No of Respondents	Percentage
Below 10,000	40	40%
10,000-15,000	13	13%
15,000-20000	14	14%
20000-25000	32	32%
Above 25000	1	1%
TOTAL	100	100

Source: Primary Data

The above table specifies the income group in which the respondent belongs which shows that around 40% of respondents fall under the category of below 10000 while it was only 1% of respondents who are above the income level of 25,000

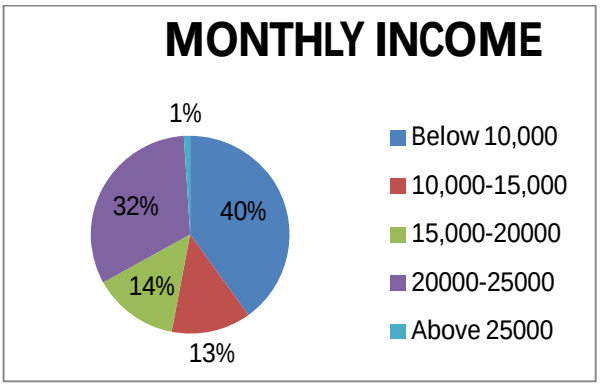


Table 4: Factors influenced for purchasing through online

Reasons	No of Respondents	Percentage
Time Saving	32	32%
Affordable price	24	24%
Different Brands Availability	20	20%
Unique and variety products	18	18%
Situational Factors	6	6%
TOTAL	100	100%

Source: Primary Data

The above table explains about the various influential factors which has been considered by the people to go for online shopping, time saving goes with 32% which is the most influential factor followed by affordable price, situational factors is the least influential factors for online shopping.

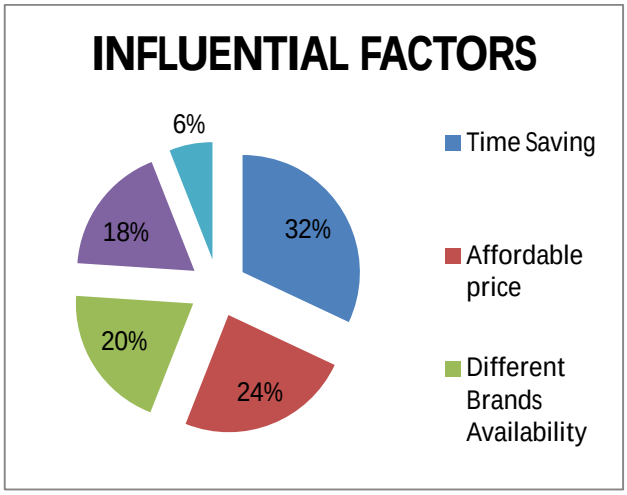


Table 5: Mode of Payment Preferred

Mode of Payment	No of Respondents	Percentage
Credit card/Debit card	38	38%
Cash on Delivery	29	29%
Internet Banking	26	26%
EMI	7	7%
Total	100	100%

Source: Primary Data

The above table explains about the mode of payment preferred in online shopping for online shopping people mostly relying on credit card and debit card for making the

payment with 38%, the least preferred is EMI facility with 7%

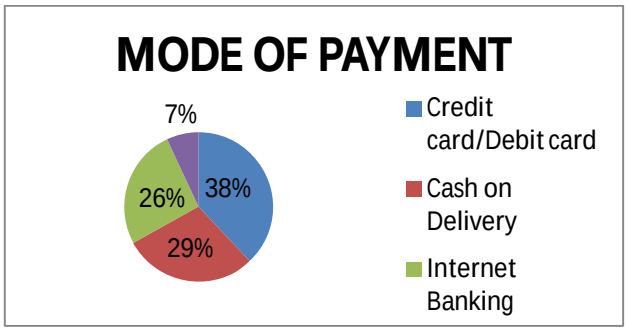


Table 6: Frequency of purchasing through online

Frequency	No of respondents	Percentage
Occasionally	62	62%
Monthly	27	27%
Weekly	9	9%
Twice a week	2	2%
Total	100	100%

Source: Primary Data

The above mentioned table shows that 62% of people buy products through online occasionally,27% people do online shopping on monthly basis,9% on weekly basis while 2% people does online shopping twice a week

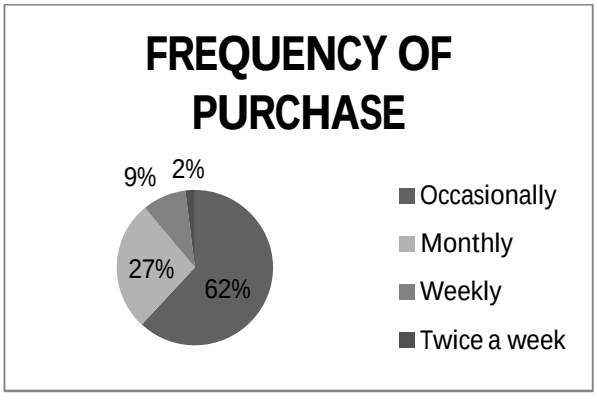


Table 7: Customer satisfaction related with product price in online shopping.

Rating	No of Respondents	Percentage
Satisfied	63	63%
Highly Satisfied	12	12%
Neutral	25	25%
Dissatisfied	0	0%
Highly Dissatisfied	0	0%
Total	100	100%

Source: Primary Data

From the Above table it's an evident that 63% of respondents are satisfied with price range of the product offered through online, while it was mind blowing that no respondent has expressed a dissatisfaction with related to product price in online shopping.

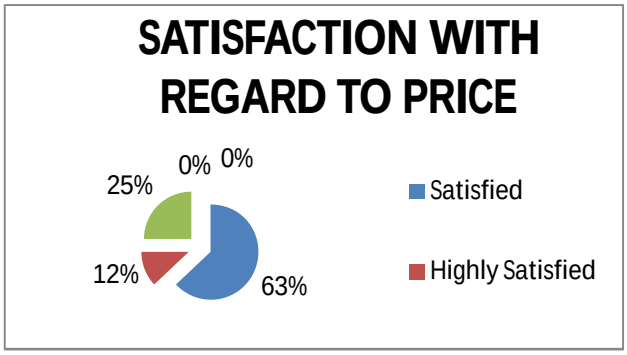


Table 8: Customer satisfaction related with Products quality

Rating	No of respondents	Percentage
Satisfied	51	51%
Highly Satisfied	7	7%
Neutral	37	37%
Dissatisfied	4	4%
Highly Dissatisfied	1	1%
Total	100	100%

Source: Primary Data

Considering the quality of product the above table shows that only 51% of respondents are satisfied while 37% expresses their opinion as neutral with regard to product quality delivered through online shopping and 1% respondents has expressed their dissatisfaction.

Table 9: Customer satisfaction related with Delivery time

Rating	No of respondents	Percentage
Satisfied	59	59%

Highly Satisfied	10	10%
Neutral	27	27%
Dissatisfied	3	3%
Highly Dissatisfied	1	1%
Total	100	100%

Source: Primary Data

The review from the above table shows that 59% of respondents are satisfied with the delivery time, 27% expresses it as neutral and 1% as highly dissatisfied.

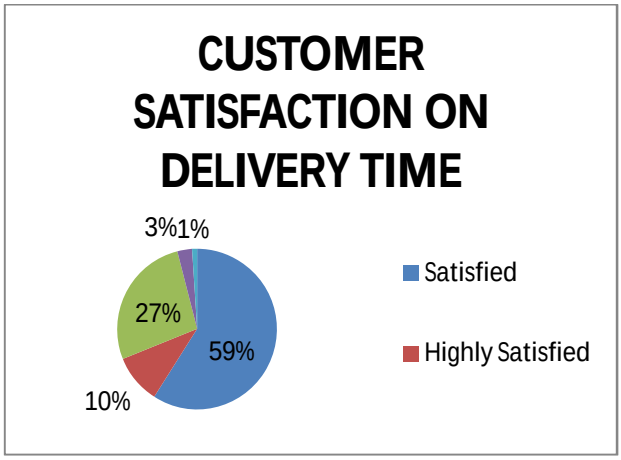


Table 10: Recommending Online shopping or not

Opinion	No of Respondents	Percentage
Yes	86	86%
No	14	14%
Total	100	100%

Source: Primary Data

86% of respondents express their opinion that they would recommend for online shopping based on their previous experience while 14% has expressed that they would not recommend for online shopping.

Table 11: Customer satisfaction with the behavior of Delivery Agent.

Factor	Percentage
Satisfied	58%
Neutral	22%
Highly Satisfied	17%
Dissatisfied	3%
Highly Dissatisfied	0%

Source: Primary Data

The above table mentions about the behavior of the delivery agent 58% of people are satisfied with the behavior of person delivering the product while 3% expressed their dissatisfaction caused because of the behavior of the delivery agent.

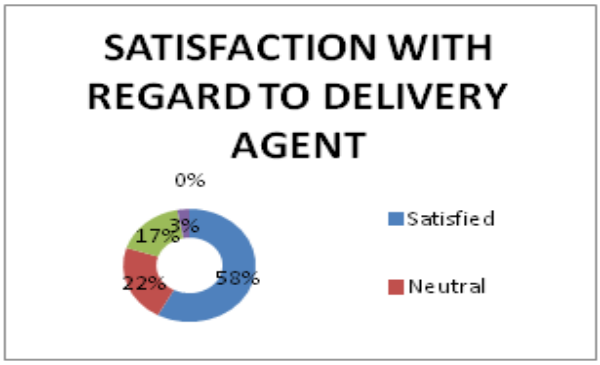


Table 12: Reason for returning the product.

Factor	No of Respondents	Percentage
Low Quality	28	28%
Damaged Product	27	27%
Wrong Product	24	24%
Others	21	21%
Total	100	100%

Source: Primary Data

The above mentioned data shows that 28% of respondents have returned their product because of the low quality of the product, while 27% returned because of receiving damaged product and 21% returned because of other related reasons.

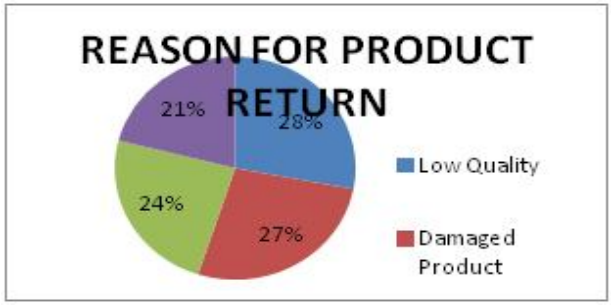
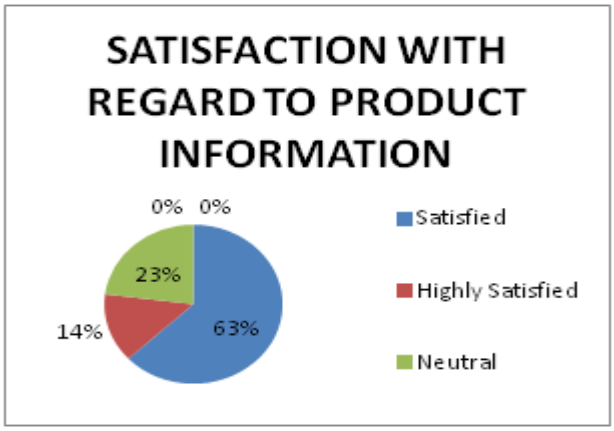


Table 13: Customer satisfaction with regard to product information provided in the sites.

Factor	No of respondents	Percentage
Satisfied	63	63%
Highly Satisfied	14	14%
Neutral	23	23%
Dissatisfied	0	0%
Highly Dissatisfied	0	0%
Total	100	100%

Source: Primary Data

The above table shows that 63% of respondents are satisfied with the product information provided in the concerned sites while no respondents have marked any dissatisfaction related to the same.



Findings

1. 55% of respondents belong to age category of 18-21 years, there is only 3% of people above age 40 who prefer online shopping.
2. The result shows comparatively male people prefer online shopping than female with 55%.
3. Mainly online shopping is done by those income category people who are having a monthly income of below 10000.
4. Time saving is the most influential factor for online shopping with 32% followed by affordable price with 24%.
5. Payment for online shopping is mainly done using debit or credit card with 38% followed by cash on delivery at 29%.
6. 62% of people purchase through online on occasional basis while 27% on monthly basis and 2% twice a week.
7. 63% of respondents are satisfied with price of the product in online shopping while nobody has expressed dissatisfaction.
8. 51% of customers are satisfied with the quality of product offered through online while 37% expressed only neutral opinion.
9. 59% of respondents were satisfied with delivery timings 27% expressed only a neutral opinion.
10. 86% expressed that they may recommend to their friends and relatives to opt for online shopping.
11. 58% of respondents are satisfied with the behavior and service of delivery agent.
12. 28% of people responded that they return the product because of low quality, 27% because of damaged product, and 24% because of wrong product received and 21% returned because of other reasons.
13. 63% of respondents expressed that they are satisfied with product information provided in the retailer site.

Suggestions

Detailed analysis of the findings shows that mostly younger generation are motivated towards online shopping the marketing team has to take utmost initiative to develop a marketing strategy for influencing the middle as well as old age people towards online shopping. The quality of the product offered must be improved because people now a day's give more preference to quality of product irrespective of price. Frequent returning of product because of quality issue may negatively affect the business as a whole. Availing the product on right time is another important factor. Delivery time must be reduced as much as possible so that we will be able to provide the product on right time. Measures should be taken to reduce the returning of the product especially because of delivery of damaged product, wrong product etc.

Conclusion

The success of every business depends up on its ability to retain their existing customers as well as in budding up new customers. Every customer purchase a product or avail a facility in order to meet their needs their satisfaction level depends up on the performance of the

product or how much the product was able to fulfill their needs, today it's very hard to develop a loyal customer for a business either it may be an online or traditional brick or mortar business. Customer satisfaction plays an important role in the sustainability of each and every business, especially in this developing era more and more online business are budding up day by day with this stiff competition the online business can retain only by providing products to the customers which is good in quality, affordable price, on time delivery etc.The online marketers still need to move forward in creating marketing strategies for influencing the customers of all age group, along with which they have take a serious revision with regard to the quality of the product too otherwise it will be difficult for the existing retailers to withstand with the tough competition which will be a head in the near coming future.

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BUYERS DECISIONS ON PURCHASE OF ELECTRONIC GOODS IN CHENNAI CITY

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ABSTRACT

This examination presents buyer's dynamic styles towards acquisition of electronic merchandise specifically, Mobile telephones, Laptops and so forth in Chennai city. The Consumer Style Inventory for exploring diverse customer dynamic styles, was taken on in this examination. A pre-tried poll was utilized as the apparatus to gather essential information and the essential information was gathered from 412 customers in Chennai city. This paper particularly presents the buyers' dynamic styles dependent on electronic merchandise. The outcome shows that there is no critical contrast between the customers.

***Keywords**: Investigation, Decision-production styles, Electronic Goods, Chennai City.*

Introduction

Since the execution of Globalization in India has gotten one of the cutthroat businesses sectors particularly in hardware area. The Electronic products market develops to be unified with acceptable potential and a beneficial to the business world. Considering the above contest in the gadgets market, having a superior comprehension of now-a-days oddity purchaser purchasing conduct, particularly dynamic styles, this investigation might assist with advertising business people to contend in this field. Prior investigations on purchaser dynamic issues were centredaround the dynamic interaction. In spite of the fact that, contemplates contend that shoppers may here and there ordinarily depend on straightforward techniques, as opposed to going through a progression of steps or cycles normally when they settled on buy choices. In this viewpoint, Sproles and Kendall (1986) added to look at customer dynamic interaction by investigating buyers into different dynamic styles. The styles are observed to be the exceptionally focussed with certain purchaser item attributes. Since electronic great market attributes not really settled its conclusive buy conduct by purchasers. Albeit, this investigation considers into the specific models in connection with customer dynamic styles in electronic merchandise in Chennai city experience issues. Thus, the scientist is planned to contribute the advertisers for better understanding the conduct of Chennai city towards electronic products. Purchaser dynamic styles and purchasing conduct acquires a lot of significance in the space of promoting.

Review of Literature

The investigation of Consumer dynamic is characterized as the personal conduct standards of customers that continue, decide and follow the dynamic interaction for the securing of need fulfilling items, thoughts or administrations:
(Zeithaml, 1988; Levy, 1999). In view of individual mental directions, every purchaser creates and rehearses this dynamic cycle in various manners which have been portrayed as dynamic styles.
(Sproles and Kendall, 1986). It is turning out to be so significant for advertisers all around the world to know how shoppers choose which specific item, brand or administration to buy. Purchasing conduct is the choice cycles and demonstrations of individuals associated with purchasing and utilizing item. Numerous past examinations zeroed in principally on the dynamic cycle.
(Sproles, 1979) contends that buyers may now and again commonly depend on basic systems, as opposed to going through a progression of steps or cycles reasonably when they settled on buy choices.
(Sproles and Kendall 1986) spearheaded to explore on shopper dynamic cycles by characterizing buyers into various dynamic styles. To foster a viable showcasing technique

organization should focus closer on shoppers and study their dynamic interaction. Understanding purchasing related dynamic styles of buyers is significant for organizations essential showcasing exercises, and compelling correspondence with the designated fragment might benefit from outside input by understanding the mental cycles that influence their conduct. The Consumer Style Inventory (CSI) to decide the essential attributes of customer dynamic styles.

Objectives

The CSI has eight measurements in particular,

(1) Perfectionist top notch cognizant customer – a trademark estimating how much a buyer look cautiously and efficiently for the best quality in items.

(2) Brand cognizant value rises to quality shopper – estimating a customer's direction to purchasing the more costly notable brands.

(3) Novelty style cognizant shopper – a trademark recognizing purchasers who seem to like new and imaginative items and gain fervour from searching out new things.

(4) Recreational gluttonous buyer – a trademark estimating how much a customer discovers shopping a charming action and shops only for entertainment only.

(5) Price cognizant incentive for cash customer – a trademark recognizing those with especially high awareness of offer costs and lower costs overall.

(6) Impulsive indiscreet buyer – recognizing the individuals who will in general purchase spontaneously and seem indifferent the amount they spend or getting best purchases.

(7) Confused by over decision shopper – a trademark distinguishing those purchasers who see such a large number of brands and stores from which to pick encountering data over-burden on the lookout and

(8) Habitual, brand-steadfast buyer – a trademark showing shoppers who have most loved brands and stores, who have framed propensities in picking these tediously.

Methodology

Table – 1. Consumer Decision-Making Styles in Purchase of Electronic Goods

S. No.	Item	Mean	S.D.	Rank
	Perfectionistic	**3.56**	**0.913**	**1**
1.	Getting very good quality is very important to me	4.03	.959	1
2.	When it comes to purchase, I try to get the very best or perfect choice	3.79	.978	3
3.	I make special effort to choose the very best quality product	4.05	.724	2
4.	My standards and expectations that I buy are very high	3.46	.913	13
5.	In general, I usually try to buy the best overall quality	3.77	.842	4
6.	A product does not have to be perfect or the best to satisfy me	2.87	.978	30
7.	I shop quickly, buying the first product or brand that seems good enough	2.95	.999	27
	Brand Consciousness	**3.39**	**0.90**	**2**
8.	The well-known international/ national brand is best for me	3.59	.880	7
9.	The more expensive brand is usually my choices	3.05	.957	24
10.	The high price, the better its quality	3.54	.996	10
11.	Nice department and specialty stores offer me the best brand	3.62	.877	6
12.	I prefer buying the best-selling brand	3.59	.880	9
13.	The most advertised brand is usually very good choice for me	2.97	.843	26
	Fashion consciousness	**2.84**	**0.88**	**8**
14.	I usually have one or more product of the very newest style	2.74	.966	37
15.	I keep my products upto date with the changing technology	2.92	.870	29
16.	Attractive design is very important for me	2.79	1.031	35
17.	To get variety, I shop different stores and choose different brand	2.77	.667	36
18.	It is fun to buy new and exciting	2.95	.887	28
	Price Consciousness	**3.24**	**0.744**	**5**
19.	I buy as much as possible at discount prices	3.49	.683	11
20.	The lower prices are usually my choice	2.79	.801	34
21.	I look carefully to find the best value for the money	3.44	.680	14
22.	Commonly I choose with special offers in shopping	3.26	.818	16
	Impulsive	**3.33**	**0.894**	**3**
23.	I should plan my shopping for more carefully than I do	3.49	.823	12
24.	I am impulsive when purchasing	3.23	.986	19
25.	I often make careless purchases of and I wish I had not	2.72	.972	38
26.	I take the time to shop carefully for getting the best	3.64	.843	5
27.	I carefully watch how much I spend for buying	3.59	.850	8
	Confused	**3.00**	**0.967**	**6**
28.	There are so many brands and I often feel confused	2.87	1.005	31
29.	Sometimes it is hard to choose which stores to shop	3.15	.933	22
30.	The more I learn about the electronic goods, the harder it seems to choose the best.	3.15	.933	21
31.	All the information I get on different Confuses me	2.82	.997	33
	Brand Loyal	**3.29**	**0.84**	**4**
32.	I have favourite brand of that I buy over and over	3.21	.864	20
33.	Once I find suitable brand of that I like, I stick with it.	3.41	.637	15
34.	I go to the same stores each time I shop.	3.26	1.019	17
	Recreational	**2.99**	**0.861**	**7**
35.	Going shopping is one of the enjoyable activities of my life	2.87	.906	32
36.	Shopping the stores wastes my time	3.15	.904	23
37.	I enjoy shopping just for the fun of it	3.00	.918	25
38.	Shopping is not a pleasant activity for me	2.69	.731	39
39.	I make shopping trips fast	3.26	.850	18

This investigation has expected to investigate the shopper dynamic styles of Mobile Phones and Laptop Computers. To accomplish the exploration unbiased, the specialist has dispersed 509 surveys and successfully returned 412 polls were utilized for this investigation. The survey has 39 explanations concerning Consumer Decision-Making Inventory comprises of eight styles as per Sproles and Kendall (1986) by embracing Likert's five-point scale (Strongly Agree – 5, Agree – 4, Neutral – 3, Disagree – 2 and Strongly Disagree – 1) was utilized to quantify the reactions. Unmistakable measurements (Mean and Standard Deviation) and InferentialStatistics (Multivariate investigation of difference) are embraced.

Results

Circulation of respondents in this investigation shows that 69.32 percent (n = 296) of them are male and 30.68 percent (n = 131) of them are female. With respect to conveyance of purchaser dynamic style of electronic merchandise buy the things of:

- The best quality item.
- When it comes to buy.
- Perfect decision and great quality.
- Buy the best generally quality.
- Getting the best items.
- Offering best brand.
- The notable global/public brand is ideal.
- Spend for purchasing for electronic products.
- Prefer purchasing the exorbitant cost, superior grade got the most elevated mean qualities.

The respondents are probably going to buy an awesome quality with better expectations and notable worldwide/public brand. The outcomes show that there is no critical relationship among purchasers.

Examination of Consumer Decision Making Style

Shoppers In request to analyse the mean scores on customer dynamic style of purchasers, One-way Multivariate investigation was taken on; from the outset, the examination utilized Box's M to check the variations. The acquired Box's M worth of dynamic styles of buyers is 78.901 with the 'p' 0.026. It implies there is critical distinction among the shoppers in their buy dynamic. Further the general outcome shows Wilk's□ esteem is 1.646 with the 'p' 0.153, which didn't show any importance, so the change of dynamic style of buyers concerning their sex. The Levene's trial of balance of blunder changes shows that the buyers have fairly minor departure from brand cognizant, imprudent, and confounded.

Discussions and Conclussions

In this investigation, correlation on Consumer Decision-production styles of shoppers in Chennai city on acquisition of electronic great contrast fairly on brand cognizant, imprudent and confounded. The most elevated styles on dynamic are observed to be stickler, brand cognizant's hasty and brand steadfast, separately. The respondents are probably going to buy an excellent quality with better expectations and notable worldwide/public brand. The outcomes show that there is no huge relationship among purchasers. Consequently, it is recommended that promoting directors should see these qualities of electronic great buy conduct of customers, so their advertising methodologies can obviously focus on these attributes.

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PURCHASER ATTITUDES ON VARIOUS PURCHASING CONDUCT OF RUSTIC INDIA

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ABSTRACT

It's generally simple to gauge what rustic shoppers purchase, where they purchase from and the amount they purchase. Understanding why they purchase is the most troublesome in country India and what components instigate them to purchase. This examination attempts to discover the variables answerable for various purchasing conduct of the country shoppers and how these components assume a significant part in the rustic customers purchasing dynamic cycle. The variables, for example, family size, item bundling, age, culture, and publicizing affect buyers' dynamic cycle, whereas cost is related to item. Rustic purchasers are on a very basic level not quite the same as their metropolitan partners. The lower levels of education and restricted openness to item and administrations are notable, yet there are additionally contrasts in utilization designs with an immediate effect on pay levels and pay streams, and an undeniable degree of between reliance influencing the elements of rustic buyer conduct. All add to make rustic purchaser conduct different from the metropolitan shopper. To comprehend this an overview was directed and Analytical Hierarchy Process procedure was applied to contemplate the cooperation of one factor to other.

***Keywords**: Attributes, Buying conduct, Culture, dynamic, country market.*

Introduction

The public Sample Surveycharacterizes rustic business sectors as those spaces with less than 5,000 inhabitants, a populace thickness under 400 individuals for each square kilometre and somewhere around 75% of male working populace utilized as agriculturists. India is a thickly populated area, in certain states with no under 1102 people living for each sq. km. The economy of certain states developed at a yearly pace of 11.36 percent during the period 2004-05 to 2010-11. This development interaction can be named as recovery of a stale economy. The development pace of the state economy in 2010-11 more than 2009-10 was 14.8 percent. This was conceivable in light of the fact that there was considerable expansion in open speculation. Indian economy has gone through some primary changes throughout the long term. One of the superb purposes behind this is the development of country market. Country wages have been developing at a quicker speed in the course of recent years, assisting with representing utilization of labour and products. Non-food consumptions are developing at an 8.2 percent yearly build rate. Rustic families are buying a wide scope of items—vehicles, versatile, level screen TVs, DTH, bicycle, hair oil, toothpastes, cleanser, shaving cream, bath powder — that as of not long ago would have been past their range. Some mechanical areas have seen astounding development coming from rustic purchasers. Because of globalization and advancement, the provincial market has seen gigantic development. Like any market that has seen an interest and mindfulness blast, rustic locales have been seeing significant ascent in buying power. Rustic customers are purchasing more wellbeing, cleanliness, individual preparing, pressed food sources items reflecting ascent in flourishing. An adjustment of utilization examples and admittance to correspondence media have made rustic market an essential part in the business development of the organizations particularly with interest for some classes of items and administrations immersing in the metropolitan business sectors. This spray in rustic utilization is the thing that energizes strategy producers and business pioneers the same. For each new chance for a resident to utilize his cell phone to ensure his harvests, there is a thump on a promising circumstance for him to buy a little cooler or a cruiser. There is a developing acknowledgment that worldwide speculation and development will progressively come from country populaces, as their investment funds

convert into utilization. The increment in rustic buying power is reflected in numerous ways. It is somewhat simple to quantify what provincial shoppers purchase, where they purchase from and the amount they purchase. Understanding why they purchase is the most troublesome in rustic India and what elements incite them to purchase. Advertisers need to examine the shopper reaction to showcasing improvements routinely and investigate the purchaser's black box to adjust their promoting techniques to get the necessary reaction. The primary focal point of this investigation is to know the connection and effect of different elements more than each other and the level of relationship with the rustic purchaser purchasing conduct. The elements considered at this investigation are cost, family size, item bundling, age, culture, and publicizing. Also, this investigation will predominantly resolve the issues applicable to how value, family size, item bundling, age, culture, and publicizing influence customer brain science and conceivable change in purchasing conduct. For this reason, AHP – Analytical Hierarchy Process; Which is a multi-standards dynamic (MCDM) approach has been applied to recognize the connection of one factor over another. These components are additionally focused on to see the need of one factor over another. AHP, created by Satty in 1980 (Saaty, 1980), is a simple and practical multi target assessment technique generally utilized for multi object assessment exercises. It is expected for abstract assessment of a bunch of choices dependent on various measures ready in a progressive plan. At the high level, the models are assessed and at the lower levels, the choices are assessed by every basis. The assessment is evaluated autonomously for each level and sublevel emotionally. By making a couple insightful correlation network, an abstract assessment for each pair of things is surveyed (Dyer, 1990).

Objectives

- To comprehend the variables answerable for various purchasing conduct of the rustic shoppers.
- How these variables assume a significant part in purchasing choice

Literature Review

The Survey (2011) showed that the significant things which represented around 45-50 percent of the rustic market were washing cleansers, cleaning materials, toiletries and food and drink. But the overview additionally saw that the development rate was extremely critical in specific things like beauty care products and toiletries over the time of five years. The development rate saw on account of beauty care products showed that the rustic ladies were not lingering behind their metropolitan partners. It likewise specifies that numerous provincial purchasers in rustic regions come up short on the biases that make their metropolitan partners impervious to change. To a few, buyer conduct is inseparable from advertising. Robertson and Kassarjian (1991), for instance, characterize buyer conduct as ―the logical investigation of purchaser activities in the marketplace‖. In any case, others see buyer conduct as free of promoting or a specific discipline. Jacoby (1976), for instance, characterized shopper conduct as ―the obtaining, utilization and demeanour of merchandise, administrations, time and thoughts by dynamic units. Arndt (1976) proposed that buyer conduct includes the issues experienced by citizenry in the obtaining and acknowledgment of their way of life. They are quick to explore different avenues regarding new items, new administrations and new interaction. The therapists fostered the chain of importance of impacts model, which recommends that conduct is made out of three measurements: intellectual, full of feeling and social (Lavidge and Steiner, 1961). The intellectual measurement includes creating mindfulness and information, the emotional segment identifies with creating sentiments and perspectives, and the social measurement includes advancement of conviction or expectation and real conduct, for example, buy dynamic method. (Lavidge and Steiner, 1961). In the promoting writing, people with a serious requirement for comprehension have been displayed to measure and assess publicizing data more altogether than those with a low requirement for discernment. They will in general be affected by message significant musings as opposed to fringe prompts such

underwrite engaging quality (Haugtvedt and Petty, 1992), representative validity (Petty and Cacioppo, 1986), humor (Zhang, 1996) or the quantity of contentions introduced (Cacioppo et al., 1983). In a broad writing survey of the subject, Cacioppo et al. (1996) found that people with a serious requirement for comprehension would in general handle data all the more completely and would in general take part in more broad data search than those with a low requirement for cognizance. This proposes that people with a significant requirement for discernment may utilize a wide scope of data sources, which diminishes their overall inclination for relational sources. Then again, people with a low requirement for comprehension are less spurred to assemble and handle broad crude data and are bound to acknowledge effectively prepared data given to them by confided in close to home sources. Murray and Schlacter (1990) characterized apparent danger as a multi-dimensional build. It addresses buyers' pre buy vulnerability identified with the kind and level of expected misfortune coming about because of the buy and the utilization of an item or administration. Conceivable misfortune classes are monetary misfortune, execution misfortune, mental misfortune, social misfortune and comfort misfortune (Arndt, 1967b; Bansal and Voyer, 2000). Past research has reliably perceived seen hazard as a crucial idea in shopper data search (Arndt, 1967b; Chaudhuri, 2000; Murray and Schlacter, 1990). Arndt, for instance, discovered that _to adapt to the perils of purchasing, buyers will in general foster danger dealing with methodologies. One such methodology is look for extra data from some of sources' (1967b: 303). Bansal and Voyer (2000) tracked down a negative impact of item mastery on saw hazard, and a positive impact of apparent danger on verbal data effectively looked for.

The Factors Affecting Rural Marketing

Country India has gone through a quick change over the most recent couple of years. Organizations have reacted by modifying items for rustic shoppers like more modest packs (Sachets), coinage evaluating and so on A few organizations, for example, HUL, ITC, Tata, Godrej, Eveready and so forth have advanced new correspondence and appropriation channels. The advancement of foundation prompting better availability by street, by telephone and admittance to broad communications through TV and expanded charge of families has opened up the country markets for purchaser durables. These components have expanded buying power and the interest for new items. Government centre around neediness mitigation and the rustic populace has prompted critical spending on drives. The rustic customer of India is advancing from the lack stricken, uninformed generalizations of the old occasions with a dread of progress and an unwillingness to use, to turn out to be more educated and worth driven. Presently let us comprehend the components which impact the rustic purchaser.

- **Culture**

Culture is one of the huge determinants of an individual's conduct in rustic region. As a kid experiences childhood in the rustic air, he gets a bunch of qualities, discernment, inclinations and practices through the family and other key affiliation required at each phase of his life. The dependable genuine conduct showed by an aggregate gathering is dictated by culture. Anyway, the level of effect that culture will have on conduct will rely upon the thinness of a culture or its consolidation with different societies. The rustic regions culture is very unique in relation to the metropolitan regions. Customs, celebrations, gathering seasons and hindrance to purchase new things are a portion of the critical elements of country shoppers. The board scientists have generally utilized Hofstede's (1980, 1997) meaning of culture, which likens culture to "the aggregate programming of the psyche which recognizes the individuals from one gathering or classification of individuals from another‖ (Hofstede, 1997, p. 5). Culture impacts conduct through its signs: values, saints, ceremonies, and images (Hofstede, 1997). These are the structures still up in the air information is put away and communicated. Hence, each social gathering has diverse social appearance.

- **Bundling of Goods**

Bundling assumes a significant part in the item offering for rustic business sectors as it is connected with reasonableness, the capacity to recognize, simplicity to clients and the allure of the item. Bundling at the essential level includes ensuring the item, while at the optional level, it adds to the style and deals allure of the item. Bundling for country showcases needs a unique centre as a result of different difficulties like helpless vehicle framework, troubles of safe stockpiling because of helpless cold stockpiling and inadequate force supply in the provincial regions. Throughout the long-term bundling materials have gone through a lot of progress. Tetra packs has gotten ubiquitous. The utilization of tetra packs has guaranteed longer timeframe of realistic usability even without refrigeration. Most of FMCG items like shampoos, tea, confectionaries, cleansers and so on have plastic bundling. Country purchasers like splendid tones. Lifebuoy is distinguished as red cleanser. Different models incorporate Dabur Lal Dant Manjan, Eveready red battery, Brooke Bond red Label tea and so forth Unmistakable lettering, utilization of nearby dialects on the pack and pictures or images that pass on the item advantage impact shopper insight about the brand. The social and social contrasts in country regions popular bundling varieties for items. Shoppers perceive and recollect brands by shadings, visuals or numbers like Godrej No.1 soap,555 cleanser bar, Ghari cleanser, cycle agarbatti and so on.

- **Cost**

It is the measure of cash a purchaser should pay to get the option to utilize an item (Hawkins, Best and Coney 2001). The right value impacts the amounts of different items or administrations that the rustic shoppers will purchase. Advertisers regularly incorrectly see cost as their possibly cudgel while focusing on provincial shoppers. Actually, country buyers are driven by an incentive for cash and not cost alone. Distinctive advancement plans by the state and local government has expanded the progression of cash. It implies an increment in their buying force of the provincial purchaser. Provincial shoppers actually don't see the superior worth of brands. They are glad to manage items particularly customer durables which offer essential capacities. Costly items with hard to deal with highlights is for the most part not preferred by rustic shoppers. Gillette Guard was dispatched to give top notch shave at a reasonable cost for men in the provincial regions. Rustic purchasers by and large contrast items cost with a reference cost considered sensible for a specific sort of item. The reference cost depends on either the memory of past costs or on the cost of different items on a similar rack or a similar product offering. In view of the reference value the purchaser decides whether costs are excessively high, too low or on track. Rustic shoppers are profoundly associated with the acquisition of horticultural items and wedding things. Here cost assumes a significant part, yet not at the expense of value.

- **Family Size**

Rustic purchaser conduct is additionally impacted by family size and design. As the family size increments so does the utilization of items. In such a case, the interest for family pack or the economy top off pack increments. In like manner enormous families have more bread workers which mean higher family pay and consequently more utilization of items. This regularly prompts multi brand utilization of an item classification among various relatives. Rustic districts are steadily moving from the enormous joint family framework to the individualized joint family system (families remaining together yet utilizing separate kitchens). This is resulting in more prominent requests, especially for buyer durables, as each new nuclear family living independently needs cleansers, cleanser, hair oil fridge, pressure cooker, TV, DTH and so on

- **AGE**

The acquisition of items and their structures are impacted by age. Like metropolitan regions this is profoundly noticeable if there should arise an occurrence of rustic regions. For example, in the age gathering of twenty to forty the utilization of cruiser, portable, readymade garments is more when contrasted with an individual over sixty. For instance, in country region, youthful grown-ups display a checked inclination for versatile handsets with the most recent elements and innovation

though seniors are happy with recycled mobiles with straightforward and essential elements.

- **Publicizing**

Low education level, helpless media reach and openness and the tremendous and different rustic crowd portrayed by varieties in language, culture and way of life represents various difficulties for speaking with the provincial crowd. For provincial purchasers the message must be straightforward and intelligent. The utilization of schooling with amusement and cut of life bids gets more acknowledgments. Dabur has utilized Bhojpuri film star Ravi kishan, to underwrite its chyawanprash with purchasers, sellers and stockiest. The FM radio broadcast has really developed radio as a mode of country correspondence. TV is the quickest developing and most well-known mass medium in provincial regions. Traditional open-air media incorporates divider artistic creations which is an inescapable type of promoting in rustic districts. Divider canvases are significant as they help provincial individuals continually to remember the brand name and logos, as well as featuring the key brand guarantee.

TABLE 1: Consumer Preferences and surveyed matrix.

	Price	Family size	Product packaging	Age	Culture	Advertising
Price	1	1/5	1/7	¼	1/3	2
Family Size	5	1	3	2	2	7
Product Packaging	7	1/3	1	4	½	6
Age	4	½	¼	1	2	6
Culture	3	½	2	½	1	5
Advertising	½	1/7	1/6	1/5	1/5	1

Methodology

Logical Hierarchy Process is utilized to know the components that affect the rustic shopper purchasing conduct regarding provincial India. The choice procedure depends on the attributes of the issue. The customer makes a decision about the meaning of every measure in pair savvy examinations. An overview of 300 people which included both male and female was directed in the provincial spaces of India to know the impact of these elements on purchasing conduct. Based on members' reaction a network was figured and AHP method was used. Thus, each of the six variables for example value, family size, item bundling, age, culture, and promoting have been focused on by allocating them a particular number subsequent to getting the input from study. The consequence of AHP is a focused-on positioning or weighting of every choice by middle of the road levels. At long last the determination decisions are masterminded at the last level of the pecking order.

