FOOD INSECURITY STATE OF AGRO-PASTORAL COMMUNITY: EVIDENCE FROM AYSAITA DISTRICT AFAR.

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ABSTRACT

Introduction: *Afar region is one of the ten states in Ethiopia where majority of its population generate livelihood from livestock. Without a dramatic progress that the region recorded on poverty reduction, and many food security projects implemented both by the government and other development partners in an effort to mitigate food insecurity the problem remains high. The aim of this study is to look at the state of food security and its association with socio-economic characteristics of agro-pastoral households in Aysiata district, Afar.*
Methodology: *The survey data for this study was obtained from three kebelles through three-stage sampling. Bar chart and frequency distribution tables were used to illustrate the given data. Chi-square and t-test were employed to identify the association between socio-economic characteristics and food security status of households. The food security measures applied in the study are Head Count, Food Insecurity Gap, and Squared Food Insecurity Gap.*
Results and conclusion: *Majority of the households were found to be food insecure (60.1%) with food insecurity gap and severity of 9.5% and 2.6% respectively. There were statistically significant associations between food security status and income, livestock ownership, training, farm size, education, remittance and family size of households. To assure food security, policy makers and development agents have to consider the role those differences in socio-economic factors play both positively and negatively.*

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Keywords: *Afar, Agro-pastoral, Aysaita district, Ethiopia, Food security.*

Introduction

Food security concern traced back to the inception of the Hot Springs Conference of Food and Agriculture in 1943, but the first explicit acknowledgement was made at the 1974 World Food Conference in Rome that this issue, food security, concern the whole of mankind. Since the 1974 Rome conference, the whole concept of food security has evolved, developed, multiplied and diversified (Maxwell, 1996). Over time, its definition has moved from a focus on supply to questions of distribution and access. Now, food security issue is among one of the sustainable development goal. The definition adopted in this study is that of the World Food Summit (WFS) in November 1996:

"Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life."

Analogous to food security concept evolvement, international concern and objectives set to be achieved too underwent different developments: from food surplus disposal in the 1940-50s to food for development in 1960s; from food assurance in 1970s to freedom from hunger and malnutrition in 1990s and onwards.

With the aim of achieving development and curbing the multifaceted food insecurity problems, as country, Ethiopia devised several food security and nutrition policies and put in place implementation strategies. These include the Food Security Strategy (2002), the National Nutrition Strategy and the National Nutrition Program (2008), the Growth and Transformation Plan I and II (GTP I and GTP II) covering 2011-2020, the Agriculture Sector Policy and Investment Framework (PIF) 2010-2020, aligned to the MDG, and SDG.

In effect, steady economic growth has been recorded in the country in the last two decades and the food security status improvements achieved in consequence. Despite the economic growth achieved and food security improved, food insecurity remains a fundamental challenge and among the top policy agenda of the country. The economic growth achieved so far geared toward the service sector, with a reduced contribution of the agricultural sector over time. This means, economic growth is increasingly taking place outside the agricultural sector on which paradoxically most of the population live and derive their

livelihoods. Hence, this may explain some aspect of the economic growth – food insecurity puzzle.

Afar national regional state's, one of the ten regional states in Ethiopia, economic and food security status and context is not an exception from the national trend but lags behind in many dimensions. On top of that, its arid and semi-arid climatic condition and pastoral means of livelihood put the region in difficult position. For instance, relatively the decline in food poverty has not been as strong and was 28 percent in 2015/16 while the national average was 24.8 percent; the third highest of all regions in the country (DHS, 2017). More generally, In line with the Mini-EDHS Key Indicator Report 2019, Afar has made progress in several nutrition, health and survival indicators; however, most rates remain under the national average.

In consonance to this, this study examined the incidence, depth and severity of food insecurity of agro-pastoral community of Aysaita district in the remote pastoral and arid part of Ethiopia, Afar regional state. To estimate head count ratio, food insecurity gap and severity of household food insecurity the Foster, Greer and Thorbeck (FGT) index was employed. The results of the headcount index indicated that 60.1 % of households were below the food insecurity line while the remaining 39.9 % were above the food security line.

Methods

2.1. Study Area Description

The study was conducted in Aysaita district, which is one of the 32 districts in the Afar national region state of Ethiopia. In this district there are 13 kebelles from those 11 are rural and the remaining two are urban kebelles (Woreda of Agriculture Office [WAO], 2017). The district has latitude and longitude of 11°34′N 41°26′E and an elevation of 300 m (980 ft). The mean temperature is between 30ºC and 45ºC per annum. In the district, pastoral and agro-pastoral livelihood pathways are the dominant practices.

2.2. Sampling Technique and Sample Size

To select sample households, three-stage random sampling method was employed. In the first stage, out of 7 districts in Awsa zone, Aysiata district was selected purposively. In the second stage, three among the total of 13 *kebelles* found in the district were drawn after stratifying them into three strata as near, medium and far based on the criteria of their distance from *Aysaita* town. The three sample *kebelles*, one from each stratum, were selected by using simple random sampling techniques. In the third stage, a total of 153 sample household heads were randomly selected based on probability proportional to size of the households in the selected *kebelles*. The sample size for this study was determined by using Yamane formula (Yamane 1967).

$$n = \frac{N}{1 + N(e^2)} = \frac{9943}{1 + 9943(0.08^2)} = 15 \quad (1)$$

Where n = designates the sample size (153), N = designates total number of estimated household heads in the study area (9943) and e = designates maximum variability or precision (8%).

2.3. Data Set and Collection Methods

A pre-tested semi-structured questionnaire was used to collect various kinds of information from sample households, i.e. socio-economic characteristics, per capita calorie intake, livelihood diversification, livestock size, access to market, access to extension services, farm size, income level and dependency ratio. The household survey was conducted keeping in view the requirements of scientific investigation ethics. For this purpose, the whole data collection procedure and framework was reviewed and approved by the Research Committee of College of Business and Economics, Samara University, Ethiopia. Primarily the semi-structured household survey questionnaire was formulated in English language. Then, the English version survey questionnaire was translated to Afar'af, local language, and then translated back to English to check its consistency. Six enumerators and two supervisors were recruited to handle the overall data collection process. The data collectors were recruited based on their priori experience in household data collection and familiarity with the target communities norms and culture. The enumerators were well trained

and their understanding was assessed before their deployment to the data collection work.

2.4. Analytical Framework

Determining food security status: as there are a number of competing ways to assess food security status, as the norm in food security literature, different studies (Bashir et.al, 2010; Bashir et.al, 2012b; Haile et.al, 2005; Sindhu et. Al, 2008; Alinovi et. al, 2009; Abebaw et. al, 2010; and Pe´rez-Escamilla and Segall-Corrêa, 2008)   used different methods to measure food security. Of the various available methods, this study employed the calorie intakes method, one of the most popular methods to measure the extent of food security. In line with the applied method requirements, to measure the pastoral household food security status and indicators, Dietary Intake Assessment (DIA) has been employed. Calorie Intake Method or DIA is a recall method for usually 7 days and hence the estimates largely depend on the memory of the respondent. One of the advantages of this method is that it measures the household's food consumption directly.

In accordance with the requirement of the applied method, per capita calorie intake data of sample households has been collected during the last seven days prior to the interview day. And it is important to make it clear that the household data on calorie intake was generated from an individual household head, not all the members of the household. In effect, dietary consumption data was used to generate the average daily consumption of various groups based on their age and gender and these intakes are considered as per consumption unit (CU) per day. Furthermore, the estimated food energy was converted into adult equivalent and reached at figure of food calorie in kilo calorie/day/AE.

After generating the per capita household's caloric intake of sample households in line with the above mentioned method, it was compared with per capita threshold for food security (2100 Kcal/day/AE). In accordance with this criterion, a sample household was considered food secure if maintain this daily caloric threshold and was assigned value "1" and zero otherwise. Thus, the applied formula to measure the sample household food security status can be stated as:

$$PHHFS_j = \sum_{j}^{n} FS_j - FSTH \geq 0 \qquad (2)$$

Where PHHFS is pastoral household food security for j^{th} household which takes value "1" if the pastoral household is food secure and zero otherwise, FS_j represents food security status of jth household, whereas FSTH stands for the food security threshold level applied (per capita calorie intake 2100 Kcal/day/AE).

Measuring food insecurity incidence, depth and severity: to measure food insecurity incidence, depth and severity of the pastoral households the commonly applied Foster, Greer and Thorbeck (FGT) method was employed. Different studies (Amsalu *et al.,* 2012; Mequanent *et al.,* 2014; Tibebu, and Sisay, 2017; and Hoddinot, 2001) used FGT for the same purpose. The FGT index use to measure the extent, at aggregate level, of households which are below (or above) the adopted food security line. Perhaps, it helps to monitor and evaluate progress made over time pertaining to food security achievements of various government policies and programs.

The overall food insecurity incidence of the pastoral household was computed as:

$$TFII = \frac{FIPH}{N} \quad (3)$$

Where, TFII is the total food insecurity incidence, which indicates the proportion of food insecure households among the sample pastoral households, FIPH stands for number of food insecure pastoral households and N is the total number of sample households.

The Total Food Insecurity Gap of the pastoral household was computed as:

$$TFIG = \frac{1}{N} \sum_{j=1}^{n} \frac{\left(FSTH - FS_j\right)}{FSTH} \qquad (4)$$

Where, TFIG is the total food insecurity gap, which indicates the depth of food insecurity among the food insecure pastoral households, FS_j represents food security status of jth household, FSTH stands for the food security threshold level applied (per capita calorie intake 2100 Kcal/day/AE) and N is the number of food insecure households.

This index TFIG provides the possibility to estimate resources required to eliminate food insecurity through proper targeting. That is, the product (N*FSTH*TFIG) gives the total calorie commitment required to bring the food insecure households to the given daily calorie requirement level.

The squared Food Insecurity Gap, which indicates the severity of food insecurity among insecure households, was computed as:

$$SFI = \frac{1}{N} \sum_{j=1}^{n} \left(\frac{(FSTH - FS_j)}{FSTH} \right)^2 \qquad (5)$$

Where, SFI is the severity of food insecurity, which indicates the severity of food insecurity among the food insecure pastoral households, FS_j represents food security status of jth household, FSTH stands for the food security threshold level applied (per capita calorie intake 2100 Kcal/day/AE) and N is the number of food insecure households.

Generally, TFII is headcount index measuring the proportion of the population whose measured calorie intake is less than the food security threshold line, TFIG is food insecurity gap measures the distance to the food security threshold line for the average person and SFI is the severity of food insecurity which indicates the most sever group among the food insecure pastoral households.

Results and Discussion

3.1. Descriptive Analysis
In this section, a descriptive analysis of the demographic variables used in the study, as well as different food insecurity scenarios of the sample household is presented (Tables 1-4).

3.1.1. Descriptive statistics of the Agro-Pastoral households
Tables 1 show summary statistics for the demographic variables pertaining to continuous variables for the entire sample.

Table 1: Descriptive statistics of the Agro-Pastoral households (Continuous Variables)

Continuous Variables	Description	Mean	SD
Age	Age of the head of household	53.64	13
Household size	Number of household members	5.57	2.6
Income	Total household income in birr (annually)	269.7	58.5
Dependency ratio	Household dependency ratio	1.13	0.87
Farm size	Household farming land size (hectares)	2.8	2
Livestock	Number of livestock owned (in TLU)	19.39	19.7
Extension	Frequency of extension contact (days/year)	19.75	16.8
Distance	Walking distance to local market (hours)	1.53	0.95

Note: SD stands for standard deviation.
Source: Authors' computation from survey, 2021

On average, a household is made up of 5.57 members, with an average age of 53 years. The average dependency ratio is 1.13 with mean income of birr 269.7. The farming in the study area, which is subsistence in nature, is operated on an average farm of less than three hectare per household. The average landholding size is 2.8 hectare per household. The average livestock holding per household is 19.39 Tropical Livestock Unit (TLU). With respect to extension, on average, a household visited by agriculture extension workers 19.75 days per annum. To reach local markets, on average, households are required to walk for 1.53 hours.

Table 2: Descriptive statistics of the Agro-Pastoral households (Discrete Variables)

Discrete Variables	Description	Frequency	%
Head	Male headed household	118	77.1
Marital Status	Married household head	123	80.39
Education Status	Literate household head	62	40.52
Remittance	Household receiving remittance	60	39.22
Credit	Access to credit	62	40.52
Input	Utilization agricultural input	66	43.14
Land	Land ownership status	134	87.58
Training	Skill development training	73	47.71

Note: %: this column refers to the percentage share of each variable.
Source: Authors' computation from survey, 2021

Tables 2 show summary statistics for the demographic characteristics of the agro-pastoral households using discrete variables. On average, the level of education of the heads of households is low (40.52% can read and write, and 59.48% can't read and write). Of the heads of household, 77% are men, while 23% are women, and the majority report their marital status as married (80%). With respect to asset ownership, the majority report as they own farm lands (80.39%).

According to the results, the provision of basic services in this agro-pastoral area is low. In terms of credit access, 40.52% of households get access to credit that helps them finance their farming and animal rearing practices. As for training, 47.71% of the respondents report as they participated in different skill development training provided by local administration or non-governmental organizations operating in the area. In reference to remittance, 39.22% of households report as they received remittances from their relatives in the last year.

3.1.2. Socio-economic characteristics and food security status

The food security status of the sample household according to their respective socio-economic characteristics is shown in Table 3 and 4.

Table 3: Descriptive statistics of discrete variables across food security status

Variables	Variable Description	Food security status				Total household (n=153)		Chi-square value
		Food secure (61)		Food insecure (92)		Freq.	%	
		Freq.	%	Freq.	%			
MALEHEAD	Male	44	72.1	74	80.4	118	77.1	1.024
MARITALSTA	Married	49	80.33	74	80.4	123	80.39	2.459
EDUSTAT	Literate	52	85.25	10	10.8	62	40.52	17.6**
REMITTANCE	Yes	46	75.4	14	15.2	60	39.22	7.33***
CREDIT	Access	15	24.6	47	51.0	62	40.52	-3.93**
INPUT	Access	40	65.58	26	28.2	66	43.14	0.98
LANDOWND	Yes	50	81.97	84	91.3	134	87.58	17.77*
TRAINING	Yes	53	87.5	20	22.2	73	47.71	65.75*

Note: ***, ** and * Significant at 1%, 5% and 10% level respectively
Source: Survey result, 2021

The study employed FGT food insecurity index to assess the extent of food insecurity in the study area. Accordingly, the findings of head count ratio from food insecurity index indicate that the extent of food insecurity was 60.14%. That is 60.14% of the agro-pastoral households were actually in the state of food insecurity - unable to get the minimum recommended calorie for subsistence. While the remaining 39.86% of the sample households revealed to be in state of food security.

As revealed in Table 3, state of food insecurity greatly varies in line with the difference in socio-economic characteristics of the sample respondent. Out of the food insecure households (92), majority of them were male headed (80.4%), while the remaining 19.6% were female headed. However, the chi-square test of association of sex of household head and food security status is not significant.

In terms of education level, Table 3 shows that food insecurity is low for household headed by literate head (10.8%). In the same talking, 85.25% of the food secure households were headed by literate head.

Moreover, the chi-square test of association of literacy status of household head and food security status is quite significant.   As of remittance, households receiving remittance were in a better state as far as food security is concerned with significant chi-square test. Out of the food insecure households (92), only 15.2% were those whom receive remittance and of the food secure households (61) majority of them used to receive remittance (75.4%).

In reference to credit access and utilization, Table 3 shows that 51% and 24.6% of the food insecure and food secure households have access to credit respectively. As of land ownership, 91.3% and 81.97% of the food insecure and food secure households own farming land respectively with significant chi-square test. On the other hand, households that attended any sort of skill development training were in better state in terms of food security relative to those that did not attended any of the trainings. As Table 3 shows, 87.5% and 22.2% of the food secure and food insecure households received skill development training respectively with significant chi-square test.

Table 4: Descriptive statistics of continuous variables across food security status

Variables	Variable descriptions	Food secure households (61)		Food insecure households (92)		T-value
		Mean	St. Dev.	Mean	St. Dev.	
AGE	Age of household head	59.77	12.74	49.57	11.56	0.862
HHSIZ	Household size (number)	4.8	2.11	6.08	2.91	0.00***
DEPR	Dependency ratio	1.04	0.78	1.19	0.93	0.00***
FARMSIZ	Farm size (ha)	3.20	1.73	2.55	1.97	0.034**
LIVESTOCK	Livestock size (in TLU)	27.26	22.56	13.88	1.61	0.00***
FREQEXT	Frequency of extension contact (days/year)	17.5	17.16	21.23	16.48	0.096**
SID	Income diversification index of the household	0.62	0.08	0.26	0.179	0.00***
INCOME	Annual income of the household (ETB)	80071.59	28191.08	65009	27106.75	0.00***
DAM	Walking distance to local market (hours)	0.78	0.2	2.05	0.85	0.00***

Note: ***, ** and * Significant at 1%, 5% and 10% level respectively
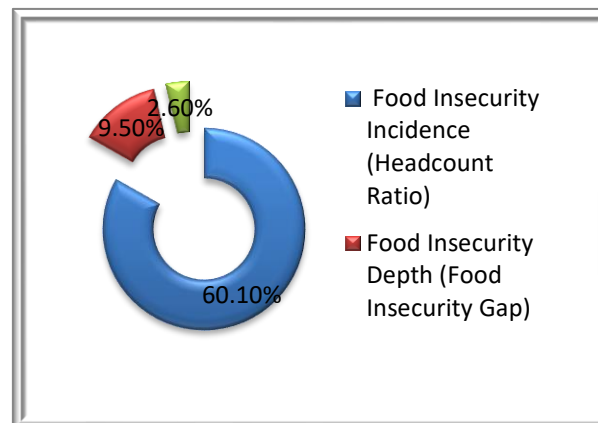Source: Survey result, 2021

Similarly, Table 4 presents the state of household food security in line with their socio-economic characteristics pertaining to continuous variables. As compared to food insecure households food secure households have small family size, lower dependency ratio, larger size of farming land, more number of livestock holdings, higher income diversification index, and higher annual income. The state of food security significantly differs in line with demographic characterization of the households, similar to the socio-economic differences pertaining to discrete variables discussed above.

3.2. Extent, Gap and Severity of Food Insecurity

As explained in the analytical framework section, the study used FGT food insecurity index to assess the extent of food insecurity in the study area. As revealed in Figure1, the finding of head count ratio from food insecurity index indicate that the incidence of food insecurity was 60.1%, implying that 60.1%of the sample respondents were actually in the state of food insecurity, that is, unable to get the minimum recommended calorie for subsistence. The food insecurity gap, which is a measure of depth of food insecurity, indicate that each food insecure sample household were in need of 9.5% of the daily caloric requirement to bring them up to the recommended daily caloric requirement level (2100 kcal/day). This implies that, on average, the households need to be supplied with 9.5% of the daily minimum calorie requirement to get out of the food insecurity state. Stated differently, the average extent of the calorie deficiency gap for the sampled agro-pastoral households was, therefore, 199.5Kcal/day; which means, on average 199.5Kcal/day of additional food energy would be required to bring up to the recommended daily caloric requirement level, then at least in theory, food insecurity could be eliminated. Furthermore, as indicated in Table 4, the result of squared food insecurity gap from food insecurity index indicates that the severity of food insecurity in the study area was 2.6 percent.

Figure 1: Food insecurity incidence, depth and severity of households

Source: Survey result, 2021

Conclusion and Policy Implication

Food insecurity is critical and persistent problems facing most Ethiopians generally and the pastoral and agro-pastoral communities particularly. The reversal process of such scenario needed to be supported empirical investigations that provide important and context based evidences on households' food security for policy makers and beyond. Thus, the main aim of this study was to assess the state of agro-pastoral household's food security and analyse how difference in socioeconomic factors influence food security status in Aysaita district using a data collected from 153 sample households. Food security was measured by the commonly applied dietary intake assessment approach.

Accordingly, the findings of the study revealed that the incidence of food insecurity (60.1%) was high in the study area, with the depth and severity of food insecurity being 9.5% and 2.6%, respectively. That is more than half of

the agro-pastoral households in the study area were found to be food insecure. Moreover, food security status varies in line with the difference in socio-economic characteristics of the households. More livestock size, larger farming size, higher income, distance to the local market center, lower household size, lower dependency ratio, participation in training, receiving remittance and diversified income are among the major factors to maintain household food security.

The finding of the study implies that policy makers and development agents have to understand that socio-economic characteristics of the household is very essential for successful food security intervention programs that address the food insecurity problems.

This study constitutes a baseline for future empirical investigations into the determinants of food insecurity in the other pastoral and agro-pastoral areas of the country, with an emphasis on differences in socio-economic characteristics of target households.

Declarations

Availability of data and materials
➢ The datasets and articles used to support this study are available from the corresponding author upon reasonable request.

Competing interest
➢ The author declares that he has no competing interests.

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Consent for publication
➢ Not Applicable

Ethics approval and consent to participate
➢ Ethical clearance was obtained from the college of business and economics, Samara University.

Author's contributions
➢ The corresponding author done all aspect of the manuscript solely.