TABLE 2: The Saaty Rating Scale

Preference weights/ level of importance	**Definitions**	**Explanation**
1	Equally preferred	Two activities contribute equally to the objective
3	Moderately preferred	Experience & judgment slightly favor one activity over another
5	Strongly preferred	Experience & judgment slightly favor one activity over another
7	Very strongly preferred	An activity is strongly favored over another and its dominance demonstrated in practice
9	Extremely preferred	The evidence favoring one activity over another is of the highest degree possible of affirmation
2,4,6,8	Intermediate preferred	Used to represent compromise between the preferences listed above
Reciprocals	Reciprocals for inverse comparison	

Synthesis with respect to Objective: rural consumer behavior

Overall Inconsistency = .21

Price	.054
Family size	.321
Product Packaging	.238
Age	.133
Culture	.188
Advertising	.066

FIGURE 1: Prioritization of factors influencing buying behavior

Rural consumer buying behavior

Priorities with respect to : Objective : Prioritization of factors influencing rural consumer buying behavior

1. Family Size	.327
2. Product Packaging	.236
3. Culture	.188
4. Age	.133
5. Advertisement	.066
6. Price	.052

Discussions and Conclusions

Discoveries propose that for provincial customers the utilization design is particularly impacted by family size and construction. In the wake of showing up at the decision set in the assessment phase of the purchaser choice interaction, every one of the chose brands are

worthy to the provincial customer. Anyway, in the present circumstance the last decision is directed by the apparent danger related with the item just as by the key powerhouses like assessment pioneers, loved ones. Seen hazard is high among rustic buyers as they think that it is hard to assemble and deal with important data. Because of this explanation they settle on an aggregate choice. Advertisers need to address the apparent danger of country purchasers by displaying the experience of clients and guaranteeing administration conveyance near the shopper's doorstep. Quality and worth are imperative for the achievement of another item as they carry improvement to purchaser lives as far as efficiency. For items that produce the impression of giving solace or working on the nature of regular day to day existence, the cost isn't addressed and the pretended by extra components isn't huge in impacting decision. The rustic purchaser likewise relies on noticed source like displays and street shows since they give a chance to assess the item actually and assimilate important data at their own casual speed. Advertisers need to zero in on diving the data search time by instigating item preliminaries and effectively contacting the buyer through ideal data channels. Advertisers likewise need to comprehend the item explicit assessment measure from essential examination to planning the progression of their image from thought set to decision set. This arrangement with the item inadequacies comparable to contest and works on its odds of determination during assessment. Consumer loyalty is the way to building a beneficial and economical relationship with provincial clients.

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A STUDY ON SPECIAL HOMOGENEOUS CONE $z^2 = 24x^2 + y^2$

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ABSTRACT

The homogeneous ternary quadratic equation given by $z^2 = 24x^2 + y^2$ is analysed for its non-zero distinct integer solutions through different methods. Formulation of second order Ramanujan numbers is illustrated. Also, formulae for generating sequence of integer solutions based on the given solution are presented.

Keywords: *Ternary quadratic, Integer solutions, Homogeneous cone.*

Introduction

It is well known that the quadratic Diophantine equations with three unknowns (homogeneous or non-homogeneous) are rich in variety [1, 2]. In particular, the ternary quadratic Diophantine equations of the form $z^2 = Dx^2 + y^2$ are analysed for values of D=29,41,43,47, 53, 55, 61, 63, 67in [3-11]. In this communication, yet another interesting homogeneous ternary quadratic Diophantine equation given by $z^2 = 24x^2 + y^2$ is analysed for its non-zero distinct integer solutions through different methods. Also, formulas for generating sequence of integer solutions based on the given solution are presented.

Methods of Analysis

Consider thecone represented by the homogeneous ternary quadratic Equation

$$z^2 = 24x^2 + y^2 \tag{1}$$

we present below different methods of solving (1).

Method 1:

(1) is written in the form of ratio as

$$\frac{z+y}{24x} = \frac{x}{z-y} = \frac{\alpha}{\beta}, \quad \beta \neq 0 \tag{2}$$

which is equivalent to the system of double equations

$$24\alpha x - \beta y - \beta z = 0$$
$$\beta x + \alpha y - \alpha z = o$$

Applying the method of cross multiplication, we have

$$x = 2\alpha\beta, \qquad y = 24\alpha^2 - \beta^2, \qquad z = 24\alpha^2 + \beta^2.$$

Note 1:

It is worth to note that (1) may also be represented in the form of ratios as follows:

$$i)\ \frac{z+y}{6x} = \frac{4x}{z-y} = \frac{\alpha}{\beta}, \quad \beta \neq 0.$$

$$ii)\ \frac{z+y}{4x} = \frac{6x}{z-y} = \frac{\alpha}{\beta}, \quad \beta \neq 0.$$

$$iii)\ \frac{z+y}{12x} = \frac{2x}{z-y} = \frac{\alpha}{\beta}, \quad \beta \neq 0.$$

$$iv)\ \frac{z+y}{2x} = \frac{12x}{z-y} = \frac{\alpha}{\beta}, \quad \beta \neq 0.$$

$$v)\ \frac{z+y}{8x} = \frac{3x}{z-y} = \frac{\alpha}{\beta}, \quad \beta \neq 0.$$

$$vi)\ \frac{z+y}{3x} = \frac{8x}{z-y} = \frac{\alpha}{\beta}, \quad \beta \neq 0.$$

Following the procedure as presented above, one obtains different sets of non-zero distinct integer solutions to (1).

Method 2:

Observe that (1) may be represented as the system of double equations as shown in Table 1:

Table 1: System of double equations

System	1	2	3	4	5	6	7	8	9	10	11
$z+y$	$2x$	$3x$	$6x$	$12x$	$24x$	x^2	$2x^2$	$3x^2$	$4x^2$	$6x^2$	$12x^2$
$z-y$	$12x$	$8x$	$4x$	$2x$	x	24	12	8	6	4	2

Solving each of the above system of equations, different sets of integer solutions to (1) are obtained. For simplicity and brevity, the corresponding solutions to (1) are given below:

Solutions to system 1: $x=k,\ y=-5k,\ z=7k$

Solutions to system 2: $x=2k,\ y=-5k,\ z=11k$

Solutions to system 3: $x=k,\ y=k,\ z=5k$

Solutions to system 4: $x=k,\ y=5k,\ z=7k$

Solutions to system 5: $x=2k, y=23k, z=25k$

Solutions to system 6: $x=2k,\ y=2k^2-12,\ z=2k^2+12$

Solutions to system 7: $x=2k,\ y=4k^2-6,\ z=4k^2+6$

Solutions to system 8: $x=2k,\ y=6k^2-4,\ z=6k^2+4$

Solutions to system 9: $x=2k+1,\ y=8k^2+8k-1,\ z=8k^2+8k+5$

Solutions to system 10: $x=2k+1, y=12k^2+12k+1, z=12k^2+12k+5$

Solutions to system 11: $x=2k+1, y=24k^2+24k+5, z=24k^2+24k+7$

Observation 1:

From the suitable values of x,y and z, one may generate second order Ramanujan numbers with base numbers as real integers.

For illustration, in system 11, taking k=5, we have

$$y=725=1*725=5*145=25*29 \quad (3)$$

Now,

$$1*725=5*145\Rightarrow 363^2-362^2=75^2-70^2\Rightarrow 363^2+70^2=75^2+362^2\Rightarrow 136669$$

$$5*145=25*29\Rightarrow 75^2-70^2=27^2-2^2\Rightarrow 75^2+2^2=27^2+70^2\Rightarrow 5629$$

$$25*29=1*725\Rightarrow 27^2-2^2=363^2-362^2\Rightarrow 27^2+362^2=363^2+2^2\Rightarrow 131773$$

$$725*1=145*5\rightarrow (725+1)^2+(145-5)^2=(725-1)^2+(145+5)^2$$
$$\Rightarrow 726^2+140^2=724^2+150^2=546676$$

$$145*5=29*25\rightarrow (145+5)^2+(29-25)^2=(145-5)^2+(29+25)^2$$
$$\Rightarrow 150^2+4^2=140^2+54^2=22516$$

$$29*25=725*1\rightarrow (29+25)^2+(725-1)^2=(29-25)^2+(725+1)^2$$
$$\Rightarrow 54^2+724^2=4^2+726^2=527092$$

Thus, 136669, 5629, 131773 ,546676, 22516, 527092 represent second order Ramanujan numbers with base numbers as real integers.

Observation 2:

From the suitable values of x,y and z, one may generate second order Ramanujan numbers with base numbers as Gaussian integers.

Consider again (3).

$$725*1=145*5\rightarrow (725+i)^2+(145-5i)^2=(725-i)^2+(145+5i)^2=546624$$
$$725*1=145*5\rightarrow (i725+1)^2+(i145-5)^2=(i725-1)^2+(i145+5)^2=-546624$$

$$145*5=29*25\rightarrow (145+5i)^2+(29-25i)^2=(145-5i)^2+(29+25i)^2=21216$$
$$145*5=29*25\rightarrow (i145+5)^2+(i29-25)^2=(i145-5)^2+(i29+25)^2=-21216$$

$$29*25=725*1\rightarrow (29+25i)^2+(725-i)^2=(725+i)^2+(29-25i)^2=525840$$
$$29*25=725*1\rightarrow (i29+25)^2+(i725-1)^2=(i725+1)^2+(i29-25)^2=525840$$

Thus $\pm 546624, \pm 21216, \pm 525840$ represent second order Ramanujan numbers with base numbers as Gaussian integers.

In the same way, second order Ramanujan numbers are obtained from the other sets of solutions.

Method 3:

Write (1) as

$$y^2 + 24x^2 = z^2 * 1 \quad (4)$$

Assume z as

$$z = a^2 + 24b^2 \quad (5)$$

Write 1 as

$$1 = \frac{\left[(2k^2-12)+i\sqrt{24}(2k)\right]\left[(2k^2-12)-i\sqrt{24}(2k)\right]}{(2k^2+12)^2}$$

Substituting (5) and (6) in (4) and applying the method of factorization, define

$$y + i\sqrt{24}x = (a + i\sqrt{24}b)^2 * \left(\frac{(2k^2-12)+i\sqrt{24}(2k)}{2k^2+12}\right)$$

Equating the real and imaginary parts, one obtains

$$\left.\begin{aligned} y &= \frac{1}{2k^2+12}\left[(a^2-24b^2)(2k^2-12)-96kab\right] \\ x &= \frac{1}{2k^2+12}\left[(a^2-24b^2)(2k)+2ab(2k^2-12)\right] \end{aligned}\right\} \quad (7)$$

As our interest is on finding the integer solutions, taking

$$a = (2k^2+12)A$$
$$b = (2k^2+12)B$$

in (5) and (7), note that (1) is satisfied by

$$\left.\begin{aligned} x = x(A,B,k) &= (2k^2+12)\left[(A^2-24B^2)2k+2AB(2k^2-12)\right] \\ y = y(A,B,k) &= (2k^2+12)\left[(A^2-24B^2)(2k^2-12)-96ABk\right] \\ z = z(A,B,k) &= (2k^2+12)^2\left[A^2+24B^2\right] \end{aligned}\right\} \quad (8)$$

Note 2:

In addition to (6), 1 may be represented in different choices as below

Choice 1:

$$1 = \frac{\left[(24k^2+24k+5)+i\sqrt{24}(2k+1)\right]\left[(24k^2+24k+5)-i\sqrt{24}(2k+1)\right]}{(24k^2+24k+7)^2}$$

Choice 2:

$$1 = \frac{\left[(4k^2-6)+i\sqrt{24}(2k)\right]\left[(4k^2-6)-i\sqrt{24}(2k)\right]}{(4k^2+6)^2}$$

Choice 3:

$$1 = \frac{\left[(6k^2-4)+i\sqrt{24}(2k)\right]\left[(6k^2-4)-i\sqrt{24}(2k)\right]}{(6k^2+4)^2}$$

Choice 4:

$$1 = \frac{\left[(12k^2+12k+1)+i\sqrt{24}(2k+1)\right]\left[(12k^2+12k+1)-i\sqrt{24}(2k+1)\right]}{(12k^2+12k+5)^2}$$

Choice 5:

$$1 = \frac{\left[(8k^2+8k-1)+i\sqrt{24}(2k+1)\right]\left[(8k^2+8k-1)-i\sqrt{24}(2k+1)\right]}{(8k^2+8k+5)^2}$$

Choice 6:

$$1 = \frac{\left[24r^2-s^2+i2\sqrt{24}rs\right]\left[24r^2-s^2-i2\sqrt{24}rs\right]}{(24r^2+s^2)^2}$$

The repetition of the process in Method 3 for each of the above choices, one obtains different sets of integer solutions to (1).

Method 4:

(1) is written as

$$z^2 - 24x^2 = y^2 * 1 \quad (9)$$

Assume z as

$$y = a^2 - 24b^2 \quad (10)$$

Write 1 as

$$1 = (5+\sqrt{24})(5-\sqrt{24}) \quad (11)$$

Substituting (10) and (11) in (9) and applying the method of factorization, define

$$z + \sqrt{24}x = (5+\sqrt{24}) * (a + \sqrt{24}b)^2$$

Equating the rational and irrational parts, one has

$$\left.\begin{aligned} z &= 5(a^2+24b^2)+48ab \\ x &= (a^2+24b^2)+10ab \end{aligned}\right\} \quad (12)$$

Note that (10)& (12) satisfy (1).

Note 3:

1 on the RHS of (9) may also be write as

Choice 1:

$$1=\frac{\left[\left(24k^2+24k+7\right)+\sqrt{24}(2k+1)\right]\left[\left(24k^2+24k+7\right)-\sqrt{24}(2k+1)\right]}{\left(24k^2+24k+5\right)^2}$$

Choice 2:

$$1=\frac{\left[\left(4k^2+6\right)+\sqrt{24}(2k)\right]\left[\left(4k^2+6\right)-\sqrt{24}(2k)\right]}{\left(4k^2-6\right)^2}$$

Choice 3:

$$1=\frac{\left[\left(6k^2+4\right)+\sqrt{24}(2k)\right]\left[\left(6k^2+4\right)-\sqrt{24}(2k)\right]}{\left(6k^2-4\right)^2}$$

Choice 4:

$$1=\frac{\left[\left(12k^2+12k+5\right)+\sqrt{24}(2k+1)\right]\left[\left(12k^2+12k+\right.\right.}{\left(12k^2+12k+1\right)^2}$$

Choice 5:

$$1=\frac{\left[\left(8k^2+8k+5\right)+\sqrt{24}(2k+1)\right]\left[\left(8k^2+8k+5\right)-\right.}{\left(8k^2+8k-1\right)^2}$$

Choice 6:

$$1=\frac{\left[24r^2+s^2+2\sqrt{24}rs\right]\left[24r^2+s^2-2\sqrt{24}rs\right]}{\left(24r^2-s^2\right)^2}$$

The repetition of the process in Method 4 for each of the above choices, one obtains different sets of integer solutions to (1).

Method 5:

Rewrite (1) as

$$z^2-y^2=24x^2 \quad (13)$$

As the R.H.S. of (13) is even,one may observe that the values of y and z are of the same parity.

Considering y and z to be even, the following sets of integer solutions to (1) are observed:

Set 1: $x=2rs,\ y=12r^2-s^2,\ z=12r^2+s^2$

Set 2: $x=2rs,\ y=4r^2-6s^2,\ z=4r^2+6s^2$

Set 3: $x=k,\ y=3k^2-2,\ z=3k^2+2$

Set 4: $x=k,\ y=k^2-6,\ z=k^2+6$

Considering y and z to be odd,the following sets of integer solutions to (1) are observed:

Set 5: $x=k,\ y=3-2k^2,\ z=3+2k^2$

Set 6: $x=2k+1,\ y=4k^2+4k-5,\ z=4k^2+4k+7$

Set 7: $x=2k+1,\ y=-10k-5,\ z=14k+7$

Generation of Solutions

Different formulas for generating sequence of integer solutions based on the given solution are presented below:

Let $(x_0, y_{0,} z_0)$ be any given solution to (1)

Formula: 1

Let $(x_{1,} y_1, z_1)$ given by

$$x_1=3x_0,\ y_1=3y_0+h,\ z_1=2h-3z_0 \quad (14)$$

be the 2^{nd} solution to (1). Using (14) in (1) and simplifying, one obtains

$$h=2y_0+4z_0$$

In view of (14), the values of y_1 and z_1 are written in the matrix form as

$$(y_1, z_1)^t=M(y_0, z_0)^t$$

where

$M=\begin{pmatrix}5 & 4\\ 4 & 5\end{pmatrix}$ and t is the transpose

The repetition of the above proses leads to the n^{th} solutions y_n, z_n givenby

$$(y_n, z_n)^t=M^n(y_0, z_0)^t$$

If α, β are the distinct Eigen values of M, then

$$\alpha=1,\ \beta=9$$

We know that

$$M^n=\frac{a^n}{(\alpha-\beta)}(M-\beta I)+\frac{\beta^n}{(\beta-\alpha)}(M-\alpha I),$$

$I=2\times 2$ Identity matrix

Thus, the general formulas for integer solutions to (1) are given by

$$x_n = 3^n x_0$$

$$y_n = \left(\frac{9^n+1}{2}\right)y_0 + \left(\frac{9^n-1}{2}\right)z_0$$

$$z_n = \left(\frac{9^n-1}{2}\right)y_0 + \left(\frac{9^n+1}{2}\right)z_0$$

Formula: 2

Let (x_1, y_1, z_1) given by

$$x_1 = x_0 + h,\ y_1 = y_0,\quad z_1 = 5h - z_0 \quad (15)$$

be the 2^{nd} solution to (1). Using (15) in (1) and simplifying, one obtains

$$h = 48x_0 + 10z_0$$

In view of (15), the values of x_1 and z_1 are written in the matrix form as

$$(x_1, z_1)^t = M(x_0, z_0)^t$$

where

$$M = \begin{pmatrix} 49 & 6 \\ 240 & 49 \end{pmatrix}$$ and t is the transpose

The repetition of the above process leads to the n^{th} solutions x_n, z_n given by

$$(x_n, z_n)^t = M^n (x_0, z_0)^t$$

If α, β are the distinct Eigen values of M, then

$$\alpha = 49 + 20\sqrt{6},\ \beta = 49 - 20\sqrt{6}$$

Thus, the general formulas for integer solutions to (1) are given by

$$x_n = \left(\frac{\alpha^n + \beta^n}{2}\right)x_0 + \left[\frac{\alpha^n - \beta^n}{4\sqrt{6}}\right]z_0$$

$$y_n = y_0$$

$$z_n = \sqrt{6}(\alpha^n - \beta^n)x_0 + \left(\frac{\alpha^n + \beta^n}{2}\right)z_0$$

Formula: 3

Let (x_1, y_1, z_1) given by

$$x_1 = h - 25x_0,\ y_1 = h - 25y_0,\ z_1 = 25z_0 \quad (16)$$

be the 2^{nd} solution to (1). Using (16) in (1) and simplifying, one obtains

$$h = 48x_0 + 2y_0$$

In view of (16), the values of x_1 and y_1 are written in the matrix form as

$$(x_1, y_1)^t = M(x_0, y_0)^t$$

where

$$M = \begin{pmatrix} 33 & 2 \\ 48 & -23 \end{pmatrix}$$ and t is the transpose

The repetition of the above process leads to the n^{th} solutions x_n, y_n given by

$$(x_n, y_n)^t = M^n (x_o, y_0)^t$$

If α, β are the distinct Eigen values of M, then

$$\alpha = 25, \beta = -25$$

Thus, the general formulas for integer solutions to (1) are given by

$$x_n = \frac{24\alpha^n + \beta^n}{25}x_o + \frac{\alpha^n - \beta^n}{25}y_0$$

$$y_n = \frac{24(\alpha^n - \beta^n)}{25}x_o + \frac{\alpha^n + 24\beta^n}{25}y_0$$

$$z_n = 25^n z_o$$

Conclusion

In this paper, an attempt has been made to obtain non-zero distinct integer solutions to the ternary quadratic Diophantine equation $z^2 = 24x^2 + y^2$ representing homogeneous cone. As there are varieties of cones, the readers may search for other forms of cones to obtain integer solutions for the corresponding cones.

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ONLINE REVIEW CATEGORIZATION

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ABSTRACT

On line reviews can replicate the sentimental tendency of the reviewers, and sentiment type is one of the maximum vital techniques to recognize sentimental tendency evaluation. it's far very important that how to pick out the capabilities that mirror the sentimental records of the file and feature true type ability. We endorse a sentiment type technique with a widespread gadget getting to know framework. For function illustration, n-gram IDF is used to extract software program-engineering related, dataset precise, high-quality, impartial, and poor n-gram expressions. We also use TF-IDF for the classification. Here basically we take reviews of different apps for understanding the sentiments of users towards those apps. These sentiments is classified into positive, negative and neutral. This could be useful project for market research to help companies understand user experience of their product.

Keywords: *Sentiment classification, N-gram, TF-IDF, Categorization.*

I. Introduction

On this paper we recommend an device gaining knowledge of based totally methodology making use of n-gram highlights and a automatic system mastering device for supposition association. notwithstanding the truth that n-gram phrases are viewed as instructional and helpful contrasted with single phrases, making use of all n-gram terms is certifiably now not a smart idea in mild of the large extent of facts and several futile highlights. To solve this trouble, we use n-gram IDF, a hypothetical augmentation of Inverse report Frequency (IDF). From the outset, pre-dealing with has been finished in which uncommon characters, numbers and so on has been killed from each information test from various news classifications. similarly factor extraction has been completed wherein TF-IDF of unigram, bigram and trigram phrase tokens has been applied as linked detail vector. For order diverse classifiers has been investigated but desire tree offers extra successful outcomes than the others.

There are three objectives to achieve in this project: (i) To develop the prototype of a sentimental analysis system. (ii) To detect the satisfaction of app users using sentimental analysis. (iii) To use N-gram technique to analyze the satisfaction of users.

II. Related Works

Y. Zhang and D. Hou worked on Extracting problematic API features from forum discussions. In [1] Computer programming exercises frequently produce a lot of unstructured information. Helpful data can be removed from such information to work with programming advancement exercises, for example, bug reports the executives and documentation arrangement. In [2] they study whether the conclusion investigation instruments concur with the assessment perceived by human evaluators (as revealed in a previous examination) just as with one another. It was by R. Jongeling, P. Sarkar. D. Bespalov, B. Bai, Y. Qi Represent a document using its n-gram embedding, in [3] which in turn is built upon its word embedding. M. R. Islam and M. F. Zibran [4] conduct an in-depth qualitative study to identify the difficulties responsible for such low accuracy. Computation of emotional scores from human rated dataset. [5] S. Li, S. Y. M. Lee worked on Sentiment classification and polarity shifting. They propose a gadget mastering method moving facts right into a document-stage sentiment type device to contain polarity.

III. Methodology

We use “TF-IDF” algorithm in this task to do our paintings. TF-IDF is a authentic degree that assesses how important a phrase is to an archive in an collection of records. This is completed via duplicating two measurements: how often a phrase shows up in a record, and the other file recurrence of the word across a group of archives. In text examination with

machine learning, TF-IDF calculations assist with arranging information into classifications, just as concentrate watchwords. This implies that straightforward, repetitive undertakings, such as labeling support tickets or columns of criticism and contributing information should be possible in a flash.

A. Login of Admin/User

The admin has to login with the aid of the usage of valid user call and password. After login a success he can perform some operations which includes upload apps, view all uploaded app information, view advantageous sentiment opinions, view bad sentiment reviews, view impartial sentiment reviews, view score consequences, view dislike effects, view like outcomes, view all faraway users, view all apps opinions, view app endorsed.

There are n numbers of customers are present in the system. Person should register earlier than performing any operations. once consumer registers, their details might be saved to the database. After registration a success, he has to login with the aid of using authorized user call and password and may perform some operations like view all uploaded apps, view all app opinions, view your profile, view all apps advocated.

B. Processing of Reviews

Here first reviews are typed into it's field. As fig 1 represents, the reviews are sent to process after collection of data. Here our data is review of app. critiques are typed in by way of the users of apps inside the precise subject wherein they should deliver the evaluate. Evaluations now and again include unique characters. We cast off characters that are neither English characters nor numbers. After removing all these, it is divided into n wide variety of various words. We use TF-IDF to technique the evaluations. We also employ N-gram approach at positive conditions.

Whilst there may be multiple bad or nice phrases are present in the review, it will evaluate the quantity of advantageous words and bad words. If the variety of fantastic words are more than the wide variety of terrible phrases, it is processed as fantastic all together. identical as that, if the range of negative phrases are greater than the range of positive phrases, then it's far considered as bad in total. If both terrible and fine words are unavailable, then it's far taken into consideration to be impartial.

C. Classification of Reviews

The processed words are classified into different sentiments like positive, negative and neutral. As shown in fig 1 after the processing, the sentiments are classified and results are shown. After getting classified it is fed into different page categories showing the different sentiments in different pages. It is allowed for recommendations also. Bar charts, pie charts and line charts are used to understand the sentiments towards each app. When review is typed into the review field, it is processed and classified and then the particular sentiment is shown below the page like a subtitle. Then it can also be shown on separate page of it's particular sentiment. There are various outlines like pie diagram, bar graph, line graph to address the assessments, different preferences of each application. The suggested applications list is additionally shown independently on an alternate page.

As said previously in case there is positive words or more sure words than negative words, it is named positive feeling. Like that in case there is negative words or more regrettable words than positive words, it is named negative conclusion. If both cases aren't applicable, then it is classified as neutral sentiment. Text analysis is an important application of machine learning algorithms.

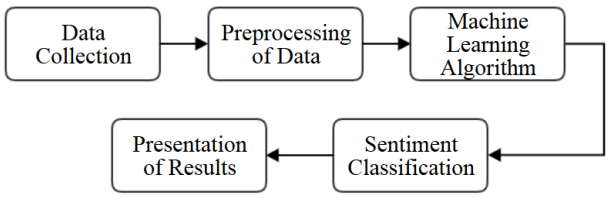

Fig 1: Sentiment classification architecture

IV. Experimental Results

We have done some tests like unit testing and integration testing. Here we are representing two of those tests in a tabular method.

Table 1: Status of unit test

Illustration	Adding new app to the list
Insert	Name and details of app
Expected output	App has to get stored

Obtained output	Stored and able to see in list from both user and admin sides
Status	Passed

Table 1 shows testing of adding new app to the list from the admin side. Name and other required details are given as input and expected output was the successfully storing of app. The test passed as expected.

Table 2: Testing for classifications

Description	Add review and check it's sentiments
Input	Review of app
Expected output	Should show sentiment below page
Obtained output	Sentiment appeared as assumed and app name updated in the particular sentiment's page
Status	Passed

Table 2 represents the integration testing of adding review of certain apps and check its sentiments. The test was successful as expected.

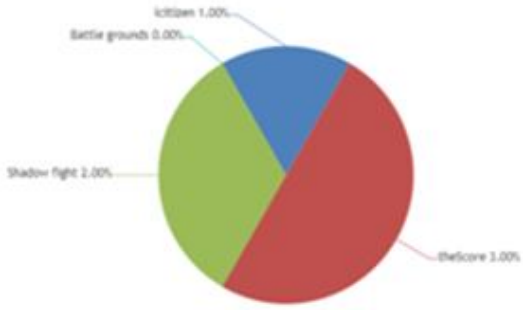

Fig 2: Pie chart

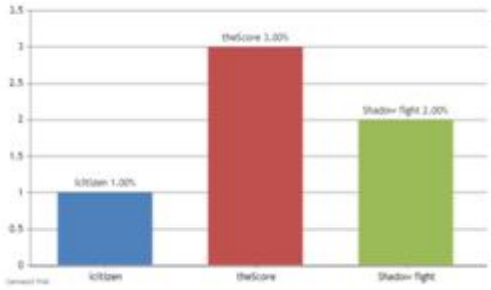

Fig 3: Bar chart

Here, we are showing chart representation of the result. After the classification of sentiments into positive, negative and neutral, we get the graphical representation with separate colors of chart representing each color for an app. It shows the percentage of the rating, likes and dislikes. Fig 2 shows the score of the apps in a pie chart. Fig 3 represents a bar chart where in X-axis it shows the name of the app and in Y-axis it shows the percentage of the likes.

V. Conclusion

Prototype of the sentiment classification of app reviews was made successfully. It can be used for understanding people's sentiment towards each app. The main use of this will be for market research to help companies understand user experience of their product. On this paper, we proposed a belief arrangement approach utilizing TF-IDF, n-gram and mechanized system getting to know. We observe this strategy on various application audits given by the clients and furthermore taken from various destinations. Our great order execution did not depend just on a high level mechanized machine learning.

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A NOVEL APPROACH FOR AN INTEGRATED SMART HOME AND AGRICULTURE MODEL

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ABSTRACT

A Smart Home and Agriculture System can smartly and efficiently operate on its own through automation. This project is implemented by gathering data related to the home such as time of switching on the lights, presence of people, temperature and humidity so that the operation of the domestic appliances can be automated. Similarly, data is such as soil moisture, mineral content, temperature, etc., will be collected and processes such as irrigation and fertilizing will be maintained. All the data will be made available to the user through the internet on his phone from where he can not only monitor but also control. This is implemented through the Internet of Things.

Keywords: *IoT, color rendering*

Introduction

The human population is on the rise, therefore we need to grow more crops and hence need more land, this land is obtained by deforestation which affects the biosphere adversely.

Our project is to integrate the home and farm as one unit. We would be having a smart home with not only automation of the home but also a mini indoor farm that can accomplish the provision of small fruits and vegetables.

The project is going to consist of a system that is going to monitor the home appliances and operate them automatically smartly and efficiently and also is going to consist of a system that will be used to grow the crops.

Literature Survey

Improving “color rendering” of LED lighting for the growth of lettuce

The "color rendering" of LED light is used for the growth of plants which is subjected to the absorption spectrum of lettuce. It is found that RYB light is similar to the ideal spectrum, which is good for the growth of a plant. The plants grow bigger under RYB light. The leaf growth rate is faster under the RYB light, and the leaf expands more rapidly under the RYB light.

A Study on Smart Irrigation System Using IoT for Surveillance of Crop-Field

In this paper they have implemented a Smart Irrigation System Using IoT for Surveillance of Crop Field, they have employed a system that involves an Arduino Uno board collecting sensory data from the sensors such as temperature, the humidity of and soil-moisture content the crops field and sends it to the user via Bluetooth, to his mobile application. If the soil moisture is below the set limit then the motor is turned on automatically to irrigate the field. The user can also irrigate the field manually by turning on the motor by using the application. An ultrasound sensor is placed in the reservoir to measure the volume of water present

A Study on Smart Irrigation Systems For Agriculture Using IoT

In this paper, we see that not only the data related to temperature, humidity and soil moisture is concerned but also other related and important data such as intensity of sunshine,
wind speed, crop growth rate and crop type is also considered. This data is updated to a web page via the internet and allows for remote monitoring of the crops. This project was mainly developed for the optimum usage of water to irrigate the plants in regions that have water scarcity. The above data is used for the irrigation of the plants without the wastage of water or
even when less water is available. With proper irrigation, there will be better and higher yield of the crop.

Home Automation Using Internet of Things

This paper proposes a Home Automation system that employs multitouch mobile devices, cloud networking, wireless communication to provide the user with remote control of various lights and appliances within their home. This system uses a combination of a mobile phone application, handheld wireless remote, and PC based program to provide a means of interface to the user.

Methodology of growing plants under LED

Introduction

Light is required by the plant for photosynthesis. Plants can be grown even under manmade sources of light such as fluorescent lamps and halogen lamps, but there is a disadvantage to this method as these lamps have high power consumption, smaller lifespan and have ungovernable wavelengths of light. Whereas Light-emitting diodes (LEDs) are a light source with high brightness, longer lifespan, ecofriendly and having spectral modulation capabilities. Spectral modulation is important in enhancing plant growth. Red, green, and blue lights are the major energy sources for photosynthesis and CO_2 absorption. We have used "color rendering" of LED light for the growth of plants subjected to the absorption spectrum of lettuce.

Color Rendring

There are two main absorption bands of the lettuce leaf mainly for chlorophyll and carotene absorption. The 437nm band which is the blue light is for the development of chloroplast and the 678nm band is the red light which promotes photosynthesis, but there is a valley centered at about 550nm which indicates that yellow light that has a negative effect on the growth of plants (Fig.1.).

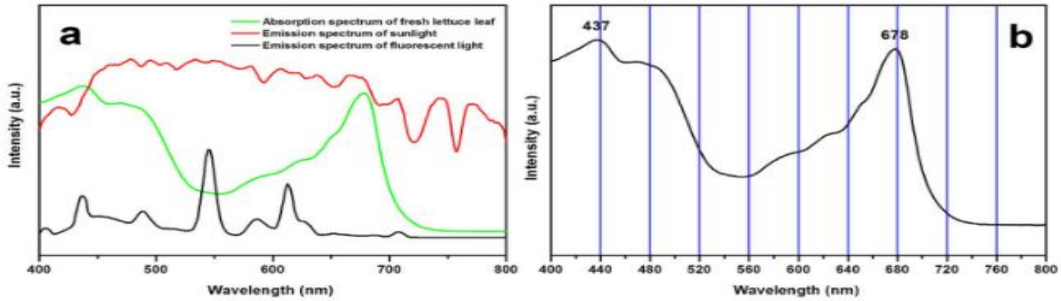


Fig.1.[1] (a)The comparison of the absorption spectrum of lettuce leaf with spectra of sunlight and white fluorescent light (b) absorption spectrum of lettuce leaf.

To verify the theory of "color rendering", let us consider the spectra of different band combinations as shown in (Fig.2.). The different spectra of light considered are sharp blue (SB), broad red-blue (BRB), red-yellow-blue (RYB), broad white (BW), sharp red (SR), sharp red-blue (SRB) and narrow white (NW) light.

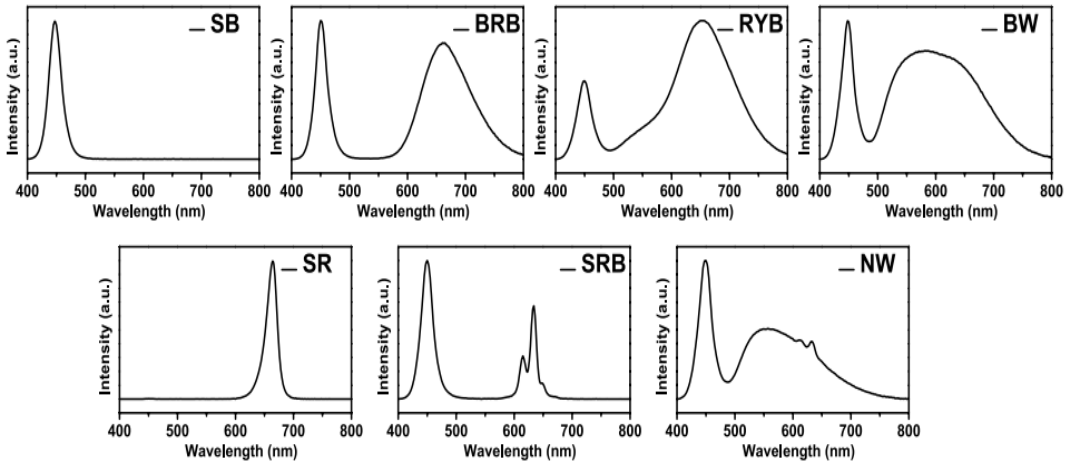


Fig.2. [1] spectra of different band combinations

We can see that from the correlation below that the RYB light is the closest to the ideal light spectrum as required by lettuce leaf, and we can say that this spectrum is good for the growth of the plant

The Pearson product moment coefficient of correlation (r) is given by

$$r = \frac{\sum(x-\bar{x})(y-\bar{y})}{\sqrt{\sum(x-\bar{x})^2\sum(y-\bar{y})^2}} \quad (1)\ [1]$$

Where x is the spectral data points of the LED light and y is that of the ideal light and $\bar{x}$ and $\bar{y}$ are their means respectively.

Therefore, from equation (1) we can find the Correlation coefficients of the LED lights related to the ideal light for lettuce. Which is given in Table.1. By this we can tell that RYB has a high correlation coefficient of 0. 587.From Fig.3. we have the CIE chromaticity coordinates of ideal light and the LED lights. Using the CIE chromaticity coordinates, we can assume that the optimum LED light for the growth of lettuce will be the angle between the vector from ideal light to RYB light and the vector from ideal light to BRB light.

Table.1. [1] Correlation coefficients of the LED spectrum related to the ideal light spectrum for lettuce

Spectral interval	LED light						
	SB	BRB	RYB	BW	SR	SRB	NW
400–440 nm	0.859	0.844	0.919	0.914	0.000	0.858	0.903
441–480 nm	0.770	0.542	0.663	0.736	0.000	0.645	0.700
481–520 nm	0.794	0.801	0.000	0.000	0.000	0.826	0.000
521–560 nm	0.000	0.000	0.000	0.000	0.000	0.000	0.000
561–600 nm	0.000	0.888	0.949	0.472	0.000	0.842	0.000
601–640 nm	0.000	0.986	0.990	0.000	0.874	0.756	0.000
641–680 nm	0.000	0.190	0.000	0.000	0.146	0.000	0.000
681–720 nm	0.000	1.000	0.961	0.999	0.899	0.864	0.996
721–760 nm	0.000	0.935	0.935	0.938	0.000	0.000	0.934
761–800 nm	0.000	0.464	0.457	0.424	0.000	0.000	0.490
Average value	0.242	0.665	0.587	0.448	0.192	0.479	0.402

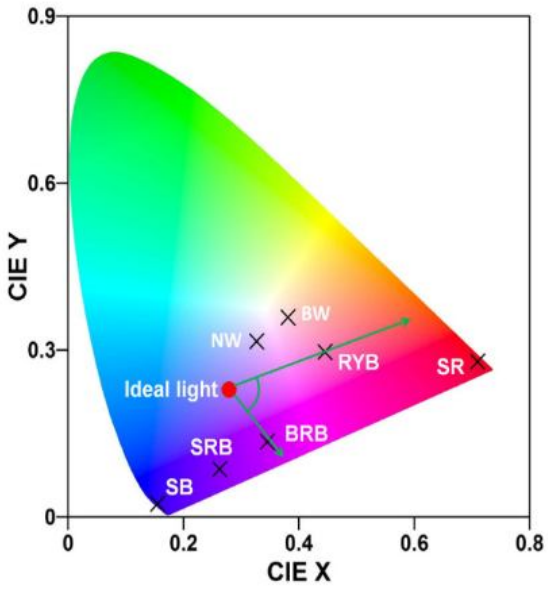


Fig.3.[1] CIE chromatically coordinates of ideal light for lettuce growth and the LED lights.

By using the correlation coefficient and CIE chromaticity coordinates, we can choose the LED lights that are to be used for the growth of the plant. We can be see that all the plants have grown bigger under RYB light treatment than others Fig.4. and we can see the growth rate of the number of leaves and the area of the leaves under the LED light treatment in 22 days in Fig4. The leaf number grows faster under the red-yellow-blue light, and also the leaf areas increase rapidly under the RYB light, the leaf area of lettuce under the radiation of RYB light is 2.4 times greater than that of SRB light. The dry weight of lettuces under the RYB light treatment is 3.0 times of SRB light. The result can support the that the RYB light with good "color rendering" is to the benefit of the plant growth.

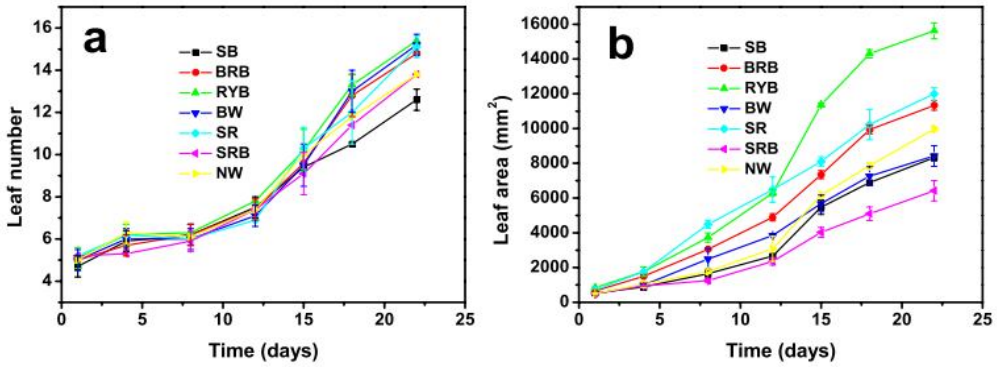
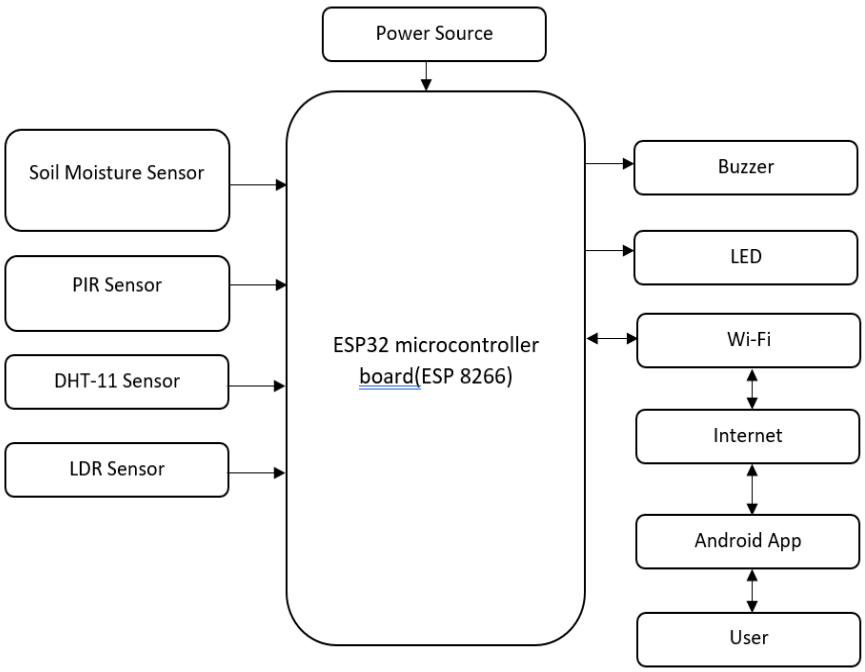


Fig.4.[1](a) growth of leaf numbers (b) leaf areas.

System Design

Our system represents the prototype of A Novel Approach for an Integrated Smart Home and Agriculture Model where it includes components such as ESP32 microcontroller board (ESP8266), Soil moisture sensor, PIR sensor, DHT-11(temperature and humidity sensor), LDR sensor and actuators such as buzzer and LEDs.

Block Diagram



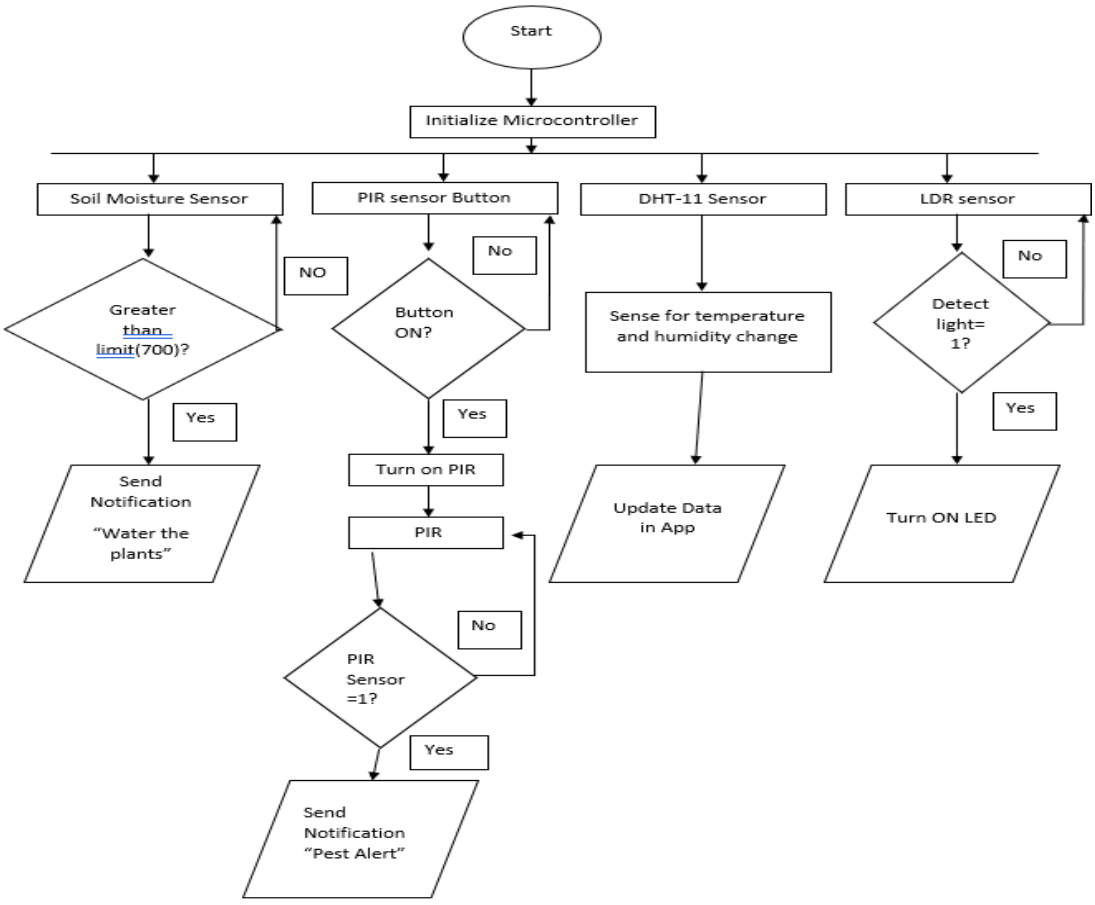
Methodology

- Initially, the data such as soil moisture, temperature humidity and content are feed into the microcontroller.
- Then the sensors are deployed. The soil moisture sensor senses for soil moisture, the temperature and humidity sensor will measure the temperature and humidity, and send the data to the microcontroller.
- The microcontroller is going to compare the sensor data with the set parameters and carry out the required action, like if the soil moisture is below prescribed limits, then it would turn on the water pump to irrigate the crop, not only that we will receive a notification on our phone that. Similarly, if the temperature and humidity data which is sensed is updated in the app through the internet.
- There are even some additional functions such as detection of intruders such as rodents by the use of a motion detector

system where we use a PIR sensor. An option is given in the app to turn on the sensor during the time of absence. If there is any intrusion then a notification is sent for the same and the buzzer will ring.

- The plants will grow under the LED lights (red, yellow and blue), therefore, adjusting the intensity of the lights by using the data from the Light intensity sensor.
- The LDR sensor is used to automatically turn on the LEDs when the room is darkened.

Algorithm



In this program, all the functions are separate and act individually. The processes are going to occur as follows:

- The microcontroller is initiated with the limits that are to be measured against by the sensors.
- LDR Sensor**:** This sensor has a light-dependent resistor, The sensors output is driven too high when it does not detect light, upon which it sends this signal to the microcontroller, which turns on the LEDs, of the room, for automating the room light. If the light is detected the sensor continues to remain in the low state.
- DHT-11 Sensor**:** This sensor is turned on as soon as the system is turned on and begins to sense the environment around it and measures its temperature and humidity, this data is sent to the microcontroller which is updated in the app for the user to view so that he can make any changes to maintain optimum temperature.
- PIR Sensor**:** A button is provided on the App for turning on the service of the PIR sensor. Once on it starts to sense motion, once detected its output goes to logic 1 and this is sent to the microcontroller which then sends a notification "Pest Alert", and a buzzer is turned on, if not continuous to sense. If the PIR sensor is turned off using the app then it will remain deactivated.
- Soil Moisture Sensor: The soil moisture sensor is turned on as soon as the power is on and begins to measure the moisture of the soil. This data is sent to the

microcontroller the is analog data and keeps varying, if the value of the moisture sensed by the sensor is greater than the limit, (we have set the limit to be 700, above which it is termed as dry soil.) a notification is sent to the user, "Water your plants". If not greater than the limit then the process of sensing continues.

Experimental Results and Result Discussion

Hardware Implementation

Fig.5. Hardware Implementation

Result Discussion

- The prototype of the system is implemented as shown in Fig.5.The LEDs are not visible in the image but are the ones illuminating the inside of the prototype

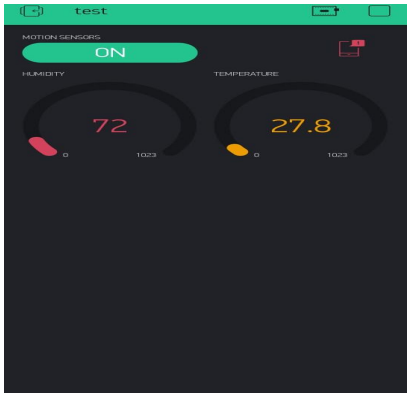


Fig.6. App interface

- The Fig. 6. shows the blynk app interface, it displays the option to turn-on/off the PIR/motion sensor. It also displays the data related to the humidity on the left in red and temperature on the right in orange. This data is updated by the microcontroller.

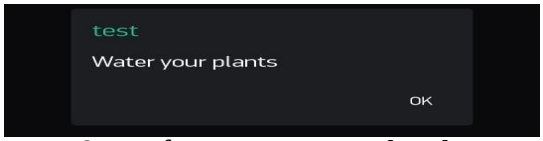


Fig.8.Notification to water the plants

Fig.9.Soil moisture sensor dipped in water

- If the moisture sensed by the soil moisture sensor is below the set limit, then it sends a notification "Water your plants", as a remainder to water the plants, as shown in Fig.8.The Fig.9. depicts the watered plant where the sensor is dipped in water where it measures moisture to be maximum, this is just a representation as it is a prototype of the system, but in reality, it would be measuring the moisture of the soil.

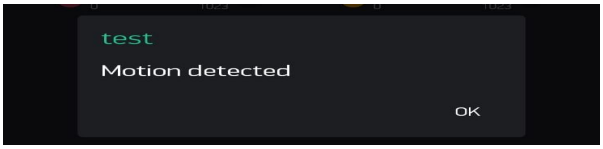


Fig.10. Notification for motion detected

Fig.11. Yellow glow representing the buzzer buzzing

- When the PIR sensor detects motion then it sends a signal to the microcontroller which intern sends a notification "Motion Detected " to the user via the app as shown in Fig.10., the buzzer is also turned on but due to hardware limitations we are showing this output signal with an yellow LED as shown in the Fig.11.

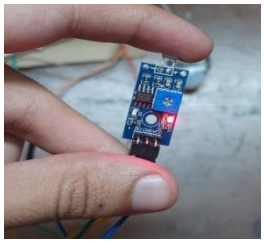


Fig.12. LDR sensor covered to simulate darkness

Fig.13.LED Turns ON

- The Fig.12. shows a covered LDR sensor, when this sensor is covered it turns on an LED as shown in Fig.13., This represents turning on the lights of the house when it turns dark outside.

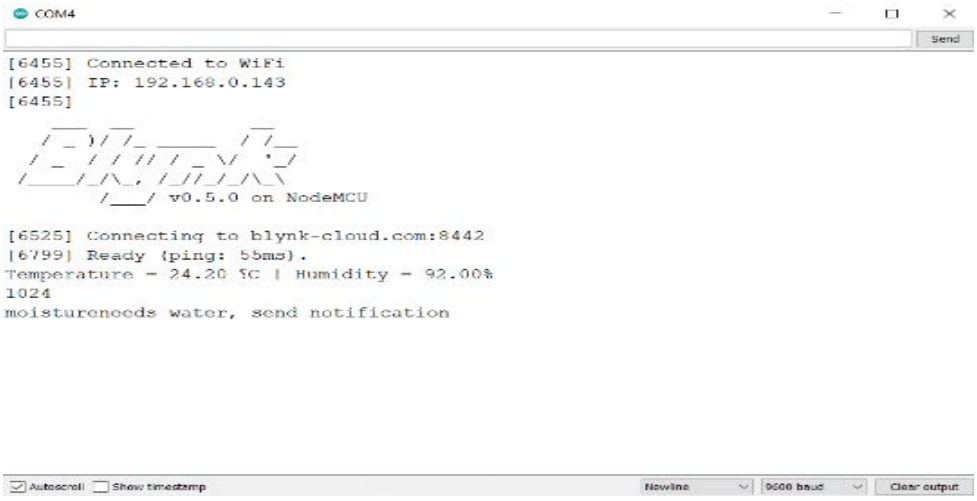


Fig.14.Serial Monitor , connecting to Wi-Fi

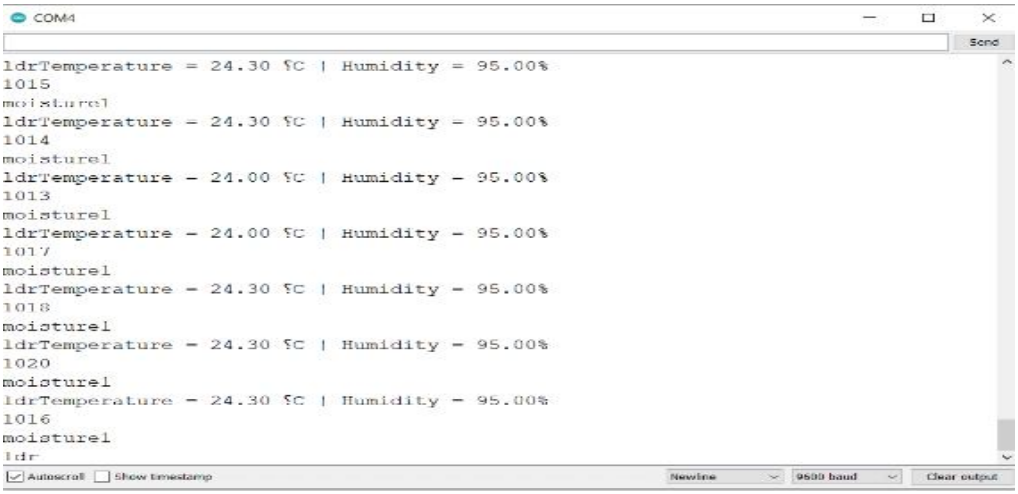


Fig.13.Serial Monitor, representing sensor data

- The Fig.12.is the serial monitor which shows the ESP32 connecting to the Wi-Fi after which there is a detection that there is not enough moisture, and it has prompted the ESP32 to send a notification regarding the moisture content. The Fig.13. shows the data collected by the various sensors.

Fig.14.Plants grown after 3 days

- After 3 days it is observed that the plants have grown and the density of branches is more.

Conclusion

The project makes use of soil moisture sensor to notify the farmer to water the plants, temperature and humidity sensors are used in order to collect data and send it to user and PIR sensors used to detect pest.

This system is a protype which is cost effective and auto mode makes it a smart system and it can be customized in future for application specific scenarios.

Future Work

The future work can be conducted on water saving analysis by making use of pump to automatically water the plants along with minimizing the system cost and HAVAC system can be used to have an optimized environment with controlled temperature and humidity. More work has to be done on automating the home.

Acknowledgment

We would like to acknowledge our regards to our guide, **Dr. L. Rangaiah**, Professor and Head, Electronics and Communication Engineering, RajaRajeswari College of Engineering, Bengaluru, whose valuable inputs have made us richer in terms of knowledge and also for guiding us at a place where everything was not familiar and also his consistent motivation and encouragement.

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BLOCKCHAIN CLUSTER BASED PRIVACY PRESERVING SCHEME FOR VEHICULAR NETWORKS

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ABSTRACT

In this developing era, the Vehicular Adhoc Networks (VANET) have occupied crucial role in intelligent transportation systems, which aims to achieve connectivity between one vehicle to another vehicle and vehicle to fixed intelligent unit. The VANET has defined to improve the driving safety and to overcome accidents in day-to-day life. It involves wireless networks, hence intruders will find easiest path to alter, monitor the messages between the moving vehicles and in infrastructure unit. Privacy and security had become primary concern in VANET. Therefore, this paper introduces efficient algorithm that makes use of Blockchain technology and whale optimization algorithm in vehicular network. The cluster-based VANET system provides load balancing and minimum overhead. At the beginning stage clustering is performed through whale optimization algorithm and the communication among the nodes through the Blockchain technology. The validation analysis enlighten that the proposed algorithm is better than the other techniques in terms of throughput, Delratio, drop, overhead and cluster size.

Keywords: *VANET, privacy, cluster, whale optimization algorithm, Blockchain.*

Introduction

VANET have been intelligent transport system in Mobile adhoc Networks. Many research people started working for conserving the privacy of messages in intelligent wireless networks. The main advantage is that it offers inter–vehicular and road side unit communications to Improve the road safety, avoid congestion and road accidents.

To progress the efficiency of the network entities estimation has to be maintained hence we require smart clustering. It should be adoptable, reliable and effective. Cluster in a system means vehicles are combined as per their characteristics, uniqueness. In cluster based architecture, each cluster Contains cluster head (CH) which is selected according to the power transmission, line-of-sight with the RSU mounted with antenna. Cluster Head is mid node to the grouping system which carry different operation like cluster deployment, Closing of a group, maintaining of system entities and balancing of group configuration. The cluster head as well manages both inside and outside

Communication occurs through the erstwhile nearby the cluster. General Cluster based architecture is as shown in Fig.1, which contains Cluster Head and Cluster Node mounted with the on-board units (OBU), Road side unit (RSU) mounted with isotropic or directional antenna and their connectivity are deployed through dedicated short range Communication (DSRC).

The privacy of message sharing will play a major role in VANET applications. The wrong information possibly makes some most horrible situations. An intruder vehicle which broadcast wrong message because of this ruin authenticated vehicle will not able to escape and also to avoid traffic congestion. These parameters should be considered while deciding to reach the destination. VANET should be able to monitor regularly to avoid challenges in particular; malicious vehicle should be avoided entering in to the network to avoid both internal and external attack.

VANETs which are decentralized, requires common database of transactions which is possible through Blockchain. It has occupied the concentration of researchers and has high scope in other fields. It is connected to determine the essential problems of information spreading in Vehicular Networks. The Blockchain is a rising no fixed infrastructure and scattered system that uses the concept of crypto currency concept.

In terms of vehicular networks, the Blockchain can be utilized to supervise the deep stage truth of information for moving networks ,any moving node get access to previous because any vehicle can access the history of incident occurred in the open environment. In our

work, we have demonstrated an efficient privacy-preserving data transmission model that uses the Blockchain for communication within and outside cluster for ensuring privacy in cluster based vehicular networks. Clustering inside the network is performed through whale optimization algorithm (WOA), which divides the vehicles in to several groups and group Head is selected for every cluster. The idea in this paper is clustering of vehicles is achieved through WOA and communication among moving nodes achieves through distributed database. We compiled the simulation through NS-2 to verify the efficiency of the whale optimization algorithm over other technique, and considered a number of parameters for the outcomes. The sections of the work are arranged as follows: Literature work, proposed technique, validation and finally concluding the work

Literature Survey

Bidiying and amiya Nayak have proposed a protocol that deals with the ambiguity and effectiveness issue in vehicular networks. To perform, it employs low-cost security operations to validate the

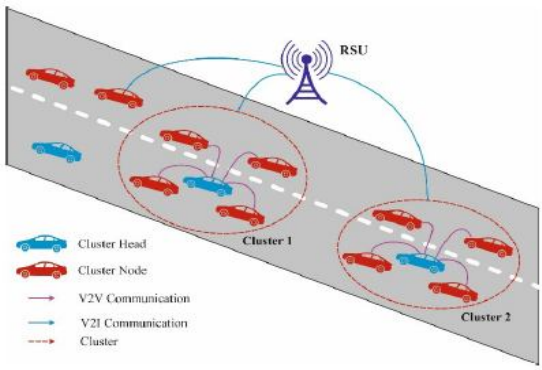

Fig 1: General Cluster based architecture

Legality of the vehicles and legalization of data messages. A login uniqueness which is changed with dynamism is planned to thwart an invader from connecting an indented vehicle with the definite individuality. In accumulation, protocol provides a technique for secret word change, which does not rely on the trusted authority. Hence, it can refuse to accept offline secret word guessing attack

Mohammad Wazid et al., proposed a competent protocol for vehicular networks, which uses only one-way hash functions and bit by bit XOR operation. They used proper safety analysis which is under the broadly used in Real-or-Random model together with familiar safety investigation.

Rajput et al., synthesised a technique that combines the features of pseudonym-specific models and depending on group signatures, in addition with the restricted ambiguity.

Lei ao et al., proposed a structure for managing the safe key within diverse network. In this safety manager attains the vital role inside the structure by recalling the vehicle leaving information, encapsulating block for moving keys then compiling the rekeying to vehicles within an equivalent safety area. The chief part of this structure is based on managing the group key with leaving probability of moving nodes to depart current area. Vehicle's leaving probability factor is introduced into system to realize a well-organized scheduling the key scheme and fewer rekeying costs. The next part of the structure using the database concept is to simplify the scattering of managing key.

Cui et al., offered a scheme for vehicular networks in combination with a cuckoo filter to improve the safety and confidentiality of nodes and to level back the communication load.

Leiding et al., included the vehicular networks using Ethereum's Blockchain-based application, and magnified a plain which is self-monitoring, and no centralized unit. It uses smart convention method for implementing a Blockchain.

Dorri et al., demonstrated a concept based on Blockchain for automotive safety using superimpose networks inside the distributed database, as well as added nodes which is placed place on top block managers. The deployment of additional place on top of the nodes results in a great delay, which may be a centre point of breakdown.

Rowan et al., introduce a Blockchain for securing message of smart vehicles by means of light communication and acoustic side channels. The Blockchain is engaged with public keys for the justification of the planned representation using cryptographic session keys, by using side channels, also as a Blockchain public key structure. Motivated

from the software-defined and performance virtualization

Song et al., magnified an electives smart mutual tracking model by the consumption of sophisticated parameter prediction skills and improved element filtering techniques. Initially, the range-based positioning problems are converted into the vector nonlinear suboptimal approximation problem depending upon the data fusion. After that, the significance of the density function is provided for calculation approximation, and review vector fortitude.

Guo et al., developed a confidence access authentication method to observe and attain combined involvement for vehicles. Besides, Blockchain is working to realize safe verification and defended confidentiality.

Sherazi et al., determined on dispersed denial service of attacks by enhancing the incident of intrusion detection system for Internet of Vehicles in addition, Artificial Intelligence and Machine Learning model are also identified allowing superior security construction. Furthermore, a symbolic reason and neural network based approach is validated to scrutinize the usefulness of the existing model.

Yang et al., identified a proof-of-event consensus idea related to vehicular networks rather than proof-of-authority methods. The congestion information is accumulated from the fixed units, and hence the moving vehicles will secure the accuracy on receipt the incident announcement. Furthermore, a two way transaction on Blockchain is used for transmitting counsel messages in suitable areas.

Proposed Technique

Proposed Architecture will be considered that moving nodes cooperate with one another through node to node and node to fixed unit and people vehicles are able to hook up with web successfully as depleted in Fig 2. Consider each one vehicle is embedded with communicating network. Moreover, the validated fixed units are more than the intruder's fixed unit. A new sort of Blockchain is required, as shown in Fig. 3. The distributed database is important towards the trustworthiness of protected messages communication.

The Database has been synchronized and monitored independently to trace the communication of all vehicles, with broadcasting their locations with the valid messages.

Location Certificate is employed as an accurate method representing a moving node that's at a particular distance and within the required quantity. All vehicles require a Location Certificate to get

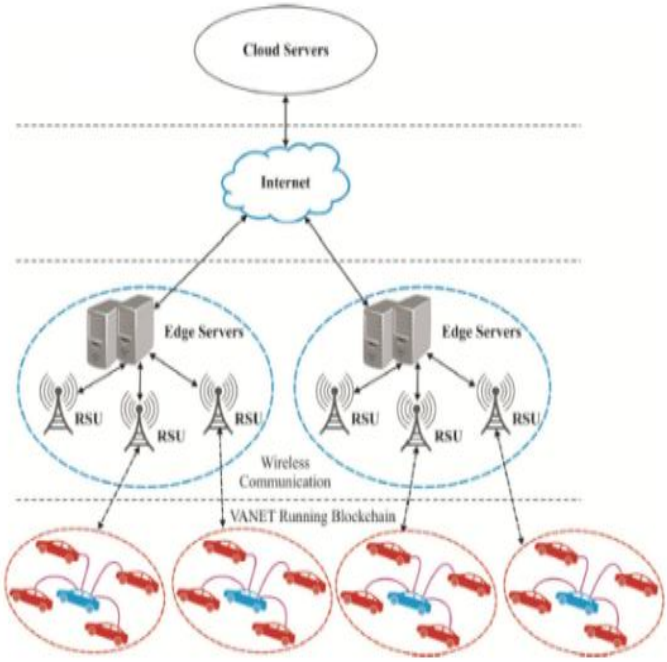

Fig 2: Proposed Architecture using Block Chain

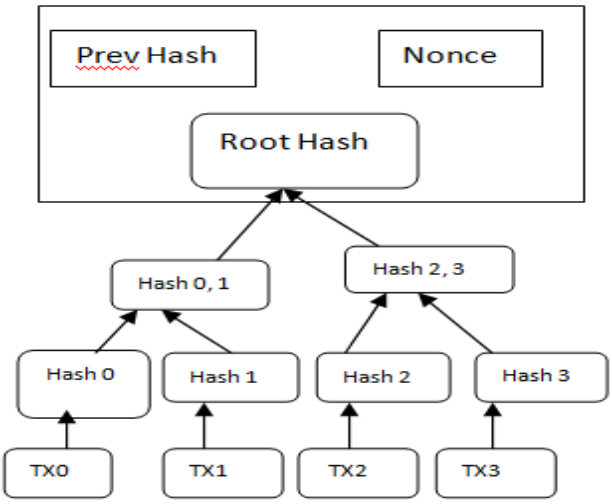

Fig 3: Block Header

approval about their location parallel. A Location Certificate is obtainable by a valid fixed unit. It works as a location identity for moving nodes, with in the given geographical area. The events occur are confined within a given
selected geographical area. Within the fundamental database the newly formed blocks are advertised collectively. The messages with in the network do not cross the boundary of specific location. Hence the congestion and accident messages of a position are not known to other vehicles found in a different location. Therefore, an alternative database system is necessary. From this self-governing database, all new blocks are reliable with the event messages, and forward the entire newly minted block within the database network. Hence moving vehicle can send query about its safety whenever necessary through the distributed database. When the process is completed, the new block is advertised, and moving vehicles within the network are validated and updated with the parameters inside the distributed database. The WOA algorithm is extensive for solving the complex engineering optimized difficulties. The apparent advantages are like ease, reliability, fast convergence speed, and random distribution property gained wonderful consideration among the today's rehunt community in various discipline like electrical and power systems, information processing and machine learning, mobile and vehicular network optimization, Internet of Things and many more.

A number of the remarkable character of the WOA is its balanced functioning of the global hunt and local hunt strategy of penetrating, and its winning execution even with a lesser number of parameter.

Proposed Model Using WOA

To achieve successful transmission in vehicular networks, grouping of moving nodes plays the best possibility. The major is to minimize the number of grouping and attending more number of moving nodes. To increase the number of nodes we proposed Whale Optimization Algorithm (WOA), it targets to decrease the number of clusters and help to accomplish compact round trip time.

Whales can distinguish the position of victim and encompass them. The location of the best possible plan in the seek out area is not recognized by a priori, the proposed algorithm considers that the ongoing prey is suitable member for the indented victim or is near to the best possible. After finding the finest hunt agent is updated, the other hunt agents will seek to fill in their locations towards the finest hunt means.

Process1: fill data samples

Process2: Initialize every hunt agent to contain k arbitrarily grouping centres

While $t < Iteration$ **do**

For every hunt agent i **do**

For every data vector x_p **do**

Process 3: Calculate the data point between each cluster to their respective centroids.

Process 4: consign x_p to the group x_{ij} such that

$$\left|x_p - Z_{ij}\right| = \min_{c=1,2,\ldots,k}\left|x_p - Z_{ic}\right|$$

Process 5: Calculate the fitness

$$Fitness = \sum_{j=1}^{k}\sum_{i=1}^{n} W_{ij}\left|X_{ij} - Z_{ij}\right|$$

$$W_{ij} = \begin{cases} 1 & if \left|X_i - Z_{ij}\right| = \min_{1\le m\le k}\left|X_i - Z_{im}\right| \\ 0 & else \end{cases}$$

End for

End for

X^* is the best hunt agent

Process 6: **For** each hunt agent **do**

Update a, A, C, I and ρ

If $\rho < 0.5$ **then**

If $|A| < 1$ **then**

Process 7: Update hunt agent

Else if $|A| \ge 1$ **then**

Select random hunt agent

Process 8: Update current hunt agent

End if

Else if $\rho < 0.5$ **then**

Process 9: Update the location of current hunt agent

End if

End for

$t = t + 1$

End while

Process 10: Return X^*

End Process R is a random vector in [0, 1].

Performance Validation

This section shows the validation of the performed proposed Whale Optimization Technique. Analysis have shown with the number of nodes and evaluated in terms of Delay, overhead, Drop and Throughput.Network Simulator-2 version 2.35 is used to get the validation of the work.The performance parameter are shown in Table 1

Table 1: Performance Parameter

Parameter	Value
X coordinate	2500
Y coordinate	1000
Adhoc Routing	AOMDV
Initial energy	10
Tranmission Power	0.660
Reciever Power	0.395
Sense power	0.00000175
Number of nodes	240
Packet size	500

The validation of the WOA algorithm and we tested a range of parameters of the results. The figure shows that with an increased node count, the node count WOA performs best by simulating a high number of clusters. The authentication scheme smart card (ASC) was less effective with the increase in number of nodes, the hybrid method for a Privacy Preserving Authentication Approach (HEPPA) was slightly better, Rainfall optimization Algorithm (ROA) have reached near optimum solution. Finally WOA has leaded the finest results by simulating with the increased number of nodes.

Analysis of the WOA in Terms of Delay

Fig. 4 shows the Delay analysis of the WOA method under a cyber attack. In simulation environment we used the nodes varying from 0 to 240 and delay ranging from to 0 to 16.000×10^3, for the 100 nodes the calculated proposed WOA has achieved 26% less than ASC, 21% less than HEPPA and 15 % less than ROAC method.

Analysis of WOA in Terms of Overhead

Fig. 5 shows the overhead analysis of the WOA method under a cyber attack. In simulation environment we used the nodes varying from 0 to 240 and overhead ranging from to 0 to 16.000×10^3, for the 100 nodes the calculated proposed WOA has achieved 44% less than ASC, 36% less than HEPPA and 18 % less than ROAC method.

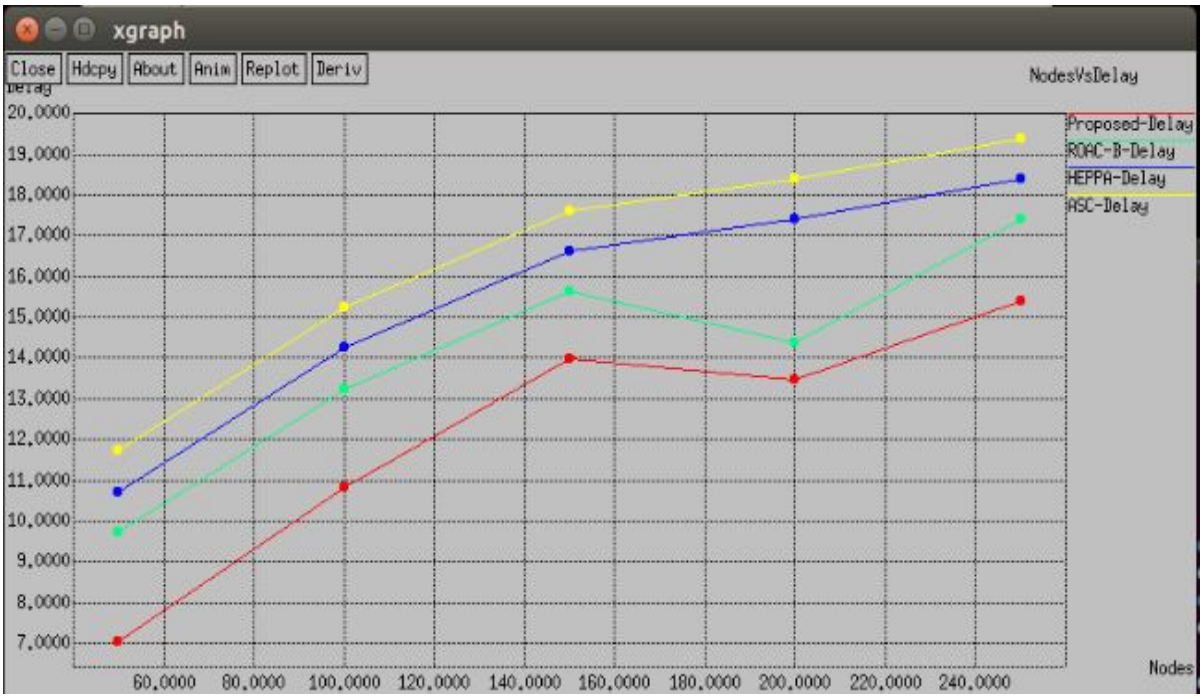

Fig 4: Delay analysis of proposed WOA Technique under cyber attack

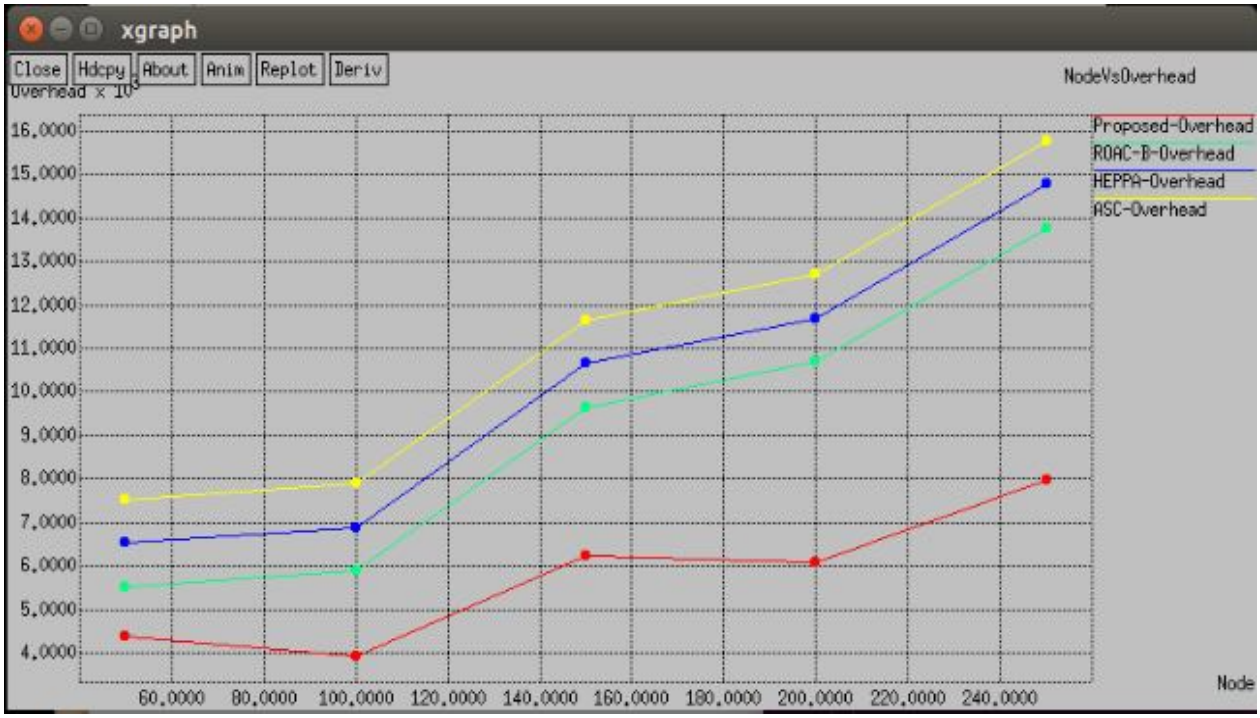

Fig 5: Overhead analysis of proposed WOA Technique under cyber attack

Analysis of WOA in Terms of Drops

Fig. 6 shows the Drops analysis of the WOA method under a cyber attack. In the simulation environment we used the nodes varying from 0 to 240 and drops ranging from to 0 to 20.000, for the 100 nodes the calculated proposed WOA has achieved 60% less than ASC, 53% less than HEPPA and 46 % less than ROAC method.