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BIO SYNTHESIS OF DUAL DOPED IRON NANOPARTICLES WITH COUROUPITA GUIANESIS FLOWER EXTRACT AND THEIR ENVIRONMENTAL APPLICATIONS

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ABSTRACT

The problem of environmental pollution, using chemical compounds as reducing agents, has been overcome by replacing the chemical reducing agents with natural reducing agents available in plant species, known as green synthesis is now attracted by different researchers. The naturally occurring reagents from plant extract are considered as a reducing and capping agents in the preparation of MNPS & MONPS. Iron metal is utilized in the biosynthesis of INPS and IONPS due to high reactivity (large surface area),easily oxidized to form free ions in the presence of oxygen and water, wide applicability in medicine and laboratory application. The kailashpati tree component (CG flower extract) has a lot of medicinal properties such as antifungal and antibacterial activity exert of cytotoxic activity against cancer cells used in chemotherapeutic agents, decoction of flower has been used to boost the immune system to fight against the number of disease. The bio-synthesised CG-IONPS were confirmed by different spectral characterisitics such as FTIR and Antibacterial activity. The FTIR spectrum recorded for CG-IONPS identifies the functional group of the flower extract utilized for the reduction and capping of the formed metallic iron and iron oxide nano particles. It confirms the flower extract will act as a capping agent and involved in the formation of CG-IONPS. The antibacterial property of CG-IONPS using different bacteria such as gram positive bacteria such as S.aureus and gram negative bacteria like S. pyogenes by disc diffusion method. Dual doped IONPS has highest bacterial killing capacity because of the enhanced crystallite size and high density of oxygen vacancies which shows the way to higher ROS values.

Keywords: Couroupita Guianesis, ,nano particles ,Bio synthesis ,FTIR, antibacterial activity
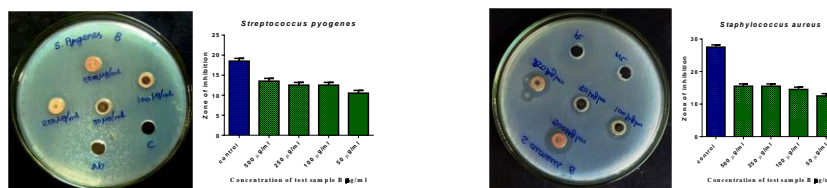
Graphical abstract:

Figure 1. The graphical representation of ZOI for S.aureus and S.pyogenes

Introduction

The potentiality to evaluate, control and authenticate things on an atomic or a molecular scale betweeen 1 to 100 Nanometres is Nano technology.These diminutive yield have large surface area to volume ratio, which is their significant notability for the boundless (or) rampant utility of Nano materials in electronic devices. Environmental remediation, medicines, Engineering fields and material science (1) The bio stability of iron has been ascribed to its presence in human system which is the first common trace elements, which plays an vital role in body metabolic activities, and it is one of the consumed metal worldwide (2). Several methods have been adapted for the synthesis of metal oxide Nano particles, which is the most expensive, toxic and antipathetic chemicals are used as a stability agent. Doping is one of the most dominant tool in tailoring the energy level surface states which then enhance the physical, optical and magnetic properties of the material [3]. Many researchers extended their interest in developing effective and green chemistry process for the production of Nano materals. Many of the organism will act as a imperishable forerunner to develop nano particles.These may include fungi ,yeast, viruses etc.,(4,5).The availability of local resources are a matter of concern in the production of Nano materials. The green technology based operate under the green conditions without the interruption of hazardous chemical.

Many studies have recommended the capacity of iron Nano particles for environmental in deminification. Among these nanoparticles,

many researchers has attracted towards iron nanopaticles(FeNP'S),because of the promising advantage of controlling the environmental pollution. The interest in the nanoscale zero valent Iron(nzvi) in environmental remediation in increasing the reactivity of nanoscale.Iron have a larger surface area to volume ratio(6,7).The prolongation of iron materials, such as metallic iron and oxide of iron through a green path. It also summarises the quest for an environmentallysustainable synthesis process of iron nano material for their application in the field of environmental sustainability.

Materials

Anhydrous Ferric Chloride (FeCl$_3$), Silver nitrate (AgNO$_3$), Zinc Sulphate (ZnSO$_4$) are bought from Modern Scientific Company, Madurai. The chemicals are the product of Aldrich and there is no secondary purification.

Preparation of flower extract

The flower of Couroupita guianensis (CG) plant were collected and employed for the biosynthesis of CG-IONPs in the present work. The collected flowers are washed 2 to 3 times with distilled water until all of the dust, debris and organic contaminants present on the flower be removed. It is then dried at room temperature and kept in sealed containers to prevent absorption of moisture. The flowers were cut into fine pieces. 15g of finely cut leaves of CG mixed with 150 ml of distilled water is taken in a 250 ml beaker. This mixture is boiled at 60 °C on a magnetic stirrer with a constant stirring of 200 rpm for 45 minutes. It is then cooled to room temperature and filtered with whatsman filter paper no.1. The prepared flower extract is further utilized for the biosynthesis of CG-IONPs.

Synthesis of IONPs

Anhydrous Ferric Chloride (FeCl$_3$), Silver nitrate (AgNO$_3$), Zinc Sulphate (ZnSO$_4$) were used as a precursors. Initially, appropriate amount of Anhydrous Ferric Chloride, Zinc Sulphate and Silver Nitrate were dissolved in 100 ml of double distilled water and kept a stirrer for a constant stirring till we get the homogeneous solution. Now the CG flower extract is added drop by drop till the color

changes. The final solution was kept at 60°C under constant stirring for one hour. Then the precipitate was filtered and washed several times to remove the impurities and then dried at 80°C for one hour. The dried precipitate was grained well using an agate motor and annealed at 500°C in air atmosphere followed by furnace cooling.

Characterisation techniques

The bio-synthesized CG-IONPs were confirmed by different spectral characteristics such as FTIR and Antibacterial Activity.

Results and Discussion

Physical observation

The preliminary confirmation of CG-IONPs had done by physical visual observation of color change of light brown to dark brown [8].

FTIR Analysis

The prepared CG-IONPs were further analyzed by FTIR spectrophotometer (Perkin Elmer 100S). The FTIR spectrum recorded for CG-IONPs was shown in Fig. 4.3. to identify the functional groups of the flower extract, utilized for the reduction and the capping of the formed metallic iron and iron oxide nanoparticles. Fig. 4.3. reveals that a strong absorption band with a wide stretch of -OH group present in alcoholic and phenolic compounds of the flower extract was observed at 3434.62 cm^{-1}. The other two peaks in Fig. 4.3. were found to be at 2923.92 cm^{-1} and 2853.48 cm^{-1}. These peaks were in accordance with the earlier reports and matches with stretching C-H vibrations of hydrocarbon chains present in plant extract [9]. From Fig. 4.3., the peaks at 1631.08 cm^{-1} and 1384.07 cm^{-1} were correspond to N-H and C-N stretching bands of primary amines and aromatic amino groups, respectively [10]. The other peaks at 1069.93 cm^{-1}, 778.86 cm^{-1}, 525.99 cm^{-1} and 474.67 cm^{-1} observed in Fig. 4.3. were assigned to C=O or C-O stretching vibrations, out-of-plane bending of aromatic C-H stretching bonds and the presence of iron-Oxygen (Fe-O) respectively [10,11]. The analysis of FTIR spectrophotometer confirms that the flower extract will act as reducing and capping agent and involved in the formation of CG-IONPs.
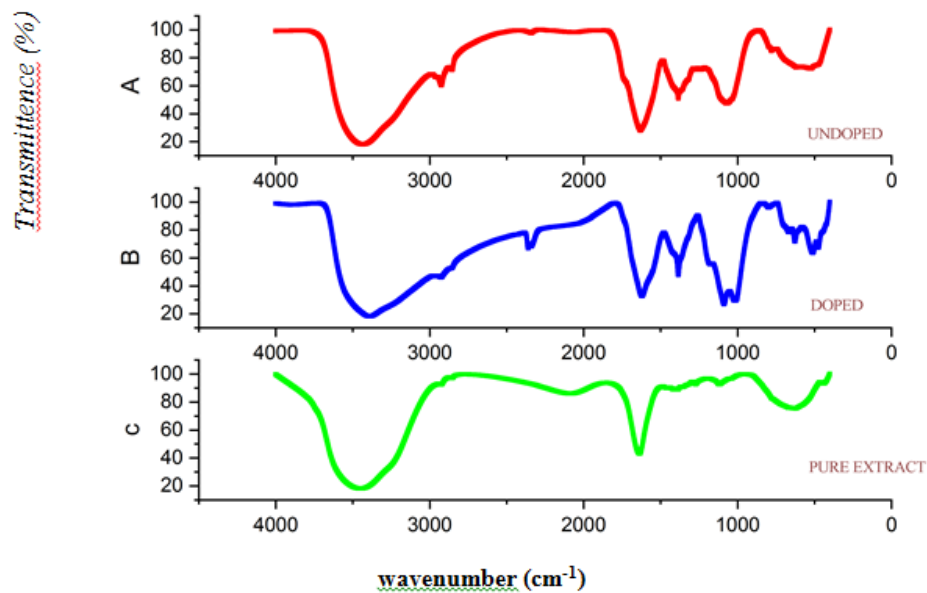
Figure 2. FTIR Spectrum of CG-IONPs

Antibacterial activity

The antibacterial activity was conducted to test the applicability of synthesized CG-IONPs for medical applications because the bacteria have become resistant to standard antibiotics. Hence, the author has studied antimicrobial property of CG-IOPNs using different Gram positive bacteria such as ***Staphylococcus aureus*** and Gram negative bacteria like ***Streptococcus pyogenes*** by disc diffusion method. The formation of zone of inhibition by CG-IONPs exhibited against different bacteria were presented in Fig.3.4. (A-D),respectively. The zone of inhibition exhibited by CG-IONPs on different and comparison with standard antibiotic, gentamycin were presented in the table.

While analyzing the antibacterial activity of the synthesized CG-IONPs, we absorbed that the inhibitory effect of 0.1 molarity CG-IONPs with and without dopant against S. pyogenes,S. aureus rerevealed significant difference when compared with those of gentamycin (Standard) where observed against S. pyogenes,S. aureus .

The result revealed that Gram positive bacteria less resistant to IONPs treatment than Gram negative bacteria. The bio active compound of Couroupita guianensis that posses antibacterial activity was assessed . It was effective against fungal diseases such as dermatophytic and skin lesion diseases (REFERence from paper 2). The antibacterial activity of CG-IONPs depends on the size, the smaller the size, the better the antibacterial activity. The CG-IONPs prepared in this work showed good antibacterial activity. The results of antimicrobial activities of the synthesized CG-IONPs and antibiotics evaluated using Agar Disc Diffusion Method against two pathogenic bacterial stains.

In the current work the antibacterial activities for carried out for CG-IONPs against both gram positive (S. aureus) and Gram negative (S. pyogenes) bacteria in order to examine the effect of killing of bacterial pathogens.
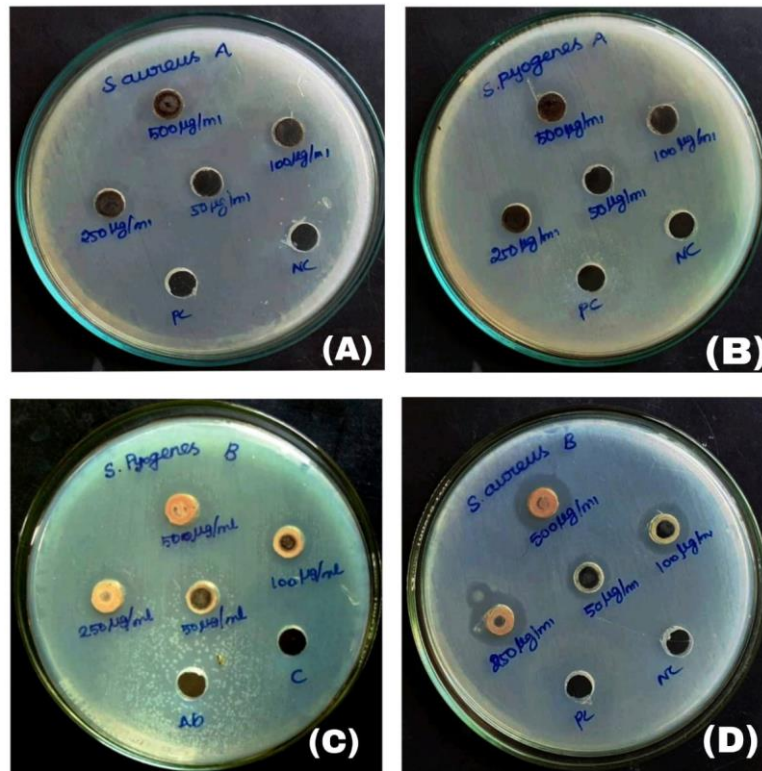
Figure 3. The zone of inhibition (ZOI) in mm for doped and undoped CG-INPs against S.aureus and   S.Pyogenes .
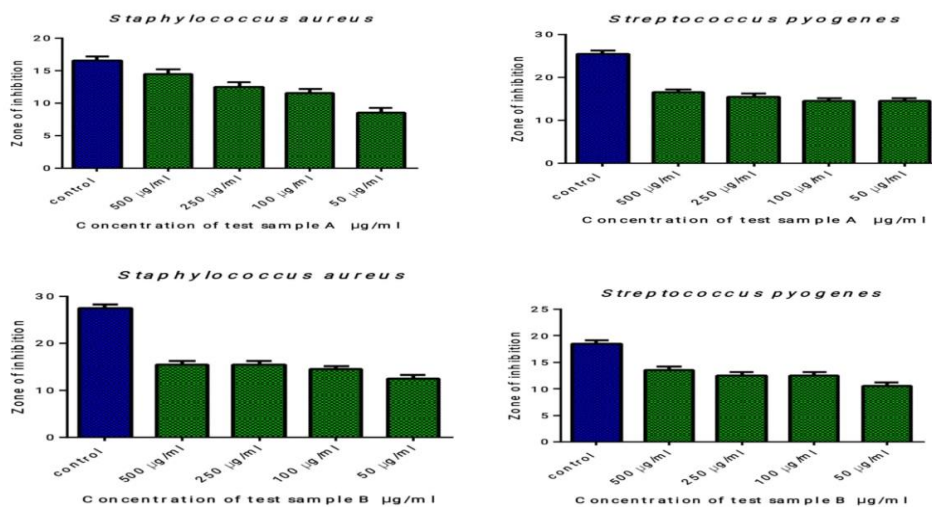

Figure 4 Shows the graphical representation of ZOI for different micro organisms such as against S.aureus and S.Pyogenes . Doped and Undoped CG-INPs reveals the enhanced antibacterial activity against the target cultures.

The dis similatires in antibacterial reactions of NPs against two different bacterial strains due to difference in the cell walls of the considered bacteria.

Even though the current mechanism of the antibacterial action is not obviously recognized. Different mechanisms have been projected ; Photo catalytic activities, Metal ion Release, ROS(Reactive Oxygen Species)Generation, [12] and membrane damage . The first and foremost mechanism is decomposition of Fe_3O_4 and formation of oxygen reactive species. A reductive process happens when an electron reacts with oxygen to produce less toxic super oxide anion radical(O_2^-) By an oxidative process ,the whole

in the valance band can attract electron from water or hydroxyl ions to generate the most reactive hydroxyl radical ($^{\circ}$OH) .Now, the super oxide anions can react with electron whole pairs to generate hydrogen peroxide (H_2O_2).

The electron hole pairs place an important role in the production of ROS. The negatively charged hydroxyl radical (OH) and super oxide anions (O_2) rather penetrate the cell membrane. H_2O_2 and the hydroxyl radical ($^{\circ}$OH) being powerful oxidizing agents can directly penetrate the bacterial cell membrane to cause injuries and prevent the growth of cells

introducing heavy toxicity to bacteria. Zn, Ag doped IONPs has highest bacterial killing capacity because of the enhanced crystallite size and high density of oxygen vacancies which show the way to higher ROS values. Fig 3.4shows the enhanced ZOI for Gram-Negative bacteria. Even though all the bacteria have an inner cell membrane ,Gram negative bacteria have a unique outer membrane. This outer membrane prohibits certain drugs and antibiotics from penetrating the cell, moderately responsible for why gram negative bacteria are normally more opposing to antibiotics than gram positive bacteria.

Table 1 given below represents the Mean ±SD of zone of inhibition obtained by sample A and B against the pathogens Streptococcus pyogenes and Staphylococcus aureus.

S.NO.	Name of the test organism	Name of the test sample	Zone of inhibition (mm) Mean ± SD				
			500 µg/ml	250 µg/ml	100 µg/ml	50 µg/ml	Control (Ab)
1.	**Staphylococcus aureus**	A	14.5±1.5	12.5±0.5	11.5±1.0	8.5±0.8	16.5±0.5
2.		B	15.5±0.5	15.5±0.2	14.5±0.8	12.5±0.5	27.5±0.2
3.	**Streptococcus pyogenes**	A	16.5±1.5	15.5±0.5	14.5±0.5	14.5±0.5	25.5±0.5
4.		B	13.5±0.5	12.5±0.5	12.5±1.5	10.5 ±2.5	18.5±0.5

Conclusion

Zinc , Silver dual doped Iron nano particles and undoped iron nano particles have been synthesized successfully by co -precipitation method. Here the flower extract act as a caping and stablizing agent.

The characteristic IR peaks for , 474.87 cm-1 to 510.81 cm-1 relates the occurance of C=O or C-O stretching vibrations, out-of-plane

bending of aromatic C-H stretching bonds and the presence of iron-Oxygen (Fe-O) which is absent in undoped IONPs . The shifting in the wavelength confirms the proper substitution of dopant in the IONPs.

Zinc silver doped iron nanoparicles possessed highest bacterial killing capacity because of the enhanced cryatallite size and high density of oxygen vacancies which let to the higher ROS values.

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SERVICES AND ICT FACILITIES AVAILABLE IN AUTONOMOUS ENGINEERING COLLEGES AFFILIATED TO VISVESVARAYA TECHNOLOGICAL UNIVERSITY (VTU), BELAGAVI, KARNATAKA STATE

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ABSTRACT

A survey among the librarians of autonomous engineering colleges affiliated to VTU, Belagavi, Karnataka state have been conducted to find out the available ICT facilities and services provided. Well-structured questionnaires have been distributed to 15 college librarians, out of which 14 have filled the questionnaire and returned. The results revealed that innovative use of ICT facilities was not widespread. An overwhelming majority of the libraries have Wi-Fi facilities, but some of the colleges have not provided fibre optic cables. All the college libraries are providing service through webOPAC and Remote access, but some of the colleges have not provided services such as E-Mail Alert Service, CAS and SDI. E-resources access are provided through OPAC, homepage and IP based access and librarians have faced challenges with managing e-Tools, e-resources, communicating with users, low bandwidth and technical issues.

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Introduction

Libraries are part of the educational institution of any type, acts as heart of the institution helps in teaching, learning and research activities by fulfilling their information needs (Habiba and Chowdhury, 2012). As rightly pointed out by Tiemo and Ateboh (2016) "the library can stand on its own, but the university cannot stand on its own". The library professionals are treated as knowledge providers doing significant role in identifying, organizing and disseminating the knowledge to the information seekers. Information is considered as important key resource for every organization and essential for any type of organization (Kiran Kumar, 2017). Exponential growth of information is being witnessed due to developments in web technology. Most of the resources available through web has made easy to access the resources and services from the user's desktop. The academic libraries in this digital environment must play an important role in fulfilling the information needs of the user community. The responsibility of every library is not just selecting, acquiring and organizing information materials, but they should also extend the services to be reached to its users (Ogunniyi, Efosa and Sheji, 2013). The academic library is a place where all the resources needed for the user community are procured, organized and disseminated to the

students, researchers and faculty members. The academic library plays significant role in fulfilling the information needs of the users. The role of the academic library could be seen as (Udoaku and John, 2013):

- Procuring the resources in support of teaching and learning process
- Provision of resources to the research community to meet their requirements
- Developing a networking with neighboring libraries to provide document delivery services
- Make it available of the resources through electronic mode
- Bring the information to their doorstep

The libraries are educational institutions must ensure that their resources and services are well utilized by the users for educational development. For library professionals, it is the time to assess how the library resources and services are utilized, changing user needs and finding their satisfaction (Gurikar and Gurikar, 2015). Library professionals must be provided with adequate resources and infrastructure facilities which will enable them to disseminate the services and achieve their library work. In this connection, this study has been conducted to find out what are all the ICT facilities and services are provided in the autonomous engineering colleges affiliated to VTU, Belagavi, Karnataka State.

Review of Literature

Some of the reviews related to the study have been thoroughly reviewed and listed as below.

A study on digital literacy skills and knowledge-based competencies among librarians of Africa University libraries conducted by Baro, Obaro, and Aduba (2019) revealed that the librarians have rated high for various information competency skills such as database search, uploading documents, handling different social media, digital library development, ability to create different file formats, and ability to use open source software. The librarians found lack of fund to support the library professional training, lack of physical facilities, and shortage of ICT educators.

Mansour (2017) conducted a study to find the digital information literacy among academic library and information professionals. The findings of the study revealed that majority of the library professionals knowledge on using mobile devices, PCs, workstations, PMP/DAP and PDA was fairly high. The study also revealed that some should be qualified and adapt ICT's skills. The study recommended that the library professionals need to be provided sufficient training to update their knowledge.

A study on ICT infrastructure and services in the college libraries of Assam was conducted by Mahanta (2019) found that software and hardware infrastructure facilities available in Assam college libraries found be to in a good condition. All the college libraries have internet connection and they have got the connection from BSNL. Majority of the colleges have barcode. The colleges also faced many problems in connection with ICT that the colleges had lack of IT skilled manpower or inadequate training in ICT infrastructure. The study recommended to allocate minimum funds to overcome the challenges and provide better services to the user community. The study also recommended recruiting skilled library professionals and providing ICT based training to cope up with the latest technologies.

Tiwari (2013) conducted a study to identify the infrastructure and use of ICT in University libraries of Rajasthan found that all the university libraries have phone and fax facilities. However, there was no single library has independent library website. Majority of the library professionals does not possess formal degrees or required ICT skills for library day to day operations. Among the total computers and equipments available in the university libraries of Rajasthan, 89.49% of the computers and equipments are in working condition and remaining items need maintenance and post service contract from the companies. Overall, it is found that innovative use of ICT in university libraries of Rajasthan is not widespread. The study suggested procuring proper ICT infrastructure including hardware, software and training the library staffs.

A study on ICT infrastructure and information services offered by the Amity University Kolkata central library carried out by Mishra (2018) the university library has 13 computer systems, four client workstations, four UPS, three LCD projectors for group study. The library also has one server, CCTV cameras, one printer, one barcode printer and 6 scanners. It is also found that there is no reprographic machine. The library is connected through LAN and Wi-Fi and both the connections are provided by Airtel and Vodaphone. The library provides services such as CAS, SDI, Newspaper clipping, mail alerting service, literature search service. The study revealed that lack of infrastructure, proper planning and supervision were the basic issues in development of ICT in university library. The study recommended improving the infrastructure and other service facilities in order to improve the existing library services.

Walmiki and Ramakrihnagowda (2009) explored ICT facilities in University libraries of Karnataka. The authors have revealed that ICT infrastructure facilities are still at different stages of development. The study results showed that the Karnataka university libraries facing insufficient computer hardware and software and internet facilities with slow internet bandwidth. In order to provide efficient information services to the users, the study recommended having a plan on urgent basis, to implement and develop ICT facilities to enhance the services.

Objectives of the study

Following are the objectives of the study

1. To identify the resources available in the libraries surveyed
2. To find out the services offered through web in the surveyed libraries
3. To know the ICT facilities available in the surveyed libraries

Methodology of the study

The study comes under descriptive in nature. For conducting the survey, the authors have chosen 15 autonomous engineering colleges affiliated to VTU Belagavi, Karnataka state. A well structure questionnaire was designed keeping the objectives in mind. Questionnaires were distributed to 15 college librarians and responses were collected from 14 college libraries in spite of repeated reminders. Simple percentage analysis was used to analyse the data collected from the libraries. The analysed results have been presented in the findings section.

Table 1: Basic information about librarians

	PERSONAL INFORMATION	RESPONDENTS	PERCENTAGE
GENDER	Male	11	78.6
	Female	3	21.4
AGE	25-35	2	14.3
	36-45	4	28.6
	46-55	3	21.4
	56-65	5	35.7
EDUCATIONAL QUALIFICATION	MLISC	2	14.3
	MLISC,MPhil	2	14.3
	PhD	8	57.2
	Other qualifications	2	14.2
PROFESSIONAL EXPERIENCE	5-15	4	28.6
	16-25	4	28.6
	26-35	6	42.9

It is found from the table 1 that majority of the library professionals 11 (78.6%) were male and rest of them were female. In age-wise distribution, highest number of the library professionals 5 (35.7) were between 56-65 age group followed by second and third highest fell between 36-45 and 46-55 age group respectively. When looking into educational qualification, it was found that majority of the library professionals 8 (57.2%) have Ph.D which is the highest degree followed by 2 respondents each have the qualification of MLISc, MPhil and other qualifications such as PGDLAN and cleared KSET. Regarding professional experience, 6 (42.9%) of the library professionals have experience between 26-35 years and (28.6%) of the library professionals each have 5-15 and 16-25 years of professional experience.

Table 2: Types of Networks available in the libraries

S.N.	Name of the institution	Optical Fibre Cables	Data Cables	Wi-Fi
1	BMS College of Engineering	Y	N	Y
2	Dayananda Sagar College of Engineering	Y	N	Y
3	Dr.Ambedkar Institute of Technology	Y	N	Y
4	KLS Gogte Institute Of Technology	Y	N	Y
5	Malnad College of Engineering	Y	N	Y
6	MVJ College of Engineering	N	N	Y
7	Nagarjuna College of Engineering and Technology	N	N	Y

8	New Horizon College of Engineering	Y	N	Y
9	NITTE Mahalinga Adyanthaya Memorial Institute of Technology	Y	N	N
10	NITTE Meenakshi Institute of Technology	Y	Y	Y
11	P.D.A. College of Engineering	Y	N	Y
12	PES College of Engineering	Y	N	Y
13	Siddaganga Institute of Technology	Y	N	Y
14	The National Institute of Engineering	N	N	Y

It is noted from the table 2 that all the educational institutions under survey used Wi-Fi connectivity except the one Nitte Mahalinga Adyanthaya Memorial Institute of Technology. In the same way, all the autonomous engineering colleges were using Optical Fibre Cable except MVJ College of Engineering, Nagarjuna College of Engineering and Technology and The national Institute of Engineering. It is also noted that among 14 institutions, Nitte Meenakshi Institute of Technology is using data cables. Overall, majority of the autonomous engineering colleges used Optical Fibre Cables and Wi Fi for networks.

Table 3: ICT Equipments available in the colleges

S.N	Name of the institution	Power Backup	Scanner	CD/DVD writer	Printing	Reprographic facility
1	BMS College of Engineering	Y	Y	Y	Y	Y
2	Dayananda Sagar College of Engineering	Y	Y	Y	Y	Y
3	Dr.Ambedkar Institute of Technology	Y	Y	Y	Y	Y
4	KLS Gogte Institute Of Technology	Y	Y	Y	Y	Y
5	Malnad College of Engineering	Y	Y	Y	Y	Y
6	MVJ College of Engineering	Y	Y	Y	Y	Y
7	Nagarjuna College of Engineering and Technology	Y	Y	Y	Y	Y
8	New Horizon College of Engineering	Y	Y	Y	Y	Y
9	NITTE Mahalinga Adyanthaya Memorial Institute of Technology	Y	Y	Y	Y	Y
10	NITTE Meenakshi Institute of Technology	Y	Y	Y	Y	Y
11	P.D.A. College of Engineering	Y	Y	Y	Y	Y
12	PES College of Engineering	Y	Y	Y	Y	Y
13	Siddaganga Institute of Technology	Y	Y	Y	Y	Y
14	The National Institute of Engineering	Y	Y	Y	Y	Y

It is found from the table 3 that all the autonomous engineering colleges affiliated to VTU, Belagavi have power backup, scanner, CD/DVD writer, Printing and Reprographic facilities.

Table 4: Services provided by the libraries

S.N	Name of the institution	WebOPAC	Remote Access	E-mail Alert	SDI	CAS
1	BMS College of Engineering	Y	Y	N	Y	Y
2	Dayananda Sagar College of Engineering	Y	Y	Y	N	N
3	Dr.Ambedkar Institute of Technology	N	Y	Y	Y	Y
4	KLS Gogte Institute Of Technology	Y	Y	Y	Y	Y
5	Malnad College of Engineering	Y	Y	Y	Y	Y
6	MVJ College of Engineering	Y	Y	Y	Y	Y
7	Nagarjuna College of Engineering and Technology	Y	Y	N	Y	Y
8	New Horizon College of Engineering	Y	Y	Y	Y	Y
9	NITTE Mahalinga Adyanthaya Memorial Institute of Technology	Y	Y	Y	Y	Y
10	NITTE Meenakshi Institute of Technology	Y	Y	Y	Y	Y
11	P.D.A. College of Engineering	Y	Y	Y	N	N
12	PES College of Engineering	Y	Y	Y	Y	Y
13	Siddaganga Institute of Technology	Y	Y	Y	Y	Y
14	The National Institute of Engineering	Y	Y	Y	Y	Y

It is noticed from the table 4 that all the autonomous educational institutions are providing facility to remote access. Regarding WebOPAC, all the institutions are providing WebOPAC facility except Dr. Ambetkar Institute of Technology. For e-Mail Alert Service also, all the educational institutions were providing e-Mail Alert Service except Nagarjuna College of Engineering and Technology. It is also found from the above table that all the educational institutions are providing SDI and CAS services except Dayananda Sagar College of Engineering and P.D.A College of Engineering. To sum up, it is found that majority of the autonomous engineering colleges of VTU are providing services such as remote access, WebOPAC, e-Mail Alert Service, SDI and CAS.

Table 5: Access to e-Resources

S.N.	Name of the institution	Through OPAC	Through Homepage	Through IP Access
1	BMS College of Engineering	Y	Y	Y
2	Dayananda Sagar College of Engineering	N	Y	Y
3	Dr.Ambedkar Institute of Technology	Y	Y	Y
4	KLS Gogte Institute Of Technology	Y	Y	N
5	Malnad College of Engineering	Y	N	Y
6	MVJ College of Engineering	Y	Y	Y
7	Nagarjuna College of Engineering and Technology	Y	Y	Y
8	New Horizon College of Engineering	N	Y	Y
9	NITTE Mahalinga Adyanthaya Memorial Institute of Technology	Y	N	Y
10	NITTE Meenakshi Institute of Technology	Y	Y	Y
11	P.D.A. College of Engineering	Y	N	Y
12	PES College of Engineering	Y	Y	Y
13	Siddaganga Institute of Technology	Y	Y	Y
14	The National Institute of Engineering	Y	Y	Y

It is noted from the table 5 that colleges such as BMS college of Engineering, Dr.Ambedkar Institute of Technology, MVJ College of Engineering, Nagarjuna College of Engineering and Technology, NITTE Meenakshi Institute of Technology, PES College of Engineering, Siddaganga Institute of Technology and The National Institute of Engineering, providing access to e-Resources through OPAC, homepage, remote access and IP based access. Again, it is found that Malnad College of Engineering, NITTE Mahalinga Adyanthaya Memorial Institute of Technology and P.D.A. College of Engineering offers e-resources through all modes except through homepage and Dayananda Sagar College of Engineering and New Horizon College of Engineering offered e-resources through all modes except through OPAC.

Table 6: Remote Access to e-Resources

S.N	Name of the institution	Remote access to e-Resources	VPN	EZ Proxy	Knimbus
1	BMS College of Engineering	Yes	Y	Y	Y
2	Dayananda Sagar College of Engineering	Yes	N	N	Y
3	Dr.Ambedkar Institute of Technology	Yes	N	N	Y
4	KLS Gogte Institute Of Technology	Yes	N	N	Y
5	Malnad College of Engineering	Yes	N	N	Y
6	MVJ College of Engineering	Yes	N	N	Y
7	Nagarjuna College of Engineering and Technology	Yes	N	N	Y
8	New Horizon College of Engineering	Yes	N	N	Y
9	NITTE Mahalinga Adyanthaya Memorial Institute of Technology	Yes	Y	N	Y
10	NITTE Meenakshi Institute of Technology	Yes	N	N	Y
11	P.D.A. College of Engineering	Yes	N	N	Y
12	PES College of Engineering	Yes	N	N	Y
13	Siddaganga Institute of Technology	Yes	N	N	Y
14	The National Institute of Engineering	Yes	N	N	Y

It is noticed from the table 6 that all the colleges are providing remote access to e-resources through one or the other network facility. Among the colleges, it is found that BMS college of Engineering was the only one providing e-resources through VPN, EZ Proxy and Knimbus. All other colleges are providing e-resources through Knimbus.

Table 7: Challenges faced in managing e-Resources

S.N	Name of the institution	e-Tools	e-Resources	Communicating with users	Low Bandwidth	Technical Problems
1	BMS College of Engineering	Y	Y	N	N	N
2	Dayananda Sagar College of Engineering	N	Y	N	N	N
3	Dr.Ambedkar Institute of Technology	Y	Y	N	Y	Y
4	KLS Gogte Institute Of Technology	N	Y	N	Y	Y
5	Malnad College of Engineering	N	N	N	N	N

6	MVJ College of Engineering	Y	Y	Y	N	N
7	Nagarjuna College of Engineering and Technology	N	Y	N	N	Y
8	New Horizon College of Engineering	N	N	N	N	Y
9	NITTE Mahalinga Adyanthaya Memorial Institute of Technology	Y	Y	Y	N	N
10	NITTE Meenakshi Institute of Technology	N	N	N	N	N
11	P.D.A. College of Engineering	N	Y	N	N	Y
12	PES College of Engineering	N	Y	N	N	N
13	Siddaganga Institute of Technology	Y	Y	N	N	N
14	The National Institute of Engineering	N	Y	N	N	N

It is found from the table 7 that Malnad College of Engineering, NITTE Meenakshi Institute of Technology and Pes College of Engineering have not faced any challenges with regard to managing e-resources. Dayananda Sagar College of Engineering, The National Institute of Engineering and Nagarjuna College of Engineering and Technology faced problem with only e-resources. Other engineering colleges have faced challenges such as communicating with users, low bandwidth and technical problems.

Conclusion

The ultimate aim of any library is to fulfill the information needs of the users. From the study, innovative use of ICT facilities was not widespread. Some of the libraries do not have optical fibre cable, but provided Wi-Fi facilities in all colleges except one. Regarding services provided, all the college libraries are providing service through webOPAC and Remote access, but some of the colleges have not provided services such as E-Mail Alert Service, CAS and SDI. Regarding access to e-resources, except few colleges, all the colleges are providing access to e-resources through OPAC, homepage and IP based access. It was found that the only college i.e. BMS College of Engineering was providing remote access through VPN, EZ Proxy and Knimbus, but all other engineering institutions are offering only through Knimbus. It is also found that the librarians faced challenges with managing e-Tools, e-resources, communicating with users, low bandwidth and technical issues. The overall study reveals that there is no uniform ICT facilities and services available in the surveyed autonomous engineering colleges. In this digital environment, most of the resources and services are available through electronic mode which needs high quality of ICT facilities to spread the information sources and services to the user community. Hence, the administrators and librarians should periodically assess the available ICT facilities and services and whether the services are reached to the user community.

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AN ANALYSIS OF SCHEMES UNDER THE NATIONAL SOCIAL ASSISTANCE PROGRAMME FOR THE DEPRIVED SOCIETY IN INDIA

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ABSTRACT

India is that the second-largest populated country within the world. Of the total population, nearly 47.9% constitute a deprived society. The Indian Government is trying its best to uplift the deprived society. To help the person who falls below the poverty line, the Government has launched a scheme known as the National Social Assistance Programme. This scheme was introduced in the year 1995 with three schemes that are National Old Age Pension Scheme, National Family Benefit Scheme and National Maternity Benefit Scheme. At present, National Social Assistance Programme (NSAP) consists of 5 schemes that are Indira Gandhi National Old Age Pension Scheme (IGNOAPS), Gandhi National Widow Pension Scheme (IGNWPS), Indira Gandhi National Disability Pension Scheme (IGNDPS), National Family Benefit Scheme (NFBS) and Annapurna Scheme. Firstly, the life expectancy rate is increasing which increased the elderly population which covers about 8.5% of the total population; to help those IGNOAPS was introduced. Secondly, the IGNWPS was introduced to help the widows who constitute around 10% of the total population. Thirdly, IGNDPS was introduced which covers the disabled persons accounting for 2.21% of the total population. Fourthly, to help the family members who lost their breadwinner, NFBS was launched. Lastly, Annapurna Scheme was introduced to cover the elderly population who were eligible under IGNOAPS but are unable to get pension were given food grains free of cost. An attempt has been made in this paper to analyses al l the five schemes under the NSAP and longing for the improvement, effective implementation mechanism and a unified and systematic approach helped by the direct bank transfer. The present study has been conceptually made to understand the acceptability of all the five schemes of NSAP and its contribution to increasing the socio-economic status of the beneficiaries.

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Keywords: Deprived Society, Life Expectancy Rate, Disabled Persons, Unified and Systematic Approach

Introduction

Article 41 and 42 of Directive Principles in the Indian Constitution states that the State shall try to provide the assistance in case of unemployment, old age, sickness, disablement and maternity relief to the poor households living below the poverty line or the deprived society. Deprived Society are the societies which do not have the things that are necessary for pleasant life such as enough money, food or good living conditions or the things that the people consider to be essential in life. The central government has launched central scheme which has been divided into central sector schemes and centrally sponsored schemes in order to provide social security to the unprotected segment of its population. The main aims of all these schemes are to generate employment, to improve standard of living of the people, to reduce poverty and economic inequality and human deprivation as well as to create basic infrastructure and assets required for economic development of rural areas. The Indian Government launched NSAP in the year 1995 for helping the deprived society. It is centrally sponsored scheme while the implementation lies in the hands of the States or Union territories through Panchayats and Municipalities. The NSAP was established with the aim of providing minimum standard through monthly pensions in order to cope up with socio-economic conditions of the people. The sub-schemes of NSAP are funded by Ministry of Rural Development. The NSAP provides social assistance, unconditional cash transfers and unconditional in-kind transfers. The targeted groups are elderly people,

widows, disabled persons and households living below the poverty line without a bread winner.

Review of literature

Sarmah (2004) analyze the ageing as a social problem under two conditions i.e. individual and social. The researcher conducted the research in Guwahati through the exploratory study from four different categories using both qualitative and quantitative data. She concludes that there is no significance difference between elderly populations among all the four categories and identified the problems like decreasing health conditions, loneliness, financial insecurity and insecurity of life and property with respect to elderly population. **Bose (2006)** reveals the demographic trends among the elderly population, the level of growth of different age groups, their depending ratios and the gender dimensions. He has mainly compared India with the global scenario and has focused on the evolution of elderly population's national policy. The researcher concluded that the son's responsibilities to bear the expenditure towards their parents can be afforded. **Sonali Sarkar (2016)** in her investigation announced that the mature age benefits gave under the Indira Gandhi National Mature Age Pension Scheme (IGNOAPS) was not adequate to meet their basic prerequisites like food and clinical costs. Some need to live with different relations or non-connection; where there is no affirmation that their necessities will be met rather they face disregard and misuse. The old in rustic India is that of desolate neediness was stricken elderly people, ladies, more than men, with higher horribleness, inability and despondency, huge numbers of who are either living alone or with different family members or non-family members and are not being sufficiently thought about. Contrasted with the metropolitan there is likewise an absence of assets also, administrations in the provincial territories. **Jayanta et.al. (2016)** in their examination clarified that the older individual (60+) speaks to 8.58 per cent of the all-out populace and a large portion of them are beneath the neediness line. Family and cultural help are two significant things for old people. At the mature age time frame, they need more consideration

and care. Be that as it may, because of deficient consideration and the consideration they feel unreliable and intellectually upset. The discoveries of the examination are edify the current status of the older people, money related security of the old people, wellbeing security of the older people and impression of an old individual concerning cultural and family uphold. That necessity of the administration to detail approaches that concentrates on these issues. **Samriddhi Vij (2017)** analyzed that National Social Assistance Program as the centre of many public policy advocated in India. The researcher criticizes the program and suggests for making some changes in exclusion criteria and pension amounts. It is of the opinion that the programme is largely underfunded. Therefore, it thinks that there is need to expand the financing scheme as well as to revise the guidelines in order to promote the programme. **Sana Hashmi (2018)** reveals about the Government policy and programme – Indira Gandhi National Old Age Pension Scheme, which is also known as 'Vridhdha Pension' for elderly people in India. The main aim of the researcher is to know the extent of implementation of this scheme in slum areas of Aligarh city and to study behavior of the people of the concerned department. The researcher is of the opinion that elderly women in the slum areas are the most deprived and vulnerable section of the society who are in need of social security most. But in reality, these section of people struggle more in order to receive the beneficial programs and finally obtain it. The researcher concludes that there is a need to change in the system of Government and as well as the society.

Need of the study

The problems of the deprived society have become a hindrance to the economic development of a country. Therefore, the Indian Government is trying its best to uplift the deprived society through several schemes. Even though various schemes have been introduced but the monitoring and implementation are not done effectively. The State government can impose effective utilization of the scheme provided by the Central Government for the welfare of society.

The present study will be carried out to understandthe working system, implementation and effectiveness in India.

Objectives of the study

- To evaluate the existing five schemes of National Social Assistance Programme.
- To study the physical coverage and fund allocation towards the schemes of NSAP.
- To understand the state wise pension provided to the beneficiaries.
- To understand implementation mechanism of the schemes.

Methodology

The present study has been conducted based on the secondary data which has been published in various research journals, leading magazines, websites and Government reports and other documents. The data on the different schemes have been collected from the annual reports of the ministry of rural development. The graphical method is used to understand physical coverage and fund allocation.