Analysis of WOA in Terms of Throughput

Fig.7 shows the Throughput analysis of the WOA method under a cyber attack. In the simulation environment we used the nodes varying from 0 to 240 and throughput ranging from to 0 to 6.000, for the 100 nodes the calculated proposed WOA has achieved 3.87 % more than ASC, 3.33%

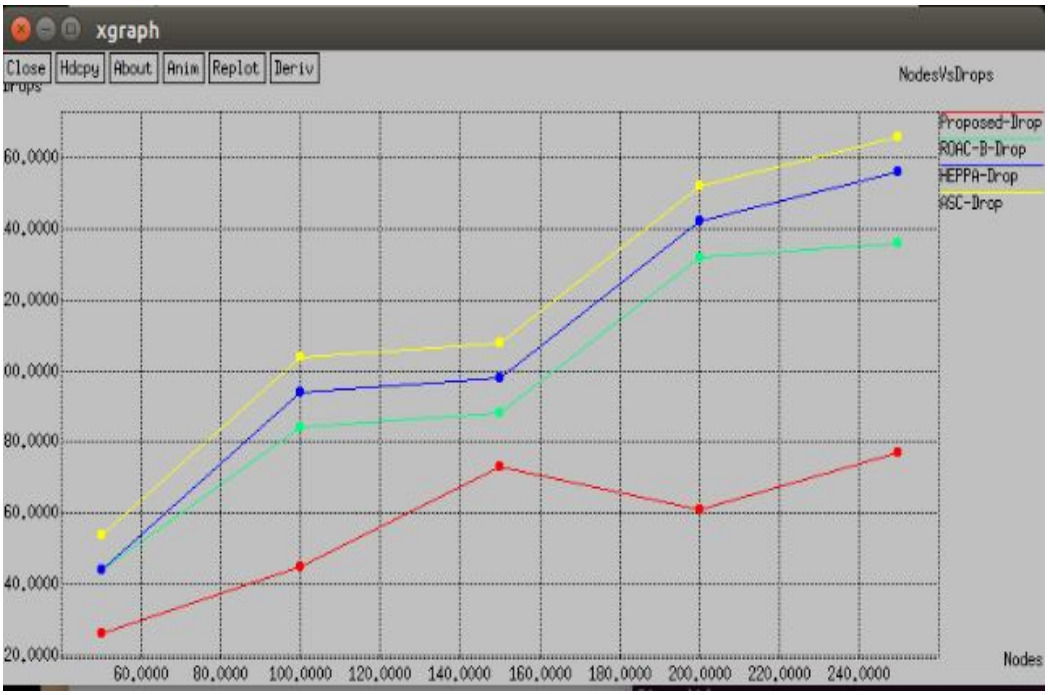

Fig 6: Drops analysis of proposed WOA Technique under cyber attack

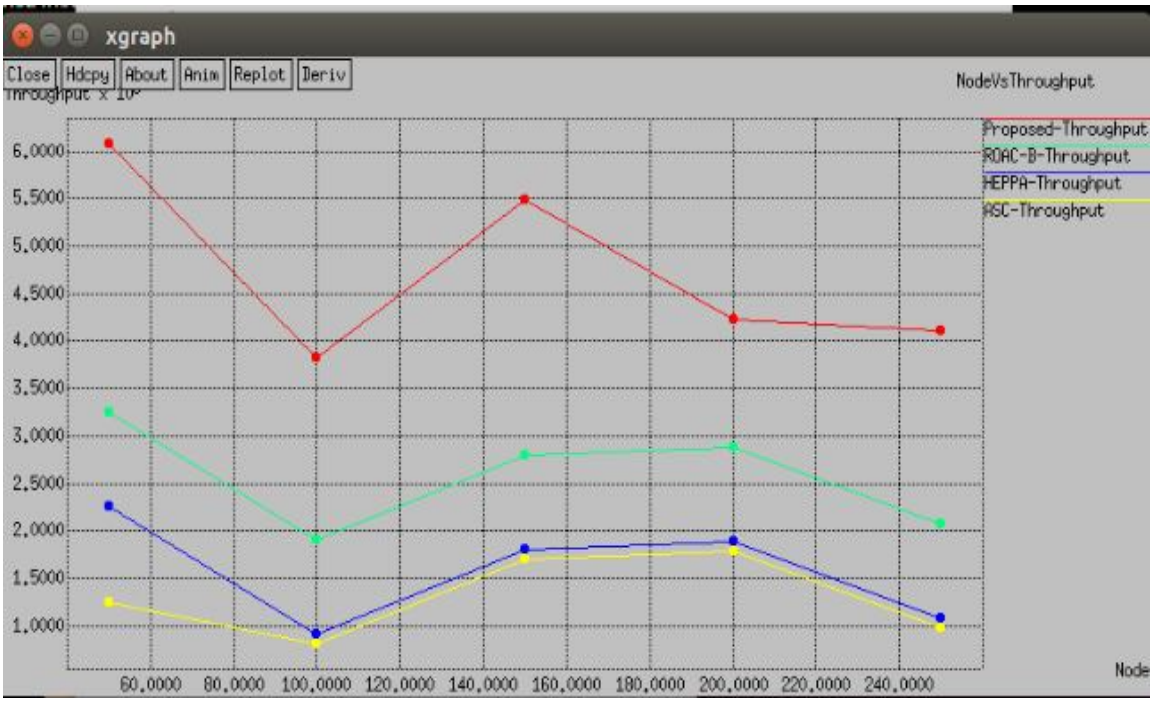

Fig 7: Throughput analysis of proposed WOA Technique under cyber attack more than HEPPA and 0.51 % more than ROAC method.

Conclusion

This work has identified the proficient privacy-preserving data communication scheme. It is incorporated by using whale optimization algorithm to cluster the vehicles and selects suitable Cluster Head, after that intercluster, intracluster and other communication occurs through Blockchain Technology.

A set of simulation processes are done in the direction to check the efficiency of proposed algorithm.The working analysis shows that the proposed algorithm is finer with other techniques in terms of throughout, Delay, drop, overhead under denial of service attack.

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AUGMENTED REALITY STUDENT CARD (ARSC)

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ABSTRACT

Augmented reality nowadays is widely used in various fields. Increased reality these days is broadly utilized in different fields. The current paper-based understudy card barely contains a lot of data and the text dimensions are somewhat minuscule, makes burden people who experience the ill effects of vision abandons, stressing their eyes while getting to the data from the cards. Alongside the huge development of use in cell phones, this venture is planned to foster an Augmented Reality Student Card (ARSC) to give the fundamental functionalities to boost the utilization of the data on the understudy cards. The data which is gathered, are shown on a cell phone by utilizing Augmented Reality application. At the point when understudy card is filtered, the understudy card capacities as a marker and gives data. Applying the idea of increased reality innovation incorporated with Vuforia library, the application is additionally improved to recover 3D models, 3D movement video, site and web worker network for understudy ID card.

***Keywords**: Unity 3D, Vuforia, Autodesk maya, Application, Augmented reality.*

I. Introduction

Increased Reality has its starting point from the word 'Expand' significance to add or upgrade. The term Augmented Reality was given by Boeing Researcher, Tom Caudell. Here, the increase is being done continuously. One can say that AR is an innovation in the middle of genuine reality and augmented reality. The formatter should make these segments, consolidating the relevant standards that follow. AR can be characterized as the framework where genuine and the virtual universes have been joined, there is ongoing collaboration, and the gadget is enlisted in 3D.

The overlaid material information can be useful or harming. This experience is faultlessly gotten together with the real world so much that it is to be viewed as a clear piece of the veritable environment. Thusly, extended reality changes one's ceaseless perspective on a certified environment, while PC created reality absolutely replaces the customer's actual environment with an impersonated one. Expanded the fact of the matter is related to two generally identical terms: mixed and reality. Moreover, the persistent correspondence between virtual.

Moreover, the virtual things can appear in automated 3D models with a further evolved system of mixing content. The virtual substance is made and prepared of time and set aside locally or in cloud. Possibly than just lowering customers in the virtual world, expanded reality development grows object in the real world by working on the applications with cutting edge information and correspondence capacities. The understudy card is the conspicuous verification card given to understudy, which holds basic nuances of an understudy. The understudy card which is given to understudy from the foundation, doesn't contain bare essential information about an understudy like understudy specialization and casual local area unequivocally proposed for calling i.e., LinkedIn, Skype, Gmail, etc, and moreover school activity entrance like Select Smart, Campus Uno.

A. Examples

1) Google Lens
2) IKEA
3) Snap Chat

II. Methdology

The block diagram consists of various software and the hardware components discussed in the previous chapter. Here physical student id card as a target image, Vuforia is used to create database and license. Later unity 3D is the software where entire design is done. Android SDK is used for building android application.

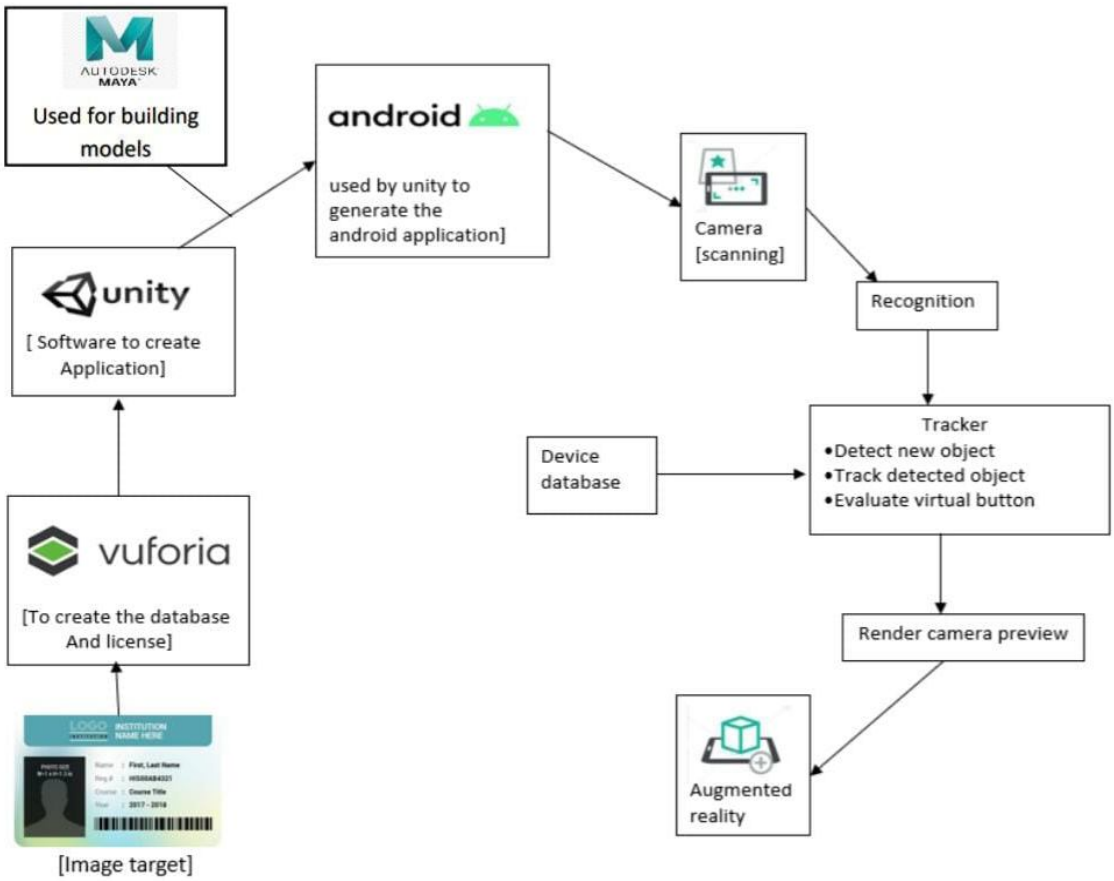

Figure1: Block Diagram

Finally installing Android ARSC application in Android mobile and experiencing the AR effects.

III. System Requirement

A. Software Requirements

1. UNITY 3D
2. VUFORIA
3. ANDROID STUDIO
4. AUTODESK MAYA
5. VISUAL STUDIO CODE

1. Unity 3D

Unity3D is a cross-platform 3D engine and easy to understand development environment. The engine which is used to create 3D,2D, virtual reality (VR), and augmented reality (AR) games, as well as simulations and other experiences. It helps to create 3D games ,applications for mobile, desktop, the web, and consoles.

2. Vuforia

Vuforia is an Augmented Reality SDK for cell phone, and foster some sort of AR application by utilizing Vuforia SDK. Vuforia provide free tone also permit for acquiring knowledge. Also, Vuforia Software Development Kit is not difficult to utilize and strong.

3. Android Studio

Android Studio is a coordinated advancement climate (IDE) for creating android applications, that contains a content manager, investigating apparatuses and devices for running our application. Android Studio is a device that makes fostering an android application a lot simpler. It is an open source.

4. Autodesk Maya

Maya is 3D special visualizations programming with amazing person creation, gear, movement, and reenactment apparatuses. It is use to make assets for intuitional 3D applications (counting computer games), vivified films, TV set of programs, and magnify the visualizations. As per the project designed, we used Autodesk Maya Software for building college models. As we are doing ARSC for RajaRajeswari College of Engineering we built a 3D model i.e., RRCE main block, Boy's Hostel, Girl's Hostel, PG Block, Xerox and college canteen.

Figure 2: RRCE main block

Figure 3:PG block

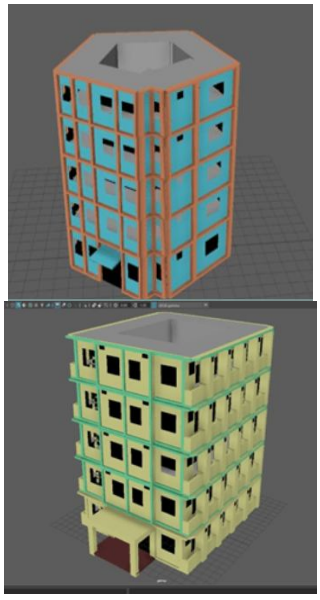

Figure 4:Girl's hostel and Boy's hostel

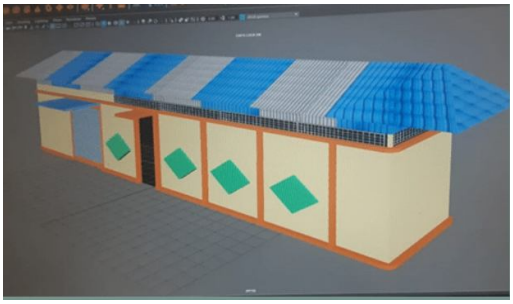

Figure 5: Xerox and Canteen

5. Visual Studio

Visual Studio is perhaps the most remarkable IDE (Integrated Development Environment) that works with all significant programming dialects like C#, Python and Java renditions. It is kept up with by Microsoft Corporation. This IDE is stacked with rich elements and functionalities that, one might conceivably envision. Visual Studio is an Advanced Integrated Development Enterprise solely fostered the Microsoft Corporation in the year 2000.

6. C# programming

C# is a programming language which upholds the pair of items situated and angle situated programming. C Sharp is utilized as prearranging language used in Unity. It is not difficult to use for creating an applications in the Solidarity climate

B. Hardware .

1. Android Device

An Android phone is a wonderful and powerful, which runs on the Android Operating System. We have developed application of Android. ARSC app will be installed in android phone and experience AR.

IV. **Result Declaration**

An ARSC application is build and is installed in an android app. This ARSC application render the camera screen and shows the relevant information.

Figure 6: ARSC Application

A. Front View

The front perspective on the ARSC which is opened in the android application. To one side we can notice the picture of actual id card of understudy examined and transferred in the beginning cycle. At the point when we open the application and output the actual id card front view the AR adaptation of the equivalent seems which contains various logos which are called catches. At the point when we click on the ideal fastens, the application's back-end with the assistance of the c# code opens the

landing page of the particular wanted application. In our case, when we click on RRCE logo button we will open the authority RRCE site, for LinkedIn logo catch to LinkedIn page of the individual understudy, Gmail to the mail id of the understudy, additionally the select brilliant and grounds uno utilizations of the particular understudies is opened. On top of this we likewise become acquainted with the data of the chose understudy like name, USN, branch, date of birth, address, telephone number and so on.

Figure 7: front view with details.

B. Back View

Similarly, back view contains the detailed information about every part of the whole campus with the extended feature of navigation which helps in locating the main building, boy's hostel, girl's hostel, PG block, canteen, xerox, bank etc. also, this app provides information about every floor inside the main building like every branch, auditorium, seminar halls location.

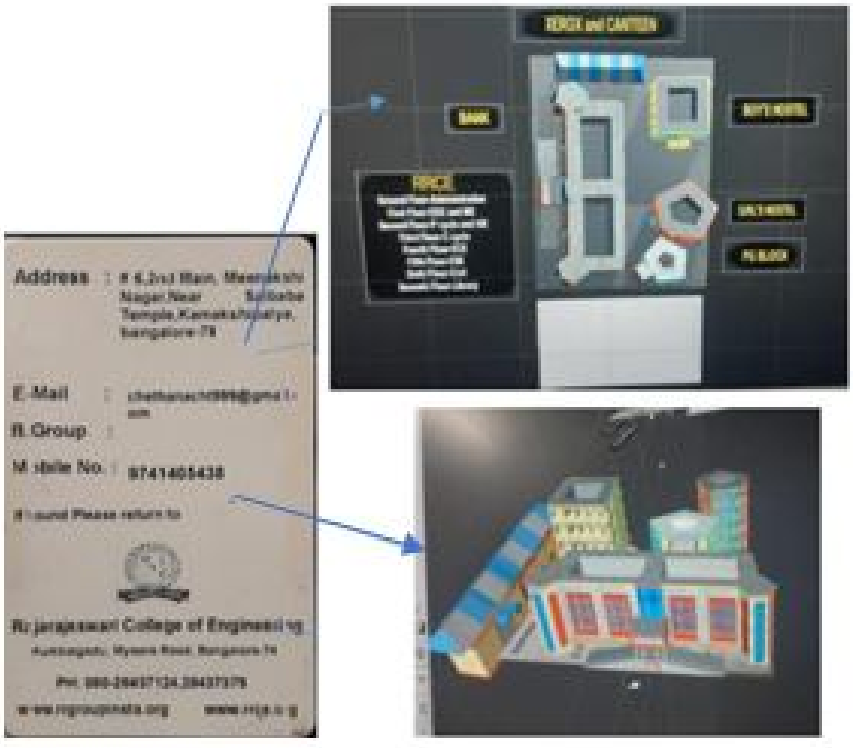

Figure 8: Back view with navigation

At first when we scan and open the AR view of the campus it shows image with information and when we zoom in the college image it properly gets itself into the 3d model shape as seen in the above picture

VI. Advantages OF ARSC

- AR can be utilized to build the information bars of individuals
- With the help of AR individuals are able to access more to their need and in a very less time.
- AR technology also enhances the perceptive power of humans.

VII. Conclusion

According to our assessment the fact is expansion for making an informational application using the AR development, making the ARSC will provoke decrease the issues related to having the opportunity to understudy nuances at educational associations and augmentation the portrayal ability to understudies with the base mechanical assemblies used. ARSC is made to access the customers to bring details from the genuine understudy id card. The application is expected to reduce the struggling of a customers, when getting to the contact data from the understudy card.

By utilizing the extended reality development, the application has been also overhauled by giving a more natural viewpoint on understudy id cards which in like manner has the component to zoom in little characters. It also progresses instinct between both the customers and understudy cards. It has the capacity of materialistic and proper to be applied into reliably life in various fields. This system is planned for coordinating people in indoor conditions with AR development. It guides the unapproachable to show up at the best region by using AR course map.

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AUTONOMOUS ARMY ROBOT FOR BORDER SURVEILLANCE

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ABSTRACT

The robotic vehicle works both as an autonomous and manually controlled vehicle using the internet as a communication medium. Robots in the military are the future of warfare. The multisensory robot is used to detect human bombs, harmful gases, and fire at remote and war field areas. The main objective behind developing this robot is for the surveillance of human activities in the war field or border regions to reduce infiltrations from the enemy side. Robots reduce the human life risk due to cross-border firing. It can send real-time video signals to the command center. The Robot is capable of surviving in harsh and difficult climate conditions for a long time without causing any harm. Conventionally, wireless security robots are obsolete due to limited frequency range and limited manual control. Multitasking wireless robot systems are very effective in regions where the environment is not good enough for human survival. These robots have video cameras to live stream video and are controlled by a remote server. A higher level of maintenance is needed than with a manually operated machine.

Keyword : *Robot , IoT, wireless system , cameras.*

I. Introduction

Nayak's article discuss about how robots are used to reduce the human life risk in hazardous situations. Than anything else human life is always prior so robotic vehicles are used as the substitution to human life. Often, we see in newspapers and other media that many of our soldiers are sacrificing their precious life in cross border surveillance and due to landmines explosion during surveillance of the border. Proposed project is inspired by the recent event that occurred in the Line of actual control between India and China. Shreedhar and Nayak e.t.l discuss about researches and development going on in the field of robotics to reduce the risk of our soldiers' lives by replacing them with humanoid or robots.

The military forces are actually trying to use new weapons and gadgets in war fields to reduce the risk in human life and defeating enemies. In the present days we can see that robotics has become the hot field of the modern age in which the nation is concentrating on military in the state of war and peace. Minal's and e.t.l discuss about modern military forces they are using different robots for many different applications like surveillance, land mines explosion, cross border firing and rescue operation. In the future we can see that robots can be used for surveillance and recognizing, communications, logistics, architecture and offensive operations and in for many other supports.[12][13][14] A robotic vehicle is a mechanical device which is capable of moving independently and can also perform a series of complex actions. Generally, it is a machine which functions continuously in spite of living beings without getting tired. The robotic vehicle includes ESP32 Camera, Node MCU ESP8266, Servo Motor, Motor driver, IR Sensors, Gas Sensors, Ultrasonic Sensors, Metal Detectors, and DC Motors. These army robots are comparatively more effective and efficient than soldiers in terms of strength, capacity and capabilities.

This article is organized as follows: In session 2 , the literature survey is discussed , section 3consist of the detail about system design , session 4 consist of detail explanation regarding proposed design methodology , whereas remaining session focus on results and outcome.

II. Literature Survey

Nayak.S, Shaw.K, e.t.l paper proposes a multipurpose robot to be used in the battle field. The robot contains Raspberry Pi which acts as a client.The unique facility of this system is that the controller can control the device remotely far away from the hazardous battle field.Thus the whole system offers an

economical approach with prominent efficiency in every aspect.

M. Vadivel.S , Siva Sundara Pandian's e.t.l system is capable of live streaming using 4G Technology. Due to the advancement in technology this robot is very effective for defence oriented applications . Use of renewable source of energy, DTMF and smart cell phone as video camera makes it cost effectiveness compared to existing robot.

Shreedhar A Joshi, Girishkumar Aravalli, e.t.l, present the work designs of a robot, constructed with the help of chain wheels and connected to motors, where movement of robot can be controlled in all directions with gear facility. It has two more applications like Gas detection and firefighting. In the presence of any toxic gases, the robot gives the alert signal by sounding buzzer. It can also fight with fire by sensing fire using temperature sensor. The controlling of this robot is done with help of wireless RF module.

III. System Design

In this robot, the proposed work has two modes of operation. These modes are virtually triggered from the control center. The modes can be defined as the surveillance mode and the attack mode. Further, the two modes are discussed below.

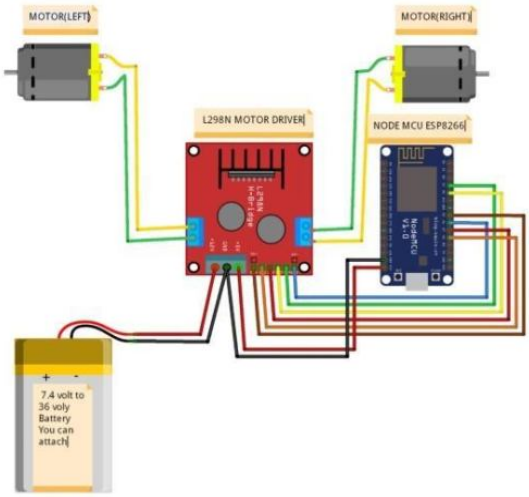

Fig 1: System Design 1

The figure 1, shows us the system design circuit connection for the attack mode. Here the motors are controlled using remote electronic devices in control center over IOT.

The first Circuit design is designed using the microcontroller ESP 8266. This microcontroller is a Wi-Fi-enabled development board using this microcontroller we have powered the motor driver L298N as shown in the image above. The microcontroller can control the robot over the cloud using IoT technology.

The microcontroller is programmed in such a way that the commands from the APK file installed in the electronic devices which are connected to the IP address of the microcontroller, decrypted, and converted into a sequence of numbers which is fed into the motor driver in parallel sequence using microcontroller. The motor driver L298N is connected to 4 DC motors that drive the robot and these DC motors are powered by a 9-volt battery through the motor driver. The speed and direction of these DC motors are controlled by the microcontroller using the motor driver.

Here in the design we have used a microcontroller ATmega328P and this microcontroller is used to control the line follower operation of the robot. Here the robot is using two IR sensors which sends the live values to the microcontroller for every millisecond the IR sensor will differentiate between the white colour and black colour, since the white colour observes less radiation than black colour it reflects more amount of IR radiation. This difference can be measured by the sensor and sent to the microcontroller. The microcontroller will analyse the data and send a sequence of numbers to the motor driver which drives the motor DC motors in the correct direction.

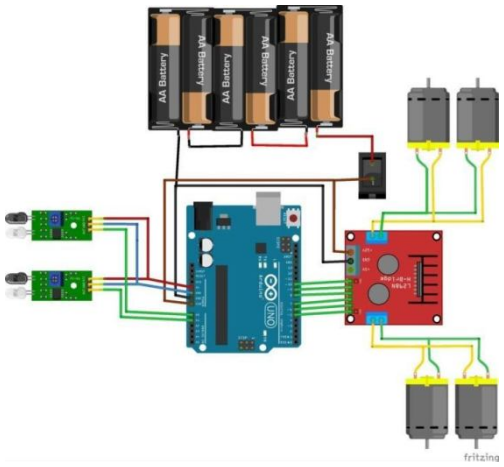

Fig 2: System Design 2

The figure 2, system design show us circuit connection for the surveillance mode. Here the

motors are controlled using Arduino Uno depending upon the data received by the IR sensor.

IV. Methodology

In the Surveillance mode, the entire control of the robot will be automatic. The Robot is guided by the line follower system which will be installed in the robot. The line follower system consists of IR sensors that navigate the robot in a particular direction. In this mode, the rover and the camera will be moved automatically in the robot. Also, the arms are deactivated during this mode. In this mode, the surveillance footage of the camera is the stream to the control center and also the other senses and functions work on their own according to their programming command.

In the Attack mode, every control of the robot is provided to the control center. When the robot is brought into Attack mode it is nullified from the line follower mode operation and the robot is navigated with a remotely operated server in the control center. In this mode, the robot is used for dense operation. As in the Surveillance mode, even in the attack mode, the rover and the camera will be moved automatically in the robot. Also, the arms are deactivated during this mode similarly. Here it uses a remotely triggered armed gun with ammunition to counterbalance the target, in case of any threats. In this mode, full control is given to the control center.

In this project, different sensors are used. The sensors can be defined as metal detector sensor, smoke sensor, ultraviolet sensor, etc. constituting their operation. The metal sensor is used to detect any land mines across the border and the smoke sensors are used to detect any smoke grenades in the area. The ultraviolet sensors measure the power or intensity of incident UV radiation. The robots are used as DC motors which will help in navigation or map-reading. The robotic vehicle will have the possibility to take the place of the soldiers at border areas to provide surveillance and also works both as an autonomous and manual using the internet as the medium of communication. The robots will be used to detect human, bombs, harmful gases and fire at remote and war field areas. The robots are coded and perform functions with high accuracy.

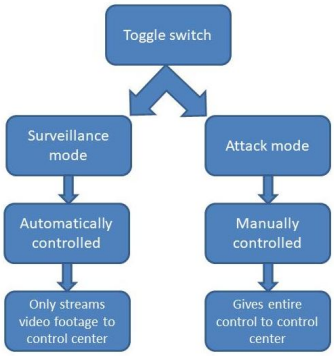

Fig 3: Flow Chart

The figure 3, system design show us difference between two modes of operation.

In the proposed work a commercial purpose microcontroller ESP8266 Node MCU microcontroller is used. The ESP32 camera used in the robotic vehicle is for streaming the video footage from the field to the control center. The entire robot is

powered with a battery setup of 12-volts. The proposed system is designed with a robotic arm that helps to handle any extreme situations such as bomb diffusion.

V. Hardware Components

1. **ESP32 Camera:** It is a 2MP camera powered by a Wi-Fi enabled microcontroller. This camera has an operational voltage of 5V and it has a pseudo static mode and pseudo static ram of 4Mbit and an external memory of micro-SD card expandable up to 4gb. Using HTTP protocol this robotic vehicle will stream with the IP address of this camera and this HTTP can be accessed by any browser we use or any multimedia player and Blynk application.
2. **Node MCU ESP8266:** Node MCU ESP8266 is a developer module which has a 10-silica microcontroller in it. It operates under the voltage of 3.3V and this is a Wi-Fi enabled microcontroller. This is helpful to create an IOT application. This will connect over the internet and this microcontroller can be accessed remotely using a blynk application or any cloud services that are provided.

3. **Arduino uno:** The Arduino Uno is a development board which is powered by microchip microcontroller ATmega328P. This is a model which is an alternative for 8051, it operates under voltage of 5V and it has 14 input/output pins with 6 PWM provided. This microcontroller is used for powering the line follower circuit. It has an input supply voltage ranging from 7-20V.
4. **Servo motor:** The servo motor has a torque of 2.5kg per centimeter. The servo motor is used to trigger the arm gun. Arm gun can be triggered by using a servo motor which is connected to a Node MCU microcontroller. The servo motor can be rotated at 180 degrees (+/-15 degrees). They are operated at 5V typically. It has a speed normally at 0.12sec per 60degrees which varies with volts of direct current.
5. **Motor driver:** Motor Driver plays a very important role in this robotic vehicle. The direction and navigation of the robot can be controlled by using a motor driver. This motor driver is used to transform the sequence provided from the micro controller into DC voltage and current which drives the DC motor and directs the robot. It supplies a maximum voltage of 46V and maximum current of 4A.
6. **IR sensors:** In IR Sensors, it contains one receiver and one transmitter. IR sensors are used for line followers. Basically, IR sensors are used for detecting the distance between two objects. When the transmitter end emits the IR radiation it hits any objects, the reflected rays are identified by the receiver. In line follower mode the black surface absorbs more IR radiation than white surface. This difference can be used for this project by creating a line follower and guiding the robot.
7. **Gas sensors:** Gas sensor is used for detecting any harmful gases like nitric oxide (NO), nitrogen dioxide (NO2) etc., which are the byproducts of any explosion. Gas sensors vary in size like portable and fixed. They also vary in range and sensing ability. Gas sensors operate at 5V.
8. **Metal detectors:** Metal Detectors work on the principle of Eddy Currents. Whenever there is disruption in the electromagnetic field provided by copper wire, it will shift in the voltage and identify any threats and they can be eliminated. It is an electronic instrument that helps to detect any metal nearby**.**
9. **DC Motors:** A DC Motor is a rotary electrical motor which helps to convert electrical energy into mechanical energy. Many types of DC motors depend on forces which are produced by magnetic fields. The small DC motors are used in toys, tools etc., It operates at a voltage ranging from 4.5V to 9V. Accordingly, the voltage that is recommended is said to be 6V.
10. **Ultrasonic sensors:** It is an electronic device that measures the distance of an object by producing ultrasonic sound waves. It converts reflected sound into electrical signals. These waves travel faster than the speed of sound. Ultrasonic sensors have two main components namely, the transmitter and the receiver. They are used to detect liquid levels in closed containers and also used to ensure the health of babies in the womb.

VI. Software Components

1. **Blynk Application:** Blynk application is used to build a graphic interface for any project. When an account is created, an attenuation token is generated where the attenuation token is defined as a series of numbers given to the account created. This attenuation token can be fed to the microcontroller so that the microcontroller can be accessed by using blynk server. The blynk server will register the attenuation token so that if there is any need change or to make the microcontroller work, the blynk application can be used.

2. **Arduino IDE:** Arduino IDE is used for programming any microcontroller which comes under the Arduino brand. In this project Node MCU ESP8266 an ESP32 Camera and Arduino UNO are used and these are programmed using this software. It helps to add any kind of header files and helps in entering the attenuation key, SSID, password etc., so that the micro controller board can come online. It is an electronic platform based on easy-to-use hardware and software.

3. **Mobile App Controller:** A mobile app controller is an APK file which operates on the principle of MQTT protocol. Firstly, the IP address of the micro controller will be assigned when the micro controller comes online it will be assigned with the static IP address. Now when the direction is published as a value so that it will be subscribed in the microcontroller. Once published the subscription will receive the value and decrypt into the sequential numbers. These sequential numbers will be fed to the motor driver which in turn instruct the DC motor to navigate in a particular direction.

VII. Result

Fig 4: Autonomous army robot

Fig 4 represents the final robot vehicle that is constructed

The above image is the working model of proposed system. This system will enable the military personal to do border surveillance from a remote location and can engage in combat operation at any time of need.

VIII. Conclusion and Future Scope

In this project, we have accomplished to design a multifunctional robot using NodeMCU module which can be used in all conditions without any restrictions being imposed on it. The primary aim of the project is to provide the ability of automatic interpretation of scenes in order to understand and predict the actions and interactions of the observed objects based on the information acquired by its sensors. In particular, the implementation of code for object detection represents first stage for development of more complex behavior analysis and understanding tasks. Here, in our project the robotic vehicle is been provided with ESP32 cam for live streaming and real-time interpretation of data using mobile environment. All adding up together provides a better surveillance reducing the human loss and making the mission to be remotely successful.

Our future work aims on improving the overall system by adding new tasks and modules for improving the overall efficiency of the system. Improving the reactivity of the system to unforeseen environmental variations such as light changes, dynamic obstacles, etc. is another major issue that cells for research on pertaining the project. Further an effort can be made to deploy the technology that can take up suitable action for the detection of landmines or any weapons hidden underground in the war field. On the other view point, we can include a trigger gun (the replica of which is shown in this proposed model using a laser) to hit the damage causing target with the help of command control created.

The additional studies projected for the future according to our knowledge are adding sounds or notifying the user on some events such as “out of range”, “video lost”, “battery percentage”, etc. Improving the precision of sensors in terms of range, sensitivity and adding new modules so that the robot will be fully automatic. For example, if camera detects any person, instead of sending an image to the user it will have the capability to authenticate itself and to trigger a gun mounted on it.

Finally, this project helped us to understand the communication with hardware and software better. Implementation of this robot has significant saving in terms of life, time, increasing the efficiency and reduced utilization of manpower should pay the cost once this robot is activated.

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SMART APPROACH FOR GROUNDWATER RECHARGING BY RAIN-WATER HARVESTING

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ABSTRACT

In today's modern world water scarcity is emerging as a new problem due to various issues be it increasing population, industrialization, increase in various forms of pollution. All these issues collectively are becoming a major source for water scarcity or water pollution. Water scarcity is majorly faced in Urban areas and in few parts of Rural areas as well. As we all know water is very precious, we must take important steps and precautions to save water and increase water availability. The goal of the present study is to utilize rain-water and to take steps for the concept of nature conservation, in this study rain-water harvesting system is analyzed to be as an, replacement for the source of water. Harvesting rain-water is one of the best, simple and cost-effective way for the conservation of water. This study of model enables us to save rain-water for future usage as well as keeping an eye on its quality. This developed model satisfies all the requirement for the common usage of water in all the areas fulfilling basic needs.

I. Introduction

We live in an era where technology is improving at a very fast pace but contrarily, we are missing on our basic needs such as water and its protection from pollution. Due to the continuous growth of industrialization which in-turn has resulted in the growth of Urban population and usage(wastage) of water at a very large scale and become a major reason for decline in underground water which is considered as source of clean water from the time of our ancestors.

Although India receives higher rainfall when compared to other nations of similar size it still faces issues when it comes to water usage and water conservation. When it comes to the point of water conservation, rain-water harvesting is believed to be one of the best solutions as rain-water is considered to one of the purest forms of water on the Planet. Rain-water harvesting system can be used to provide sources for high-quality, soft water and reduces our dependency on rivers, ponds, and supplementary sources of water. It is cheaper economically in implementing when compared to other sources of implementing conservation of water. It is easy to implement in industrial areas, residential areas or any other vicinity.

Quantum of water collected through rain-water harvesting is intangible form which it is not possible to measure the quantity of water harvested in the rainy season, if we could measure the quantum of water collected during rainy season through rain-water harvesting this data will be helpful for the government authorities on creating a roadmap to deal with the issue of water conservation.

This paper proposes a model to deal with the issues mentioned above including from the collection of water to measuring its quality and quantity. It can be done by the help of various electronic components which includes various sensors, pump, microcontroller along with IoT to keep the user updated on the quality and quantity of water stored in the storage element. The main objective of the rain-water harvesting system is to fulfil the rising needs of water necessity, to decrease the groundwater contamination, to increase the underground water table, to use the water for usages other than drinking, it can also help us in reducing the water bills in urban areas, along with reducing flooding and soil erosion and using it for irrigation purpose in Rural areas.

II. Related Works

In recent years many approaches on rain-water harvesting system has been introduced in different views. Rain-water harvesting system has an accumulation area and storage system. The main concept of rain-water harvesting system involves collecting water and to store it in storage tanks and later used for various forms/purposes.

There were different ideas for RWH. One of those examples include method such as the device using sun energy for RWH. It contains ultrasonic sensor, cellular modem, low power draw processing unit. By using solar energy, it monitors the water level and uses rain-water harvesting approach in various places especially rural areas. The rain-water collection contributes to a large portion of water that is utilized by the people living isolated from municipal water supplies.

Another method was quite different model which is statistical model. It is model practiced in area in Amman, Al Jubayah, which has the highest amount of rainfall. This is completely a statistical model which deals with the quantity of rainfall, storage of rain-water dependant on the area of rooftop and etc. It doesn't deal with handling the amount of handling all that water and its usage for future.

In another approach the user gets the information of all the necessary information on Desktop or Mobile and need not to worry about water quality. As a result of this paper the quality of rain-water and to establish a direct connect between RWH system and the user. This model deals mainly with establishing the connection between user and the RWHS through the means of IoT and doesn't deal with how to collect the data which is to be shown to the user.

An intelligent centralised rain-water harvesting project was utilised to conserve the rain-water process and additional sensors (rain water sensor, ultra-sonic sensor), and Arduino were used in one of the methods. The microcontroller is Arduino. The primary goal of this project is to save rain-water.

III. System Requirements

A. Software Requirements

1. ARDUINO IDE
2. BLINK APP
3. EMBEDDED C PROGRAMMING

1. ARDUINO IDE

The Arduino is an IDE. We have made use of Arduino sketch for Node MCU, the same is used to establish connection between the user and technical expert to achieve IoT environment. It is also used for designing the widgets in the Blink app. The replacement of binary data into percentage is also done by using Arduino IDE.

2. Blink App

The Blink app aims to allow users to swiftly construct interfaces for supervising and observing all of user hardware projects from their iOS or Android device. After installing the Blink app, we construct a project on dashboard along with arranging buttons, graphs, and other widgets on the display. The widgets may be used to turn images on and off, as well as many other apps that display infrared data.

3. Embedded C Program

Embedded C is a popular and widely used programming language in the creation of a wide range of embedded devices. It is a well-known programming language that is widely utilised in all fields for developing various programming embedded models. Embedded systems are commonly developed using a variety of programming languages such as assembly, BASIC, C++, Python, and others.