Discussion

National Social Assistance Programme is a welfare programme which is administered by the Ministry of Rural Development. It was brought within the umbrella of 'Core of Core' schemes of the Centrally Sponsored Schemes in 2016. This programme is being implemented in rural as well as in urban areas. The NSAP is implemented in the states or union territories in accordance with the general conditions applicable to all the components of the NSAP as well as specific condition applicable to each component. The NSAP schemes are mainly implemented by the Social Welfare Departments in the States. NSAP is implemented by Rural Development Department in the States of Andhra Pradesh, Assam, Goa, Meghalaya and West Bengal; by the Department of Women and Child Development in Orissa and Puducherry; by the Revenue Department in Karnataka and Tamilnadu and by the Department of Labour Employment and Training in Jharkhand. For getting benefits under NSAP the applicant must belong to a Below Poverty Line (BPL) family according to the criteria prescribed by the Government of India.

Components of NSAP

The National Social Assistance Programme initially consisted of three sub-schemes:

- National Old Age Pension Scheme (NOAPS) - ₹75 per month per beneficiary.
- National Family Benefit Scheme (NFBS) - ₹ 10000 in case of death of the primary breadwinner to the bereaved household.
- National Maternity Benefit Scheme (NMBS) - ₹ 500 per pregnancy up to thefirst two live births.

At present, the National Social Assistance Programme consists of five sub-schemes:

- Indira Gandhi National Old Age Pension Scheme (IGNOAPS)
- Indira Gandhi National Widow Pension Scheme (IGNWPS)
- Indira Gandhi National Disability Pension Scheme (IGNDPS) 4.National Family Benefit Scheme (NFBS)
- Annapurna Scheme

Indira Gandhi National Old Age Pension Scheme (IGNOAPS)

❖ A monthly pension of ₹ 200 is provided to all persons of 60 – 79 years from the Below Poverty Line families. For individuals above the age of 80 years, the pension amount is ₹ 500.

Indira Gandhi National Widow Pension Scheme (IGNWPS)

❖ BPL widows between the ages of 40 – 79 years have been entitled to monthly pension of ₹ 300, which is enhanced to ₹ 500 for widows above 80 years of age.

Indira Gandhi National Disability Pension Scheme (IGNDPS)

❖ The individuals with severe and multiple disabilities with about 80% and above disability from BPL individuals and the families in the age group of 18 – 79 years are provided with a monthly pension of ₹ 300, which is enhanced to ₹ 500 to the agegroup of 80 years and above.

National Family Benefit Scheme (NFBS)

❖ Households that have lost their bread-winner between the age group of 18 – 59 years of the family falling under the BPL are given a lump sum assistance of ₹ 20000.

❖ A bread-winner can be defined as either a male or a female adult on whose income their family's subsistence is dependent on.

❖ The family benefit would be paid to the surviving members of the household of the deceased, who after a local inquiry, should be found to be the head of the household.

Annapurna Scheme

❖ 10 kgs of food grains, be it wheat or rice per month, are offered free of cost to those senior citizens who, though eligible, have remained uncovered under IGNOAPS.

Table showing the number of beneficiaries under different schemes of NSAP

Year	IGNOAPS	IGNWPS	IGNDPS	NFBS	ANNAPURNA
2002 – 2003	6697509	NA	NA	85209	776173
2003 – 2004	6624000	NA	NA	209456	1057155
2004 – 2005	8079386	NA	NA	261981	820583
2005 – 2006	8002598	NA	NA	276737	851509
2006 – 2007	8708837	NA	NA	243972	871424
2007 – 2008	11514026	NA	NA	334153	1050885
2008 – 2009	15020640	NA	NA	423292	1011240
2009 – 2010	15695334	2303739	510354	125118	740417
2010 – 2011	17456979	3798209	766064	228071	954921
2011 – 2012	19696062	3610724	770399	234368	731522
2012 – 2013	22318295	4130876	743806	291010	824001
2013 – 2014	22331089	6197062	1579246	277537	780795
2014 – 2015	19097677	5592926	960291	164814	419811
2015 – 2016	15224455	3937861	553050	140232	388581
2016 – 2017	22912696	6008123	832760	283871	388764
2017 – 2018	17758979	4617328	719332	100268	NR

One-Sample Effect Sizes

		Standardizer[a]	Point Estimate	95% Confidence Interval	
				Lower	Upper
IGNDPS	Cohen's d	313131.54772	2.638	1.198	4.049
	Hedges' correction	346882.01100	2.382	1.082	3.655
IGNOAPS	Cohen's d	5831559.54087	2.542	1.507	3.557
	Hedges' correction	6144902.97009	2.412	1.430	3.375
IGNWPS	Cohen's d	1270414.98404	3.516	1.696	5.314
	Hedges' correction	1407344.95670	3.174	1.531	4.797
NFBS	Cohen's d	90201.06720	2.550	1.513	3.568
	Hedges' correction	95047.78299	2.420	1.436	3.386
ANNAPURNA	Cohen's d	222195.43921	3.501	2.114	4.870
	Hedges' correction	235055.88015	3.309	1.999	4.604

From the above table,, it could be traced that all NSAP schemes became popular in the last decade . It also describes that the first half thee has been increasing trend, it further decrease to three more years till 2015-16 there after it tends to increase due to the political continuity in the Second tenure of the Union administration. The sanctioned funds are taken care properly by present party with the proportionate increase in the allotment.

It has been statistically proved with minimal score in average change of 0.50% between the samples.

Whereas, all the NSAP schemes are in right direction that sanctioned amount properly distributed to the beneficiaries in the respective year.

Table showing fund allocation, fund released and total expenditure (in crore)

Year	Fund Allocation	Fund Released	Total Expenditure	Balance	Percentage of utilization of available fund
2002 – 2003	680	657.09	594.06	63.03	90.41
2003 – 2004	679.87	602.26	655.97	-53.71	108.92
2004 – 2005	1189.87	1032.01	868.37	163.64	84.14
2005 – 2006	1190	1189.71	1033.89	155.82	86.90
2006 – 2007	2489.61	2489.61	1968.28	521.33	79.06
2007 – 2008	2891.48	2889.73	3123.08	-233.35	108.08
2008 – 2009	4500	4500	3961.51	538.49	88.03
2009 – 2010	5200	5155.50	4914.88	240.62	95.33
2010 – 2011	5762	5162	5352.36	-190.36	103.69
2011 – 2012	6596.47	6596.47	6188.67	407.8	93.82
2012 – 2013	8447.30	5859.50	4855.77	1003.73	82.87
2013 – 2014	9614.51	9112.46	5857.11	3255.35	64.28
2014 – 2015	10635	7241	7086.71	154.29	97.87
2015 – 2016	9082	6664.86	4772.03	1892.83	71.60
2016 – 2017	9500	8851.14	4185.79	4665.35	47.29
2017 – 2018	8744.57	6111.60	3329.69	2781.91	54.48

Correlations

		Fund_Allocation	Fund_Released	Total_Expenditure
Fund_Allocation	Pearson Correlation	1	.957**	.852**
	Sig. (2-tailed)		.000	.000
	N	16	16	16
Fund_Released	Pearson Correlation	.957**	1	.873**
	Sig. (2-tailed)	.000		.000
	N	16	16	16
Total_Expenditure	Pearson Correlation	.852**	.873**	1
	Sig. (2-tailed)	.000	.000	
	N	16	16	16

**. Correlation is significant at the 0.01 level (2-tailed).

From the above table, it has been inferred that there is a high degree (0.873) of significant relationship between fund allocated and the fund released during the study period. And it has been identified that there is a gradual decrease 97.87% to 54.48% from 2014-15 and 2017-18 which described that sanctioned amount of fund is properly been utilised in the planned expenditure. It has been graphically represented in the following three degree dimensional graph.
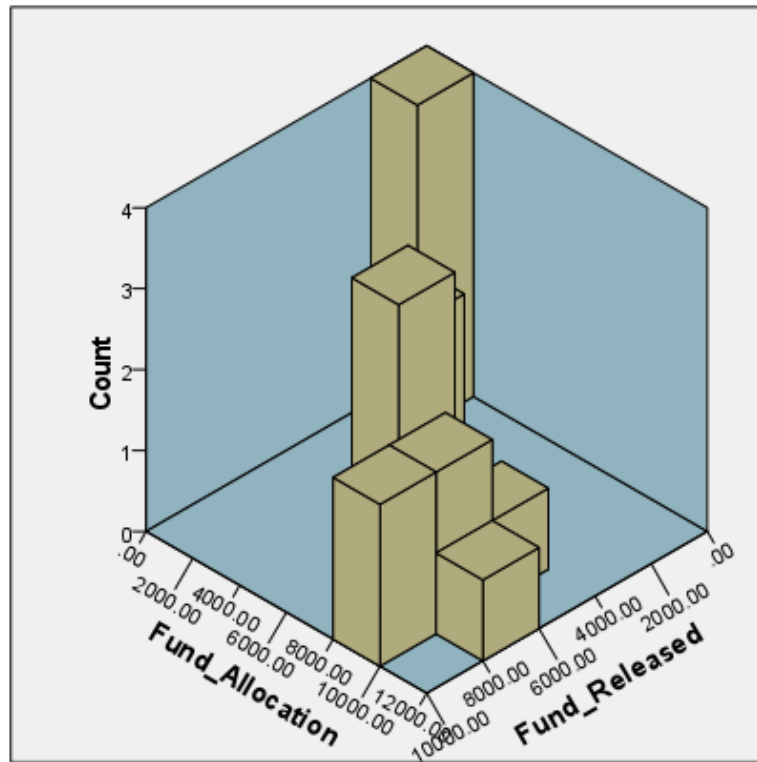
The monthly pensions provided by different states for the beneficiaries are as follows

Sl.No	States/UTs	IGNOAPS	IGNWPS	IGNDPS
1	Andhra Pradesh	1000	300	500
2	Bihar	400	300	300
3	Chhattisgarh	350	300	300
4	Goa	2000	1000	1000
5	Gujarat	400	300	500
6	Haryana	1800	850	650
7	Himachal Pradesh	700	430	450
8	J & K	1000	500	500
9	Jharkhand	400	500	500
10	Karnataka	500	500	1000
11	Kerala	2000	420	450
12	Madhya Pradesh	300	375	450
13	Maharashtra	600	700	600
14	Odisha	300	300	300
15	Punjab	750	550	550
16	Rajasthan	500	600	750
17	Tamilnadu	1000	1100	1000
18	Telangana	1000		
19	Uttar Pradesh	400	400	400
20	Uttarakhand	800	500	600
21	West Bengal	750	500	400
NE States				
22	Arunachal Pradesh	1700	300	300
23	Assam	400	300	300

24	Manipur	200	300	300
25	Meghalaya	500	300	300
26	Mizoram	250	300	350
27	Nagaland	300	300	300
28	Sikkim	1000	600	400
29	Tripura	700	500	500
Union Territories				
30	A & N Islands	2000	1100	1000
31	Chandigarh	1000	800	600
32	D & N Haveli	1000	600	600
33	Daman & Diu	1000	600	600
34	NCT Delhi	2000	1100	1000
35	Lakshadweep	1000	600	600
36	Puducherry	2000	700	1000

The following table shows 100% Direct Bank Transfer (DBT) compliant States

Arunachal Pradesh	Delhi	Lakshadweep	Tamilnadu
Bihar	Goa	Madhya Pradesh	Telangana
Chandigarh	Gujarat	Maharashtra	Tripura
Dadra & NagarHaveli	Haryana	Meghalaya	Uttar Pradesh
Daman & Diu	Jharkhand	Sikkim	Uttarakhand

Implementation Mechanism

As we came to know that the NSAP is a centrally funded scheme, its implementation lies within hands of State Governments. The State Government follows the following programme administrative structure at the District and Municipality or Gram Panchayat level is as follows, which might vary from state to state.

The Workflow of Programme implementation is as follows:

Conclusion

The present study reveals that the Central Government is trying its best to provide assistance for the deprived society. In order to implement the pension scheme, the Central Government is seeking assistance from the State Governments and Union Territories and also instructed to contribute top-up assistance for the pension. Through these, the socio-economic status of the deprived society is increasing and also resulting in the development of the economy. With respect to the fund allocation, release and expenditure, the Central Government is releasing sufficient amount whereas the State Governments has failed in utilizing it effectively. Therefore, necessary precautions should be taken by the State Governments in order to utilize the fund efficiently. Among all the states and union territories, union territories are paying more with respect to all the schemes as pension to its beneficiaries. From the study, we can conclude that the Central Government is doing its part of the work very effectively whereas the State Government has failed in implementation and effective utilization of the fund and there is also lack of awareness about the schemes. Therefore, necessary steps should be taken by the State Government in order to make the schemes familiar among the deprived society and make effective utilization of the fund released.

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EFFECT OF ORGANIZATIONAL CLIMATE ON EMOTIONAL INTELLIGENCE OF EMPLOYEES IN IT SECTOR

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ABSTRACT

Recently, some of the Indian business organizations have started concentrating on the emotional dimension of the human resource which deals with those non-cognitive human competencies and potentialities which have a significant impact on the various aspects of organizational climate and effectiveness. This aim of this paper is to investigate the effect of organisational climate on emotional intelligence of employees in IT sector. Descriptive research design was used to this study and simple random sampling method is used to collect the data. The sample for the present study will consist of approximately 347 employees and the descriptive statistics, regression and correlation were used to analyse the date. It is observed that organisational climate dimensions are positively related with Emotional intelligence.

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Keywords: Emotional Intelligence, Organisational Climate, IT Sector

Introduction

The Emotional Intelligence intervention was partly a response to a problem that many businesses face today. There is a need to develop the highest standards of leadership skills, the challenges of high team turnover, ever increasing demands of s for high quality goods and services, rapidly changing business environment, economic demands or escalating costs. What companies need is people who have both technical knowledge and social and emotional abilities which will enable them to delight the s. There is a growing realization that emotional intelligence could contribute to developing those skills and abilities that are linked with this aspiration (OrmeandLanghom, 2003). Managers, who have similar levels of IQ, are often differentiated on the basis of their EQ. In the times of job insecurity and when the very concept of a 'job' is being replaced by 'marketable skills', EQ is considered as the prime factor which makes and keeps people employable (Singh, 2006). Although, emotional intelligence competencies have for decades been referred to by various names-'personality traits', 'soft skills', 'social skills' , 'personal qualities', etc. But, now there is a precise understanding and growing importance of these abilities and a new name given to it is emotional intelligence or emotional quotient (EQ). Farh et al. (2012) conducted a study to investigate the relationship between emotional intelligence and job performance of 212 professionals from different organizations and sectors. The study revealed that emotional intelligence is significantly positively related to performance under high managerial work demands context of jobs that require management of diverse workforce, functions and lines of business, since such job context, allowed individuals with high emotional intelligence to act in emotionally intelligent ways that enhances their performance.

Organizational climate provides standards which guide employees' behaviour. Organizational climate is not only determined by the organizational characteristics, but, it is also subject to direct influence from the psychological characteristics of the employees. Various definitions have been offered on the concept of organizational climate. These definitions are frequently inconsistent with one another as to what constitutes organizational climate. Vetrivel (2018) stated that the organization atmosphere is as important to human behaviour as is the field of gravity for the explanation of events in classical physics.

The purpose of the paper is to assess the impact of the emotional intelligence of employees and mangers on the organisational climate in a business entity. An analysis of the literature of the subject demonstrated that the emotional intelligence of team members is one of many factors affecting the climate in an organisation. Since the issue has not been

sufficiently investigated so far, a need arises to diagnose the level of the emotional intelligence in project team members on a person-by-person basis, agree on the degree to which the intelligence can be developed and improve and work out the development paths for employees on an individual basis not only with regard to their technical but also social competence, including general development-oriented training. The findings presented in the paper are important for the actions taken to develop the emotional intelligence of employees/managers in the social and vocational learning process.

Research methodology

The aim of this paper is to analyse the most importance determinants of organisational climate ne emotional intelligence. This study will focus on primary and secondary date. The primary data will be collected from IT (Information Technology) employees in different IT companies in Chennai city with the help of a structured questionnaire. Descriptive research design was used to this study and simple random sampling method is used to collect the data. The sample for the present study will consist of approximately 347 employees. It will be given questionnaires on organisation climate base on the variables of Consistency, adaptability, involvement, mission and responsibility with job satisfaction to fill. The data were uploaded and analyzed by using the SPSS techniques which are are the descriptive statistics, regression and correlation is to measure the degree of relationship between the independent and dependent variables.

Table -1: Organisational climate and Organisational Emotional intelligence

Organisational Climate	Organisational Emotional intelligence	
	r-value	p-value
Consistency	0.291	0.001*
Adaptability	0.477	0.001*
Involvement	0.597	0.001*
Mission	0.462	0.001*
Responsibility	0.605	0.001*

Primary data computed, *significant at 1% level

Table -1 explains the relationship between dimensions of organisational climate and organisational Emotional intelligence

Ho: There is no relationship between dimensions of organisational climate and organisational Emotional intelligence.

In order to examine the above stated hypothesis, pearson correlation is applied. From the correlation value, it is observed that the organisational climate dimension, Responsibility is secured highest r-value (0.605) with organisational Emotional intelligence of the IT companiess. Followed by responsibility (0.597), Adaptability (0.477), Mission(0.462) and Consistency(0.291) Hence, it is inferred that the organisational climate dimensions and organisational Emotional intelligence are having significant relationship. So, the stated hypothesis is rejected. The secured R-values are lies between 0.639 and 0.291. However, the R-values are found to be positive. It shows that organisational climate dimensions are positively related with Emotional intelligence.

Here, Responsibility and involvement are having higher level of correlation value than the other organisational climate dimensions. Hence, Responsibility and involvement are the dimensions have the strong relationship with organisational Emotional intelligence.

Table -2: Effect of Organisational climate on Emotional intelligence

R-Value	R- Square Value	Adjusted R- Square Value	F-Value	P-Value
0.757	0.573	0.565	77.937	0.001

Organisational Climate	B	Std. Error	Beta	t- Value	P-Value
Constant	2.921	1.304		2.239	0.026
Consistency	0.000	0.056	0.000	-.005	0.996(N.S)
Adaptability	0.159	0.045	0.142	3.529	0.001*
Involvement	0.232	0.058	0.203	4.028	0.001*
Mission	0.088	0.057	0.066	1.564	0.119(NS)
Responsibility	0.106	0.051	0.108	2.070	0.039**

Source: Primary data computed

* Significant at five percent level;   Ns - Non - significant

Table-2: explains the effect of organisational climate dimensions on organisational Emotional intelligence

Ho: Organisational climate dimension do not have influence on Emotional intelligence.

In order to examine the above stated hypothesis, multiple linear regression has been applied. Here, the organisational climate dimensions namely, consistency, Adaptability, Involvement, Mission and Responsibility are considered as independent variables and organisational Emotional intelligence is treated as dependent variable. Further, the analysis has been done. From the model summary, the p-value is found to be (0.001) significant at one percent level. Its shows that the independent variable such as consistency, Adaptability, responsibility, Mission and Responsibility are significantly influenced the organisational Emotional intelligence of the IT companies. Hence the stated hypothesis is rejected. Further the R-Square value is found to be 0.57. It is inferred that the organisational climate dimensions, are influenced at 57 percent level on organisational Emotional intelligence towards the IT companies. The standardized co-efficient beta value indicates the relative importance of predictors of employee emotional intelligence is expressed by the equation.

Emotional intelligence = 2.921+0.232(Involvement) + 0.555(Adaptability) + 0.159(Responsibility)

The equation is explained that the Involvement, Adaptability and Responsibility are having positive impact on organisational Emotional intelligence. It shows that, to have one unit increase in organisational Emotional intelligence, the Involvement has to be increased by 0.232 levels while other factors remain constant. And like, if Adaptability increases by 0.159, one unit of organisational Emotional intelligence, increases as independent. It is clearly indicates that the organisational climate dimension are having significant effect on the emotional intelligence. However Involvement, Adaptability and Responsibility are the predictors of organisational Emotional intelligence.

Table No: 3 Organisational Emotional Intelligence based on Educational Qualification

Educational Qualification	Organisational Emotional intelligence		ANOVA result	
	Mean	S.D	F-value	P-value
Degree	25.27	5.5		
Post graduation	24.63	5.13	6.634	0.001*
Diploma	24.08	6.3		
HSC	22.17	4.15		

Source: Primary data computed;   *Significant at one percent level

Table 3 explains the customer opinion towards organisational Emotional intelligence of the IT companies based on their educational qualification. The mean score and standard deviation value of organisational Emotional intelligence is calculated with respect four groups of educational qualification of respondents. The calculated mean value is ranged between 25.27 to 22.11. It is observed that the degree group secured higher levels of mean score (25.27) followed by post graduate (24.63), diploma (24.08) and higher secondary (22.17). It is inferred that degree holder group is having higher level of organisational Emotional intelligence towards the IT companies.

Ho: There is no difference of opinion towards organisational Emotional intelligence of IT companies based on their education.

Here, One-way ANOVA is applied to examine the above stated hypothesis. From the ANOVA result, (f-value 6.634 and p-value is 0.001), it is noted that the p-value is significant at five percent level. Hence the stated hypothesis is rejected. It is inferred that the customer organisational Emotional intelligence towards the IT companies is significantly varied based on their educational qualification. It is found that degree group, post graduate level educators and post graduate are having higher level of organisational Emotional intelligence towards the IT companies when compared to higher secondary education holders.

Conclusion

The concept of emotional intelligence has gained much attention in the management literature as a factor useful in predicting individual performance at work and it has become necessary to understand and leverage it so as to gain sustainable competitive advantage by creating emotionally intelligent environment which will enable creation and maintenance of a positive supportive organizational climate by incorporating emotional intelligence competencies like self-awareness, commitment, optimism, interpersonal connectivity and personal integrity among employees. The research results presented in the paper show that the level of emotional intelligence of managers and employees has influences by organisational climate. Identification of the level of the emotional intelligence of their employees is the core responsibility of a manager. It is because the emotional intelligence determined the means and tools to be applied to stimulate and motive the employee to make an effort towards more effective performance.

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A STUDY ON FACTORS INFLUENCE OF ECO-FRIENDLY PRODUCTS ON CONSUMER BEHAVIOR WITH REFERENCE TO TIRUCHIRAPPALLI

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ABSTRACT

Consumer decision reverse not only price and quality preferences but also common and proper values, in the act of witnessed in the exceptional growth of the global market for nuclear and environmentally friendly products. In edge with the aura related with green consumerism, results displayed that public action more enthusiastically after bare disclosure to green products than after bare disclosure to traditional products. Environmentally friendly (also eco-friendly, nature friendly, and green) are synonyms used to refer to goods and services, laws, guidance and practices deals with to exact minimal or no abuse on the environment. The study was conducted through a survey among 400 consumers in Trichirappalli City who have experience on friendly products. Data from the consumers were collected through a questionnaire, tabulated methods. In order to indicate analyze result, the research hypothesis test was conducted. The present study focus to explained the concept of green product and consumer behavior towards it. This study also explore that factors influence to purchase the green products with consumer demographics (age, gender, income and educational qualification). Primary data was collected using structured questionnaires and analysis using descriptive statistics . The purpose of this article is threefold: first, to investigate the different concepts relating to eco-friendly products, secondly, to find out depth review of consumer behavior, third and final is to find out the relationship between eco-friendly products and its impact on consumer behaviour.

Introduction

Nowadays raising peoples have meet the direct impact of their purchasing behaviour on global warming, climate change and problems related to ecology. As the case may be, this could also commit to the reasons why people are enhancing more aware about renewable consumption, and its positive impact on society. Usually, environmental concern to desire divides the public into two categories. The first category intend point theirs fingers at the government and control the government chargeable for environmental affair while the second category are above mentioned that are highly anxious about environmental concern and they themselves try to maintain ecofriendly balance. Still, it is bitter to absorb, society has to enter that the environmental problem is every person's responsibility.

Eco-friendly products provide exactly the best benefits for its customer along with the content is complimentary from chemical material which abuse to customer's body (Tung et al., 2012). However, the most valuable price is compared with common price (Suki, 2013), make this product is not a preeminent choice. Beyond that, eco-friendly products can not be easy to get, only traded at Supermarket (Syarifuddin & Alamsyah, 2017). Depend on those aspects, it is required customer's green recognized value. Because its impact on purchasing of customer's opinion (Chen & Chang, 2012) and customer's green awareness on eco-friendly products (Syarifuddin & Alamsyah, 2017).

In addition, most studies have focused on the general environmental behavior rather than specifically on consumers' purchasing behavior towards eco-friendly products. This research empirically examines the factors influencing the selection of ecofriendly products on consumers' purchasing behavior in Trichirappalli. The research also determines the factors that discriminate between those who purchase green products and those who don't. The remainder of this paper is organized as follows. Section 2 reviews previous studies on environmentally conscious consumer behavior and factors affecting their purchasing behaviors towards green products. Section 3 describes the data collection and the methodology employed. The results and their implications are discussed in section 4. Section 5 provides the conclusions.

Literature Review

A review of the literature shows that little attention has been paid to the issue of product aspects and green purchasing behavior. The product aspects show a very important role in product development since they affect consumer product choices and they help marketers to satisfy customers' needs, wants and demands. For example, Roozen and De Pelsmacker (1998) investigate the relative importance of different green product attributes to consumers. Their study is useful in understanding how consumers determine what product is a green product. However, the authors only focus on green attributes and ignore other product attributes that may affect consumer purchase decision.

A "green" product is essentially a product that is environmentally friendly. So, what does environmentally friendly entail? There are many different explanations that answer this question. (Laurence) 1991 Explained, that how we can decides whether a product is environmentally friendly. (Laurence) 1991 stated, first we consider the product's life cycle - its manufacture, use, and disposal - to determine its total impact on the environment. Then we weigh its benefit to humans against its environmental costs. Third, we ask whether any less harmful alternatives are available. (Joel) 1997, author of The E-Factor, states, "At its essence, being 'green,' for all the many things it entails boils down to two basic goals: reducing waste and maximizing resource efficiency". Waste includes human effort, energy, use of facilities, and money. Resources include those used by the company such as materials, energy, supplies, and inventory. Resources also include those that come from the environment such as water, air, plants, and land. It is clear that each company has their own definition of what a "green" product is. Most definitions are similar, however, and usually contain at least one of the following words: sustainable, organic, natural, biodegradable, or chemical free.

According to Vining (1990) Products with little or no packaging, products made from natural ingredients and products that are made without causing pollution are all examples of eco-friendly products. Defining a product as "green" is not often straightforward since green

building is a whole-systems approach to designing, constructing, operating and maintaining buildings (Shrum, 1995). To accurately assess the true greenness of a product, consideration must be given not only to particular environmental and health impacts of a product from its manufacturing, use, and disposal phases—but also to how the product is utilized within the larger system (Castle, 2007).

According to D'Souza (2007) Green products have to represent a significant achievement in reducing environmental impact; they may also have to incorporate strategies of recycling, recycled content, reduced packaging or using less toxic materials. The rising number of customers demanding environmentally responsible products and the need to remain competitive has prompted many marketing managers to seek information concerning environmentally responsible purchase behaviour (Scott & Jobber, 2000).

Environmentally Friendly Consumer Behavior

The marketers need to enhance their environmental performance as to satisfy the environmental requirements and to remain competitive globally. Furthermore, due to consumer demand, increasing of environmental regulation, managerial concern dealing with ethics and customer satisfaction have force industries to be more environmentally friendly (Foster et al., 2003). Apparently, environmentally friendly conscious consumers are contending to look after the environment through activities such as recycling, emphasizing environmental label of recycled material, and consuming only green products (Barber, 2010). Now a day, consumers are beginning to notice the contributing factors of the environmental problems. Obviously, industries are damaging and ravaging the existing environmental resources. They bring more harm than good. Accordingly, a growing number of concern consumers are looking for products and services that follow practices to protect the environment. Past study from Barber (2010) specifies these concern consumers would choose the eco-friendly products against a standard product if they were been given a choice to choose.

Environmental Awareness:

Environmental Awareness is concern towards environment or environmental

problems. In other word it is defined as "an idea holding a general impression or consciousness about something without having to know much about it."(Roberta, 2009). In the past two decades, environment has attracted the attention of decision makers, scientists and even laymen in many parts of the world. They are becoming increasingly conscious of issues such as famines, droughts, floods, scarcity of fuel, firewood and fodder, pollution of air and water, problems of hazardous chemicals and radiation, depletion of natural resources, extinction of wildlife and dangers to flora and fauna. People are now aware of the need to protect the natural environmental resources of air, water, soil and plant life that constitute the natural capital on which man depends. The environmental issues are important because the absence of their solutions is more horrible. Unless environmental issues are not solved or not taken care of the coming generations may find earth worth not living. The need of the planet and the needs of the person have become one.

Cherian and Jacob (2012) studied consumer's attitude towards environment-friendly products. They presented a conceptual framework of green marketing and various ways in which different consumer attributes are related to the concept of green marketing. It was concluded that there is a need for green marketing and a need for a shift in consumer behavior and attitude towards an environmental friendly lifestyle.

Sheikh, Mirza, Aftab, and Asghar (2014) investigated the consumer behavior towards green products and how they will make their green purchase decision. The data was collected from 400 respondents through questionnaire and hypotheses were tested using Chi-square. It was found that product and gender difference have a very good relationship with consumer green behavior while price,

quality and green marketing have a strongly positive one.

Research Methodology

The research is purely descriptive in nature, the researcher has select the primary data for his study, and they data have been collected from 400 respondents in the respective study area. Through the questionnaire method the data has been collected and certified by a traditional way. From this survey method the researcher has found many facts and figures about the factors influence of eco-friendly products on Consumer behavior among the society. The respondents are young age group of peoples are mostly used green products. In this research the researcher has chosen chi- Square method to find the significant difference between the variables. This study was conducted for a period of four months. The collected data were analyzed using statistical package for social science (SPSS).

Objectives

The present study was undertaken with the following objectives:
❖   To understand the concept of Green product
❖   To identify the Consumers attitude and awareness of Green Product
❖   To find the factors influence to buy green products with consumer demographics

Limitations

The study compressed only with the 400 selected samples, the geographical area is also one of the major reasons to restrict the study. Time and money is one of the major constraints to the study.

Results and Discussions

Descriptive Statistics

Table 1 : The demographic profile of respondents

Type	Number of Respondents	(%)
Gender		
Male	207	51.75
Female	193	48.25
Age		
19 -30 years	172	43
31 -40 years	122	30.5

41 -50 years	65	16.25
Above 50 years	41	10.25
EducationalQualification		
Undergraduate	204	51
Postgraduate	125	31.25
Others	71	17.75
Monthly Income		
Below Rs.10,000	144	36
Rs.10,000- Rs.20,000	127	31.75
Rs.20,000- Rs.30,000	85	21.25
Above Rs.30,000	44	11

Gender Vs. Factors that Influence when the respondents buy Green Products

Hypothesis: H0 (Null hypothesis): Gender has no statistically significant relationship with influence factors like (sales promotion, acceptable price, design/packaging, brand name, the product quality, popularity, and advertising) to consider when they purchase for green products.

H1 (Alternative hypothesis): Gender has statistically significant relationship with influence factors like (sales promotion, acceptable price, design/packaging, brand name, the product quality, popularity, and advertising) to consider when they purchase for green products.

Influence Factor	Opinion		Total	Chi-square Value
	Gender			
	Male	**Female**		
Acceptable Price	18	13	31	12.60
Design/Packaging	12	14	26	
Sales Promotion	11	10	21	
Advertising	20	15	35	p = 0.099
Popularity	15	14	29	
Brand Name	10	10	20	
Quality of the product	121	117	238	
Total	**207**	**193**	**400**	

Source: Primary data

The calculated value of X2 as seen in the table is less than the table value. The null hypothesis H0 is accepted. Hence, gender has no statistically significant relationship with influence factors like (sales promotion, acceptable price, design/packaging, brand name, the product quality, popularity, and advertising) to consider when they purchase for green products.

Age Vs. Factors that Influence when the respondents buy Green Products

Hypothesis: H0 (Null hypothesis): Age has no statistically significant relationship with influence factors like (sales promotion, acceptable price, design/packaging, brand name, the product quality, popularity, and advertising) to consider when they purchase for green products.

H1 (Alternative hypothesis): Age has statistically significant relationship with influence factors like (sales promotion, acceptable price, design/packaging, brand name, the product quality, popularity, and advertising) to consider when they purchase for green products.

Influence Factor	Opinion				Total	Chi-square Value
	Age group (Year)					
	19 -30	31-40	41-50	Above 50		
Acceptable Price	28	15	14	7	64	28.90
Design/Packaging	26	17	9	4	56	
Sales Promotion	36	10	5	4	55	
Advertising	41	20	10	12	83	p = 0.154
Popularity	18	8	6	3	35	
Brand Name	13	20	4	2	39	
Quality of the product	10	32	17	9	68	
Total	172	122	65	41	400	

Source: Primary data

The calculated value of X2 from the above table is much less than the table value. The null hypothesis H0 is accepted. Therefore, age has no statistically significant relationship with influence factors like (sales promotion, acceptable price, design/packaging, brand name, the product quality, popularity, and advertising) to consider when they purchase for green products.

Level of Education Vs. Factors that Influence when the respondents buy Green Products

Hypothesis: H0 (Null hypothesis): Level of education has no statistically significant relationship with influence factors like (sales promotion, acceptable price, design/packaging, brand name, the product quality, popularity, and advertising) to consider when they purchase for green products.

H1 (Alternative hypothesis): Level of education has statistically significant relationship with influence factors like (sales promotion, acceptable price, design/packaging, brand name, the product quality, popularity, and advertising) to consider when they purchase for green products

Influence Factor	Opinion			Total	Chi-square Value
	Level of education				
	Undergraduate	Postgraduate	Others		
Acceptable Price	31	12	5	48	21.0
Design/Packaging	23	9	12	44	
Sales Promotion	11	7	7	25	
Advertising	15	23	11	49	p = 1.231
Popularity	10	10	9	29	
Brand Name	9	10	5	24	
Quality of the product	105	54	22	181	
Total	204	125	71	400	

Source: Primary data

The calculated value of X2 from the above table is less than the table value. The null hypothesis H0 is accepted. Thus, level of education has no statistically significant relationship with influence factors like (sales promotion, acceptable price, design/packaging, brand name, the product quality, popularity, and advertising) to consider when they purchase for green products.

Annual Income vs. Factors that influence when the respondents buy green products

Hypothesis: H0 (Null hypothesis): Annual income has no statistically significant relationship with influence factors like (sales promotion, acceptable price, design/packaging, brand name, the product quality, popularity, and advertising) to consider when they purchase for green products.

H1 (Alternative hypothesis): Annual income has statistically significant relationship with influence factors like (sales promotion, acceptable price, design/packaging, brand name, the product quality, popularity, and advertising) to consider when they purchase for green product

Opinion						Chi-square Value
Influence Factor	**Monthly Income (Rs.)**				**Total**	
	Below 10,000	**10,000-20,000**	**20,000-30,000**	**Above 40,000**		
Acceptable Price	11	6	6	3	26	28.90
Design/Packaging	9	6	7	3	25	
Sales Promotion	12	17	11	4	44	
Advertising	23	24	18	7	72	**p = 0.374**
Popularity	13	13	12	5	43	
Brand Name	18	16	10	10	54	
Quality of the product	58	45	21	12	136	
Total	**144**	**127**	**85**	**44**	**400**	

Source: Primary data

The calculated value of X2 from the above table is much less than the table value. The null hypothesis H0 is accepted. Hence, annual income has no statistically significant relationship with influence factors like (sales promotion, acceptable price, design/packaging, brand name, the product quality, popularity, and advertising) to consider when they purchase for green products.

Cosnclusion

In the present generation of advancement and growth, environment is being degraded at a rapid rate. It is hence, necessary to worry now rather than regret later. Environmentally friendly products can lower the negative impact on environment and ensure a feasible future for the coming generations. The study highlighted that demographic variables such as age, gender, educational qualification and income level have no relationship with influence factors to consider when they purchase for green products. Moreover, irrespective of demographic variables, most consumers intend to purchase such products to safeguard the environment. Cherian and Jacob (2012) suggest that researchers need to explore factors that motivate consumers towards green product usage. The present study finds out that, consumers are motivated to use green products because of environmental sustainability and their personal consciousness towards the environment. However, unavailability of such products and unawareness refrain them from using such products. Environmentally friendly products are good for humans and nature. Some environmentally friendly products are more costly than 'traditional' types of products but savings can be made if we go 'back-to-basics.'

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EFFECTS ON ONLINE MARKETING IN START-UP ENTERPRISES

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ABSTRACT

This study aims to observe the use of online marketing to obtain and maintain business relationships, with an emphasis on online marketing in Tiruppur District start-ups. Due to the exponential growth in the use of digital media for the distribution and expansion of a company's business scope, it is critical that start-up companies are well-versed in their choices when formative whether or not to implement a specific technology, since they often have limited resources and a narrow margin for error. E-marketing encompasses social media, e-mail marketing, and advertisements. The digital tools that can boost their start-up businesses in online marketing in spinning mills can help them earn profit while lowering costs. A review of the literature uncovered many aspects of online marketing. Primary data was obtained from the top level employer of a spinning mill through organized questionnaires. A sample size of 122 start-up businesses was calculated, and respondents were chosen at random. Following the completion of the questionnaire, the answers were evaluated using ANOVA and cross tabulation tests. . The findings led to the conclusion that YouTube channels, email marketing and social media are important to improve startup enterprises sales while the other techniques (advertisement, popup) had little or moderate effect on sales.

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Keywords: Online marketing, start-up Enterprises

Introduction

Globalization has usherd in advances in information, communication, and technology, resulting the extensive use of the internet and, as a result, the rise of social media. In current years, company owners' use of social media has developed into an important medium for selling their goods and services to customers (Paquette, 2013). Some businesses now employ the media as part of their marketing strategy to reach out to potential customers, and this trend has resulted in significant changes in how business is done now compared to three to four decades ago. While social media was created with the intention of being used for socializing, some marketers have realized the commercial potential it offers and have opted to utilize it to grow their company. Social media, according to (Neti, 2011), is a marketing opportunity that eliminates the intermediary and connects businesses and customers directly.

Digital marketing is a new phenomenon that is attracting a growing number of businesses. Businesses have shifted their focus to promoting their marketing efforts through the internet and electronic media, resulting in the exponential expansion of digital marketing.

Review of Literature

Husam Yaseen et.al (2019) Digital Marketing Adoption among SMEs in Jordan: A Mixed-Method Approach. The purpose of this article is to determine the level of adoption of digital marketing and to investigate the critical criteria for the adoption of digital markings among Jordanian SMEs. To accomplish the objectives of the report, a mixed approach was adopted, consisting of an online survey questionnaire accompanied by semi-structured interviews. Thus, for further study, 279 questionnaires were eventually used. The survey analysis shows that the majority of respondents owns an informative website and do not use e-commerce in their business.

Olonde Jeconia Omondi (2016) Because of its expense, marketing has become a challenge for small and medium enterprises (SMEs) around the world. Conventional marketing including television, radio and billboards has a high cost for these SMEs and therefore the development of these businesses is a challenge due to low revenue as a result of products and services provided. In order to respond to the research objective, the sample size of 255 SMEs was calculated and randomly selected. Using the questionnaire as the data collection method sent to the SME owners or marketing heads, primary data was collected; the questionnaire was designed to provide

uniformity in responses. The results of the study showed that email marketing and social media marketing had a big influence on the growth of SME sales and, to a large degree, mobile marketing, search engine optimization (SEO) marketing, pay-per-click (P.P-C) and online marketing both had a significant and moderate impact on SME sales growth. The results led to the conclusion that email marketing and social media marketing are critical for increasing the sales of SMEs, whereas other strategies (mobile marketing, SEO marketing: P.P.C and online marketing) have had little moderate sales effects.

Prem Kumar et.al (2015) this paper focuses on current marketing media for small and medium-sized companies in the service sector and looks at the spectrum of online marketing. Research shows that there are very few studies on online marketing for small and medium-sized businesses searching for ways to enter the global marketplace. Online marketing has become one of the main factors affecting SMEs' business, survival and growth. Research finds that during the preparation and implementation phases of SMEs, the adoption and assessment of IT investment should be taken care of, as Lin, Huang & Tseng & Tsengg also say (2007).

Isa Sin & Polina Dimitrova (2018) this research aims to explore the use of digital marketing in the Swedish market for the acquisition and maintenance of business relationships, or more specifically digital marketing, in B2B start-ups. In the studies that provide adequate information to address the research questions, digital marketing techniques in the acquisition and management of business relationships are indicated. The paper will provide recommendations for more research to strengthen the current topic of digital marketing. The study concludes that digital marketing has been found to be understood as a creative and successful way to attract, retain and develop business relationships.

Online Marketing

Online marketing is a set of tools and methodologies that are used to promote products and services the Internet. Owing to the extra platforms and marketing mechanisms available on the internet, online marketing requires a broader variety of marketing elements than conventional business marketing.

Online marketing can be seen as a new modern business strategy and ideology connected to the Internet and other electronic means of purchasing and selling products, services, information and ideas. The Internet provides you with broad access to your prospective customers. It has been estimated that a few billion people use the Internet around the world. With more every day, more and more are becoming aware of the Internet. Therefore, selling the company to such a wide group of individuals is only possible through the Internet.

Online marketing is part of the digital economy, or development. In online marketing, India is the fastest growing economy. Digital advertising of product and marketing campaigns includes online marketing. The industry of online service providers plays an important role in the digital movement. The telecommunications industry in India plays the most important role in linking people to online marketing.

Now a day using online marketing in start-up business profits are growth increased by 50 to 70 percent. On social media and e-commerce websites, people invest more time. Therefore, product exposure is more of an opportunity for online marketing. In online marketing, it includes content marketing, social media marketing, Google Ad Ward, App Marketing, YouTube Channel Marketing, E-mail marketing, E-comers website marketing, etc. They play a part in the field of online marketing.