B. Hardware Requirements

1. pH Sensor
2. TDS Sensor
3. Flow Sensor
4. LCD Display
5. Electromagnetic Relay
6. Power Supply
7. Pump
8. ESP32 Module

1. PH Sensor

PH meter is an instrument that quantifies the hydrogen ion activity in water-based solutions. It is used to measure the acidic or basic nature in various solutions. If solution has a value lesser than 7 on scale then it is considered as solution is acidic and if it is greater than 7 on scale then it is considered as solution is basic and 7 is a neutral value. The values of various solutions changes based on its parameter.

2. TDS Sensor

TDS Sensor is hardware component is used to detects quality of water by measuring the order of opaqueness. It's a deice which is used to detect the total dissolved solids in solution. The dissolved solids like salts, minerals and so on. TDS values below 300 mm per litre is considered for drinking purposes.

3. Flow Sensor

Flow Sensor is a hardware component which is used for measuring the speed or flow rate of moving water. The working principle of Flow Sensor is Hall effect.

4. LCD Display

A liquid-crystal display (LCD) is a flat display panel or electronically tuned device that makes use of polarizers to modify the light modulated characteristics of liquid. Each and every running model uses an LCD to display output on a screen.

5. Electromagnetic Relay

Electromagnetic relay works where low power signal can be used to control circuit and use for various purposes. It is used to control the operation of DC motor. It consists of various parts like Electro-magnet, moving armature, Switching point contacts and spring.

6. Power supply

Power supply is used to power the various hardware components used for accurate working of devices and displaying accurate results. It comprises of step-down transformer, diodes, capacitor, voltage regulator which provides output of 12V DC.

7. Pump

Pump is a gadget that displaces fluids like various liquids, gases by various mechanical actions like converting electrical energy to mechanical energy.

8. ESP32 Module

ESP32 Module is a low cost efficient which is on chip microcontroller with integrated Wi-fi module and Bluetooth. It is manufactured on 40nm process.

IV. Methodology

The block diagram consists of various software and the hardware components discussed in the previous chapter.

Here microcontroller is considered as a target, which acts as a mother board where it is connected to other devices/components (hardware and software components).

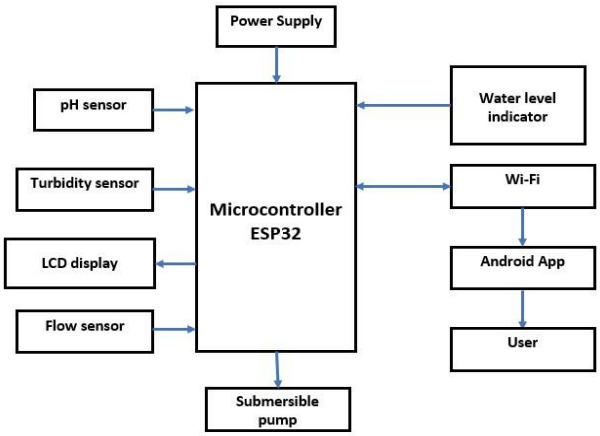

Figure1: Block Diagram

The information from various sensors reach microcontroller which is powered by power supply. Ph sensor which is used to check whether water is fit for drinking or not, TDS sensor which is used to check any dissolved salts present in water and make fit for drinking by purifying it, Flow sensor is used to measure the volume of water flowing through pipe to storage tanks which is used to measure quantity of water, Water level indicator which is used to know the water level in tank, LCD display is used to display the contents of all parameters on lcd board. Pump which is used to pump the excess water from tanks which is used in case of emergency (power loss). All information from various sensors which is in microcontroller perform various operation and later send to wi-fi module which is in turn reach to user via mobile application (blink app).

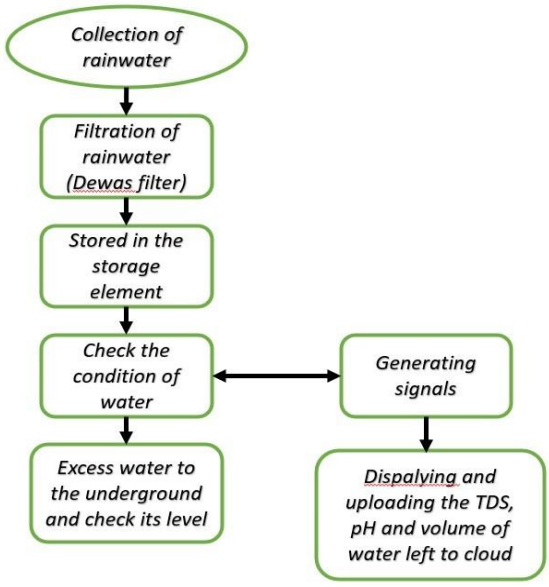

Figure2: Flow chart explaining RWH

Here we gather rain-water from the roof tops and store it in reservoirs. The main intention is to make provide water for future usage. Gathering and collecting rain-water for use is mainly important in dryland, hilly, urban and coastal areas and also in many other places.

Studies on RWH have till date have focused on harvesting of water only but poor quality of rain-water sometimes, makes it difficult to check the quality of water. Hence, quality of water becomes an important part of RWH.

In today's world, because of increased emission of gases that are toxic in the environment, has resulted in receiving acid rain. If pH of rain is greater than 5 it is suitable for drinking but if it is less than 5, it is unfit for drinking. Use of bad quality of water imposes bad effects on health. It can become a reason for illness and diseases such as: Vomiting or Diarrhoea, Sick stomach, skin rashes, Cancer (like leukaemia), Reproductive problems (like Infertility), Developmental problems (like Learning disabilities).

In 2001 Kerala received blood rain i.e., rain in red colour. This red coloured rain dyed the clothes pink in colour. Green, yellow and black coloured rains were also reported in Kerala, and eastern and north-central provinces of Sri Lanka. As a result, it becomes necessary to check the pH of rain-water before harvesting it. To take measures for water scarcity, quality and unequal distribution, new techniques are in demand to be explored.

V. Result discussion

The above model is Smart Approach to Groundwater Recharging by Rain-water Harvesting System deals smartly with the problem of decrease in underground water by various problems such as pollution, population, wastage of water.

Here we are using various sensors such as pH sensor, TDS sensor, water level indicator to measure the pH, turbidity, and level of water in the storage element respectively along with a flow sensor which is used to measure the rate of flow of water from temporary storage to permanent storage.

We are using two storage elements to store the water, one for the immediate usage which can come in handy during long power-cuts in rainy season and the another is a permanent tank which will be the underground unit of water storage.

Figure 3: Rain-water harvesting prototype model

Dewas filtration system is used to filter the water from impurities which has various size of pebbles along with charcoal to ensure the purity of water.

User can stay up to date about the quality and quantity of water in the permanent tank as this model is equipped with IoT to update the user about all the information, all these data is sent to user's mobile phone through Blynk App also it displays all these values in an LCD display.

A pump is used to pump the water from permanent unit to using unit of storage when required. All these functions of the model are controlled by the ESP32 microcontroller which is the heart of this project.

The model can be powered by 12V DC supply, an adapter can be used when using AC supply to convert DC supply of 12V can be used to power the device. the incoming AC to DC for the model or directly a LM317 voltage regulator is used to regulate the voltage for pump and pH sensor whereas pH sensor is also equipped with its own pH board which

converts analog data of pH meter to digital data.

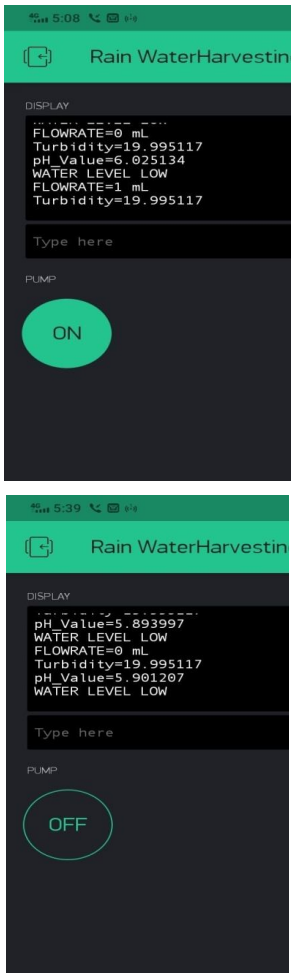

Figure 4: Snapshots of result obtained on Blink app

The above figure explains the output displayed on blink app. Here various components output like ph value, TDS value, Water level value and flow rate. All the component readings displayed on blink app reach user via mobile phone.

VI. **Conclusion**

Rain-water harvesting system conventionally mean and deal only with storing and using the rain-water for future usage when there is drought or some other natural calamities where living beings face water shortage. Our model not just does this conventional function of rain-water harvesting but also keeps a track on the quality and quantity of water stored and keeps the user up to date on all the information with the assistance of IoT provided to this circuit with the help of Wi-Fi module in the ESP32 microcontroller. Our model uses two storage elements and provides facility to use the water stored either immediately or later based on the user requirement and monitors the amount the water used in the form of water flown to the permanent tank from storage tank with the flow meter connected in between temporary and permanent storage elements.

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VEHICULAR PLATOON BASED TRAFFIC CONTROL SYSTEM

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ABSTRACT

Nowadays, the increase in the flow of traffic raises the need for a new technology that can improve the efficiency and safety of travel systems. Road safety can be improved by building wireless networks using platooning technology. Platooning is an idea that one vehicle tracks and follows the movement of another. Aiming to provide reliable wireless communication for the vehicle network. This paper presents an implementation of vehicle-to-vehicle communication at low cost and an efficient platooning system is designed. Zigbee module is used to communicate between the vehicles. Ultrasonic sensors, Infrared sensors, Arduino Board, Zigbee module are used to implement the complete design.

Keywords: *Platooning, Sensors, V2V communication, Zigbee*

Introduction

Nowadays, road accidents and traffic jams are the major issues in day to day, life. Platooning of the vehicle is a technology build based on V2V communication and **Cooperative adaptive cruise control (**CACC) controller. Figure 1 shows the platoon communication. The algorithm is developed which operates by communicating with vehicles indicating the accidents, traffic jams, weather conditions, road work, etc. The communication involves sharing the information from the moving vehicle to the previous vehicle and is ongoing. In the real scenario, the communication takes place through **Dedicated short-range communication (DSRC)**. These are wireless communication channels designed for automotive purposes. DSRC technology also helps VANETS to convey with the larger network through mobile stations and the internet. The speed of the vehicle can be controlled by CACC. We proposed zig-bee technology to establish a communication between the prototype model.

Some researchers have been developed for platooning of vehicular safety and transportation efficiency. In work [1] describes platooning dynamics for a self-driving vehicle, effect on increasing the road capacity and safety, reduce fuel consumption and CO_2 emission by 10% and also introduce the protocol for maneuvers such as joining, leaving maneuvers, reliability and driver comfort.

In work [2] the authors described the communication established between vehicles using long term evolution (LTE) network where the information can be transmitted by the messages received by the cellular mobile station which then re-transmitted to intended vehicles. In work [3] V2V communication utilizes sensors for warning messages and to avoid head-on collisions. In work [4] it is focused on pre-cash detection and warning system, blind-spot detection system based on V2V communication system.

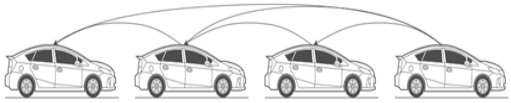

Fig. 1. Platoon communication

Methodology

Working of Prototype Model

Figure 2 shows the proposed block diagram of the vehicle1 and vehicle 2 model. It consists of the Ultrasonic sensors, Infrared [IR]sensors, Motor Driver with DC Motor, Zigbee module.

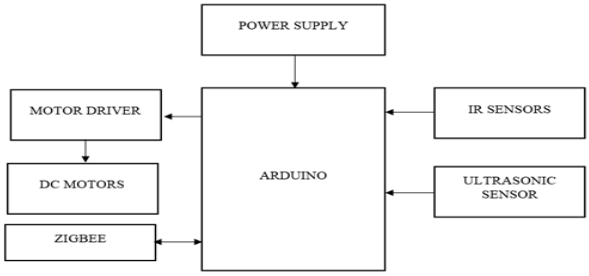

Fig. 2. Block Diagram of Vehicle 1 and Vehicle 2 model

An ultrasonic sensor is placed on the front part of the vehicle, used to indicate the obstacle/object in the front of the vehicle. The two Infrared [IR] sensor is placed on the right and left corner of the vehicle to detect the objects/obstacle within a certain range to avoid the collision. Arduino is a microcontroller that acts as a controller by reading the information obtained by the sensor and it controls the vehicle. A customized program is developed using Arduino UNO software and the program is written on the Arduino board so that the microcontroller functions according to the program.

Wifi-ESP8266 is an inbuilt module in Arduino Uno that is used to host vehicle1 so that vehicle2 follows vehicle1. It can be controlled via the internet. Zigbee is a Bluetooth module used to communicate between vehicle1 and vehicle 2, for controlling and monitoring the applications within the 10-100m range. Dc motors are used to run the wheels of the vehicle which is connected to the power supply.

In the vehicle module shown in figure 3 and figure 4, both the model 1 and 2 working are the same. Vehicle 1 or the lead vehicle sends every information about vehicle 1 to the vehicle 2 through a wireless communication. Initially, both the vehicles move in the forward direction. If any object/obstacle is detected by vehicle 1 within the vehicle range (vehicle range of 20 cm) then it sends the information to vehicle 2, both vehicles reduce their speed by the Pulse Width Modulation (PWM) process. Pulse Width Modulation is a modulation process that produces pulses of various widths to represent the magnitude of the analog input signal.

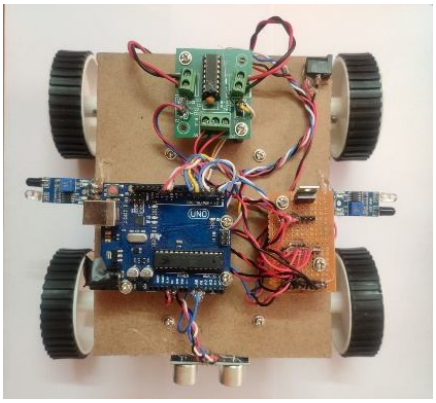

Fig. 3. Prototype model of Vehicle 1

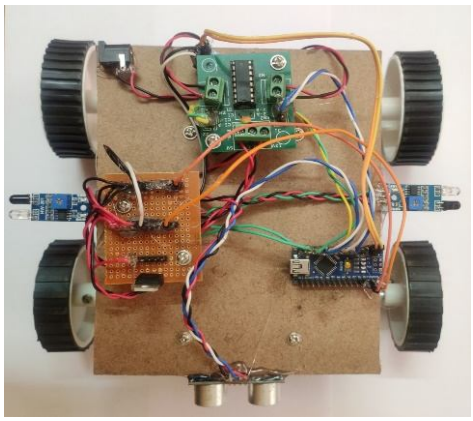

Fig. 4. Prototype model of Vehicle 2

Vehicle 1 checks if any object is present on either side of the object:

- If an object is present on the left side, then vehicle 1 overtakes the object from the right side of an object and passes the same information to vehicle 2.
- If an object is present on the right side, then vehicle 1 overtakes the object from the left side of an object and passes the same information to vehicle 2.
- If an object is present on both sides, then vehicle 1 applies the brake to stop the vehicle and passes the same information to vehicle 2.

HUB Communication

HUB can be implemented in the traffic zones to control the traffic lights based on the speed of the vehicles. It can also be used at the junctions of the roads. HUB Communication is shown in figure 5.

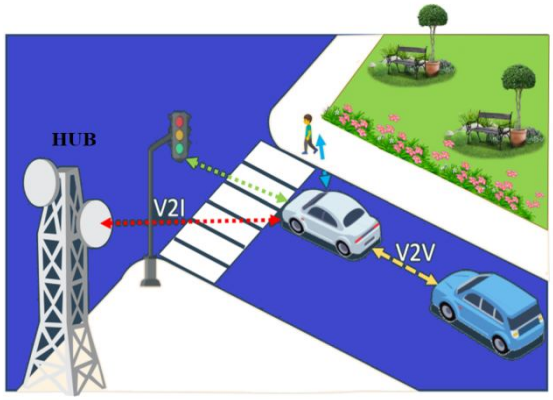

Fig. 5. HUB communication

HUB model is constructed by using four Infrared [IR] sensors and a Nano Arduino. A block diagram of the HUB model is shown in figure 6.

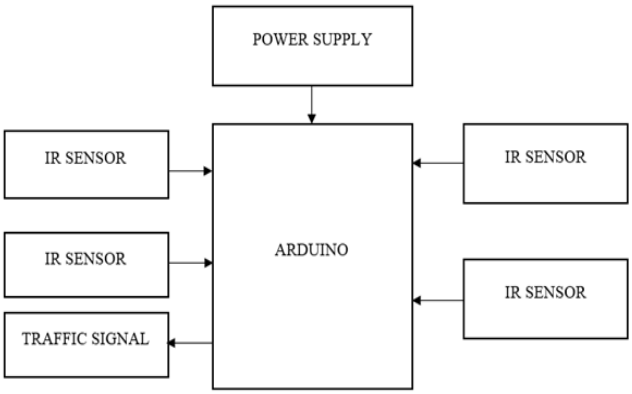

Fig. 6. Block diagram of HUB

The Hub model shown in figure 7 can be explained using an example: Assuming a road having two lanes, in each lane, there are two infrared [IR] sensors connected to the traffic signals.

Initially, the Hub model is in red condition, once the movement of the vehicle is detected on the lanes. The IR sensor 1, sensor 3 of lane 1 and lane 2 respectively, a timer is switched ON for both the lanes.

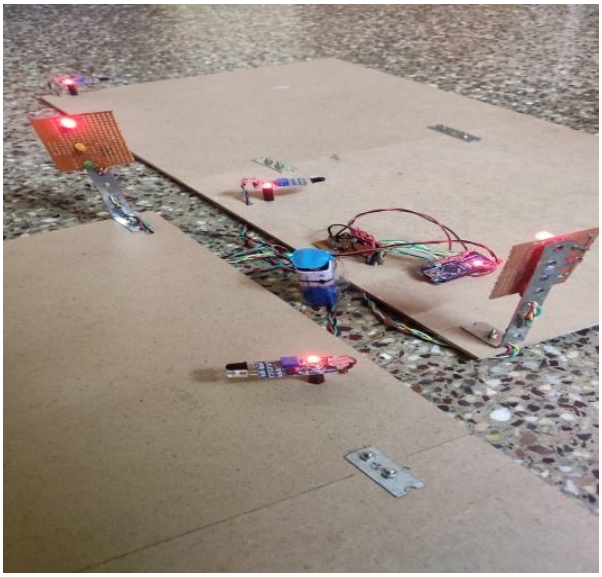

Fig. 7. Prototype model of HUB

When the vehicles come near the traffic light then using another IR sensor 2, sensor 4 of lane 1 and lane 2 respectively, the timer is stopped. The speed of the vehicles is detected using (1),

S=D/T □□□

Where S is speed, D is distance covered and T is the time taken.

Assuming the speed of vehicle 1, vehicle 2 are speed 1 and speed 2 respectively. If,

- Speed 1 > Speed 2, then the lane 1 traffic signal will be in green condition and the lane 2 traffic signal will be in red condition.
- Speed 2 > Speed 1, then the lane 2 traffic signal will be in green condition and the lane 1 traffic signal will be in red condition.

Result

The results in this paper show the implementation of our efforts to build Vehicle-to-Vehicle communication. In the proposed prototype model is explained using two applications. (i) Vehicle-to-vehicle communication using the Zigbee module. (ii) Reducing Traffic jams by giving priority to the lane having vehicles with higher speed. The implementation of the application results in good performance and efficient in the designed project. The prototype consists of two vehicles that utilize the platoon algorithm, when the power supply is switched ON, the microcontroller takes the inputs from the ultrasonic sensors and Infrared sensors. The Zigbee module helps to communicate between the vehicles. The traffic congestion is reduced by implementing a HUB module in the traffic zone, which detects the speed of the vehicle by using Infrared [IR] sensors and provides the GO [green LED glows] signal for the highest priority.

Conclusion and Future Scope

The project is developed for an easy drive with reduced accidents and traffic jams. This project can be implemented by using highly equipped cameras, sensors and controllers. Thus, to obtain wide vision and increase the range of obstruction and communication with vehicles.

For the future work, implementation of Intelligent Parking and weather forecast can be included to this project.

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AN EXPERT SYSTEM TO DETECT A CLASS OF INDIAN APE USING IMAGE PROCESSING

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ABSTRACT

Image processing is an important field in computer vision and real-time analysis of data, which has been a prevailing field of research for the past few years. Throughout the year across gardens, estates, agricultural fields, monkeys are known to create havoc by ruining fresh fruits, vegetables and different varieties of agricultural yields. The property damage caused is immense and it affects the day-to-day lives of millions of farmers. Farmers resort to manual methods of scatting the monkeys away using sticks which can be time-consuming and cumbersome. As digitization is emerging throughout all the domains, the task of protection can be digitized. The core idea of this project is to automate this process by designing an intelligent device that provides security to the yielding crops, fruits, and vegetables by spraying water towards the monkeys thus protecting the yield whilst causing no harm to the monkeys.

Keywords: *Haar Cascade Classifiers, Raspberry pi, pi camera*

Introduction

The project is based on the powerful concept of image processing, sensors, a Raspberry camera and some actuators (pumps, valves and sprinklers) which are performed on a Raspberry pi board. Computer vision is a booming field of study which encompasses how computers visualise digital images and videos. Computer vision involves sensing a visual stimulus from the computer's end, extracting complex information from the images and videos and analysing them to capture details. The ideology is that, whenever the monkey is detected by the R-Pi camera mounted on the R-pi board, it transmits the signal to the sprayer which sprinkles water on the monkeys that results in scattering the monkeys away. The image processing is based on Haar cascade. The sprinkler consists of the centrifugal pump and the sprayer nozzle.

It benefits the end-user, as the crops they grow can be saved from the devastation caused by monkeys. The other major reason for the implementation of this project is the protection of crops from monkeys takes valuable time and is a difficult process, this becomes cumbersome. The process of providing security from monkeys can be automated to avoid humans from safeguarding the agricultural fields.

Proposed Method

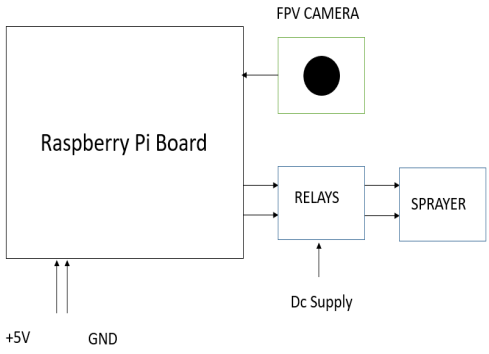

Fig 1: General block diagram of the system

The project works on the Raspberry pi 3B+ board which is a microprocessor. The board contains 40 GPIO pins and a camera is installed into it. The resolution of the camera is 5MP.

Project works on the principle of image processing. The image of the monkey is initially detected by the pi camera. Video is series of images, at any frame when monkey is captured, it uses Haar cascade classifier to detect monkey.

Haar classifier is basically a machine learning approach to detect objects using cascade function, a lot of positive and negative images should be trained converted to xml file (Extensible markup language). It is a fast algorithm comparatively.

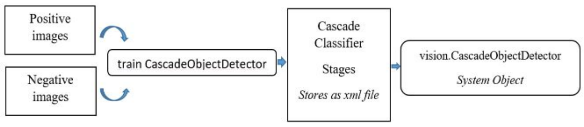

Fig 2: Flowchart of cascade classifier.

Here the monkey is taken as an object, both positive and negative images are trained using a cascade function where positive images (images of monkey) and negative images (images without monkey). Haar cascade features are used to extract the features from an image, each feature has a single value that is obtained from the difference between black pixels and white pixels.

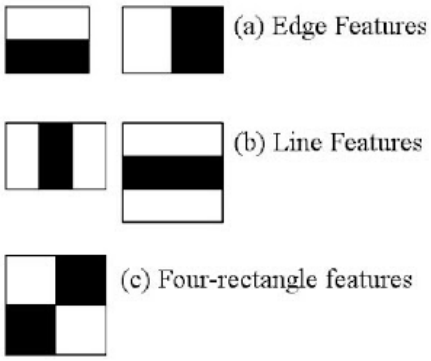

Fig 3: Haar cascade Features

0	0	1	1
0	0	1	1
0	0	1	1
0	0	1	1

Fig 4: Ideal Haar feature pixel intensities

0: White

1: Black

0.1	0.2	0.6	0.8
0.2	0.3	0.8	0.6
0.2	0.1	0.6	0.8
0.2	0.1	0.8	0.9

Fig 5: Real values detected on the image

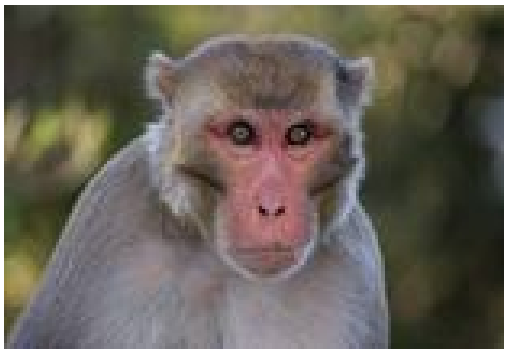

Fig 6: Colour image

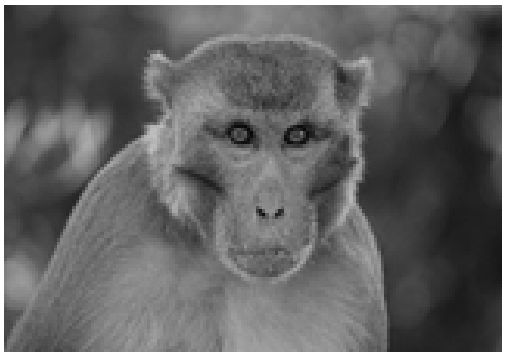

Fig 7: Grayscale image

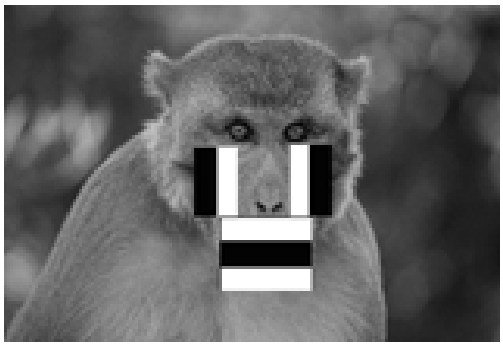

Fig 8: Traversing Haar cascade

Feature through the image

$$\Delta = \text{dark} - \text{white} = \frac{1}{n}\sum_{\text{dark}}^{n} I(x) - \frac{1}{n}\sum_{\text{white}}^{n} I(x)$$

This algorithm compares how close the real scenario is to the ideal case.

Δ for ideal feature is: 1

Δ for the real image: 0.74 - 0.18 = 0.56

Closer the value to the 1 the more accurate the detection and Haar cascade feature is found.

At each frame the image is taken for the process and converted to the grayscale image to calculate the intensities of the image. The Haar cascade features traverse through the image and then compares with the ideal value, If the value is closer then the object, is

detected and a match is found. These Haar cascade features traverse through the image at every frame of the video.

Thus, whenever the monkey appears in front of the camera, the Raspberry pi processor analyses the monkey by Haar cascade classifier and the sprayer connected to the GPIO pins of the pi circuit gets activated and sprays water on monkeys.

Result

Thus, by the Haar cascade classifier method we will be able to detect the monkeys and spray water on them, so that the devastation caused by monkeys can be reduced.

Fig 9: Detected monkey

Conclusion

Protecting the crops from monkeys is a difficult task, it is time consuming yet a job that has to be done for the livelihood of millions of farmers. In the effort of safeguarding the agricultural fields, and estates, manual methods from the physical labour of humans can be replaced by this cost-effective detector device. Image processing is a great technique for detecting an image of a particular object. Raspberry pi board is used to implement this project. The devastation caused by the monkeys is reduced to a greater extent compared to regular approach (human monitoring). If ever the monkey appears within the frame of the camera, the device gets activated and sprays the water on the monkey, thus restricting the entry of the monkeys to the property lands.

The proposed method provides an efficient way of getting rid of monkeys safely without causing any real harm to monkeys and safeguarding agricultural commodities. Thus, our proposed method entitled “AN EXPERT SYSTEM TO DETECT A CLASS OF INDIAN APE USING IMAGE PROCESSING” is a unique approach in securing the yield.

The described method presents an automated system that continuously analyses the environment and upon detection of an object (here a monkey) within its frame, the attached sprayer will be activated, which sprays water on the monkeys. The initial processing of the image is done on the Raspberry-pi 3B+ board by taking the input from the interfaced Raspberry Pi-camera. This is an efficient way of getting rid of monkeys safely as humanly as possible without causing any real harm to monkeys and safeguarding agricultural commodities. It benefits the end-user, as the crops they grow can be saved from the devastation caused by monkeys.

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AN INTEGRATED SYSTEM TO MONITOR AND RECOGNISE ATTENDANCE OF STUDENTS

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ABSTRACT

In educational institutions, attendance system was brought into practice to maintain discipline and to help students grasp utmost knowledge. The traditional attendance system was more time consuming and it included a lot of paper work. Hence, there was a need for a new method which could eliminate the drawbacks of the conventional system. This project aims to build a user friendly, less time consuming and efficient attendance system which includes three types of authentications. They are Radio Frequency Identification, Fingerprint Detection and Face Recognition. These modules are interfaced to Raspberry Pi.

Keywords: *Radio Frequency Identification, Fingerprint Detection, Face Recognition, Raspberry Pi*

I. Introduction

The proposed system is designed in such a way that the limitations of the traditional attendance system are reduced. Earliertherewereretwomainwaysofmarking attendance. Either the teacher used to call out the names or take the signature of the students in apiece of paper. Since the other person could mark the attendance of the actual person, the data accuracy of earlier attendance was low. In the proposed system, the individualcardorfingerprintorthefaceofthestudentis recognized and the attendance is recorded in a CSV file automatically. It stores the name and time at which the attendance is recorded. By using this system, data accuracy is increased and it simplifies the overall process of marking attendance and saving the database of students. This proposed system can be used in any field where attendance plays a vitalrole.

II. Componentsused

The proposed system is developed by using the following components:

A. SD Card: The operating system for the raspberry pi i.e., Raspbian, database and the code are stored in the SDCard.

Fig. 1 SD Card

B. Raspberry Pi: It is a miniature computer whichcan be plugged into computer monitors or TV and can be programmed using different languages to get real- time output. The engineering concepts can be converted to interactive electronic modules. Raspberry Pi is an ARM Cortex processor with dual band wireless LAN, Bluetooth, fast Ethernet, USB ports and improved thermalmanagement.

Fig.2 Raspberry Pi

C.RFID: This module consists of mainly two components. They are RFID reader and tags. The tags encode digital data which are captured by the reader using radio waves. Every tag has a unique digital data. Hence, the reader identifies every taguniquely.

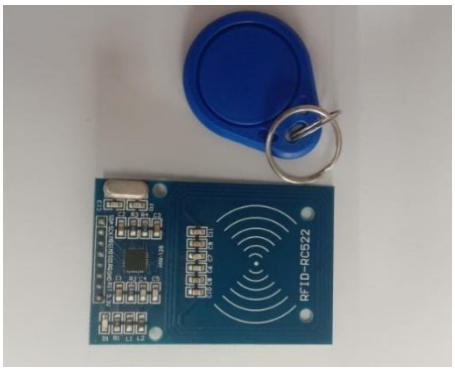

Fig.3 RFID Module

D. Fingerprint sensor: The sensor scans the fingerprint optically. It controls the encryption and transfer of data through the USB interface to the Raspberry Pi

Fig. 4 Fingerprint Sensor

E. Pi Camera: The camera module is used to capture images and videos. Raspberry Pi of all version supports Pi camera. In the process of face recognition, the camera is fixed in a specific distance or is counted to a wall from where the faces of every student is detected. It captures the video of a class concurrently and send it to the system for further processing.

Fig 5. Pi camera

III. Methodologies

1. RFID

The RFID system is mainly based on the concept of radio waves. The RFID tags include an integrated circuit and an antenna. The data is transmitted to the reader by them. The RFID tags can be passiveor active. Passive tags do not have a battery and needs to be powered by the reader whereas theactive tags are powered directly with power supply like a battery. The data which is transmitted by the tags is then converted to more understandable form. RFID uses AIDC (Automatic Identification and Data Capture) method which means that it identifies the object, and stores itsdataautomatically without any human intervention. This system is similar to a barcode system but hasone advantage over it. That is, RFID reader can read the tag even if it is not in direct line of contact with the tag unlike the barcode reader**.**

The RFID systems are mainly of three types. They are Low Frequency, High Frequency and Ultra High Frequency systems. Another type is a Microwave RFID. The Low Frequency RFID system ranges vary between 30kHz to 500kHz.The transmission range of these systems is generally as short as few inches. The High Frequency RFID system ranges vary between 3MHz to 30MHz.

The trans mission range can be a several feet. The Ultra High Frequency RFID system ranges vary between 300MHz to 960MHz. The transmission range of these systems is more than 25 feet. The Microwave RFIDsystems operate at a frequency of 2.45GHz and transmission range can be more than 30 feet.

The RFID module used in this project is RC522. The frequency band at which this module operates is 13.56MHz. it is designed to communicate at a data rate of 10Mbps over a Serial Peripheral Interface (SPI). It can also use I2C or UART standards for communication. The system is able to do 2 functions mainly. They are registering a new tag and identifying already registered tag.

The following flowchart describes the working of RFID based recognition system.

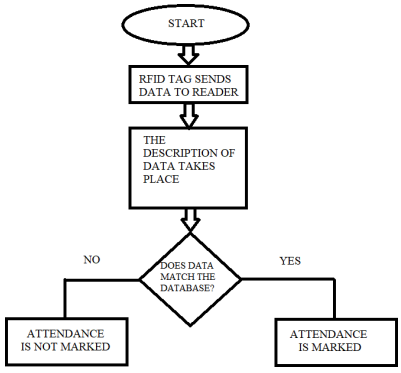

Fig.6 Flowchart of RFID based recognition system

2. Fingerprint Based Recognition System

Authentication using biometric is one of the popular technologies which has high rate of accuracy in noting attendance. The whole system can be constructed using an embedded computer i.e., Raspberry Pi where database is created, fingerprint reader is accused and the process of authentication and recognition is done.

Every person has a unique fingerprint, this feature was taken as an advantage to recognize an individual person and hence this system came into existence.This mode has proved to be the most reliable mode to identify individual.

This system mainly contain a USB serial port converter and fingerprint reader connected to Raspberry Pi. The USB serial converter is an important device which allows the serial devices or sensors to directly plug into USB ports. It supplies both 3V and 5v output.

The fingerprint reader can be programmed in two operating systems i.e. Linux and Windows. When the user touches the screen of the reader that is the glowing window, it scans the fingerprint optically. The reader used here is R307.It can detect the existing fingerprint and enroll new fingerprints. The reader itself stores the fingerprints. It has the capacity to hold 1000 fingerprints. The data of fingerprint comparison, collection, search and deletion canbe taken place using this reader.

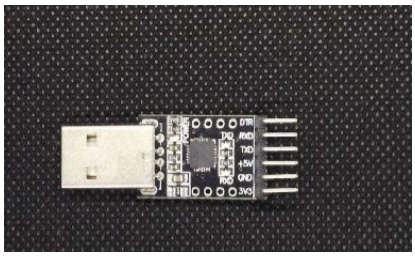

Fig.7 USB serial converter

The following flowchart describes the working of fingerprint based recognition system.

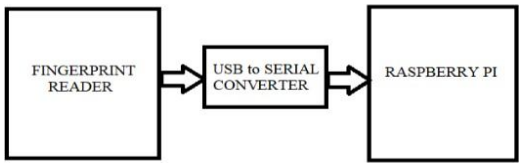

Fig. 8 Flowchart of fingerprint based recognition system.

3. Face Recognition System

The process of identifying a person and authenticating the identity is called face recognition.

Face recognitionsystem: The system that validates the captured face with the dataset provided. The face recognition is carried out in twoways:

a. Authentication / Validation of a facial image: It compares the captured image with the relatedfacial image of the user requiring theauthentication.

b. Identification: It compared the captured image with the facial data set provided to find the matching face.

Concurrent Face Recognition

The proposed system is called concurrent face recognition. The objective of this process is to capture the face of every student and update the data in the CSV fileaccordingly.

The following flow chart shows the working of the concurrent face recognition.

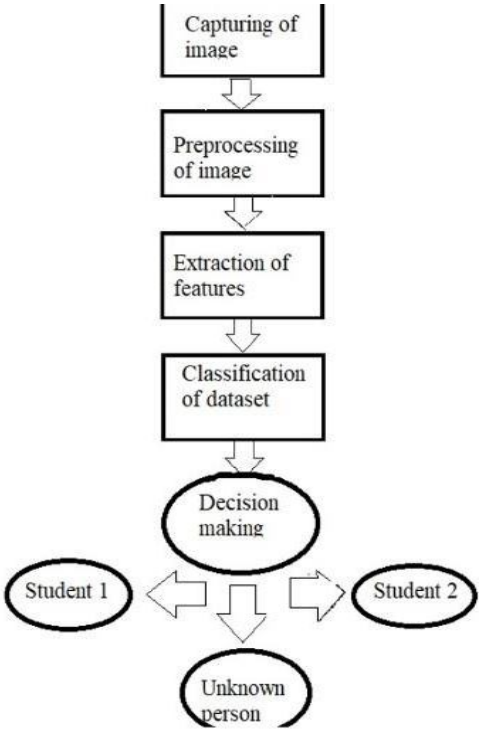

Fig. 9 Flowchart of RFID based recognition system

A. Capturing the image: The faces are captured in such a way that all the features aredetected.

B. Image processing: It involves the steps to compose images before they undergo model training and deduction. Model training mainly included analysis of features. Model training of images also includes correction of size, orientation andcolor.

C. Feature extraction: In this process the data is divided to feasible parts. For eg, A capturedimage have many characteristics. These characteristics need to be computed. They are selected and combined together to form a bestfeature.This feature represents the originality of an image and has high accuracy.

D. Classification: Since the feature vary from image to image, the dataset is accordingly differentiated andstored.

E. Decision making: After the classification of dataset/images, the decision is made by the system as to which image belongs to whichindividual.

If the extracted feature from the capturedimage matches the data set, the face of the student is recognized.