Start Ups

In the first stages of operations, the term start-up refers to a company. Start-ups are created by one or more entrepreneurs who want to build a product or service that they think demand exists for. In general, these businesses start with high costs and minimal profits, which is why they are looking for funding from a number of sources, such as venture capitalists.

Objectives

- To find out the relationship between the business start-up in years and online marketing preference.
- To find out the ranking preferences of business promotions.

Scope of the Study

This investigation is based on empirical survey conducted by the researcher in the start-up spinning mill in online marketing usage.

Research Methodology

This section provides the methodology applied in the current study. It consists provide the questionnaire and collect the data. The research design is a plan, structure, and procedures of investigation that used in data collecting to find out the answers to the research questions and to complete the project research aims and objectives.

Sample

The sampling technique used is simple random sampling for this analysis. Probability Sampling is a form of sampling in which samples from start-ups are collected using a method based on probability theory. The sample size in Tiruppur is adopted as 122 start-up enterprises.

Sampling Methods

The methods of data collection were carried out by direct survey and online survey methods of analysis.

Research Design

The sample population for this research involved 122 participants chosen on the basis of simple random sampling method. Participants in the research will include the start-up enterprises members who are adopting online marketing tools for business development purposes and others who are intending to join online marketing tools for business development purposes too.

Table: 1 Reliability Statistics	
Cronbach's Alpha	No of Items
.871	8

Reliability analysis

Reliability analysis was used to test whether the online marketing constructs can be combined to form an e-marketing tool. This analysis also tested whether the online marketing constructs were consistent in e-marketing. The most commonly statistic used in this analysis is the Cronbach's alpha value. The Cronbach''s alpha value was 0.850 higher than a minimum value of 0.7 (Nunnally, 1978), indicating that the e-marketing constructs could be quantified to form one variable, in this case, e-marketing Index.

ANOVA

Table - 2 One way ANOVA Analysis for Start-Up Enterprises 'Relationship between Online Marketing Business start-up years.

Years	N	*Mean*	*Std. Deviation*	*F*	*Sig.*
0-1	48	*2.3750*	*1.02366*		
1-2	*40*	*2.3000*	*.46410*		
2-3	*34*	*3.3529*	*.48507*	22.959	*.000*
Total	*122*	*2.6230*	*.86558*		

Source: Primary data

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The table shows that in the company start-up years, the mean value gap between online marketing. The three consolidated start-up years are 0-1, 1-2 and 2-3. The factors related to online marketing are treated statistically during these company start-up years. The important difference between the company

start upon the basis of the statistical result used of the f value and the corresponding p-value

Hypothesis: There is a positive relationship between the business start-up year and online marketing preference.

In various business start-up years, the hypothesis relating to online marketing should

be referred to with the aid of F value for the substantial difference to the hypothesis. With the 0-1Business start-up year (mean value 2.3750), the Internet objective is high as compared to business start-up years 1-22. (Mean value .46410). The value of F is. 22.959 And the value of P is .000, which is significant.

Table- 3 CROSSTABULATION

Age	Popup	Sponsorship	Google adds	E-Mail	Social Media	Key Word Search	YouTube Channel	Advertisement	Total
25-30	0	10	0	0	0	0	0	0	10
31-35	4	2	0	1	23	0	0	17	47
36-40	7	17	0	3	2	2	13	0	44
above 41	0	0	9	2	1	6	1	2	21
Total	11	29	9	6	26	8	14	19	122

Hypothesis: There is no online marketing preference among start-ups business.

From the above table cross-tabulation study, the results show that sponsorship is used by 25-30 age group of (10) respondents because it increases brand value in the mind of consumers and hence they are more drawn to their respondents, followed it appears to be a very convenient and cost-effective e-marketing method; 31-40 age group used by the majority as e-marketing aid (23) respondents are used media, Media is one of the powerful methods for selling the product because it can quickly grab the minds of customers; followed by (17) respondents who used ads, the safest and effective marketing campaign approach is to include advertising; pop-ups (4) respondents; sponsorship(2) respondents; 41-50 age groups most respondents (17) used in sponsorship, Although (13) respondents are using 3D visualization; (7) respondents are using pop-ups, (9) respondents are using an internet discussion group over 50 years of age, while (6) respondents are using key word quest. It is concluded that their most common form of e-marketing is sponsorship based on all age groups of respondents (29).
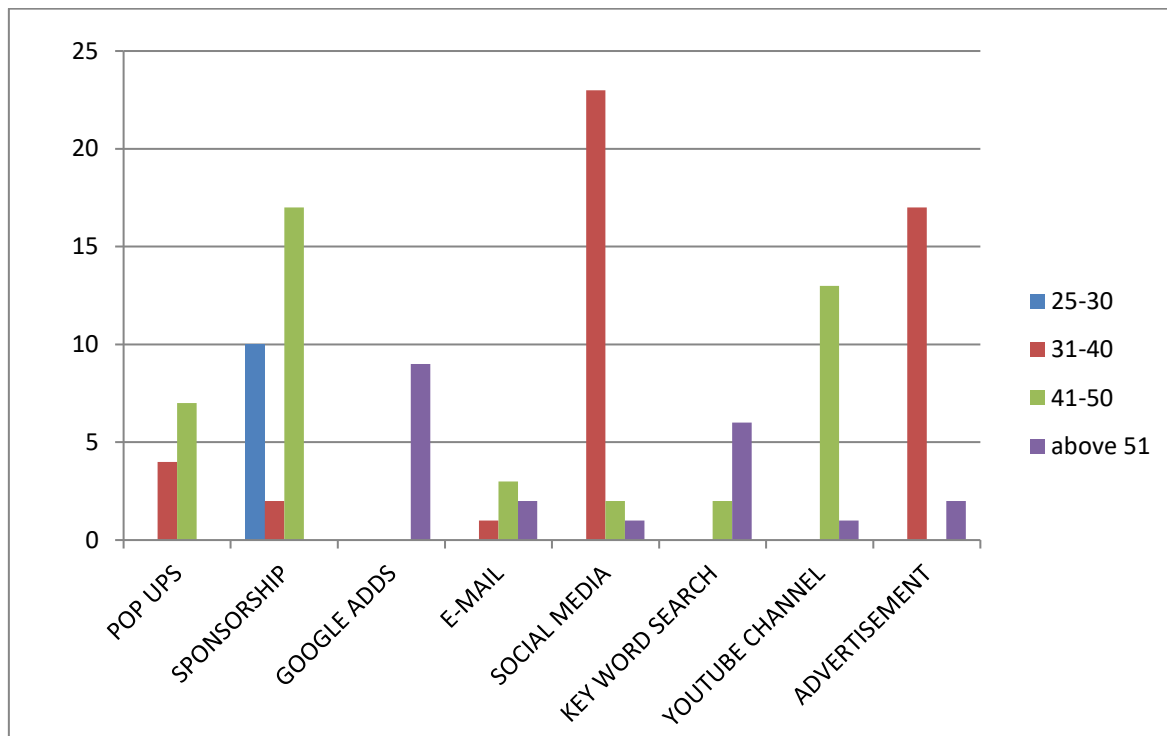
Figure-1   - Findings and suggestion

There is no significant different between the start-up year of business and e-marketing, f value= 22.959, p value= (.000) at 1% of the significant distinction between start-up years of business and e-marketing.It is found that based on all the age group of respondents was taken by more preferred form of e-marketing is email.

It proposed that businesses should build more online marketing strategies at all levels of mass media to capture consumer minds based on their desires and results in order to succeed in attracting all consumers to technology-based start-up companies.

Conclusion

Accordingly, this research gap has led to a study question and objectives where the research model has been established and tested to fill the discovered knowledge gap. By now, the main research question of this study the relationship between the business start-up in online marketing preference start up enterprises development efforts has been indirectly answered. In sum, the study results suggest that the first research sub-question, what is the current situation of online marketing tools adoption in the context of startup enterprises in tiruppur for business purposes, is discussed next. To put it simply, the answer to this question was targeted through ten main questions in arrange to fulfill the objective of determining the current features and status of online marketing tools adoption in the Tiruppur start-up enterprises in accordance with business purposes.

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INFLUENCE OF LOCATION ON SALES PROMOTION ACTIVITIES WITH SPECIAL REFERENCE TO FMCG PRODUCT

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ABSTRACT

A sales promotion is a marketing strategy where a business will use short-term campaigns to spark interest and create demand for a product, service or other offers. Sales promotions or promos can have a positive effect on the brand awareness, customer satisfaction and revenue. In this article, we analyse the effect of sales promotion activities on consumer buying decision based on the location. 276 consumers are considered as a sample size for the study. Descriptive statistics, ANOVA, and Post- Hoc are used to describe the sample, to show that which are the factors those that highly influenced the consumers buying decision. It is found that on the main street and near to residence locations differed with other groups such as home based, near market and the crowded area. The sales promotion tools such as free samples, coupons, Demonstration, Contest, Cash refund offer, Buyback allowance and Discounts are found to be significantly influence the consumer buying behaviour

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Keywords: Sales promotion tools, Buying behaviour, FMCG, Location

Introduction

Sales Promotion is the widely used component of the promotion mix, other being personal selling, direct marketing, publicity and advertising. Promotion is the direct way an organization attempts at reaching its market and is usually performed through the five elements of promotion mix, i.e. advertising, sales promotion, personal selling, public relations, and direct marketing (Czinkota & Ronkainen, 2004). It involves the delivery of messages to target customers with the main aim of building brand awareness, creating favourable brand attitudes, gaining market share, inducing buying, building brand loyalty and increasing sales (Kurtz, 2010) Sales promotion consists of marketing activities that stimulate consumer purchasing and dealer effectiveness. These include displays, trade shows, coupons, contests, samples, premiums, product demonstrations, and various non-recurrent selling efforts used combined with other forms of promotion to emphasize, assist, supplement, or otherwise support the objectives of the promotional programme (Thompson, 1998).

Sales promotion tends to be thought of as being all promotions apart from advertising, personal selling, and public relations. The environment in which businesses are operating is changing rapidly posing great challenges to decision makers in organizations. This has made the business environment very sophisticated with consumer preferences changing at a very fast pace mainly because of ease of switching from one brand to another. Consumers have more demands hence organizations have to focus more of their resources in attracting and retaining its customers. This has led organizations to prioritize the meeting of customers" wants and needs more effectively and efficiently than its competitors (Kotler, 1988). Marketers are therefore faced with the challenge of keeping up with the trends in the market hence the constantly formulating and implementing new strategies as occasioned by the market changes.

The strategies can either be long term or short term. However the short term strategies are aimed at increasing sales volume in the short run hence the use of sales promotion. In most fast moving consumer goods companies, sales promotion accounts for 65% to 75% of the total marketing budget and this has been rising for the last two decades (Kotler, 1997). For a company to penetrate into new markets it needs to arm itself with specific marketing strategies that will ensure growth in the target market. This becomes even more important if the target market is already filled up with competitors offering the same products or services (Vetrivel et.al, 2015).

Research Methodology

The aim of the paper is to analyse the effect of sales promotion activities on consumer buying decision based on the location. The descriptive research design were used for this study. The various reviews have been gone through by the researchers and also made personal interaction along with consumer's opinion also been collected. Based on the information, it is consider some sales promotion tools namely free samples, coupons, demonstration, contests, cash refund offer, buyback allowance and discounts research schedule is framed in the five point scale where 5 stands for strongly agree, 4 stands for agree, 3 for neutral, 2 for disagree and 1 stands for strongly disagree. Simple random sampling method was adapted for this study and the samples are chosen from urban areas of Villupuram District, Tamilnadu. Those made shopping frequently with FMCG product. Totally 300 consumers were approached. Finally 276 consumers are considered as a sample size for the study. Descriptive statistics, ANOVA, and Post- Hoc are used to describe the sample, to show that which are the features those that highly influenced the consumers and measure the linear association between the dependent and independent variable.

Table-1: Opinion towards sales promotion activities based on location

Retailer Challenges	Location	Mean	S.D	ANOVA Result		Post-hog test
				F-value	P-value	
Free samples	On the main street	2.54	1.35	62.598	0.001*	1,2 vs 3,4,5
	Near to residence	2.80	1.10			
	Home based	3.73	0.67			
	Near market	4.07	0.34			
	In the crowed area	4.08	0.22			
Coupons	On the main street	2.55	1.20	51.477	0.001*	1,2 vs 3,4,5
	Near to residence	2.84	1.36			
	Home based	3.72	0.79			
	Near market	3.93	0.47			
	In the crowed area	4.18	0.18			
Demonstration	On the main street	2.44	1.15	88.116	0.001*	1,2 vs 3,4,5
	Near to residence	2.78	1.23			
	Home based	3.84	0.69			
	Near market	4.19	0.27			
	In the crowed area	4.28	0.20			
Contest	On the main street	2.33	1.19	90.593	0.001*	1,2 vs 3,4,5
	Near to residence	2.78	1.22			
	Home based	3.94	0.86			
	Near market	4.17	0.37			
	In the crowed area	4.40	0.42			
Cash refund offer	On the main street	2.40	1.13	77.509	0.001*	1,2 vs 3,4,5
	Near to residence	2.71	1.18			
	Home based	3.66	0.94			
	Near market	3.97	0.50			
	In the crowed area	4.42	0.27			
Buyback allowance	On the main street	2.55	1.53	32.624	0.001*	1,2 vs 3,4,5
	Near to residence	3.16	1.38			

	Home based	3.47	0.79			
	Near market	3.38	1.36			
	In the crowed area	4.52	0.38			
Discounts	On the main street	2.74	1.33	45.250	0.001*	1,2 vs 3,4,5
	Near to residence	2.76	1.34			
	Home based	3.43	0.70			
	Near market	3.46	1.11			
	In the crowed area	4.59	0.29			

Source: Primary data computed; * Significant @ 1% level.

Location of shop is very important factor of sales promotion because these are the unplanned purchases customers make on a shopping trip. Items with high impulse success get great locations in the store. The cash desk area is a prime location for these products. Some stores designate an area of the floor for merchandise that is on hand for only a short time. This creates an efficient changeover of that area when a new season arrives. In most stores, seasonal stock requires high visibility.

Table-1 revealed that opinion towards sales promotion based on location, the researcher has identified location such as on the main street, near to residence, home based, near market and in the crowded area. The corresponding mean and standard deviation values are calculated for each group.

H_0: There is no significant difference of opinion towards sales promotion based on location.

The above stated hypothesis has been tested by one way ANOVA. The sales promotion tools such as free samples, coupons, Demonstration, Contest, Cash refund offer, Buyback allowance and Discounts are found to be significant because the calculated P-value is significant.

Hence free samples, coupons, Demonstration, Contest, Cash refund offer, Buyback allowance and Discounts are significantly varied based on the location of retail shops. Hence the stated hypothesis is rejected.

In the case of free samples, the location near crowded area sales promotion secured the mean value of 4.08, followed by near market sales promotion secured the mean value of 4.07 home based retailers secured 3.73, near the school or govt. office retailers secured 2.80 and on the main street sales promotion secured the mean value of 2.54. It is noted that the locations have difference of opinion towards free samples of retailers. The calculated F-value is 62.598 and the P-value is 0.001, which is significant at one percent level. Hence there is a significant difference of opinion towards free samples of sales promotion tool based on the locations. It is found that the shop in the crowded area has the higher level of free samples than other sales promotion tool but, on the main street promotion have the low level of free samples.

With regard to coupons on location of sales promotion, crowded area secured the mean score of 4.18, followed by near market having the mean score of 3.93, home based have the mean score of 3.72, near the school/govt. office have the mean score of 2.84 and the main street scored a mean value of 2.55. It is noted that locations have the difference of opinion towards coupons sales promotion techniques.

The calculated F-value is 51.477 and the P-value is 0.001, which is significant at one percent level. Hence there is significant difference of opinion towards coupons based on the location. It is found that sales promotion in the crowded area have the higher level of response on coupons. But, in the main street having the low level of response on coupons in their locations.

Regarding Demonstration, location in the crowded area secured the mean value of 4.28, followed by near market secured a mean value of 4.19, home based secured a mean value of 3.84, near to residence secured a mean score of 2.78 and on the main street secured a mean value of 2.44, It is noted that the locations have difference of opinion towards Demonstration of sales promotion. The calculated F-value is

88.116 and P-value of 0.001 which is significant at one percent level. Hence there is a significant difference of opinion towards Demonstration based on the locations of promotional campaign. It is noted that crowded area sales promotion have the higher level of response of Demonstration. However on the main street based sales promotion have low level impact on Demonstration.

In the case of contest, crowded area have the mean score of 4.40, followed by near market secured a score of 4.17, home based scored a mean value of 3.94, near to residence retailer scored a mean value of 2.78 and on the main street secured a score of 2.33. It is noted that the locations have difference of opinion towards contests of sales promotion techniques.

The calculated F-value is 90.593 and P-value of 0.001 which is significant at one percent level. Hence there is a significant difference of opinion towards contest based on the locations. It is found that in the crowded area sales promotion have the higher level of response of contest financial problem and the main street sales promotion have low level of response on contest.

For cash refund offer, in the crowed area secured the mean value of 4.42 followed by near market secured a mean value of 3.97, home based secured a mean score of 3.66, near to residence secured a mean value of 2.71 and on the main street secured a mean value of 2.40. It is noted that the locations have difference of opinion towards cash refund offer. The calculated F-value is 77.509 and P-value of 0.001 which is significant at one percent level. Hence there is a significant difference of opinion towards cash refund offer based on the locations. It is found that the crowded area sales promotion campaign have the higher level of response on cash refund offer on other hand the main street promotion have the low level of response on cash refund offer than other locations.

With regard to Buyback allowance on location, in the crowed area have the mean score of 4.52, followed by home based secured a mean value of 3.47, near market retailer scored 3.38, near to residence scored 3.16 and on the main street secured a score of 2.55. It is noted that the sales promotion locations have difference of opinion towards Buyback allowance on customers.

The calculated F-value is 32.624 and P-value of 0.001 which is significant at one percent level. Hence there is a significant difference of opinion towards Buyback allowance based on the locations. It is found that in the crowded area sales promotion have the higher level of impact on Buyback allowance but the main street activity have the low level of response on Buyback allowance in their location.

For Discounts of sales promotion techniques crowded area secured the mean value of 4.59, followed by near market secured a mean value of 3.46, home based a mean score of 3.43, near to residence 2.76 and on the main street secured a mean value of 2.74. It is noted that the sales promotion locations have difference of opinion towards Discounts of tools. The calculated F-value is 45.250 and P-value of 0.001 which is significant at one percent level. Hence there is a significant difference of opinion towards Discounts based on the locations. It is found that crowded area sales promotion have the higher level of response on Discounts however the main street sales promotion activity have the low level of response on Discounts than other locations.

While gone through the P-values it is found to be significant at one percent level. Hence there is significant difference of opinion towards sales promotion based on location. Further Bonferroni post hog test is applied to find out the difference between location of the sales promotion and the sales promotion tools . From the post hog test it is found that on the main street and near to residence location has differed with other groups such as home based, near market and in the crowded area.

This result is similar with the previous studies of Choudhari Himanshu and Vandana Sharma (2009), observed that there is significant influence of format of sales promotion and location on the operational efficiency. Location of the sales promotion must be central to the customers to encourage higher competition.

Conclusion

The study found out that the sales promotion strategies practised in the FMCG products had

a significant positive influence on the consumer behaviour based on their loactions. The study therefore recommends that the management should formulate comprehensive and effective sales promotion strategies based on locations that seek to build brand awareness, creating favourable brand attitudes, gaining market share, inducing purchase, building brand loyalty and increasing sales. The study revealed that various factors such as free samples, coupons, Demonstration, contest, cash refund offer, buyback allowance and discount attached to the product enhance the effectiveness of sales promotion strategies in the FMCG products. It is recommends that the management of focus on all these tools of sales promotion, though unique from each other, so as to achieve a long term effect on increasing the firm"s market share, improve sales volume, retain customers and reduce switching of customers.

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OUTBREAK OF COVID 19 AND THE WORLD WIDE DEPRESSION

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ABSTRACT

Historical evidences show that many pandemics which spread in the past destroyed civilizations and economies. We can recall the episode that happened during 1920 when Spanish flu destroyed the world economy and killed more than 50 million people. After 100 years the World is about to face a similar situation. Present paper is an attempt to disclose the tentative and present effect on economy due to COVID 19. The secondary data has been used for the study which was collected from the newspaper and online articles from different websites.

Keywords: Pandemic, Economy, COVID 19, Civilization

Introduction

It was the eve of 31st December 2019 when people from all over the world were welcoming the year 2020. Everything was very normal and usual but something was suspicious in China although the whole world was not aware of it. It was probably the end of January when China disclosed that a new kind of virus was spreading in Wuhan region of China and killing hundreds of people every day. It was expected that the virus has been spread from the seafood wholesale market of Wuhan. On January 23, 2020, the central government of China imposed a lockdown in Wuhan and other region of Hubei. The other regions of the world were not aware of the threat of this virus as there was a lack of information. It was true that rest of the globe considered this an epidemic.During the month of February and March the Corona virus spread all over the world, European and Asian regions were badly affected from this virus. Now the new hotspots were Iran, Italy, Spain and the USA. Every day thousands of people were losing their lives due to this pandemic. With the loss of human lives it has majorly ruined the economy of the world. Due to the lockdown in almost all the nations the business and economic activities have been totally stopped, which has left the poor hungry and starve for basic necessities all over the world. Under developed and developing countries is facing lot of difficulties as they do

not have the sufficient resources to fight the deadly pandemic COVID 19.