CSVFILE

Comma Separated Values are abbreviated as CSV file. It is a text file that allows the storage of data in

A table format. The information of the student is stored in the following format:

- First name
- Last name
- Time of check-in

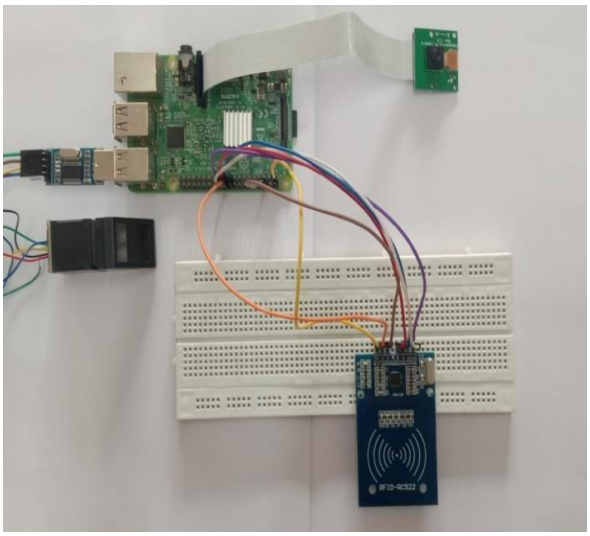

Fig.10 CSV File

Interfacing All Three Authentication

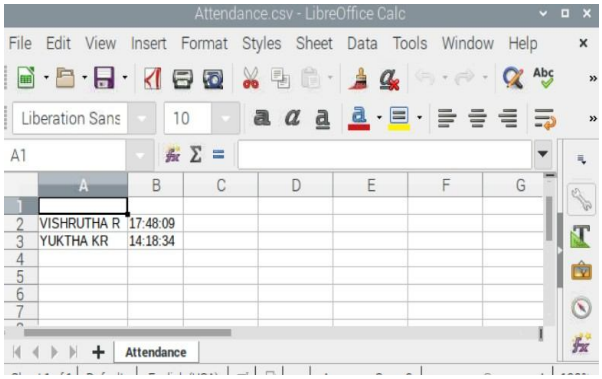

Fig.11 Interface of RFID module, fingerprint sensor and pi camera.

IV. Conclusion

This attendance system which includes RFID based recognition system, fingerprint based recognition system and face recognition system works in such a way, that the marked attendance of each individual is stored precisely. Aim of the project is to improve the attendance management in the institutions. This system is less time consuming and more efficient than the traditional method. The attendance is stored in a digital database hence it is eco-friendly. Since the attendance are secure it can be accessed anytime anywhere. This smart way of monitoring attendance is low-cost and yet more effective. To conclude, this project accesses all the database and picks up different functions.This system overcomes many limitations of the traditional system of attendance and results the report flexibly.

Advantages

A. High level of authentication: The attendance would be more exact since there are threemodes.

B. Effective in cost: Since the whole procedure of marking and calculation is done by the computer itself, the cost of paper and extra employees are saved.

C. Increased security: As the system stores thetime of check in, it is moresecured.

D. Cautious: During the time of pandemic, it is very much essential to maintain individual hygiene and social distancing. The process of face recognition would help students maintain thesame.

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POWERLINE COMMUNICATION FOR DATA TRANSMISSION

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ABSTRACT

One of the technologies that has proven useful for control applications is power line communication (PLC). It is frequently utilized in applications including home automation, automobiles, and internet access. Adopting this technology will eliminate the need to lay additional cables and reduce the overall cost of installing the system compared to other available technologies. Our project aims to design the Power Line Communication System to control and transfer the data between master and slave application device data. The data is transmitted through the power line with the help of PLCC modem KQ-330, and at the receiving side, the same data is retrieved by which the data is displayed. This paper discusses the required technology and knowledge involved in the PLC model. As a result, information on how modulation schemes are introduced, how signals will transfer across the power line, and implementation for actual power line analysis is discussed.

Keywords: *Power line communication, ODFM technique, KQ-330 module, modulation, demodulation.*

1. Introduction

Power Line Communication technology takes advantage of the existing electrical infrastructure to install communication network [1]. However, data transmission at these frequencies is complicated by the power lines used for AC power distribution at 50Hz and 60Hz. High-speed text data can be transferred over existing power lines using the power line communication approach. This technology, also known as broadband over power lines (BPL), is utilized for a variety of applications, including home automation and internet access [2]. When it comes to communication, broadband communication has become a part and partial of our day-to-day life. However, due to uneven geographical conditions and demographic setup in the country, broadband communication access is still a big issue in remote areas. The broadband communication lines are not available in all the parts of our country. Therefore, the people of such areas feel left out and isolated from the rest of the world. As electrical power lines are available in most places, the deployment of a power line for broadband communication is economically feasible. It cuts down additional expenditures on infrastructure for the system channel. The information signals can be transmitted through the power line system in the power line communication technique using the power line as a channel or medium. It is a very flexible and cost-effective approach for communication since no new wires are required, hence offering an existing extra mile infrastructure [1].

Single carrier, Spread spectrum, OFDM (Orthogonal Frequency Division Multiplexing) are three modulation techniques which is used by high-speed power line carrier communication system [3]. This project revolves around designing and implementing a Powerline Communication Modem for text data transfer based on OFDM which is used as the most favorable modulation technique for a communication environment [4]. The characteristics of this PLC channel introduce the effect of noise, attenuation, and multipath propagation, which are the significant challenges in implementing a PLC system. The usage of OFDM in PLC enhances the performance through high spectral efficiency, resilience to Radio Frequency (RF) interference, lower multipath distortion, and results in high speed. OFDM is a multicarrier modulation technique, which has several carriers within the available bandwidth to transfer the information from source to destination. The system is modelled so that there can be a transfer of text data over the power line.

2. Problem Definition

New wiring is required in public and domestic infrastructures whenever there is a broadband

installation, home automation, CCTV cameras, etc., which will increase the deployment cost. In difficult-to-reach nodes such as underground structures, buildings with obstructions, and metal walls are some of the places where the Radio Frequency wireless signal suffers from high attenuation degrees [5]. To achieve a better connection, the hardware requirement proves to be an expensive affair, and having special cables only for this purpose results in high cost, time-consuming, and requires more labor. A Power Line Communication system is designed to overcome these problems through which data communication can happen through the power line itself.

3. Initial Design

The Powerline Communication System establishment was analyzed by sending a square wave over the power line, triggering the light at the receiver end (LC resonating circuit). The components used are 220v AC supply, 555 timer, Bridge diode IC, LED, Zener diode,1k,1M,330,220-ohm Resistor, IRFZ44n Power MOSFET, 47nF, 820nF Capacitors, and zero board to design the circuit.

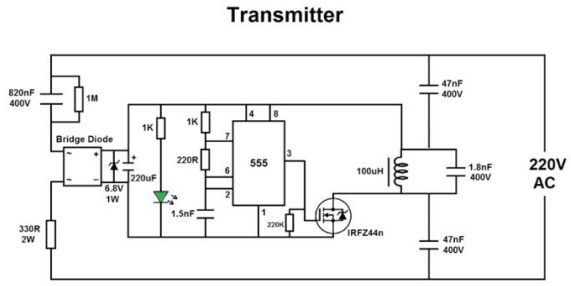


Fig: 3.1 Transmitter

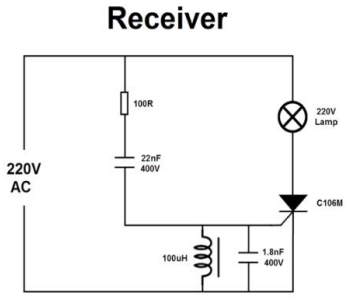


Fig: 3.2 Receiver

The RC circuit reduces the voltage to make the 555 timer ON. As a result, a square wave pulse is generated at the output (pin no. 3 of 555 timer), i.e., 376KHz. As Digital data can be represented as square wave pulses, the same is simulated here. IRFZ44n Power MOSFET, for the pulse trigger, keeps on sending voltage to the LC circuit. The LC circuit determines the frequency of the entire circuit. The LC circuit at the receiver is connected to C106M Silicon Controlled Rectifier. The LC circuit must be resonated to trigger the silicon-controlled rectifier and make the bulb glow. SCR works like the trials. Every single time we provide a gate voltage, it keeps triggering. To trigger the SCR, we need to resonate with the LC circuit. When the high frequency is provided to the LC circuit from the transmitter, it resonates with the LC circuit, and once the high-frequency signal is carried on the sine wave and reaches the SCR, the SCR triggers and turns on the bulb. Hence through this, we could conclude that through AC signal data transmission is possible [6]. To determine the frequency of the square wave pulse, the following formula is used:

$f = 1/2\prod\sqrt{LC}$

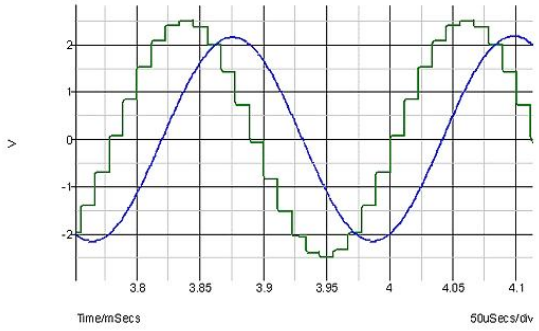
where,

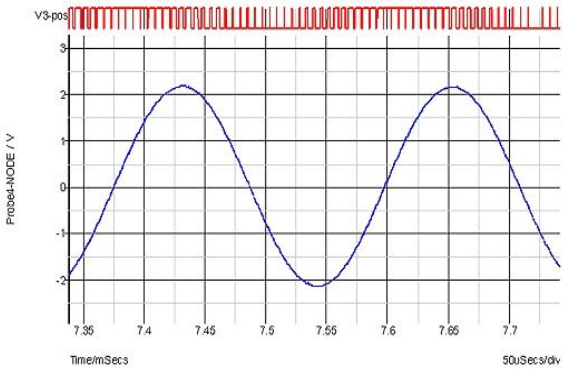
f= Frequency

L = Inductance

C = Capacitance

3.3. Waveforms:





4. PLC Technology

In this technology, the text data is modulated at the transmission side and is injected into the power line. At the receiver, the text data is demodulated to read it, much like any other communication method. The main difference is that PLCs do not require additional cabling and instead rely on existing wiring [7]. Given the ubiquitous nature of power lines, this means that nearly any line-powered equipment may be controlled or monitored using a PLC.

4.1 Modulation Schemes

In a PLC, a different type of modulation can be employed such as OFDM, Binary Phase Shift Keying (BPSK), Frequency Shift Keying (FSK), Spread-FSK (S-FSK).

4.2 Selection of Modulation Process

Selections of modulation technique process are vital in data transfer; depending on how massive the data is, we must select the type of modulation we need. The above charts show the basic waveform of the modulation process. The selection is very efficient modulation process for small data sets or vice versa results in less efficiency of the entire device. Hence, we are choosing the corresponding modulation technique for data sets.

4.3 OFDM

The PLC system is implemented using the OFDM technique and this is the succeeding technology for a high-speed communication system. In OFDM, closely spaced multiple orthogonal subcarrier signals with overlapping spectra are transmitted parallelly to carry the data.

OFDM is a particular type of the frequency-division multiplexing (FDM) multicarrier modulation technique. In multi-carrier systems, the data to be transmitted is split into many small data fragments and transmitted independently. Each of these sub-carriers contains many numbers of parallel data channels and is modulated at a low symbol rate which is expressed in bits/second [7][8]. The single carrier, multicarrier, and OFDM frequency spectral curve is shown in the figure below.

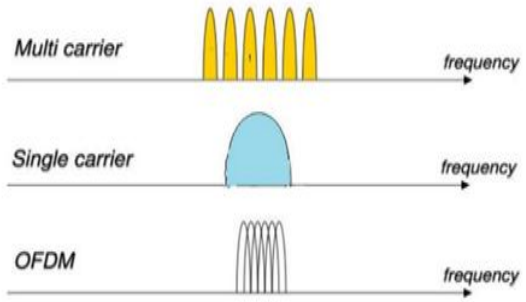


Fig: 4.3.1 OFDM Spectrum curve

OFDM is a modulation method that uses multiple carrier frequencies to deliver high data transfer rates. It is difficult yet very effective. OFDM modulation techniques offer improved error management, bandwidth efficiency, and reduced inter-symbol and inter-channel interference. OFDM has good resistance to diverse interferences and allows numerous accesses, as shown with Spread Spectrum modulation [9]. The OFDM distributes the usable spectrum in multiple narrowband sub-channels. The capacity to operate in critical channel conditions, such as attenuation of high frequencies, narrowband interference, or selective fading owing to multipath, is the main advantage of these methods

Furthermore, OFDM has a high modulation efficiency, which is ideal for high-bit-rate applications. However, this is achieved with a high signal-to-noise ratio, which may cause interference with other parties at high frequencies; as a result, a regulation governing this aspect is required. As a result, OFDM is the better modulation method for PLC applications [10].

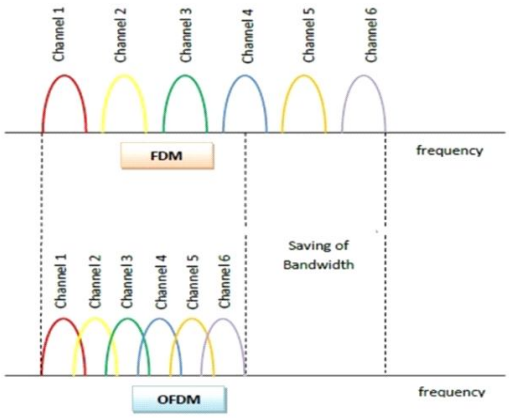


Fig: 4.3.2 OFDM vs. FDM

5. Design and Implementation

5.1 Hardware requirements

KQ330 module-

Fig: 5.1.1 KQ330 Communication module

The KQ-330 Power Line Carrier module is designed to communicate between two devices via a power line (for example, a 220V power line) without the use of any additional components. The PLC can send broadband data across power lines, making it suited for both residential and commercial network applications that use power lines. There is no need to run additional lines, and the PLC can connect to the internet from anywhere [11]. PLC system with the use of KQ-330 module is also used for AC electric power distribution and power transmission.

Working frequency - 120~135KHZ
Temperature range: -25 ° C ~ +70 ° C
Power supply: DC +5V
Receiving current: ≤11mA
Transmitting current: ≤300mA
Pin Description:
pin 1 for 230V AC power
pin 2 for 230V AC power
pin 3 5V DC supply if it is used as a transmitter.
pin 4 GND supply
pin 5 5V/3.5V DC supply if it is used as a receiver.
pin 6 RX pin should be connected to TX of the controller.
pin 7 TX pin should be connected to RX of the controller.
pin 8 & 9 we did not have to use.

The signal (data) transmission is carried out over a low-power line by the KQ330 module. The signal's carrier frequency (data modulated by the module) is 50KHz to 350KHz. The low-voltage power line's high-frequency signal can be sent across a long distance. The KQ330 module is used to send data over the power line using the OFDM technique. We have used two KQ-330 modules, where one is at transmitter side to modulate and the other one is at receiver side for demodulation.

Arduino UNO-

Fig: 5.1.2 Arduino UNO board

Open-source microcontroller which is known as the Arduino Uno board based on the Microchip ATmega328P microcontroller. It is designed by Arduino.cc [2][3]. It has digital and analogue input/output pins used to connect to other different types of boards and circuits [1]. The Arduino contains 14 digital I/O pins in which 6 of them can be used to generate PWM output and 6 analogue I/O pins. Arduino is programmed using the Arduino IDE (Integrated Development Environment) with the help of a USB type B cable [4]. We have programmed the board using the IDE software where the code for the project is written in C language. Then the code is dumped into the board to perform as required. The Arduino takes the input text data from laptop and sends it to the KQ-330 module for modulation process.

5.2 Block Diagram

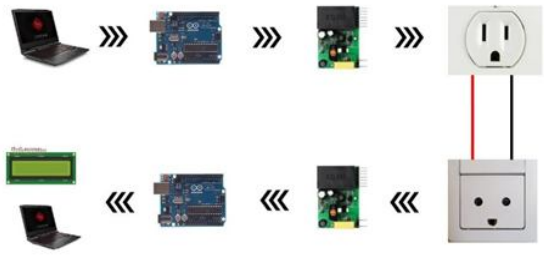


Fig:5.2.1 Block diagram of PLC system

Text data transmission is achieved by converting the text data into binary format. Since the data is converted to binary, the data can be transmitted quickly. Now, to avoid errors, we have used algorithm UTF -8. Then the binary data is further sent to KQ330. The KQ330 module transmits the data using the OFDM technique over the power line. Then the transmitted data is received by the slave module (KQ330) at the receiver side and is decoded. Therefore, the text is received, which can be seen on the screen.

6. System Software Design

6.1 Communication Protocol

The major purpose of the communication model is to make sure that the transmitted text data does not interfere with other slave devices in the network. It ensures that the communication is of high quality. Furthermore, the agreement reduces the expense of communication to a level. It aids in the identification of the source and facilitates the exchange of devices. The communication protocols in this system maintain data transfer quality. Only data packets that satisfy the communication format can trigger the associated function during data reception, reducing the risk of error and data damage. The system's communication protocol divides data into packets and sends them one at a time. When the carrier module is in the transmitting mode, the text information is pushed to the power line. After completion of data transmission, receiving mode is turned on in the carrier module.

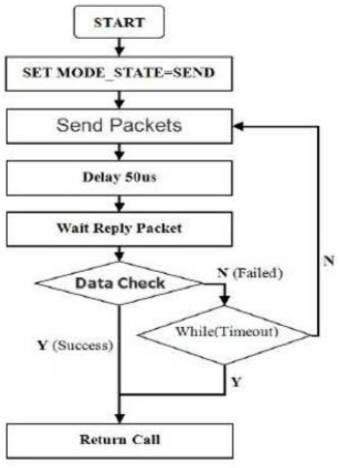


Fig: 6.1.1 The Flowchart of send Subroutine

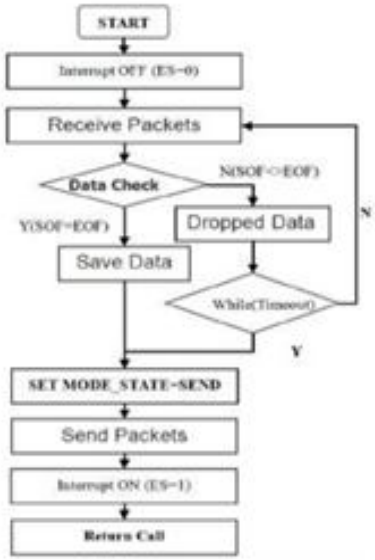


Fig:6.1.2 Packet reception interrupts the program flowchart.

6.2 UTF-8 Encoder Algorithm

UTF-8 Encoder Algorithm stands for Unicode Transformation Format - 8 bits. To store any information, computers use a binary system. In binary, every information is represented in 1s and 0s. The next largest unit of binary consists of 8 bits which is known as 1 byte. Text is one of the data that computers store and process. The text comprises characters, each of which represents a string of bits. For computer to process the data, it converts characters into binary sequences which is known as encoding. This algorithm converts the code into a group of one to four bytes. Thus, the first 256 characters in the Unicode library, including the characters as in ASCII, are represented as one byte.

6.3 Zero-Crossing Circuit

Zero-crossing technique is used to control electrical circuits that initiate operation at a load AC voltage close to 0V in an alternating cycle. For example, the relays and rectifiers conduct at a very close to the time when the load voltage crosses 0V so that the output is obtained. In power-line communication network, if the input signal that is the orthogonally modulated signal is sent at any point of AC output wave in power line other than very near to the 0V point, the switching circuit output will "WAIT" to turn on. This state is maintained till the output AC wave reaches its next 0V point and when it reaches,

the zero-crossing circuit will push the modulated signal to the main AC power line. This is helpful in reducing unwanted effects like high-frequency spikes which is also called as noise, will harm the circuit and output is obtained with disruptions. The zero-cross point is the point in AC line voltage where the voltage is 0V.

The detection of sine waves in the power line is detected by zero-crossing circuit. This happens during the sine wave passes through the 0V points, the text modulated data signal is transmitted without altering the amplitude of the signal drastically**.**

7. System Stabilization

We need to stabilize the network to reduce data loss. So, we need to calculate the impedance. The calculation is as follows.

Calculation:

|Z|=0.005 x f^0.63, where f is frequency.

Now, when it comes to communication, for a stable communication system, the impedance is either 4Ω or 8Ω. So, accordingly need to adjust the impedance by changing the value of frequency.

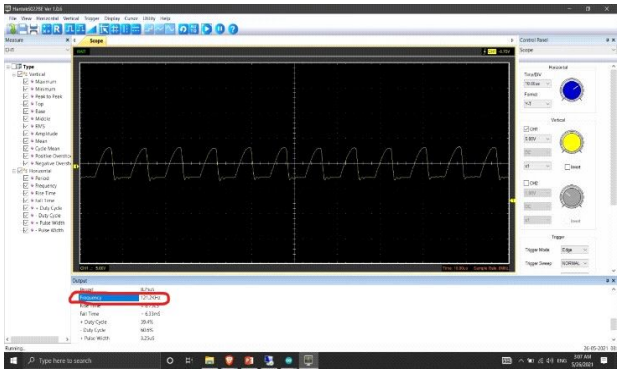
Here, we have taken frequency, f = 120KHz.

Hence, the impedance |Z| ~ 8 Ω.

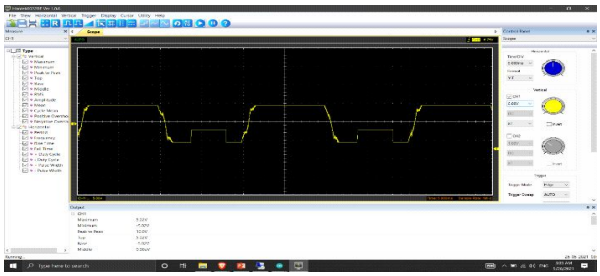
8. Results

Communication between the two nodes is established over the power line acting as the medium for communication. The nodes were able to communicate with each other using encrypted text commands successfully. A higher data rate is achieved, i.e.,115,200 bits per second.

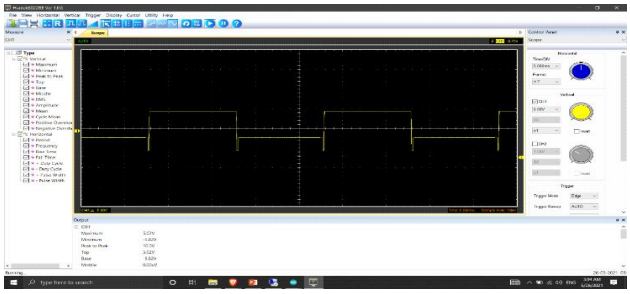
8.1 Simulations of Text Data Transfer



1. The 120 Khz carrier wave.



2.The 120 kHz carrier wave multiplexed with the digital data waveform.



3.Digital data waveform

8.2 Implementation

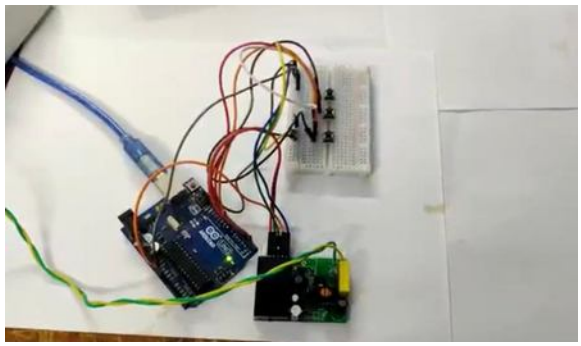


Fig: 8.2.1 Transmitter

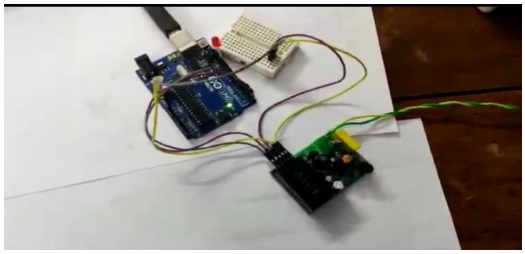


Fig 8.2.2 Receiver

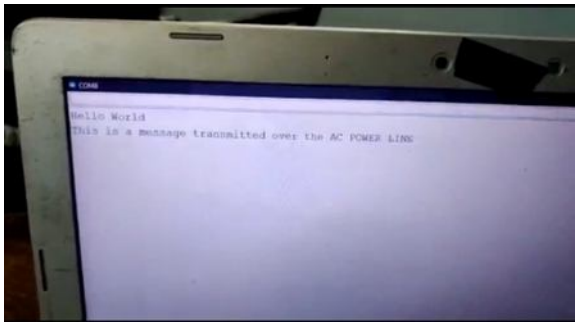


Fig 8.2.3 Received text displayed on screen

9. Conclusion

This project uses the existing power lines as the means for the transmission and reception of data signals. Therefore, there is no need for any extra infrastructure. Hence, the number of wires used to transmit audio signals can be reduced since the power lines are already existing everywhere. The bit error percentage is in the ratio of 10^-9, which is quite acceptable compared to those obtained from implementing other modulation techniques like FSK or DPSK over this PLC Modem. The excellent performance is because of the OFDM implementation.

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DESIGN OF SLOTTED HEXAGONAL MICROSTRIP PATCH ANTENNA WITH IMPROVED BANDWIDTH

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ABSTRACT

In this paper, the design of slotted microstrip patch antenna with aperture feeding at resonating frequency of 25 GHz is designed. The bandwidth can be enhanced by using aperture coupled feeding technique and slotted patch is presented in this work. In order to calculate the dimensions of the patch and positioning of the slots, the standard antenna formulae have been used. Two Hexagonal patches with a dog-bone type of slot are chosen to improve the bandwidth. The bandwidth of the antenna with slots is found to be 1.7032GHz i.e. 6.65% which is much more than other bandwidth enhancement techniques. Simulation is done using the ANSYS HFSS (High Frequency Structural Simulator).

Keywords: *Microstrip, Aperture feed, Slotted patch, VSWR, Gain, Directivity, Bandwidth.*

Introduction

An antenna is a passive transducer device that converts electromagnetic radiation into electrical signals and vice-versa. It can be designed as both transmitter or receiver depending upon the applications. Some antenna parameters are required for judging the antenna performance and it's efficiency; they are gain, directivity, bandwidth and many more. In it bandwidth plays a major role. There are many types of antennas depending upon their physical appearance , dimensions, some of them are isotropic, monopole, dipole, loop, conical, aperture, travelling, microstrip and so on.

A microstrip antenna is usually fabricated by using photolithographic techniques on a printed circuit board. Microstrip antennas have become very popular in recent decades due to their thin planar profiles which can be incorporated into the surfaces of consumer products, telecommunication applications, aircraft and missiles, IOT ,and so on.

There are various types of feeding techniques to feed microstrop antenna, they are microstrip feed, coaxial feed, aperture feed, proximity coupled feed. Among the types, the first two types are contact feeding and the last two are contactless feeding techniques. In this paper bandwidth enhancement is considered as the main concern. There are many ways of enhancing bandwidth of microstrip antenna, some of the techniques are adding parasitic patch elements along with main patch, creating slots of different shapes on patches, increasing substrate thickness, using defected ground structures, etching slots on radiating elements. By using the slotted patch along with bandwidth improvement, resonating frequency shift and tuning can be obtained. However increasing substrate thickness for bandwidth enhancement has it's own practical limit i.e by increasing thickness beyond 0.1λ , there occurs a degradation of antenna performances due to surface wave propagation. In this paper slotted patch, increasing substrate thickness, defected ground slot in total aperture feeding is used.

Feeding Technique

This type of feeding belongs to contactless feeding technique, in which the patch is placed above the antenna side substrate and feed line is attached below the feed side substrate and ground along with specific slot is sandwiched between the antenna side substrate and feedside substrate.

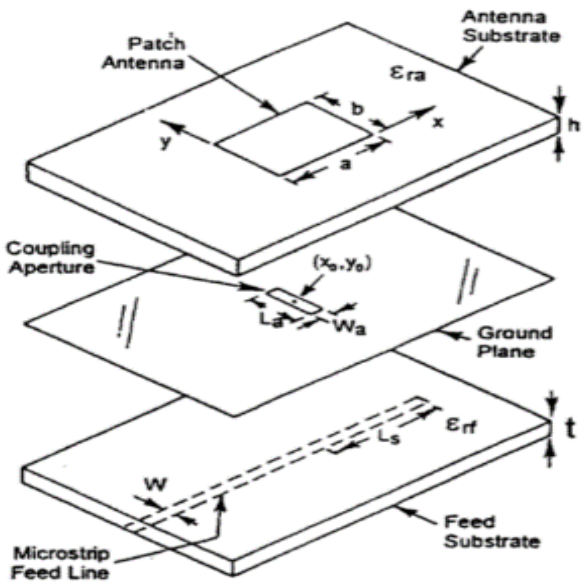

Fig.1.Aperture coupled microstrip antenna.

During initial days of aperture feed antenna, circular shaped slot in ground was used but in later days it found to be that rectangular shaped slot will give a better results, soon in coming days 'H' shape , 'dog bone' shape slots will further increases the efficiency and performances. By using aperture antenna the back radiation effect can be solved to a greater extent. Slot length can affect the resonating frequency by increasing the length of slot, resonating frequency can be reduced and also length affects the coupling level and back radiation level. The slot should not extend more than the required impedance matching. The ratio of slot length to its width should be typically 1/10 and for maximum coupling the slot should be placed below the center of patch and feed line should be orthogonal to the ground slot[5].

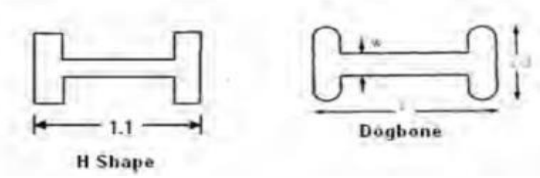

Fig.2.' H' shape and 'Dog bone' shape slots.

For better performance the antenna substrate is chosen of low dielectric constant and more thickness compared to bottom feed side substrate. Here antenna side substrate chosen is RT/duroid 5880 of dielectric constant of 2.2 and thickness of 0.787mm[8] and for feed line RT/duroid 6006/6010LM is chosen of dielectric constant of 10.2 and thickness of 0.635mm.

Antenna Design

Antenna is designed for a centre frequency of 25GHz and required calculations are made using standard empirical formulas and it is simulated using ANSYS HFSS software.

Width of patch is obtained by

$$w = \frac{c}{2f_r}\sqrt{\frac{2}{\epsilon_r+1}} \quad (1)$$

Where c is velocity of light and c = 3×10^8.

$$\epsilon_{eff} = \frac{\epsilon_r+1}{2} + \frac{\epsilon_r-1}{2}\left[1 + 12\frac{h}{w}\right]^{-\frac{1}{2}} \quad (2)$$

Here

ϵ_{eff} = Effective dielectric constant

w= antenna width

ϵ_r = dielectric constant of substrate

h = antenna substrate height

The effective length is given by

$$L_{eff} = \frac{c}{2f_r\sqrt{\epsilon_{eff}}} \quad (3)$$

$$\Delta L = 0.412h\frac{(\epsilon_r+0.3)\left(\frac{w}{h}+0.264\right)}{(\epsilon_r-0.258)\left(\frac{w}{h}+0.8\right)} \quad (4)$$

$$L = L_{eff} - 2(\Delta L) \quad (5)$$

By using the above equations,(1)-(5) length and width of the antenna can be calculated.

Length of feed line is the distance between the source port and slot. The input impedance at the source port of feed line will always be equal to slot impedance if length of feed line is equal to λ/2. To avoid the use of impedance matching techniques the desired impedance is set to 50 Ω, λ is not the free space wavelength

but it is the wavelength inside the microstrip feed line.

$$L_{feed} = \frac{\lambda}{2} = \frac{c}{(2f\sqrt{\epsilon_{eff}})} \quad (6)$$

Stub length is the distance between the slot and other end of feed line it must be equal to λ/4

$$L_{stub} = \frac{\lambda}{4} = \frac{c}{(4f\sqrt{\epsilon_{eff}})} \quad (7)$$

VSWR and an independent variable 'n' gives the freedom to adjust the slot dimensions to acquire the desired result of VSWR < 2.

$$L_{slot} = W_{feed} + nh \quad , where \ \ n > 6 \quad (8)$$

$$W_{slot} = \frac{L_{slot}}{10} \quad (9)$$

Along with the rectangular slot of length 4mm and width 0.4mm extra length of 0.4mm and width 3mm are added to both sides of the slot, so that it forms an 'H' shape slot in the ground plane. Hexagonal slots are added on the main patch of either sides in the direction of Y axis, with the size of each hexagonal slots of distance between it's geometrical center to it's any vertex is of 2mm, with the distance between each hexagon is 6mm.

Table.1. Parameters of antenna

Elements	X (mm)	Y(mm)	Z(mm)
Patch	9	12	0
Antenna substrate	16	18	0.78
Feed substrate	16	18	0.63
Feed line	1	14	0
H slot	4	0.4	0
Source	0.75	0	0.63
Ground	16	18	0

Antenna Simulation and Results

The Microstrip patch antenna is simulated with the two hexagonal patches and a dog-bone shaped patch .The below figures are the results of the simulation done on ANSYS HFSS software with the values in Table.1:

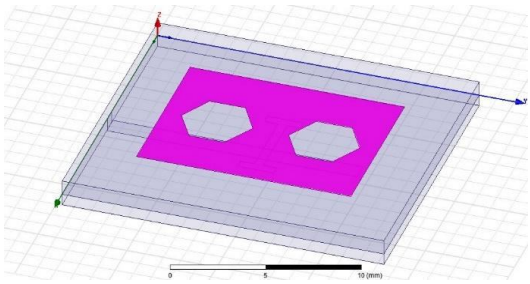

Fig.3. Geometry of Antenna.

It is a dual band antenna has it's central frequencies at 25.5779GHz and at 31.0050GHz with a return loss of -35.9631dB and -26.1982 dB respectively as shown in below Fig.4 The bandwidth is at -10 dB is observed of 6.65% at centre frequency of 25.59GHz and 1.05% bandwidth at 31.50GHz.

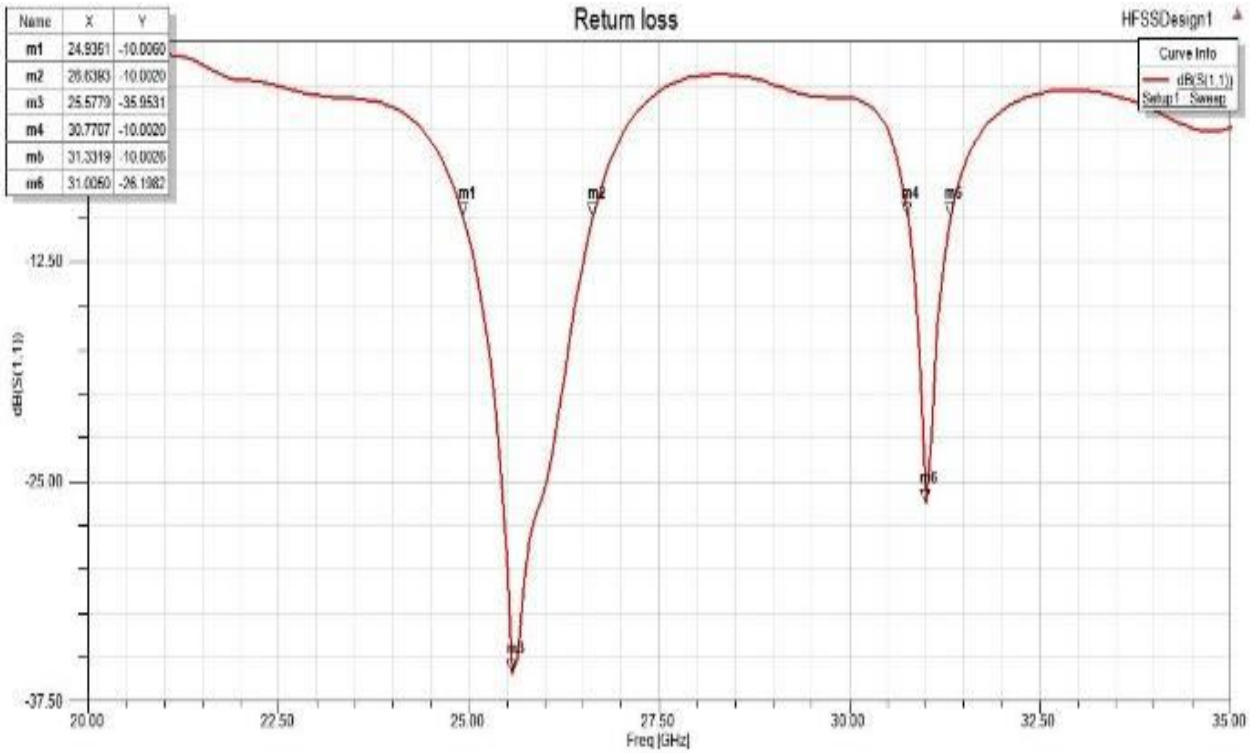

Fig.4. Return loss v/s frequency

By adding extra slots the resonating frequency can be shifted and tuned to our requirements. Voltage standing wave ratio is one of the important parameter in microstrip patch antenna design. For better performance of design the VSWR should be equal to 1 generally. The Fig.5 shows the VSWR at 25.5779GHz is 1.0324 and at 31.0050GHz is 1.1030

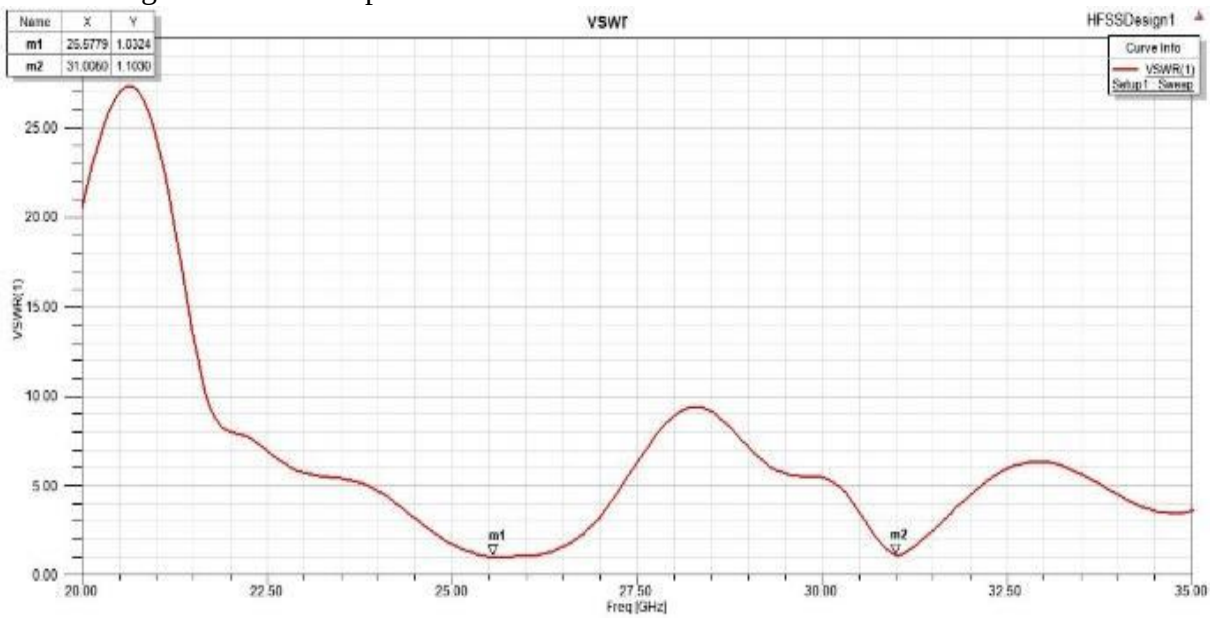

Fig.5. VSWR

The radiation pattern of an antenna at 0 degree is shown in Fig.6. the efficiency of an antenna can be found using the gain and directivity plot graphs shown in Fig.7 and Fig.8. The maximum gain of the antenna is obtained as 5.9064 dB and directivity is 6.0697 dB, and from the ratio of gain to directivity, the efficiency of the antenna is found to be 97.3%.