Objectives of the Study

1. To know the crucial effect of Corona Pandemic on the world.
2. To disclose the financial effects on the world economy due to the spread of COVID 19.
3. To offer valid suggestions and conclusion.

Methodology

Present study is purely based on the secondary data which has been collected from newspapers and different websites from January 2020 to April 20201. Atop ten economies of the world have been considered for the study, which includes USA, China, Japan, Germany, United Kingdom, France, India, Italy, Brazil and Canada. Collecteddata has been analyzed by the simple percentage and further elaborated with diagrams.

Treatment of Contagious diseases in Perspective

There is long history behind the Pandemics and Epidemics in the world. The first case of Small Pox came in 1500 BC and it took 3296 years to develop vaccine, same as the vaccine of Polio took 3348 years to develop. Following table shows the number of years to develop vaccine for different disease.

Table 1.1
Treatment of Contagious diseases in Perspective

Sl. No.	Name of Disease	First Evidence of Disease	Vaccine developed	Until Vaccine was Developed (Total Years)
1.	Small Pox	1500 BC	1776 AD	3296 years
2.	Polio	1400 BC	1948 AD	3348 years
3.	Cholera	460 BC	1885 AD	2345 years
4.	Measles	AD 500	1971 AD	1471 years
5.	Rubella	AD 1619	1971 AD	352 years
6.	HIV	AD 1980	1995 AD	15 years[*]
7.	Ebola	AD 2014	2019 AD	5 years

Source: humanprogress.org   ***until first life saving drug developed**

Effects of COVID 19 on different Economies

World economy is going through challenging times. As per the reports of IMF ,Asia would see no growth in 2020, for the first time in 60 years with the service sector particularly under pressure. National lockdown across the region have left the airlines, factories, shops and restaurants in a disoriented state.After Italy and Spain, France is the worst hit by COVID 19 in Europe. Due to prolonged shutdown, its economy was expected to contract by 7.2%, for the accounting year 2020-2021 RBI has expected to -7.5 per cent. But the lockdown and social distancing is the only way to stop Corona Virus until any vaccine is invented. The following table shows the expected condition of top ten economies of the word.

Table 1.2
Expected GDP Growth of World's Top Ten Economies

Sl. No.	Country	Annual GDP ($ Billions)	GDP Growth in 2019	Expected GDP Growth in January 2020*	Expected GDP in April 2020	Percentage Change in GDP (Decrease)
1.	USA	20544.34	2.30	2.00	-5.90	395 %
2.	China	13608.15	6.00	6.00	1.20	80 %
3.	Japan	4971.32	-0.70	0.70	-5.20	842 %
4.	Germany	3947.62	0.40	1.10	-7.00	736 %
5.	United Kingdom	2855.30	1.10	1.40	-6.50	564 %
6.	France	2777.54	0.90	1.30	-7.20	654 %
7.	India	2718.73	4.70	5.80	1.90	67 %
8.	Italy	2083.86	0.09	0.50	-9.10	1920 %
9.	Brazil	1868.63	1.67	2.20	-5.30	340 %
10.	Canada	1713.34	1.80	1.80	-6.20	444 %

Source: worldometere; data as on 14th April 2020 compiled by ETIG and percentage calculated by researchers
*before COVID 19

Table 1.2 shows the economic condition of world's largest economies in terms of annual GDP in Billions and expected GDP for the month of April. After calculating the percentage it was found that the economy is worst affected due to the COVID 19, here the decrease in the GDP is 1920 per cent followed by the Japan by 842 per cent. Among all the above countries there is a minimum decrease in the GDP of India by 67 per cent while the decrease in GDP in China is 80 per cent. Situation in Germany, France and UK is also not very good with the percentage decrease by 736 per cent, 654 per cent and 564 per cent. The Carrabin country Brazil shows the 340 per cent decrease in its GDP, on the other hand USA and Canada shows 395 per cent and 444 per cent. The collected data shows the result before 14th April, although the condition became worst in the end of April 2020 as the

number of Corona cases and deaths are   increasing rapidly in these nations.

Chart 1.1

Percentage Change in GDP (Decrease)

Percentage Change in GDP (Decrease)	China	Japan	Germany	United Kingdom	France	India	Italy	Brazil	Canada
	80%	842%	736%	564%	654%	67%	1920%	340%	444%
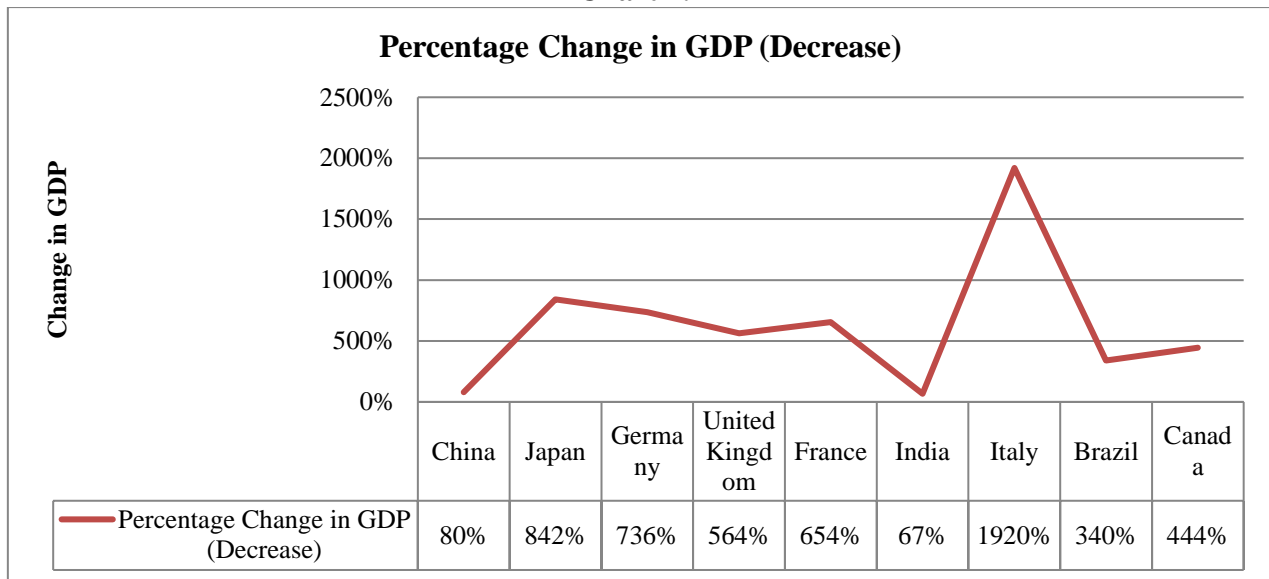
Source: Compiled from the table 1.2

Suggestions

1. The nation should spend more amount on health and its allied activities instead of war equipments.
2. Nations should be self reliance in order to avoid deficiencies of goods and services in the same circumstances.
3. Supply chain of goods and services should be well defined in order to avoid confusion.
4. An international task force should be made to provide the help to provide the help to poor nations.
5. Pandemic laws should be well defined on international level.
6. Nature should not be destroyed; limited use of these resources is needed.

Conclusion

Present paper highlighted some core issues related with COVID 19. The whole world is suffering from Corona virus, thousands of people have lost their lives and thousands are struggling with their lives. The people who are affected off Corona Virus not only the victim, but the whole world is facing this challenge, each and every family on the Earth is suffering. Almost all the people are directly or indirectly effected by, millions of people have lost their jobs due to lockdown, students are losing their precious time of study as the schools and colleges have been shut down. But this Virus has taught us lot of lessons, like there is a need to increase medical and health facilities, respect the nature, effective disaster management and international cooperation.

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BROAD UNEXPOSED SKILLS OF TRANSGENDER ENTREPRENEURS

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ABSTRACT

Since ages gender difference is always a debatable theme whether caused by nature, evolution or environment. The birth of a transgender is dreadful not only for the child but also for their parents. The pain of living in the wrong physique and treated as second class victimized citizen is outrageous and fully harboured with vicious baseless negative scruples. For so long, social exclusion had perpetuated inequality and deprivation experiencing ingrained malign stigma and besieged victims of crime or violence across their life spans. They are pushed into the murky way of life with a source of eternal disgust, bereft sexual potency and perennial fear. Although they are highly visible but very little is known about them. The common public needs to comprehend the ravaged arrogance on these insensitive souls and assist in integrating them into the mainstream by offering equal opportunity, treat with humanity and respect their dignity. Entrepreneurship in the current age is endorsing the gender fairness movement. Unstable careers and economic inadequacy had inclined one of the gender variant people called Transgender to become entrepreneurs. These tiny budding entrepreneurs resulted in economic transition by means of employment, free from the clutches of stereotype jobs, raised standard of living and handful of financial empowerment. Besides all these inhibitions, they were able to witness a platform for skill set development that ignited them to enter into entrepreneurial domain. This paper epitomizes skill sets involved in trans-entrepreneurs of Thoothukudi Municipal Corporation of Tamil Nadu State and is a groundbreaking determination to sightsee various skills incorporated and the impact on entrepreneurship.

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Keywords: Gender Differences, Transgender, Entrepreneurs, economic transition and skill set development.

Introduction

In 1965, Psychiatrist John F. Oliven of Columbia University coined the term Transgender in his reference work Sexual Hygiene and Pathology. Transgender are an extremely secretive community steeped in mystery. This disastrous community is enforced to live on the fringes of society, despised in fear, never loved and welcomed. They are forbidden to talk about their lives to outsiders. They lead lives more akin to bonded labourers rather than free democratic citizens of the country. Once they step into this lifestyle, they are embroiled in a web of deceit and abuse in every turn. Indian Census has never recognized third gender for years. It was only in the year 2011, the data of transgender were collected by Census Department for employment, literacy and caste but was clubbed in male category. There is a nascent proof of transgender population growing. Ministry of Law and Social Justice both at the Central and State need to recognize the suffered transgender people. It is really weird to understand that public call these sexual minorities with derogatory names, does not recognize for being trapped in the wrong gender and had always kept them aloof. Despite receiving some recognition and social acceptance, they remain coldshouldered not only in Indian societies but also worldwide. For a meaning change, formal legislation must be passed to transform a social changeover with acceptance, respect and dignity.

Objectives of the Study

The study assumes the following objectives:
1. To understand the demographic contour of the transgender entrepreneurs.
2. To explore numerous skills implied by transgender entrepreneurs in their ventures.

Research Methodology

Research Design

This paper deals with the demographic summary in order to understand various business skillsets applied by transgender entrepreneurs in their ventures. The literature review was obtained from library sources, prominent e-journals, Madurai Transgender Resource Centre, reputed newspaper online-news, notable author books/ biographies and Novels. The questions were constructed using Likert's Five-point scale and the variables were identified from the review of literature with the help of transgender experts' like Community

Link Leaders, Para Legal Volunteer and District Non-Official Third Gender Welfare Board Members. The Reliability test was conducted using Cronbach's Alpha which was 0.723.

Sample Selection Structure

The topographical region selected for the study was Thoothukudi Municipal Corporation of Tamil Nadu State which is very popularly known for entrepreneurial hub and industrial coverage. The sample elements were 270 transgender entrepreneurs using Daniel's Formula. The entire population was 340 in the Thoothukudi Municipal Corporation which was derived from Transgender District Welfare Association. The sampling technique adopted was Simple Random method for the study.

Sample Calculation

In case of Finite Population the following simple formula represented by Daniel 1999 can be used.

$$N = Z^2 P (1-P) / d^2 * 100$$

where :

n = sample size

Z = Z statistic or a level of confidence at 95% or 1.96

P = expected prevalence or proportion (in proportion if 20%, P = 0.2)

d = precision (in proportion if 5%, d = 0.05)

The computations of sample are given below:

$$= (1.96)^2 * 0.2 (1 – 0.2) / 0.05 * 100$$
$$= 3.8416 * 0.2 (1 – 0.2) / 0.05 * 100$$
$$= 0.16832 (0.8) / 0.05 * 100$$
$$= 0.134656 / 0.05 * 100$$
$$= (2.61312 * 100)$$
$$= 269.312$$
$$= 270$$

Statistical Tools Used

IBM SPSS Statistics Version 21 was used for data analysis. The items were analyzed through Percentile Analysis via Descriptive Statistics and the impact of skills has been clearly examined with the help of fitted Regression mode.

Data Analysis

Demographic Profile of the Transgender Entrepreneurs

The demographic variables of the respondents are important to study. This comprises few attributes like Age, Educational Qualification, Prime business ventures and income levels of the respondents are considered.

Table 1 : Age and Living Style

Age of the Respondents	Way of Living			
	With family Associates	With Transgender	Isolation	Total
Less than 25 years	0 (0.0)	11 (4.0)	0 (0.0)	11
25 - 35 years	0 (0.0)	57 (21.1)	2 (0.7)	59
36 - 45 years	1 (0.4)	165 (61.1)	0 (0.0)	166
46 – 55 years	0 (0.0)	27 (10.0)	3 (1.1)	30
Above 55 years	0 (0.0)	0 (0.0)	4 (1.5)	4 (1.5)
Total	1 (0.4)	260 (96.3)	9 (3.3)	270

Source: Primary Data

It can be ascertained from the above table that the dominant age group of the respondents is 36-45 years which constitutes a majority of (61.1 percent) who live with transgender and only one point four percent prefer to live with

their family members. Similarly 21.1 percent of the respondents in the age group of 25-35 years reflect their living with transgender. The transgender entrepreneurs hardly associate their living style within their families and one point five of the respondents above the age group of above 55 years as well as one point one percent of the respondents belong to the age group of

46-55 years live in isolation. Overall majority of 96.3 percent of the transgender respondents associates their living system with transgender followed by three point three percent live separately and zero point four percent with their family members.

Table 2 : Education Qualification

Educational Qualification	Number of Respondents	Percentage
Up to 8th Standard	101	37.4
9th – 10th Standard	55	20.3
11th – Higher Secondary	46	17.0
Diploma Holders	30	11.1
Bachelor's Degree	21	7.8
Master's Degree	12	4.4
Professional Degree	5	2.0
Total	270	100.0

Source : Primary Data

From the above table it is found that out of 270 respondents reflected for the study, 101 respondents pertaining 37.4 percent have studied up to 8th standard. Respondents with 20.3 percent constituted educational qualification up to 9th – 10th standard. 17.0 percent of the transgender entrepreneurs have possessed education up to 11th to higher secondary level. The respondents with

Diploma comprises of 11.1 percent whereas for Bachelor's it is 7.8 percent. Confining towards Master's Degree it is subjected to 4.4 percent and only 5 respondents ie., two percent of the transgender entrepreneurs have acquired Professional Degree as their educational qualification. The analysis reveals that most of the respondents have studied up to 8th standard.

Table 3: Primary and Nature of Business

Primary Business of the Respondents	Nature of Business		Total
	Sole Proprietor	Partnership	
Food Making	40 (15.0)	160 (59.2)	200
Mat Weaving	0 (0.0)	60 (22.2)	60
Stitching/ Tailoring	7 (2.6)	0 (0.0)	7
Agro related business	3 (1.1)	0 (0.0)	3
Total	50 (18.5)	220 (81.5)	270

Source: Primary Data

The table above postulates that there are major four business ventures undertaken by transgender entrepreneur respondents. Out of these, 200 respondents are occupied into food business. Among them a majority of (59.2 percent) is doing partnership form of business and only 15.0 percent are carrying their business in sole proprietorship form. As far as

mat weaving business is concerned all the 22.2 respondents are carrying their business in partnership. Only seven and three transgender entrepreneurs pertaining to tailoring and agro related business has shown sole proprietor nature of business. Overall, irrespective of any type of business the transgender entrepreneurs have occupied in food making business and

mostly prefer their nature of business into partnership ventures except for tailoring and agro related business.

Table 4 : Income Level

Income	Respondents	Percent	Cumulative %
₹5,000 - 15,000	244	90.3	90.3
₹15,001 - 30,000	14	5.2	95.5
₹30,001 - 45,000	8	3.0	98.5
₹45,001 - 60,000	3	1.1	99.6
Above ₹60,000	1	0.4	100.0
Total	270	100.0	

Source : Primary Data

The table above depicts that majority of (90.3 percent) of the respondents are earning income ranging ₹5,000 - 15,000. 14 respondents of five point two percent earn up to ₹ 15,001-30,000. 8 respondents with three percent make income of ₹30,001 - 45,000. 3 respondents with one point one percent gain income of ₹45,001 - 60,000. Only one respondent with zero point four percent have income level above ₹60,000. Hence, it can be conferred that most of the transgender entrepreneurs have an earning capacity of ₹5,001 - 15,000.

Impact of skills on Transgender Entrepreneurs

The present study has made an attempt to examine the degree of influence of factors motivating to start business ventures for transgender entrepreneurs on the capital invested. The impact of skill set was obtained with the help of multiple regression analysis. The fitted regression mode is:

$$y = a + b_1x_1 + b_2x_2 + \ldots\ldots\ldots\ldots b_6x_6 + e$$

Where

Y	=	Business ventures undertaken
X_1	=	Score on skills and experience
X_2	=	Score on personal factors
X_3	=	Score on family factors
X_4	=	Score on economic factors
X_5	=	Score on employment factors
X_6	=	Score on market factors
$b_1, b_2, \ldots b_6$	=	Regression Co-efficient of independent variables
a	=	intercept
e	=	error term

Table 5 : Skills sets and nature of business

S.No	Variables	Notation	Mean Score of transgender entrepreneurs			
			Food Making	Mat Weaving	Tailoring	Agro
1.	Experience	X_1	0.733**	0.674**	0.529**	0.462**
2.	Personal	X_2	- 0.055	0.123	0.019	0.010
3.	Family	X_3	0.115*	0.288*	0.312*	0.422**
4.	Economic	X_4	0.314*	0.241*	0.259*	0.152*
5.	Employment	X_5	- 0.066	-0.005 NS	-0.001 NS	-0.002 NS
6.	Market factors	X_6	0.152*	0.254*	0.678**	0.523**
	R^2		0.871	0.752	0.714	0.452
	F-Test		112.25	124.07	132.71	146.54

Source : Primary Data
** Significant at one percent level
*Significant at five percent level
NS = Not Significant

The analysis reveals that the significantly influencing factors on the skill sets of the nature of business are Experience, personal, family, economic, employment and market factors since their regression co-efficient are significant at five percent level. The nature of food making business in the above said factors showed an increase in the skill set by 0.733, 0.115, 0.314 and 0.152 respectively. The change in the view factors are explained to an extent of 77.1 percent since R^2 is 0.871. Similarly in case of mat weaving the proportionate increase can be observed by 0.674, 0.288, 0.259 and 0.678. The mean score for mat weaving nature of business is 0.752. In case of tailoring, it is noted that the factors have shown an increase by 0.529, 0.312, 0.259 and 0.678 in the mean scores and the changes

in the view of factors explain the changes in the nature of business for tailoring is 0.714 and agro related business is 0.452 respectively. There is a higher extent of (87.1 percent) in food making nature of business.

Table 6 : Skill Set Projection

S.No	Variables	Cumulative Mean Score	F Statistics
1.	Group Skills	8.1098	9.055**
2.	Soft Skills	0.1238	1.480 NS
3.	Behavioral Skills	0.2333	1.8254 NS
4.	Creative Skills	7.521	8.291**
5.	Risk Skills	3.152	5.143*
6.	Business Management Skills	0.288	2.713 NS

Source : Primary Data

The highly viewed variable are Group skills contributing the mean score as 2.1098 followed by Creative skills with a cumulative mean score of 7.521and slightly showing significant skill projection on risk bearing skills and not significant towards soft skills and behavioural skills ranging with F statistics as 1.480 and 18254.

Findings

1. As far as the age group of the transgender entrepreneurs is concerned, 36-45 years constitutes a majority of (61.1 percent) who live with transgender and only one point four percent prefers to live with their family members and none in isolation. Overall, 96.3 percent of the transgender respondents associate their living system with transgender.

2. Out of 270 respondents, majority of 101 respondents with 37.4 percent have studied up to 8th standard. The analysis reveals that most of the respondents have studied up to 8th standard. Only 5 respondents ie., two percent of the transgender entrepreneurs have acquired Professional Degree as their educational qualification.

3. A majority of (59.2 percent) is doing partnership form of business and only 15.0 percent are carrying their business in sole proprietorship form. Irrespective of any type of business venture, the transgender entrepreneurs have occupied predominantly in food making business and mostly prefer their nature of business into partnership ventures except for tailoring and agro related business.

4. Most of the transgender entrepreneurs have an earning capacity of ₹5,001 - 15,000. Only one respondent with zero point four percent have income level above ₹60,000.

5. On the basis of skill set and nature of business, it is conferred that there is a significant variations in influencing factors for trans-entrepreneurship such as experience, personal, family, economic, employment and market factors since their regression co-efficient are significant at five percent level. There is a higher extent of 87.1 percent in food making nature of business.