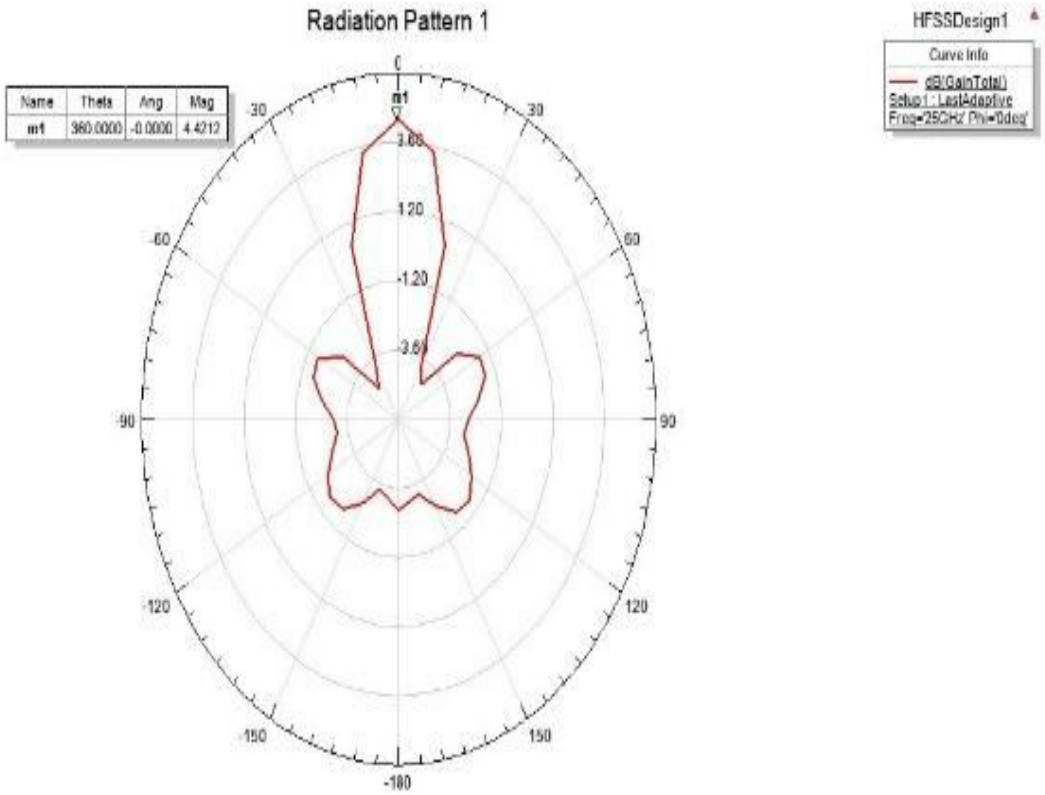

Fig.6. Radiation Pattern at 0 degree.

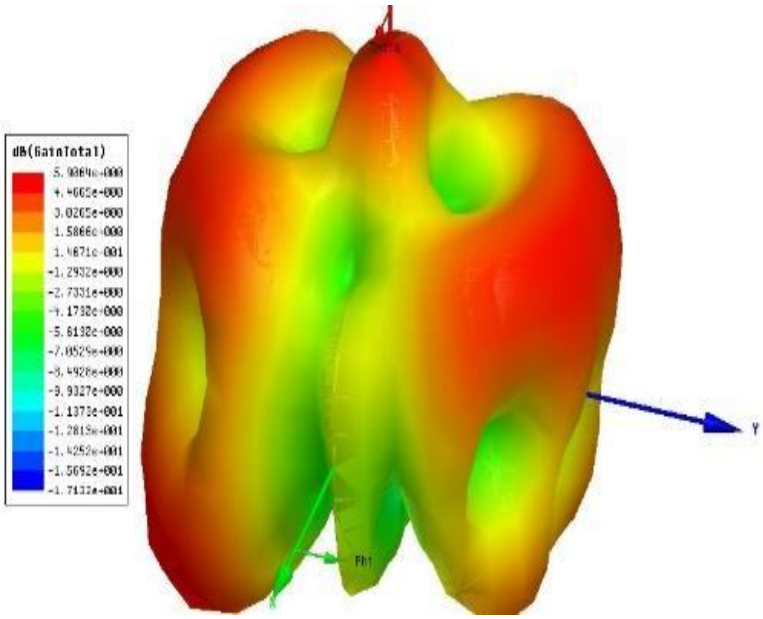

Fig.7. Gain of antenna (dB)

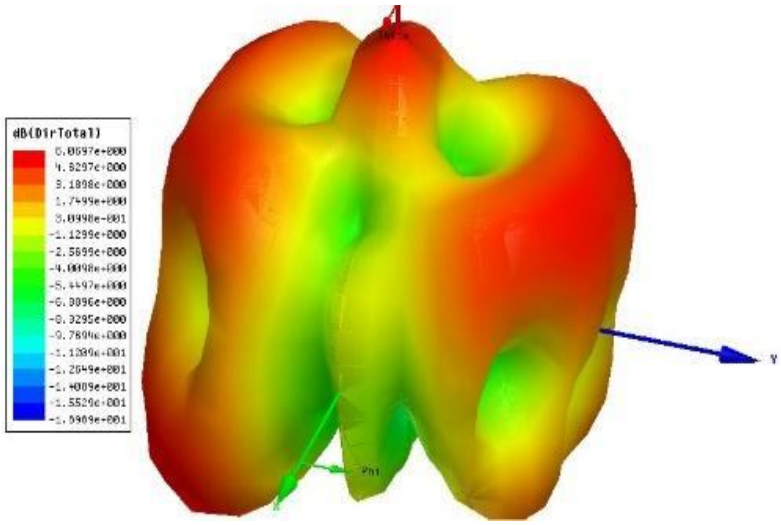

Fig.8. Directivity of antenna (dB)

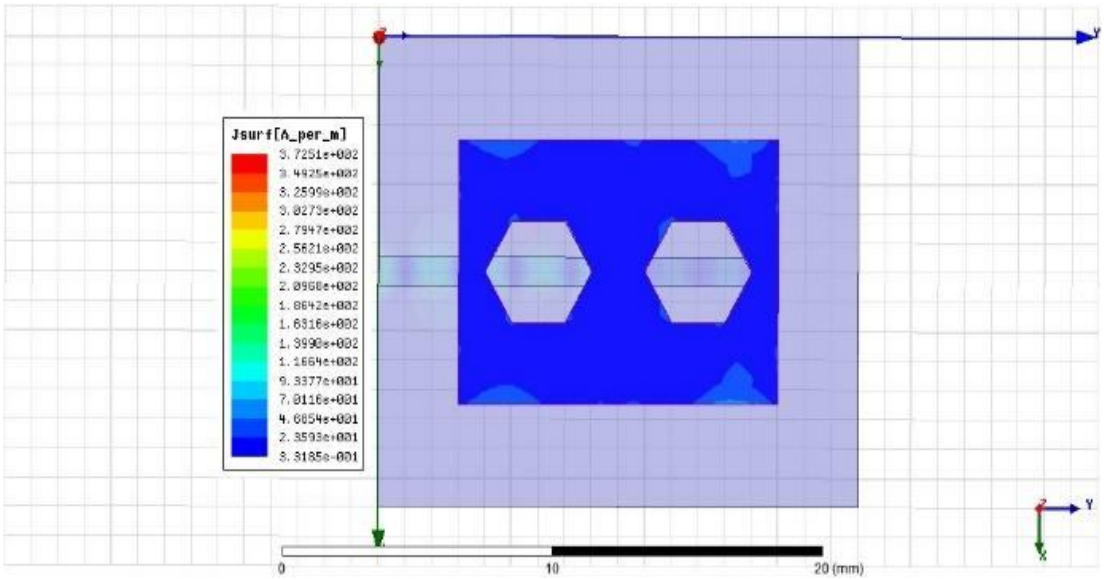

Fig.9. Current distribution in patch of antenna.

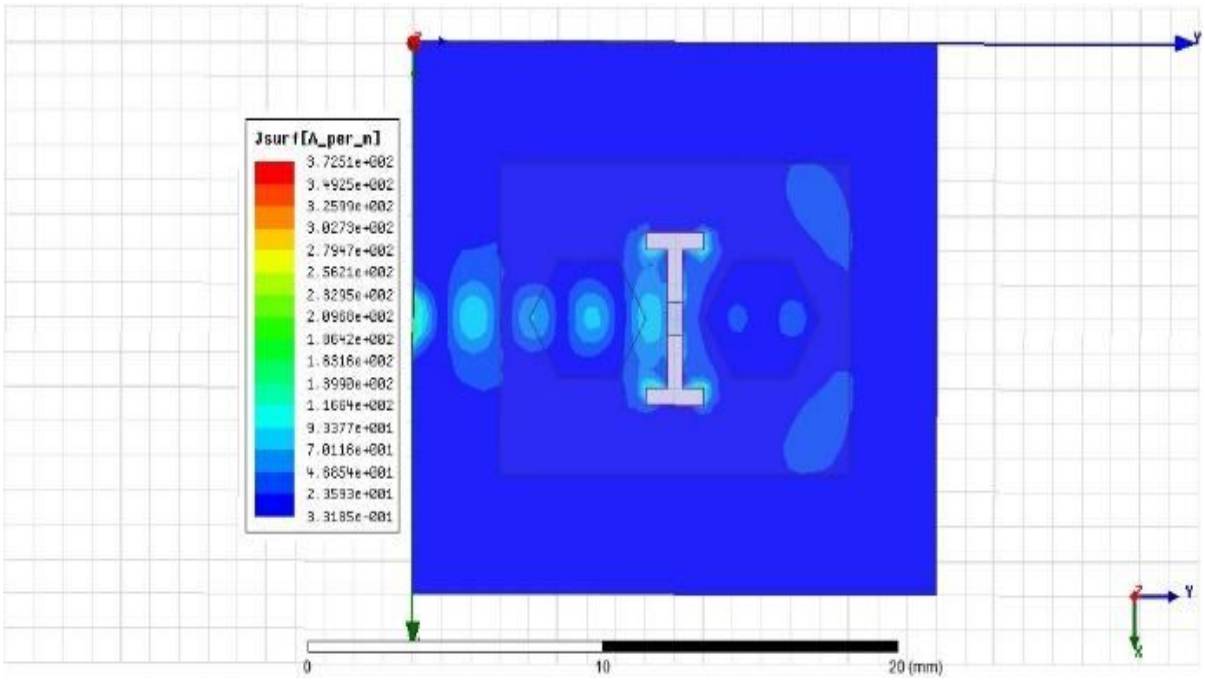

Fig.10. Current distribution in ground plane of antenna

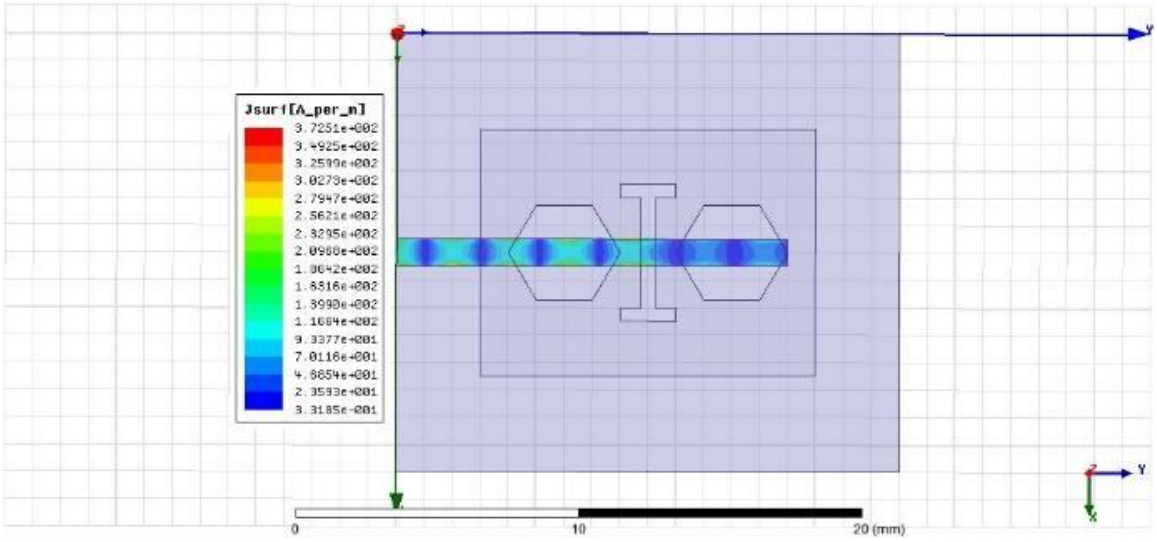

Fig.11.Current distribution in feed line of antenna.

Various shapes of slots in patch gives various results in terms of gain, directivity, VSWR, return loss and many more parameters, here various slots like triangle ,pentagon, hexagon, square shapes are compared with each other in terms of return loss, gain, directivity, VSWR, bandwidth.

Table.2. Performance comparisons with various slots on main patch

Types of slots	Return loss(dB)	Gain (dB)	Directivity(dB	VSWR	BW (GHz)
Triangle [1]	-36.80	5.32	5.52	1.31	0.42
Square [1]	-38.11	5.53	5.65	1.27	0.51
Pentagon [1]	-40.65	5.62	5.75	1.10	0.56
Hexagon (our work)	-35.96	5.91	6.07	1.03	1.70

From the above table it is clear that various performance parameters will be improved by using the hexagonal slotted shape on the main patch.

Conclusion

Microstrip slotted patch antenna using aperture coupled feeding is modeled and designed at 25GHz frequency. It was observed that at

25.5779GHz the bandwidth was 1.7032GHz i.e. 6.65% which is much more than other techniques of bandwidth enhancement. It has many applications in the field of cellular videos, missiles, aircrafts, guided weapons, radar and many more.

By adjusting the stub length of feed line the impedance matching of the circuit can be done and by using 'H' shaped slot coupling from the feed to patch can be done effectively with very less back radiation effect, selecting proper dielectric substrates with proper dielectric constants, loss tangent circuit can be tuned to the requirements.

Acknowledgment

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WALKING AID STICK FOR VISUALLY CHALLENGED PEOPLE

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ABSTRACT

Today' technology is growing at a faster rate, but there is no price effective device for visually challenged people. This proposed paper is a sensible stick that has different types of sensors embedded with it, which are used to sense the intruder, once objects or obstacles are available in the reach of an supersonic device then blind person is alerted with a buzzer and voice alert to his/her speakers. The proposed system contains live location tracking, so the person with incapacity will track his location with the assistance of a switch and a speaker. The proposed system will also be integrated with a RaspberryPi Camera which can identify the objects that appear before him/her. The proposed work is trained using the Deep Learning algorithm- CNN, which will be capable of identifying the objects. This paper conjointly has a feature provided to the impaired to contact his/her family just as a matter of necessity. The exigency information using GSM will contain the blind persons' details such as: location. The primary objective of the proposed paper is to deliver an affordable and structured walking assistance to visually challenged people.

Keywords: *CNN Algorithm, Emergency Message, RaspberryPi, and RaspberryPi Camera.*

1. Introduction

Blindness is a very commonly occurring disability among people around the globe. As stated by United Nations agency, more than 28 crore individuals are purblind globally, more than 3 crore individuals are vision less and 246 are partially sighted. To be classed as blind, one has to be completely sightless. Visually impaired persons have hard time in interacting with the environment. They cannot contact with surroundings. Physical activities turn out be a challenge to the blind people, as they cannot identify the objects present around them.

Blind people confide on their descendants for movement and monetary help. The portability restricts themselves from communicating with public and to congregate, as each device they use as an aid are of no greater use. Many walking aid systems are proposed earlier which does not provide accuracy to the blind person. The researchers have developed resourceful devices to reinforce and notify visually challenged people through hindrance and notify them their locus. From the last ten years, studies have been carried out for designing authentic system for purblind person to encounter hurdles and notify them at hazardous places.

The proposed paper is intended to encounter hurdles on the path of visually challenged person. The voice alert will keep the blind person aware of the objects around him/her and which will considerably reduce accidents. This paper proposes a notion to issue a smart assistance for purblind person, within public places. The preferred work consists of ultrasonic sensor, voice alert messages, RaspberryPi Camera and speaker when hindrances occur within the identifiable scale of the ultrasonic sensor, then voice alert calls the object name which is in sight of the cane. The assistive cane is the uncomplicated devices which encounter hurdles ahead. The proposed work is translucent and convenient. It provides an efficient travel aid for the blind person. The visually challenged person can travel independently using the smart walking stick. The key objective of the propose work is to yield systematic travel assistance for the purblind person which allows eyesight by notifying them about the circumstances and objects around them. During emergency situations, the cane will also assist the blind to connect to his family through an emergency message.

2.Literature Review

Manikandan Shanmugam, John Victor, Mayank Gupta and Saravanakumar proposed a blind stick for the blind people using the

Arduino UNO board. The stick consists of sensors and location tracking module. The GPS module will track the route of the blind person. If the blind person comes across any difficulty or if he needs any help from his family, he can press the button present on the stick to inform his family about his emergency. The family will receive his location from the GPS module.

Ms. Rajeswari and Mrs. Niraja P Rayen proposed a work where ultrasonic sensor is used for measuring the distance without touching anything using ultrasonic waves generated by the ultrasonic sensor. A microcontroller is used to calculate and analyze all the data from the sensor. If the obstacle is found to be near the blind the stick will give a buzzer, if not it does nothing. Ultrasonic sensor has scale starting from 2cm up to the scale of 450cm; on every occasion when the objects detected in the specified scale it alerts respective blind person. The day and night can be predicted by using the LDR sensor. LDR or light dependent resistor is also known as photo resistor.

Ashish Kumar and Reeta Verma proposed this work which presents the Electronic travel Aid (ETA) i.e. the electronic smart stick which guides the blind person by a buzzer which beeps when the ultrasonic sensors, infrared sensor detects any obstacles present in its way. The smart stick proposed here also incorporates the LDR sensor and the water sensor for detection of the dark by the LDR and the potholes filled with water by the water sensor. The stick proposed has an additional feature which is that it cannot be easily displaced by the blind person. It contains a RF receiver which receives the radio signal of 433 MHz when the user displaces it with the help of a remote containing the transmitter.

Sukriti Sudhakar proposed a smart cane in this work, it has sensors on it, and therefore it detects the obstacles, when any object comes ahead in range of the ultrasonic sensor. The blind person will be alerted within a quick response. This proposed work has infrared sensor and water sensor on the stick to increase the efficiency. This proposed stick provides additional feature of navigation too. Using the ultrasonic waves the obstacles can be detected and the stick also comprises of light detection sensor.

S. Munirathnam and S. Amruthavalli proposed a device which can be used to track people who have lost their vision. The main target design of the proposed paper was to help people with visual difficulties. The proposed navigation system in this system comprises of: Sensing nearby obstacles to the blind person sing the ultrasonic sensor, warning the blind person about the obstacles using the voice playback module. This system consists of a Blynk application, which can be used to track the blind person. It uses LDR sensor and soil moisture sensor to detect light and moisture.

3. Convolution Neural Network (Cnn): A Deep Learning Algorithm

Convolution Neural Network: CNN has different design when compared to methodical Neural Networks. The Systematic Neural Networks transfigure the input data by passing the data into and out of a sequential set of unseen connected neural network layers. Each layer is created using a collection of neurons, where every layer of the neural network is fully connected to all neurons within the layer below. At last, there is a fully-connected layer also known as dense layer — the output layer — that delivers the predictions. The layers in neural networks are organized into three dimensions namely: width, height, and depth. Lastly, the final output prediction is going to be reduced to one vector contain all the likelihood scores, organized along with the depth dimension of the data. CNN is mainly composed of two major parts: Feature extraction and classification.

3.1. Feature Extraction

Feature extraction of the Convolution Neural Network algorithms performs a sequential series of convolution operation respectively followed by the pooling operations throughout which the features are detected. For example, if you would have an image of a zebra to be used for recognition, feature extraction is the part where the network would extract the features like its stripes, two ears, two eyes and 4 legs, etc. This layer is responsible for extracting the external features of the object.

3.2. Classification

The next part of Convolution Neural Network

is the classification process. Here, the fully connected layers i.e. the dense layers function as a classifier on the extracted features. Based on the predictions made by the algorithm this process will assign likelihood for objects on the image. The squares and red dots region will be broken down in further layers. The predictions will consist of green circle like regions called as classification. This neural network area is known as the multi-layer perceptron area. The multi-layer perceptron area is basically termed as the classifier. The inputs to classification layer come from the feature extraction process.

3.3. Steps in Convolution Neural Network (CNN) Algorithm

Step 1: Convolution Operation

As the name "Convolutional neural network (CNN)" indicates that a network which employs a mathematical operation called Convolution. Convolution is a mathematical operation on two functions that produces a third function. The third resultant function will express the modification from one function to another.

Step 2: ReLU Layer

The second layer of CNN involves the Rectified Linear Unit or ReLU. This layer applies the rectifier function to enhance the non-linearity in the CNN. Images that are collected as data are made of different objects that are nonlinear to each other. The rectifier activation function is used to eliminate the non linearity.

Step 3: Pooling

The pooling layer is also called the down sampling layer. This layer is responsible of reducing the activation map sizes. To measure the input volume stride and filters are applied. As image recognition is done in small representations, the data with less significance is ignored. Over fitting values can be reduced in this layer. As the amount of parameters taken is reduced using pooling, the cost becomes less. The input will be divided into rectangular regions and then either maximum or average is calculated, which returns output as maximum or average respectively.

Step 4: Flattening

The pooled feature map is obtained after pooling is done. This layer helps in flattening the pooling feature map. Flattening is a process that involves transformation of the entire pooled map matrix of 3*3 or 2*2 into a single array which will be fed further for neural network processing.

Step 5: Connecting

As flattening produces a flattened feature map which will be passed through a neural network. This step consists of three layers: Input layer, fully connected layer and output layer. The fully connected layer of CNN is similar to that of ANNs, but here they are fully connected. The output layers gives out the predicted classes. The data that is passed through the network and the error of predicted classes is calculated. The errors will be back propagated through the network for improvising.

4. Experiment Setup and Analysis

In Object detection process, the first step performed is pre-processing the data, then building the model, train and finally to estimate the model. After the training the model, whenever any object comes in the range of camera it captures the image and then classifies the image with the data set (classes). If any object is detected then it alerts the visually challenged person about the obstacle. It is a user friendly device which helps the user in all aspects. The proposed work has used ultrasonic sensors for obstacle identification. The proposed device can be used in two modes, 1st mode for object detection and 2nd mode for object distance measurement. In emergency condition user can press the switch to alert the caretaker by sending the current location of the user.

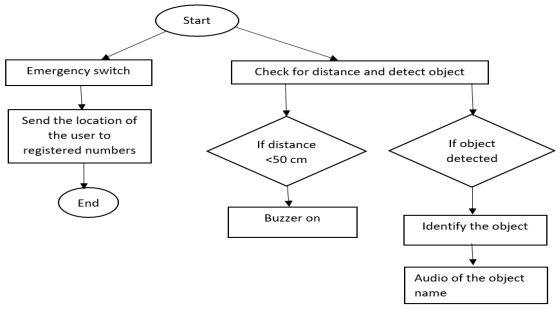

Figure 1: Flowchart of the proposed system

4.1. Data Collection

The data collected to train the project is from the different sources over the Internet. The project consists of over 80+ real time objects which are used to train the model. Each object data is used to train model separately so that the system can detect maximum range of the objects that come ahead of the blind person. Overall the model is trained over 80+ different objects normally occurring in the surroundings.

4.2. Data Pre-processing

Pre-processing of data involves three different steps as: Formatting, Cleaning and Sampling. The process of formatting is about sorting data respectively according to the requirements specified. The next step is cleaning which involves removal of null values in the data. Cleaning also comprises of fixing the missing data. The last step sampling involves taking a small representative data to work on that independently.

In data pre-processing the raw data can be cleaned using the following steps given as follows:

1. Scaling: The data values are scaled in the range from 0 to 1.
2. Normalization: The data is re-scaled to obtain the desired format.
3. Binarization: This process involves conversion of raw data to binary values.
4. Standardization: The process of converting the dataset values taken as input into numerical values.
5. Data Labeling: Labeling the data collected in the model is done by the used of data labeling.

4.3. Building the model

The model is built based on the dataset collected. It is built sequentially according to the layers of CNN algorithm. The first two layer i.e. Conv layers; will perform the input tasks for the model. Then the ReLU layer is used for activation function of data. The pooling layer performs pooling using 2*2 filter matrixes. The pooling computation will reduce the extension of data. The dense layer of CNN performs operations on data based on the functions of the model. Then the output layer is define to give the output of the predictions.

4.4. Training the model

The next process is to train the model using an algorithm. The algorithm used in this proposed project is Convolution Neural Network (CNN), which is a Deep Learning Neural Network algorithm. The model will be trained on the dataset which was collected earlier. The model is trained on detecting real time objects. Thus the proposed model can identify up to 80+ objects.

4.5. Prediction

The last process of object detection is predicting the output. In this proposed system the model has to predict the identity of the object that a blind person comes across. The model uses RaspberryPi Camera to predict the outcomes of the system.

4.6. Sensors

The ultrasonic sensor is embedded into the stick to detect the obstacles in the range of a blind person. The other sensor embedded is RaspberryPi Camera that identifies the object and notifies the blind person by a voice command. These two sensors tend to help the blind person to travel independently.

4.7. Live Location

The blind stick has been provided an additional feature of grasping the live location of the visually challenged person. The Smart Blind Stick will detect the live location of the visually challenged person and that location will be used to notify the emergency contacts during the time when an emergency occurs.

4.8. Emergency Message

When the visually challenged person meets with an emergency, where he needs assistance of another person he can press the emergency button situated on the handle of the stick. As soon as he presses the emergency switch an emergency message will be sent to all his emergency contacts saved in the microSD card.

5. Results and Discussions

This proposed work has implemented a smart blind stick which serves as an aid to visually challenged people. The results obtained after successful implementation are accurate and efficient, the proposed work will be helpful for

a visually challenged person in order to make things easier in his/her life.

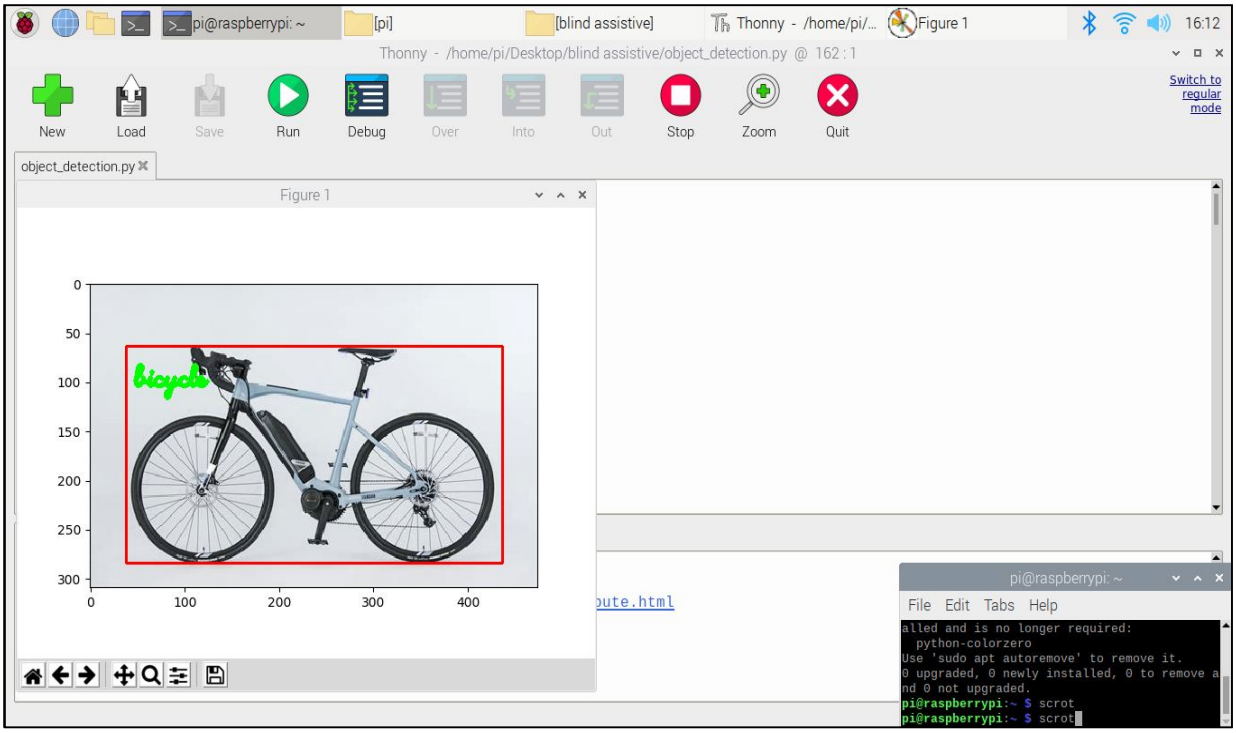

Figure 2: Object Detection by the Blind Stick

The proposed work can detect real time objects in the environment of the blind person, and will notify the visually challenged person with the help of a voice command. The voice command will contain the name of the object ahead of the blind person.

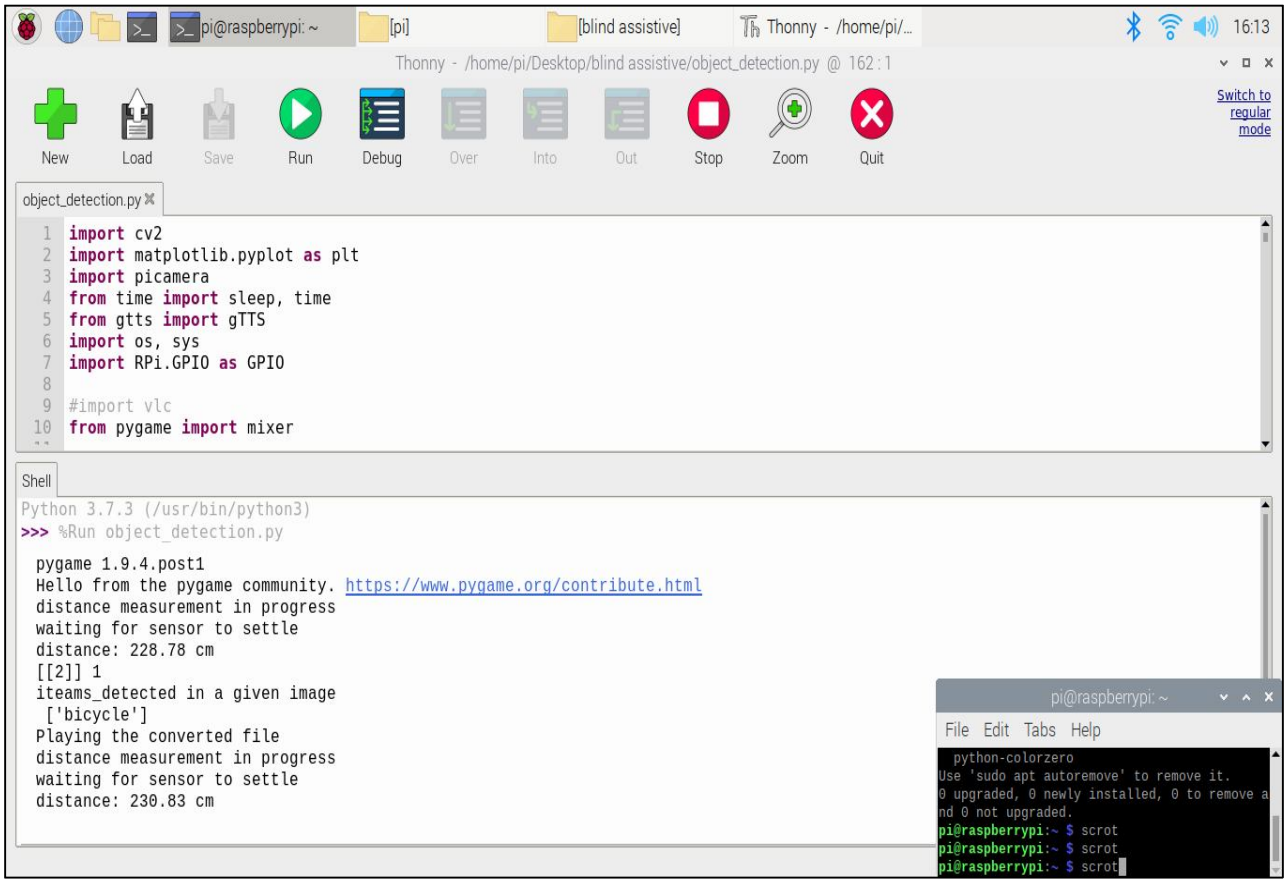

Figure 3: Sensory measures by the blind stick

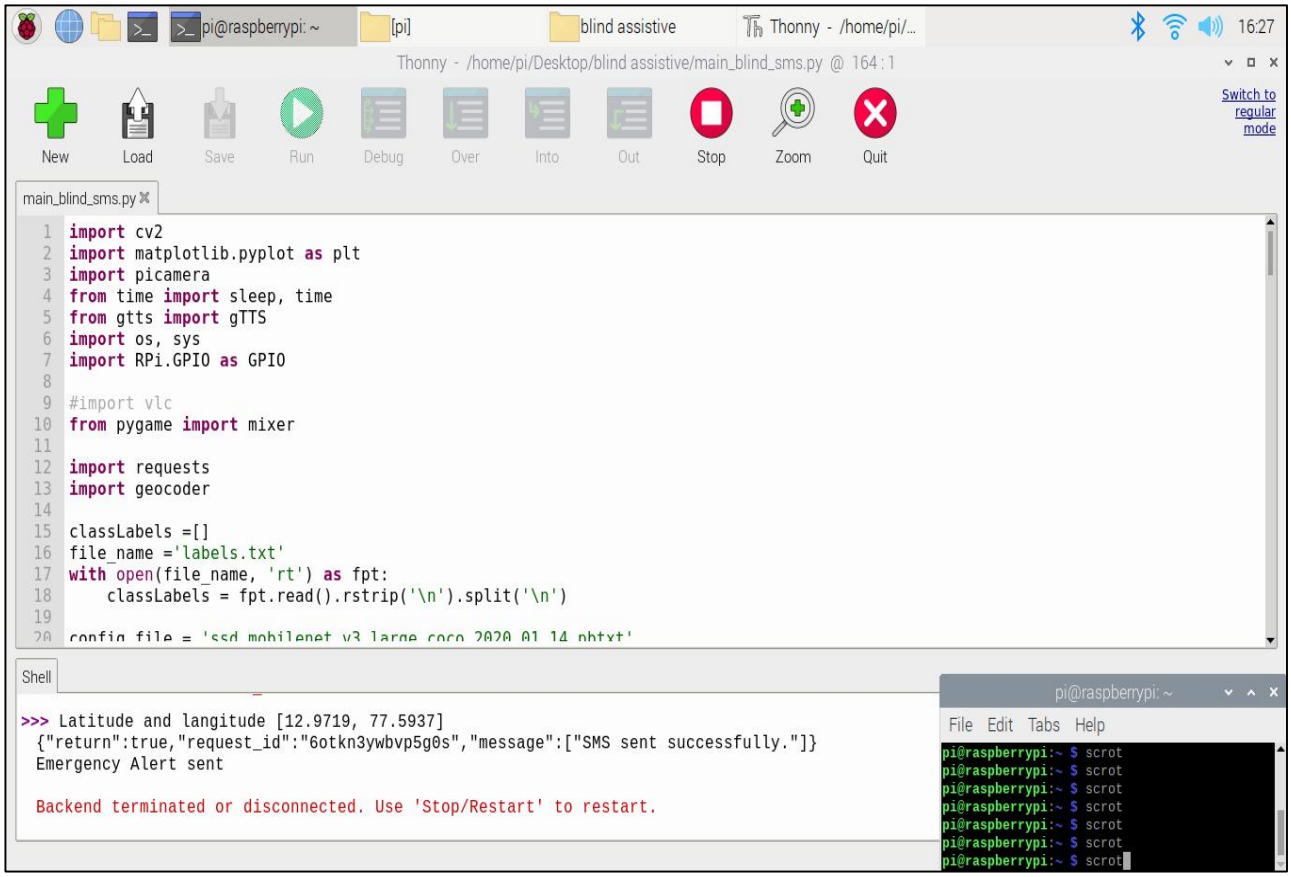

Figure 4: Emergency Message Alert

The proposed work will send an emergency message alert to emergency contacts with the latitude and longitude of the visually challenged person.

6. Conclusion

The smart walking stick for visually challenged people is constructed with at most accuracy; it will help them to move from one place to another independently. This proposed paper will serve the blind a sense of vision. The smart stick reduces the dependency of visually impaired people on other family members, friends and guide dogs to travel outdoors. The proposed paper is combination of various working units like sensors, camera, location tracking and emergency message which makes the stick stronger. The smart stick senses the objects/obstacles in front of visually challenged person and gives warning back, in the form of voice alert instead of a vibration alert. The advantage of the system lies in the fact that it is a low cost solution to millions of visually challenged people worldwide.

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INDUSTRIAL BOILER MONITORING AND CONTROL SYSTEM

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ABSTRACT

Rapid developments of the industrial sector in India have a great demand for power generation in sugar industries, which is increasing day by day. Regular inspection, maintenance and regular monitoring of parameters of such boilers in thermal power plant, as well as their controls, pose the greatest difficulty in today's power plants.
Currently, boiler parameters like pressure, temperature, gas leakage, humidity, water level are monitored and controlled manually in many sugar industry at high risk which is difficult in everyday life owing to adverse industrial disasters. As a result of which, several boiler explosions/blasts are reported even till today. Thus, continuous monitoring of these boiler parameters plays an important role.
The suggested prototype will fit this notion and give a start-up initiation to automate the monitoring systems in several boiler sectors. Water level, Ultrasonic, Temperature, Humidity sensors along with MCU ESP8266 are used to implement the prototype. The designed prototype finds applications in many boiler industries where human intervention can be replaced to save many lives.

Keywords: *Automation, boiler, Internet of Things, thermal power plant, temperature sensor, gas sensor, Node MCU*

Introduction

Over the last few decades, the field of industrial automation has expanded rapidly by replacing humans by machines. The thermal power plant is one such industry that needs regular inspection and monitoring. Any rapid unfavorable changes at the power plant's should be reported immediately to the central controlling unit, which shall act immediately and take situation into control. Data's are securely used to monitor the parameters of the boiler and analyze the critical issues like boiler blast in many industries.
Role of Internet of Things in Information Technology plays an important role in monitoring and control of parameters in any automation systems. Thermal power plants is one such industry where approximately 65% of the world's power is generated. The efficiency of the thermal plants, their control strategies, different hierarchical levels have taken a new face off due to present automation and IOT. Maintenance operation through sharing of data and safe remote monitoring system makes the system to be fully efficient.

Literature Survey

The BMS (Boiler Monitoring and Control System) in boiler industry uses a variety of methods and technology to keep track of the operations. Navneet Kumar Verma [1] simulated and automated a boiler system using sensors and IOT that collected data from the thermal power plant using modeling, pattern finding, as well as data mining approaches. Marek Moleda implemented a model utilizing IoT, big data, and cloud computing to identify any deviation or malfunction in boiler feed pumps from normal operations [2]. Stefano Tedesch implemented an data acquisition unit capable of self-learning while a machine tool was running. The systematic approach focused on risks that cause the monitoring system to lose data or information. This monitoring system was used as a remote-control system for various actuators in future development. This laid the foundation for the creation of a safe remote monitoring system for machine tools through IoT devices and analyses the critical issues focusing on the manufacturing environment [3]. Tawanda Mushiri used CBM and fuzzy logic to control and maintain the parameters of the boiler. This increased the efficiency of boiler and reduced Clinker formation [4]. Y. Nandini Reddy proposed a method which monitors and controls boiler temperature remotely using wireless communication. This method uses Internet of Things (IoT) as the platform of communication

On the basis of smart devices, F.M. Aiysha Farzana suggested an autonomous boiler monitoring system to maintain temperature, steam, flow level, and pressure. If any abnormal values of temperature, steam, flow level, or pressure were detected by related sensors, the monitoring system transmitted alarm messages to the people through GSM..[6]. K. Gowri Shankar presented an automation system for continuous monitoring that used SCADA and a communication wire to connect to the PLC. [7]. L. Navaneeth delivered a paper on employing wireless communications to remotely monitor and regulate boiler settings. [8]. Joshuva Arockia Dhanraj implemented a system using CAN for information sharing and with the help of LabView for controlling the process [9]. S Mythili proposed a system to monitor the boiler parameters using Think Speak and Internet of Things [10]. Aixia Duan, A ZigBee based online gas leakage monitoring system was implemented to monitor the boiler industry [11].

Supporting Software Tools

The Arduino IDE v1.6.1 and Embedded 'C' software's were used in our proposed Boiler Control and Monitoring System. The Node MCU ESP8266 Wi-Fi module was used for communication and programming using embedded C. The Arduino IDE is a platform-independent program. It comes with an editor and a compiler, as well as the ability to easily upload sketches to the board and the cloud. Embedded C is a programming language that is widely used in the creation of embedded systems. Compared to Assembly, BASIC, C++, Embedded C remains popular because to its efficiency, shorter development time, and portability.

System Hardware Architecture

The proposed prototype of a boiler monitoring and control system consists of field unit and control unit as shown in fig 1, which includes a power supply, voltage regulators, current controllers, water level, temperature, humidity, and gas sensors, as well as an Arduino UNO and Node MCU ESP8266 Wi-Fi shield.

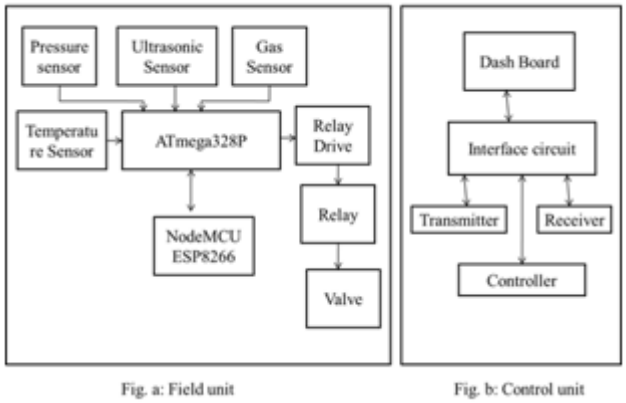

Fig. 1: Block diagram of prototype model

Power Supply: The proposed model uses single phase 230v, 50Hz AC power supply.
Voltage Regulator circuit: 3 DC voltages (+5v, +5v and +12 volts) were used from Voltage regulator circuit to provide voltages for sensors, two pumps and for microcontroller as shown in fig 2.

Fig. 2 :Voltage Regulator Circuit

Arduino UNO

Arduino is an open-source physical computing system based on microcontroller ATmega328 that includes an IDE for creating software to run the board.

Sensors

Ultrasonic sensor (HC- SR 04) determines the amount of water in the drum. A minimum and maximum threshold value is fixed so that water in the drum will be always full. LM35 Temperature Sensor was used to measure the temperature inside the boiler. DHT11 Temperature and Humidity Sensor is an digitally controlled sensor which measures the relative temperature and humidity created in the immediate vicinity of the Boiler power plant. MQ-04 gas sensors were also used to measure gas leaks around the boiler surroundings. Gases like methane, LPG, hydrogen, NH3, Benzene, and Propane can also

be sensed, which may leak due to many reasons inside power plant. 5V Relay is utilized to connect the boiler, pump, and supply to regulate the current flow to various sensors to control water level. Two 5V DC micro pumps are used to continuously feed water to the boiler, while the other is used to provide cooling- when the boiler temperature goes above a particular degree. LCD Display is used to display the collected date from field unit.

Node MCU is an open-source platform based on the **ESP8266** that enables the connection of objects and the transmission of data over the Wi-Fi protocol. Microcontroller functionalities such as GPIO, PWM, ADC are used for communication.

The Blynk Application is a platform that allows us to control Arduino, Raspberry Pi, and other devices via the Internet using IOS and Android applications. It's a digital dashboard that was utilized in our project to develop a graphical interface.

Results and Discussion.

The proposed boiler Monitoring system using Arduino UNO Microcontroller is implemented using above mentioned components and sensors which is shown in fig 3.

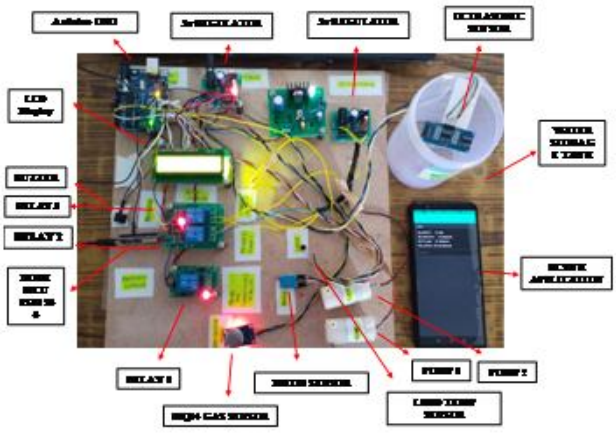

Fig. 3. Boiler Monitoring system using Arduino UNO Microcontroller

The regulator circuit reduces the voltage from 230V to +5V and +12V, respectively such that it offers an efficient input voltage supply to all of the sensors utilized in the proto type model.

Ultrasonic sensor checks for Quantity of water in the drum by comparing the water level with minimum threshold (5cm) and maximum threshold value (24 cm), so that water in the drum will be always full. The ultrasonic "**turns on**"" the pump with the help of relay 1, when the distance in the drum is less than 5cm and "**turns off**"" once the distance of the water reservoir is at most 24cm with the help of relay 2. An embedded C programme has been dumped inside the microcontroller for the same. Continuous level of the water in the drum is monitored and displayed in blink and LCD simultaneously as shown in fig 4 and 5 (when water is less and water is full respectively) .

Fig. 4: Output of Ultrasonic Sensor when water is less

Fig. 5: Output of Ultrasonic Sensor when water is full

LM35 Temperature sensor is placed inside the boiler to monitor the temperature of the boiler. A constant current is supplied via relay 1 to the boiler as shown in fig 6.

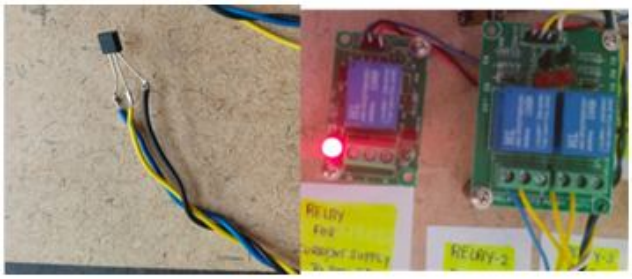

Fig. 6: LM35 Temperature Sensor

Temperature of the boiler is constantly measured and displayed in LCD and Blynk continuously as shown in fig 7 and 8. Fig 7 represents condition when temperature of boiler (0 < boiler temperature < threshold value (40^{o}C)).

Fig. 7: Rise in temperature of the boiler is displayed both in LCD and blink app simultaneously and continuously

Fig 8 displays value of boiler temperatures greater than 40^{o}C (temperature > threshold temp).

Fig. 8: Display of Boiler temperature, when it increases beyond the Threshold value (LCD and blink app) simultaneously.

Once boiler temperature increases greater than 40^{o}C, the supply which is used to heat the boiler will be turned off using relay 1 and relay 2, which will continuously sends water to the tank. Immediately relay 3 is turned on, to supply water across the surroundings of boiler to cool the system and bring back the temperature to normal operating condition.

Relative temperature and relative humidity across the boiler environment is measured using DHT11 sensor and is as shown in fig 9. MQ-04 Gas Sensor is also used to measure the gas content in boiler surrounding gas shown in fig 10.

Fig. 9: Relative Temperature and Humidity across the boiler power plant

Fig. 10: Output of gas sensor

A Boiler Monitoring System protype has been developed and implemented which can operate automatically without human interaction. This system constantly monitors and display data using IoT. The situation in and around boiler can be easily understood and controlled so that

unfavorable conditions can be controlled easily.

Conclusion

An promising way to Monitor and Control BMS has been implemented using an simple prototype using sensors which shall display messages to persons in control unit if any abnormal conditions exists, which may lead to malfunctions.

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CROSS BORDER POWER TRADING MODELLING EXAMINE FOR INDIAN REGION

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ABSTRACT

Cross border power exchanging sector is constantly developing. So, the participating nations must be updated with the latest development in this sector which is bounded by a regulated framework and with enable the operator of the power plant to trade efficiently. Initially there was need to provide risk free finance to build the infrastructure. Now the money earned by the utilities was carefully invested to develop the system and so the amount of risk involved is also less. So, now the original requirement for regulation is no more. Power can be considered to be an essential thing that can be sold or purchased in the market. The main focus of this work is to make a cross border power trading (CBPT) model which coordinates different operation and will share data w.r.t electric power trade among India and it's cross border neighbouring countries. The main duties of CBPT would be gathering, investigating and sharing relevant data so that there is a revolutionary change in the interconnected power system in the region in terms of generation and transmission. The power system designer's market administrators, control framework planners considers this work as the guide line for the promotion of cross fringe electricity market with system reliability and security.

Keywords: *Power Trading, Congestion Control, Power Control, etc.*

1. Introduction

In the decade of 90s almost all the countries in the world had witnessed numerous reforms in their respective power sectors. The vertically coordinated mechanism has been changed to open market frameworks. The developing countries were facing some major problems which include a great demand of power along with poor management of the system and illogical price rate. These factors were responsible for non availability of funding sources which would prove to be beneficial for increasing power production capacity of the utilities. So the developing countries were compelled to bring about reforms and to deregulate the electricity industry so that they can get financial benefits from the international funding agencies. Conversely the countries which are developed aspire to provide their consumer cheap price rate. The power charges presently have two segments – one from the generator that produces electricity and the other from the company which transmits, distribute and gives retail power to the consumer for maintaining the transmission networks and providing reliable services.

During the last several years, the electricity sector was predominately controlled by large local traders which had monopoly over all the activities of the power sector which included producing, moving and distributing electricity in its region of activity. Such a trader was the only provider of power in that particular area and was responsible to deliver power to each and every consumer in that area. Since there is monopoly over all activities, it is not easy to separate the cost related to the activities like producing, moving and distributing electricity.

Lot of reasons was responsible for the establishment of deregulated power industry. In recent times technology has improved so much that the efficiency of small units like gas turbines hydrological cells etc. has substantially increased. Also the quality of materials has improved significantly. Due to improved material quality, it was easier to build strong and less expensive small machineries. Communication and monitoring system have become computerized. This has reduced the number of manual staff personnel. Now only one operator works in a centralized manner to control the various activities. So now it becomes easy to establish new power plants which can deliver low cost power to the consumer as compared to the big, old power plants.

L. Parisio et.al talked about the power costs and cross-fringe exchange. In this paper drive the balance offer capacity in disconnected local power market and afterward break down their alterations when cross fringe exchange among them is overseen utilizing the certain closeout

technique . H. Asano et.al examine additionally address and examine new issues identified with the further administrative change and dependable tasks of intensity markets and frameworks incorporat.ing request interest in the serious market. Dr. Mahindra et.al likewise talk about the cross fringe poor exchange South Asia. Local vitality security can be guaranteed to a great extent through the procedure of association and proportions of continued cross-outskirt trades. The discoveries represent that a planned exchanging instrument (clog, travel) prompts increment of market rivalry, increment of interconnection use and decrease of market player chance just as age of income in advertise based techniques.

One of the significant parts of electricity act 2003 is to achieve fulfilment in India power market momentary exchanging of power is a vital advancement towards thispath. This work deals with the basic structure of trade in the electricity market. In trading power, it is very essential that a common power system is being developedso that a big group of consumers can buy power from a big group of generators. The main aim of this particular system of trade is to ensure that the consumers payfor the amount of power which they have consumed. Also it should be ensured that all the generators get paid for their power generation.

2. Requirements Analysis

In India the electricity trading markets has significantly evolved over times and facilitated competition in the market. Hence we can anticipate a bright future of India in the power trading market. This market has rapidly developed physically and financially. The electricity market are increasing their connections as an incentive from energy commission for producing more market generation. The fig 1 shows the intersection of demand & supply curve. The results are solved by use of optimization problem for maximum welfare.

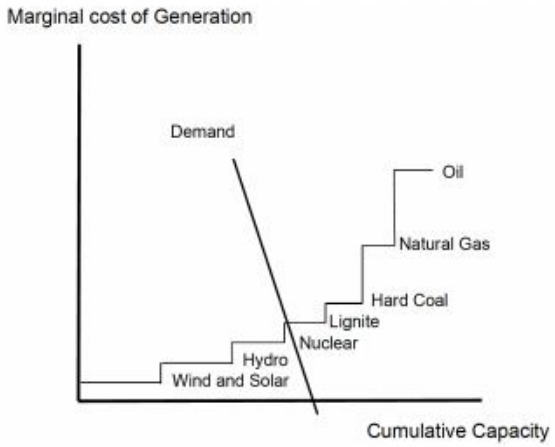


Fig 1: Demand Intersecting & Capacity

2.1 Power Pool Power Trading Objectives

To develop a model in the electricity market this will facilitate trading of power between the neighbouring countries of India. It is a quite difficult task for the planners and designers of the power system. The main objective of this work is to make a cross border power trading (CBPT)model which will coordinate different operation and will share data w.e.f electric power trade among India and it's cross border neighbouring countries. The main dutiesof CBPT would be gathering, investigating and sharing relevant data so that there is a revolutionary change in the interconnected power system in the region in terms of generation and transmission. Also it would be the responsibility of CBPT to intermittently monitor the financial and technological aspects of power trading system of the participating countries. This would be of great help to set the best technological standard so that the power network can operate efficiently and reliably.

- To discover market clearing price
- To coordinate demand and supply
- To give guiding rules for the transmission framework plan

2.2 Factors affecting Power Trading

The main factors that affect the power trading are:

- Lack of system for transmission
- Transmission asset flow lacking

In India, there are two power exchanges. Prices are determined by basically two factors i.e. demand and supply. Electricity charges are

mainly determined by how much power is needed by the consumers as the price of production of power remains either constant or varies minimal. There has been situations in which demand has substantially increased due to many factors like election weather etc.this is turn has increased the price rates. Electricity buyers quote the price depending on their demand. But it has been found that the price quoted also depend on the price quoted by other buyers.

2.3 Scenario for Power Trading

There are various methods of restructuring the electricity sector so that it becomes a competitive market. But we have to consider many factors like monetary status, structure of control, coordination and organizational set up etc. Nepal, Pakistan, India and Bhutan have a capability of hydro vitality asset of roughly 83000 MW, 21000 MW, 84000 MW and 21000 MW individually. Other than this Myanmar and Bangladesh have noteworthy unexploited gas holds. India presently exchanges power from Bhutan through reciprocal agreements. The force producing limit of Bhutan is moderately little and the vast majority of the age is traded to India. There are very uncovering varieties in the introduced limits of intensity utilities in South Asia. These varieties likewise mirror the possibilities as dependent on their normal enrichments. The power exchange for South Asia was opened in Year 2007 an is the leading operator in various countries like Poland, Hungary etc. Moreover we have developed many mathematical models for calculating market clearing price (MCP) and used matrix laboratory version 7.5 software for MCP calculations.

3. Design Concepts

The main aim of this particular system of trade is to ensure that the consumers pay for the amount of power which they have consumed. Also it should be ensured thatall the generators get paid for their power generation. One of the significant parts of electricity act 2003 is to achieve fulfilment in India power market momentary exchanging of power is a vital advancement towards this path. Another important development that has taken place is the establishment of Indian power exchange (IEX) in 2008.

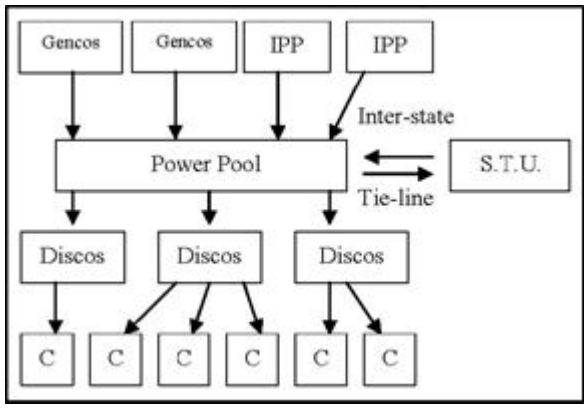


Fig 2: Single Pool Purchasing Model

This has made collective transaction possible. Earlier before restructuring there were many plants which continued to function in spite of being old and inefficient just for the sake of recovering investments. But now after restructuring, these plants may be out of the competitive market. Before restructuring, due to overcapacity of the plants there were increased prices but in the competitive market, prices decreased dye to overcapacity of the plant. So we can say that is a typical regulated regime there is practically no existence of incentives for cost cutting. But in competitive market, owners take all the risks initially. The make all the decisions. They are solely responsible for their decisions whether good or bad. If they take sound decision they will earn profit and will suffer loss for bad decisions. Many rules regulations and procedures have been gradually developed in this competitive market. The main aim is to use the excess generating capacity. Use theexcess transmitting capacity giving the right to the consumers to choose the supplier of power.

In this scheme, competition prevails only in the production sector. The power generators sell the electrical energy only to the purchasing agent and not to any other agent. The single purchasing agent is also called Central pool. They again sellthe power to the distributing utilities of the state or the service area. It is mandatory that the generating companies (GENCOs) sell power to the purchasing agency and the distributing companies (DISCOs) will purchase power only from thatsingle purchasing agency. They have only one power supplier and so do not have

any choice of choosing the power supplier.

3.1 Assumptions

It is often required to have a good coordination for various operational andinformation sharing activities between CBPT member nations. For this CBPT power exchange should have facilities for exchange of data and real time monitoring. The main source of operational data is CBPT-PX and also independent system operator. All the ISO's of the member nation are managed and coordinated by ISO. The operational data is made available through the CBPT-PX depend on the availability of data and the introduction of the power market in the South Asian area. It is theresponsibility of the ISO's to make the data available to PX via data link.

The evolution of the competitive regional power market from the current situation is a step by step development. The energy management system (EMS) is being upgraded and many renovation projects in ISO have been completed. So now it is assumed that the EMS will manage the current offline data or it can be managed inthe electronic form which is made available via the data link. There are various market designs and many rules and regulation control the market. These factors basically ensure electricity trading settlement.

3.2 Role and Responsibilities

Power exchange is an independent market operator. It is an entity which is separate from system operator. However, power exchange must be well coordinated with ISO for ATC information. All the ISOs also have the close coordination with ISO. In this way DA schedules are dispatched and imbalances are settled through balancing power market.

3.3 System Operator Model

In the deregulated power market scheme, independent system operator (ISO) plays a major rule. The restructured part of the system is mainly needed so that it is possible for the transmission company to exert force on the market. This is done by system operator. If both the activities are managed by a common entity then there could be risk of conflict of interest. Many a times there arises a conflict of issue of maintenance scheduling of transmission lines. The same thing can occur in other nations who are participating in trade. Under electricity act 2003 there is an option where we can isolate the transmission and framework activity work. . It is found that system operation function should operate separately .

3.4 Congestion Management

Congestion in the transmission network occurs when the amount of electricity flowing in a specific transmission corridor is greater than the exchange limit of that specific corridor. The entire transmission system might get badly affected if the entire power schedule flows in the line. When there is congestion, the lesser expense generators in other region are not able to supply load. So, the higher cost generators have to run. During congestion, transmission system operators (TSO) have major role to play. The TSO who are operating in connected local areas can re dispatch and co ordinate cross border trade. TSO's has the responsibility for securing the local network.

3.5 Transmission System Operator

Transmission System Operator (TSO) manages and operates the operator. They maintain coordination between the generators, customers and other network owners. In the CBPT area, the TSO's are the owners of the respective national main grid. TSO's also ensures the third party access to the transmission lines. The exchange members at CBPT are considered to be generators, customers and traders. They are also considered to operate bilaterally. In the ISO model a single entity is considered which integrates the operation of the grid and the ownership of the grid. This entity works for the development of the transmission system and also provides open access to all market players.

4. Simulations

The aggregated supply and demand curves intersect at a point which is the lowestprice of the market. MCP is the price which is satisfactory for the generators as well as for the customers. All the accepted purchase bids will be satisfied by providing enough electricity from accepted sales bid. There are

different types of bidding process. Markets are classified based on the bidding process. There are two types of markets , when the only suppliers are allowed to bid , then it is called single sided bidding and when bidding is done by both suppliers and consumers then it is called double sided bidding.

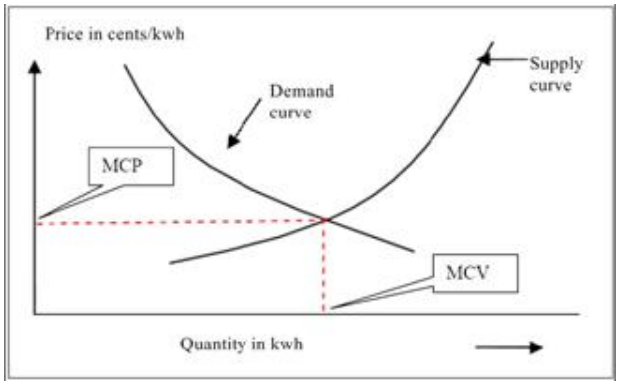


Fig 3: Response Curve for Quantity vs. Price

4.1 Single Side Bidding

This is a type of bidding process in which the demand is kept fixed and only the supplier is allowed to bid. This model is linear in nature. Suppose there is a bidder " i " in the market . Its supply curve is a function of market price and is given by:

$$Qi = \frac{P}{msi} \quad (1)$$

The slope of the supply curve is given by msi as shown in the figure. The quantity of ' ith ' supply curve is given by Qi (p). The price in cents/Kwh is P. Let us suppose that the total number of suppliers who are bidding into the market is given by Ns. So as a result the combined supply curve will be given by:

$$Qi(P) = p\sum\frac{1}{msi} \quad (2)$$

5. Result & Discussion

In cross fringe power trading in the electricity market, we need to study various bidding scenarios. For studying these scenarios, we have to consider uniform pricing approach. To make the process easy and simple it is recommended to take only one bidder from each nation. During congestion, power is taken from India and it amount to 30KW

Table 1: Linear Bid Data

Bidders	Msi, Rs / KW^2	Qmax	Q min
1st Bidder (Nepal)	0.161	61	10
2nd Bidder (Bhutan)	0.121	70	10
3rd Bidder (Myanmar)	0.121	62	10
4th Bidder (Bangladesh)	0.220	50	10
5th Bidder (Pakistan)	0.350	30	10
6th Bidder (Srilanka)	0.320	65	10

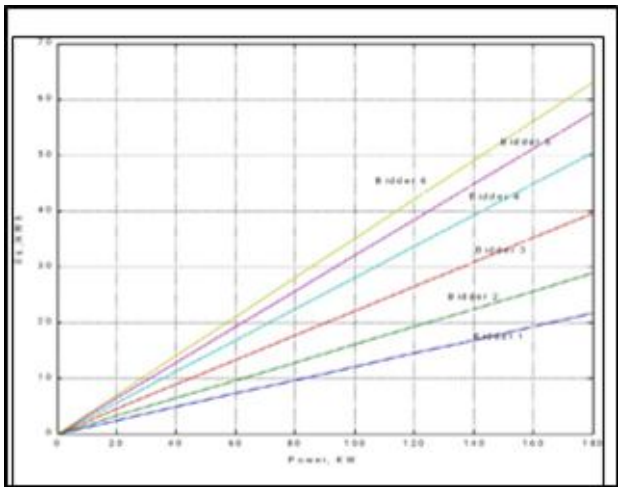
This table depicts the linear supply data of every nation participating in the cross border trade. This is a single sided bid market. In this study linear supply bid with fixed demand has been taken into acc. A fixed demand of 180 KW is being considered. The following analysis is done:

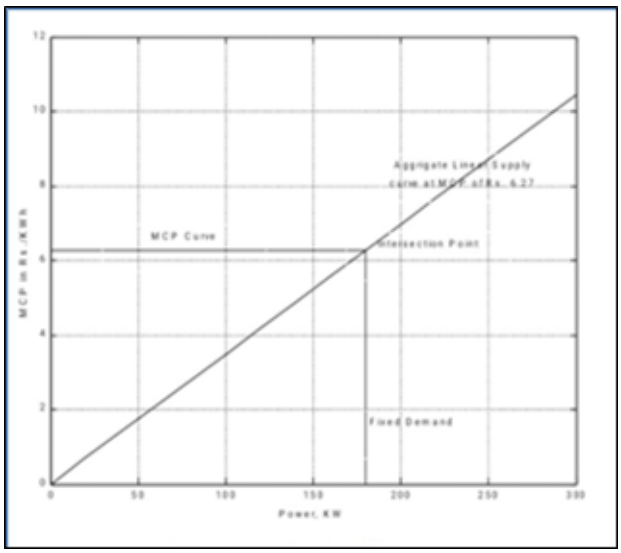
a) Let us consider, the power supply from India is unavailable. The other six cross border nations are meeting demand. The intersection point of the cumulative supply curve of the 6 bid with the fixed demand like of 180 KW gives the value of the MCP as shown in the figure 5.2. This value is accordingto their high cost of capital and its maintenance.

From the figure 4, it is evident that the MCP = 6.2756. In the table 2, we have seen how much power is supplied by each generatorso that they can meet the demand of 180 KW. In the new scenario, we assume that the generation powers that India supplies is up to 30KW and the rest of the demand is met by the other six bidders. Therefore we find that all the bidders' total dispatch reduces from 180 KW to 150 KW due to Indian power supply. As a result the MCP also reduces to 5.2297 cents / Kwh. Now, it becomes difficult to recover the costof the Indian generation as the MCP is reduced. So the output of the biddersalso reduces by

$$\Delta Q = \frac{\Delta P}{msi} \quad (3)$$

It is evident that the congestion into the power system is not certain. So, the output of the Indian power varies with the different bidding rates. The MCP alsovaries.





Restriction of the Indian Generator

When the bid of the Indian generator is zero, we find that it is dispatchedcompletely and the MCP will be 6.2756 Rs /Kwh.

No Restriction on the Indian Generator

The MCP is different for restricted Indian generator and unrestricted Indian generation. The MCP with restricted Indian price is 5.2297 Rs/Kwh maximum. We can find out maximum MCP and minimum MCP in relation to bidding rate withthe help of equation (5) and afterward comparing to zero.

For different offering rate (ms) changing from 0 to 10 instalments and yield areshown in table 5.2 for the accompanying two alternatives.

Choice 1 :- With fixed Indian power of 30 KW , MCP = 5.2297 Rs/ Kwh , when MS < 1.

Choice 2 :- Where MS somewhere in the range of 1 and 10 , MCP determines without Indian power and yield of bidders 1,2,3,4,5,6 as balanced.

At the point when 30 KW control taken from a nearby Indian generator then the MCP will be decreased to Rs.5.229 as appeared in fig 5.3 and the nearby area price will be 5.229. The absolute amount provided by each supply bidder is likewise diminished and aggregate sum of cash at MCP of Rs
941.34. In the event that we consider the inventory amount of unrestricted, Indian generator influence to satisfy the need of 180 KW and MCP of restricted Indian generator influence at that point aggregate sum of cash paid to supply bidders is Rs 1129.61. There is a probability of syndication into the single sided advertise offering.

5. Conclusion

In India, demand of power is rapidly growing. To meet this enormous demand of power, the CBPT model that has been proposed would prove to be very beneficial. The proposed CBPT model promotes competitive spirit across the border area of India. This allows the demand side to be better managed in the area. In this way, the adverse exposure to traderscan be constrained within sensible limits. Moreover, power exchange cooperates with the system operator and also facilitates efficient clearing and settlement. This theory additionally exhibits the different market methodologies in cross fringe electricity market. If we use such market strategy model properly then we can easily avoid congestion in the competitive electricity market. The power taken from the cross outskirt can assume a fundamental job in relief of market control, subordinate administrations however their cost must be recouped for effective advancement of cross fringe control exchanging vitality. The power system designer's market administrators, control framework planners can consider this thesis as the guide line for the promotion of cross fringe electricity market with system reliability and security.

In Future, There are various numerical models which are used to calculate market clearing price (MCP) and market clearing volume (MCV) . Such kind of model can be applied to the South Asia.

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COLOR BASED VEGETABLE AND FRUIT CUTTER AND SORTER USING ARDUINO

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ABSTRACT

In the document, the ESP8266 WIFI module is used to provide control signals to the machine. The received control signal is transmitted to the arduino. Arduino is used in conjunction with the universal asynchronous receiver transmitter. Seven motors with three motor controllers are used for the movement of the unit. There are two L293D high-power motor drivers. One of the engine impellers is used to manage the motion of the wheels in all directions. Second motor driver is used to control up and down movement of the arm, and also controls the cutting action. When the sensor detects color, it triggers the cutting action. Once the vegetables leave the factory, they are placed directly on the tray and the vegetables are transferred to the corresponding compartment of the container according to their color.

Keywords: *Agribot, Arduino, etc.*

1. Introduction

Agriculture is the pillar of India. "The discovery of agriculture is the first step towards civilized life." One of the famous Arthur Keith quotes. The above line highlights that agriculture becomes a very important part in the development of each country. From beginning, agriculture was a method of earning income by producing food for humans. Today, a large amount of land is being developed for the production of various crops. India is a great agricultural country. Agriculture is the main occupation of India. India's economic situation is highly dependent on agriculture. The agricultural process involves various actions that need handling of large materials. Some examples in traditional are plowing, where farmers use heavy-duty plough.

Nearly 70% of India's population lives on agriculture. There are several activities that need to be improved to achieve effective agriculture. Some of them are plowing, sowing, watering, weeding, fertilizing and harvesting. When watering their crops, farmers use the ancient method of transporting water through heavy pipes. All these processes are time-consuming and laborious. All of these processes require more manual skills and worker power. Therefore, it is necessary to adopt new technologies and skills to increase agricultural production. At the same time, the population of India is growing day by day. Therefore, it is necessary to improve the agricultural profession to fully meet the demand. In present days farms are anticipated to produce higher yields and quality at bottom most price in a justifiable way that has reduced dependent on labor. The application of digital agriculture and precise management of specific locations are few possible answers, which depends on sensor technology, and also in addition to continuous field data collection that can only be achieved through the appropriate use of agricultural robots. Agricultural scientists, farmers, and growers also face the consequences of growing more yield on less land in a justifiable manner to reach the demand of the population. The blend of digital tools, sensors and control technologies has advanced the design and development of agricultural robots, exhibiting the important advantages of present-time agriculture.

A. Project Objectives

Module is built to perform three main functions, such as detecting the color of ripe fruits or planted vegetables, finishing, and determining the corresponding compartment in which the container will be placed. Design a machine that is effortless and is a compatible user interface to perform the required operations. Reduce malfunction, minimal labor input, and manual maintenance costs. An easy-to-use mobile app that controls the machine to run the way you want it.

B. Literature Views

The purpose of the document is to design an

agricultural robot, which is beneficial to people in carry out operations such as digging, planting, spraying pesticides, mowing and plowing, and detecting obstacles.

The goal of this work is to design, develop, and manufacture Agribot, a multifunctional robot that can perform all agricultural operations, including plowing, planting seeds in the plowed area, and using a leveler to keep the field flat. , Irrigate crops, fertilize and control agricultural robots through cameras.

The project objective is to automatize the system that not only minimize labor costs, but also minimize the operation time for excavation and seeding. Solar energy is used to charge batteries, which are used as power sources for DC parallel motors, Arduino and other components.

II. Problem Statement

Currently, people are migrating to urban areas, so the lack of labor for agricultural activities is a major problem. Because labor requires more time to perform specific activities. This may not be accurate to the expected level. To overcome these problems, the agricultural robot is designed to automatically perform multiple activities without human intervention, so it can complete precise tasks in less time than humans.

III. Proposed Statement

The robot can plow fruits and vegetables with the help of color sensors and robot plows, and the sorter is also very easy. It takes less time, and there is no error handling of the product.

***Working*:** Improve the harvesting process of fruits and vegetables according to the form of products. In the process of collection and placement, the robot moves and corrects the position of matured fruits and vegetables. The work process begins according to the instructions provided, backward, to the right, is left and stopped. The engine driving device 2 is used for the movement of the arm and the cutting operation. The motor driving device 3 is used to place aged fruits and vegetables in a specific partition. . The color sensors are used to detect if fruits and vegetables are fresh or mature depending on the color. The cutting action is initiated and the blade is connected to the end and arm. Depending on the color, the tray has two partitions. When the vegetables and fruits are shipped from the plant with the help of the bladder, it is placed directly on the respective compartments with the support of the tray.

Block Diagram

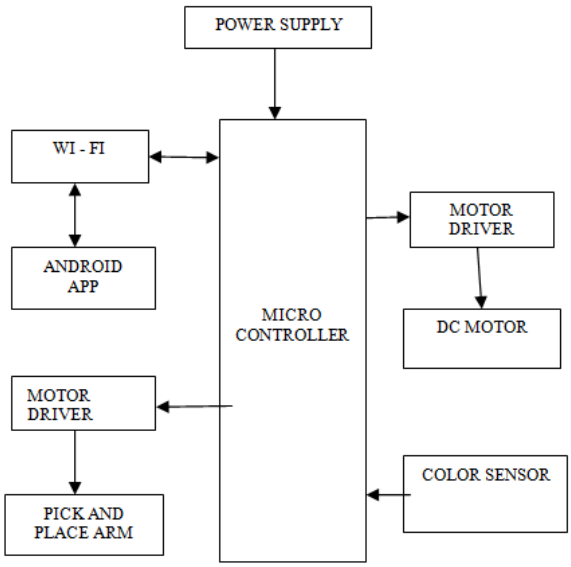

Fig : Architecture of system

Hardware Requirements:

- Arduino
- Power supply
- WiFi module
- Motor drivers
- DC Motors
- Color sensor

Software Components:

- Terminal
- Arduino IDE
- Embedded C

IV. Future Scope

Agricultural field robots play an important role. In the future, on a fully automated farm, robots can perform tasks such as fertilization, pests and monitoring of diseases, collection and cultivation. By increasing the correct size and the size of the robot, we can easily choose the fruits, we can reduce human power. This allows you to monitor without operating when monitoring robot .The power of saved persons can be used for other purposes in the agricultural field.

V. Result

Do some activities, such as recognizing the vegetables based on their color, then picking up the vegetables with the help of the blades provided on the robot arm, and placing the vegetables and fruits in the corresponding compartments of the tray. The features of the Android platform are of great help to farmers. Depending on the color, there are two compartments on the tray. Once the vegetables or fruits are removed from the plants with the help of the knives, they are placed directly on the corresponding compartments with supports for trays. Smart Farm Bot provides farmers with a elastic UI to effectively administrate the machine. It decreases the need for worker, which is beneficial for farmers, because finding workers is a burden. Compared to performing the same activity manually, the time required to perform the function is greatly reduced.

Advantages:

- They are small in size.
- Save time and waste resources.
- Useful in continuous agriculture for farmers who cannot provide large-scale machines, paying labor to work on other land as labor.

Applications:

- Can be used to manage farmland.
- Can be used for domestic purposes.
- Can be used to stimulate interest in learning about agriculture between generations and communities.

VI. Conclusion

In this project, efforts are made to design smart agricultural robots. Do some activities, such as recognizing the vegetables based on their color, then picking up the vegetables with the help of the blades provided on the robot arm, and placing the vegetables and fruits in the corresponding compartments of the tray. Compared with traditional agricultural robots, it uses color sensors to detect the color of fruits or vegetables. Smart Farm Bot uses the functions of the Android platform to significantly help farmers. In this project, the ESP8266 module is used to provide control signals to the Arduino UNO. Seven motors and three motor controllers are used here. Among the three motor controllers, two are the L293D high-power motor controller for wheel motion control and the other is the low-power L293D motor controller for pallet control. In addition, it also contains a rechargeable battery. color sensor, the cutting action is initiated. Blades are connected to the extreme end of the arm. There are two compartments provided in the tray depending on color. Once the vegetable or fruit is dispatched from the plant with the help of the blades, is placed directly on the respective compartment with support of tray. Smart Farm Bot provides a elastic UI to farmer to manage the machine successfully. It decreases the requirement of labour which is a add on advantage to the farmers. The duration required to complete the functionalities decreases comparatively with carrying out the same activities manually. The Smart Farm Bot can perform in any type of climatic condition as well as can work

nonstop. It is a profitable investment that decreases the overall farming cost. Smart Farm Bot acts as a hub to automize smart farming.

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