6. On the skill set Projection scale the highly viewed variable are Group skills contributing the mean score as 2.1098 followed by Creative skills with a cumulative mean score of 7.521and slightly showing significant skill projection on risk bearing skills and not significant towards soft skills and behavioural skills ranging with F statistics as 1.480 and 18254.

Suggestions

The following are the suggestions incorporated from the study :

❖ Entrepreneurial Development Centre should establish Transgender Cell in every educational institution. This will enhance entrepreneurial or employment opportunities for trans community and also clear misconception which will generate a platform for exhibiting their skill sets and bring more of societal inclusion.

❖ Exclusive Training and Development Programmes are to be offered. Along with that financial support can be granted so that there is no troublesome in commencing of business ventures by transgender entrepreneurs. Sponsors, Donors and various high profile business tycoons can contribute monetary assistance to trans-community.

Conclusion

Transgender persons are constantly facing manifold forms of social discrimination and oppression in the country. Discernment is so extensive and marked even in basic necessities like healthcare, employment and education, that it makes their social inclusion a daunting task. It is the need of the hour, to step out a remedy to get out of the clutches of the terrible situation and advance social inclusion for the members of this community through strong legal as well as social dimensions to lead a dignified, respectful and equilibrium life. Awareness packages and sensitization of transgenders as well as the associates of the society need to be agreed upon in order to ensure their social enclosure.

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ETHICAL RESEARCH ON ROLE OF CUSTOMER IN DIGITAL MARKETING DURING COVID -19 – A STUDY WITH SPECIAL REFERENCE TO NILGIRIS DISTRICT

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ABSTRACT

During the first two decades, particularly during the covid-19, online marketing became a major channel for the sale of products and services all over the world. Digital marketing is gaining popularity as a result of its unavoidable future, and it has become a very important mode of purchase in this pandemic. However, as the expected challenges and ethical issues arose, this method of doing business resulted in many conflicts between the customer, the seller, and the seller. Authentic product information, fast and accurate product delivery, no sharing or misuse of customer card number, personal information, and purchase history, and accurate and prompt customer service draw attention to the ethical responsibility of electronic commerce. But about the customer, do they act ethically when purchasing products online. The primary goal of this article is to investigate the ethical role of customers in digital marketing in the twenty-first century. To ascertain the facts or ways in which the client behaves unethically, as well as to propose solutions to the problem. The study's findings are based solely on responses obtained through a self-structured questionnaire from a sample of 300 people in the Nilgiris district. Due to their small size and narrow research area, an exploratory and descriptive research design was used, and data was calculated using descriptive statistics to validate the outcomes.

Introduction

The Covid-19 has had an impact on the business in a variety of ways. Some businesses will go out of business, while others will struggle and only a few will start out winning. Even as a recession looms, a specific set of companies in healthcare, pharmacy, medical equipment, online media and entertainment, online learning, digital payment, food processing, and other testimony, increase demand and may create new job opportunities for a few. The Internet, one of the greatest inventions of the twentieth century, is used in many aspects of our daily lives as well as in modern business. Based on statistics, there has been a remarkable increase in the number of online retailers that offer certain benefits such as more information, increased service, and increased customer control due to the global spirit of the Internet. In 2021, the top 20 internet user countries will account for 3 billion people worldwide. As of January 21, there were 624 million internet users in India, and the number of internet users in India increased by 47 million between 2020 and 2021, with internet penetration reaching 45 percent in 2021.

The few disadvantages of online marketing are the slow Internet connection, the tangibility of the product, the electronic payment method, and the lacs of trust. Regardless of these issues, people's online shopping spending has increased, and consumers have begun to show an interest in online retailing.

Many nursing practices now see online marketing as the new area of market communication, with Facebook blocking Twitter, YouTube, and LinkedIn at the top of the list of uses for different mediums. These trends indicate that electronic retailing has become an important alternative to purchasing channels. The ability to convert quickly and easily to new things are the most important characteristics of the online market. The online market is a particularly fast-changing environment, and the popularity of online shopping is growing by the day. The consumer's perception of risk is one of the primary factors that drives him away from online shopping and prevents the establishment of consumer loyalty. As a result, developing trust and transferring it to customers is a critical step in converting e-commerce visitors into loyal customers. Now that the market is more focused on ethical issues that can harm in the online mode,

Source: https://datareportal.com/reports/digital-2021-global-overview-report
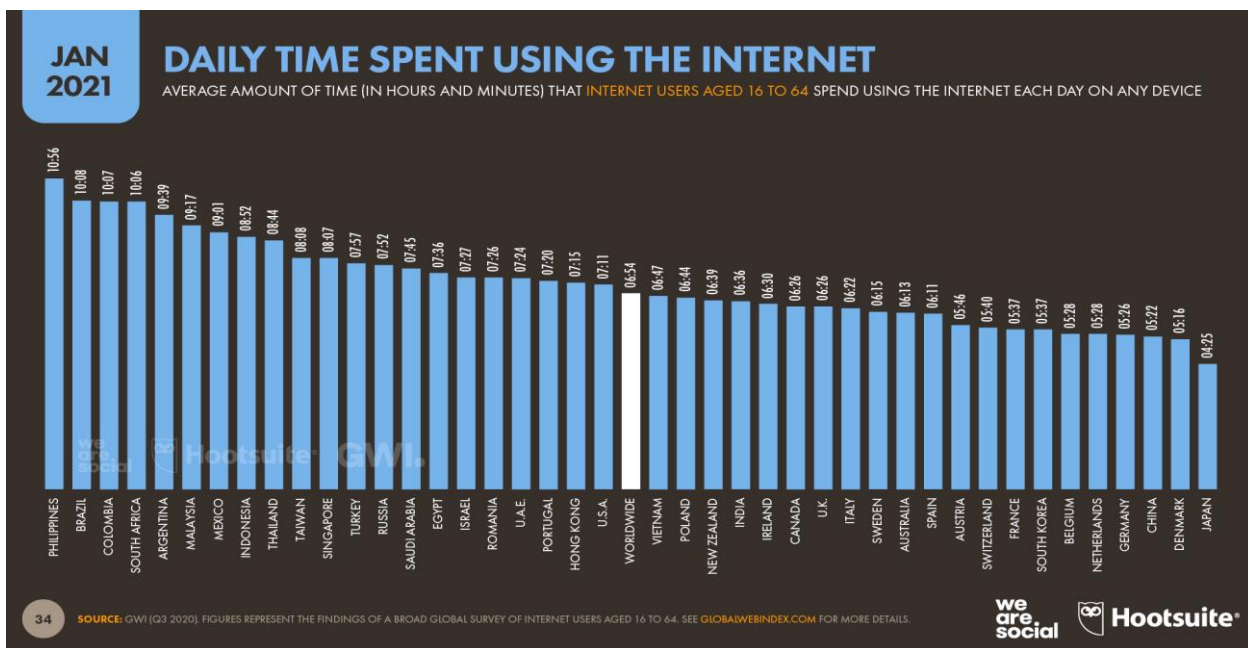
it is the ethical responsibility of the trader to provide appropriate information about the product he is using, such as the expiration date, the date of manufacture, and the quality of the product. Customer data, such as card number, online banking details, address, and contact number, must be kept confidential. This implies that the trader must follow ethical practices, but the question is, what exactly is ethics? The study of ethics seeks an answer to the question, "What is good?" It draws a line between what is desirable and what is undesirable. what's good and what's not marketing. The term "ethics" refers to the ethical judgement that applies to the enforcement of marketing decisions and attitudes. The responsibility of retailers, including their trustworthy, fair, and honest behaviour toward the customer and safeguarding the interests of their customers, is defined as e-commerce ethics.

As a result, it is now clear that marketers' ethical responsibilities will always influence customer preferences and the success of online marketers. The primary goal of this research extends beyond these areas and focuses on the ethical behaviour of customers when it comes to online marketing. If the merchant provides prompt and adequate service to the customer, it is also the customer's responsibility to act ethically. This study also attempts to investigate the various ways in which the client responds unethically and makes recommendations for both.

Objectives of study's:

- Evaluate the ethical role of customers in digital marketing.
- Analyze the ethical role of customers in relation to digital marketing based on demographic variables.
- Explore the unethical path of customers to digital marketing.

Limitation of the Study

- Feedback provided by respondents have been considered authentic, no further verification is performed.
- Time is a limiting factor in carrying out in-depth research work

Hypothesis of the study

- There is a significant relationship between the customer's ethical role and digital marketing.
- Based on demographic variables, there are degrees of difference in customers' ethical roles in relation to digital marketing.

Methodology

The study employs an exploratory and descriptive survey design to attempt to explain the various ethical roles of customers in relation to digital marketing. The research is based on original data collection. Data was

gathered using a standardised questionnaire that was produced and distributed personally. Books, the Internet, and journals were used to gather secondary data.

Discussion and outcome

The demographic characteristics of the respondents are shown in table No.1 from the total number of 300 respondents from the Nilgiris district, 56 percent are male and 44 percent are female. Table also depicted that 26 percent respondents are below graduation; 33 percent are graduate and 41 percent are post graduate.majority of the respondents are students. As concern to family income of respondents, table shows that 56 percent respondents families earning less than 2 lacs and 28 percent respondents families earning in between 3 to 5 lacs.

Characteristics		Percentage
Gender	Male	56
	Female	44
Age	Below 20	34
	21-25	58
	26-30	5.3
	31-35	1.3
	36-40	0.6
	ABOVE 40	0.6
Occupation	Businessmen	2
	Service	6.6
	Student	88
	Other	3.4
Qualification	Below UG	26
	UG	33
	PG and above	41
FAMILY INCOME	Below 2 lacs	56
	2-5 lacs	28
	6-10 lacs	7.4
	More than 10 lacs	8.6

H1: there is a significant relation between ethical role of customer and digital marketing. Outcome: At 5% significance, the critical (tabulated) value of chi square values for the degree of freedom is 41.113 (as χ^2calculated> χ^2 tabulated), because the calculated chi-square value is greater than the tabulated chi-square value (table2).

The null hypothesis is rejected, while the alternative hypothesis is accepted. There is a significant relationship between ethical behaviour and e-commerce.

Dimension	Calculated Chi Square Value	Degree of Freedom	Table Value	Null Hypothesis(at 5%)	Result
significant relation between ethical role of customer and online marketing	746.9	23	41.113	Rejected	Significant

Table 2: Chi-square Table of Selected Respondents

A percentage frequency distribution was used to determine the level of ethical role of customers in online marketing. Table 3 shows that more than half of the respondents have purchased products online, particularly food items that are not included in this category; otherwise, this figure could reach 90%. When ordering products online, 63 percent of respondents admit to never returning used ones, while 29 percent rarely do so. Almost 36% of respondents replaces some parts of a product with damaged parts and file a claim for a new product from the vendor, while 41%

never engage in such unethical practices.Frequent product cancellation for any reason also falls under unethical practices 45 percent of respondents rarely do this, and 36 percent regularly or occasionally cancel the product. If it is the marketer's responsibility to provide prompt and adequate service to the customer, the customer must also demonstrate a sense of responsiveness on their part. 5 percent of respondents are usually and 25percent of the time not available for delivery person at scheduled time, while 39 percent are rarely unavailable for the same.

Characteristics		Percentage
Buy Product from Online Marketing	Usually	32
	Sometimes	56
	Rarely	11
	Not At All	1
Use Product for Few Days and Returned Back	Usually	3
	Sometimes	5
	Rarely	29
	Not At All	63
Will Youreplace Some part of Product with Damaged with Damaged One and Claim for New	Usually	19
	Sometimes	17
	Rarely	23
	Not At All	41
Frequently Cancelled Orders	Usually	5
	Sometimes	31
	Rarely	45
	Not At All	19
Unavailable for Delivery Person	USUSALLY	5
	SOMETIMES	25
	RARELY	39
	NOT AT ALL	31

When asked about the unavailability of delivery personnel due to a lacs of cash, 75% of respondents stated that they never engage in such practices. Table 4 shows that 86 percent of respondents are not intentionally posting negative feedback in order to gain benefits. The majority of respondents did not freely provide their incorrect information details for the sake of amusement. Customers may order products

from multiple companies and receive them from any of them; however, 77 percent of respondents indicate that they are not involved in such activities at all. 3 percent usually, 17 percent occasionally, 19 percent rarely, and 61 percent never order multiple items from multiple companies and selecting the best one and returned back other items.

CHARACTERISTICS		PERCENTAGE
Unavailability of Deliver Person Due to Non-Availability of Cash	Usually	4
	Sometimes	3
	Rarely	17
	Not At All	76
Deliberately Posting Negative Feedback	Usually	1
	Sometimes	8
	Rarely	4
	Not At All	87
Deliberately Not Provide Your Proper Information Details	Usually	1
	Sometimes	3
	Rarely	5
	Not At All	91
Ordering Product from More Than One Company and Rejecting Others	Usually	0
	Sometimes	9
	Rarely	13
	Not At All	78
Ordering Multiple Items and Selecting Usually the Best One	Usually	3
	Sometimes	17
	Rarely	19
	Not At All	61

H2: there is difference in the ethical role of customer towards digital marketing based on demographic variables

Outcome: To see if any of the differences in gender, age, academic level, occupation, and family income are statistically significant, compare the p-value at the significance level to the null hypothesis. The null hypothesis asserts that all of the population means are equal. A significance level of 0.01 is usually sufficient. A significance level of 0.01 indicates a 1% chance of concluding that a difference exists. Table 4 depicts the differences in customer ethics toward digital marketing based on gender, age, academic level, occupation, and family income.Concerning the ethical role of customers towards online marketing based on gender, the table value (5.19) is less than the calculated value (40.6), so the null hypothesis is rejected, implying that all of the population means are not equal, and that the ethical role of males may differ from that of females when they shop online. As the null hypothesis is accepted, the age means of the four groups are similar. To assess the ethical role of customers based on academic level, it was discovered that undergraduate and postgraduate students have different ethical roles in digital marketing based on their academic level.At the 1% significance level, the calculated value of F is 0.64, which is less than the table value of 3.49. The null hypothesis of no difference in sample mean is accepted in this analysis. As a result, it is concluded that there is no significant difference in ethical role towards digital marketing due to occupation among these four groups.

DIMENSIONS	D.F	F CALULATION	F TABLE	NULL HYPOTHESIS	RESULT
ETHICAL ROLE OF CUSTOMER TOWARDS ONLINE MARKETING BASED ON GENDER	9	40.6	5.19	REJECTED	ALL POPULATION MEANS OF TWO GROUPS ARE NOT EQUAL
ETHICAL ROLE OF CUSTOMER TOWARDS ONLINE MARKETING BASED ON AGE	15	1.71	3.49	ACCEPTED	ALL POPULATION MEANS OF FOUR GROUPS ARE EQUAL
ETHICAL ROLE OF CUSTOMER TOWARDS ONLINE MARKETING BASED ON ACADEMIC LEVEL	11	34.07	4.06	REJECTED	ALL POPULATION MEANS OF THREE GROUPS ARE NOT EQUAL
ETHICAL ROLE OF CUSTOMER TOWARDS ONLINE MARKETING BASED ON OCCUPATION	15	64.2.02	3.49	ACCEPTED	ALL POPULATION MEANS OF FOUR GROUPS ARE EQUAL
ETHICAL ROLE OF CUSTOMER TOWARDS ONLINE MARKETING BASED ON FAMILY INCOME	15	2.02	3.49	ACCEPTED	ALL POPULATION MEANS OF FOUR GROUPS ARE EQUAL

Unethical customer approaches towards digital marketing:

- Use the product for a few days and then return it within the return period.
- Replacse some of the product's parts with the damaged ones and file a claim for a new one.
- Your order was frequently cancelled for a variety of reasons.
- The delivery person was unable to arrive at the scheduled time.
- Unavailable for delivery person due to lacs of cash at the time of delivery.

- Purposefully posting negative feedback or commendation and attempting to gain benefits for the same.
- Purposefully failing to provide your proper information details only for fun.
- Ordering your product from multiple companies and rejecting others while receiving any of the ones.
- Ordering multiple items, selecting the best one, and returning the others.

Conclusion

Marketing ethics is becoming increasingly important with the advancement of technology,

globalisation of markets, globalisation of production, and the rise of emerging markets. According to the study, the increasing literacy about the internet among people is the primary reason for the growing importance of digital marketing. They have discovered that the internet is a truly beneficial medium through which they can serve their various purposes, primarily social networking, digital shopping, and media sharing, and the efficacy of the internet has increased their proclivity to be online.

As per the current study's findings, there is a significant relationship between the ethical role of the customer and online marketing, which means that customers always adopt ethical behaviour when shopping online. The majority of respondents stated that they had never engaged in unethical practices such as frequently cancelling orders for better options, providing incorrect information, not accepting cash on delivery, purposefully posting negative commands, and so on.While analysing the role of the customer towards online marketing based on demographic variables, the current study attempts that male and female received the ethical role difficulty the academic level of the respondent influences the ethical role of regardless of age and occupation where there is no significant difference exists among the group towards online marketing. The study also found that the population of family income groups is equal and that there is no significant difference because family income influences individual behaviour and roles in digital marketing.

The current problem should be minimised by avoiding the aforementioned unethical practices in digital marketing, and this will only come from the individual customer inside no one can behind to behave ethically but all the companies may prepare a code of contact to customers so that the specific problem does not emerge. Online marketers should implement a try strategy in order for customers to first try and be satisfied with their requirements before purchasing those products. Cash on delivery timing should be agreed upon by the customer and marketer, and penalties should be imposed for non-compliance.Companies are providing free cancellation services to promote their products, but if customers cancel quickly, the company should impose a certain penalty, which should be mandatory for all companies so that this does not affect their individual sales. Electronic goods should only be installed by the concerned company so that the customer does not change any part of it, and this practice may also ensure proper product settlement.

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CLUTCH SIZE, HATCHING PATTERN AND BROOD CENSUS OF SARUS CRANE IN FARIDPUR TEHSIL IN BAREILLY DISTRICT OF UTTAR PRADESH, INDIA

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ABSTRACT

The current research conducted to evaluate the clutch size, hatching pattern and brood census of Sarus Crane in Faridpur Tehsil in Bareilly District of Uttar Pradesh. The work carried out in the Faridpur Tehsil of Uttar Pradesh's Bareilly District from August 2011 to July 2012.The survey was done to know the clutch size, assess the current status of habitat and food resources use by Sarus crane. During the study 11 nest were observed with nesting success was 72.72%. No nest was seen in Khanpura Village. Out of the 8 nests encountered with eggs, 7 (87.50%) were having the clutch size of two eggs, followed by only one nest (12.50%) with clutch size one. The mean eggs length, breadth and weight recorded were 10.17±0.02 cm, 6.27±0.05 cm and 210.71±0.08 g respectively. Both sexes participate in egg incubation. The incubation period varied from 28–34 days.

Keywords: Brood, clutch, hatching, Sarus.

Introduction

A group of eggs which lay by a bird in the nest called clutch. The size of clutch differs between the species. Even if there are two eggs in a bird's nest, their size may vary. Every species of bird hatch the eggs in different period of time. The Sarus Crane (*Grus antigone*) is a residential loftiest flying bird (Archibald *et al.* 2003) in Uttar Pradesh which forage in wetland and agricultural land. This species has also been designated as Uttar Pradesh state bird. In Faridpur Tehsil, Sarus Cranes found in the wetlands, agricultural land, near the pond and canals of the river.

Historically, the species was extensively widespread in India's lowlands and along the Gangetic plains (Sundar and Choudhury, 2006; Tomar *et al.* 2017).They are the iconic species of opens Wetlands (Vyas, 2002). Hatchlings are communal and prefer to graze in natural wetlands, however they also frequent wet crops like rice and wheat (Archibald, 2003).

The Sarus is considered to be hardiest species of all the cranes and it flourish well in harmony with man and in agricultural landscape that has been transformed by human activities (Yaseen *et al.* 2013). Due to the rapid decline in population, numerous additional pressures, the feature is considered endangered on a worldwide scale. (Mukherjee *et al.* 2000, Bird Life International, 2001). At present, Sarus crane has been listed as vulnerable species with criteria A2cde+3cde+4cde under IUCN category (IUCN, 2012). The factor indicates the threat to the species from a variety of sources such as habitat degradation, exploitation, pollution, competitors, and parasites, among others (Yaseen *et al.* 20013). With this in mind, a study was conducted to determine the clutch size, hatching pattern, and brood census of Sarus Cranes in the Faridpur Tehsil of Uttar Pradesh Bareilly District.

Materials and Methods

Study Area

Present examination was led in chosen towns of Faridpur Tehsil under Bareilly area of Uttar Pradesh. The Bareilly locale is situated in the north western piece of U.P. furthermore lies between scope 28°10′N, and longitude 78°23′E. The area comprises of six Tehsils and fifteen squares. There are 385 towns are available in Faridpur Tehsil and it is partitioned in two squares Faridpur and Bhuta the detail are given in Table 1.

Methods

The work was held in August 2011 to July 2012 in Faridpur Tehsil under Bareilly District of Uttar Pradesh. During the investigation, areas were chosen from the towns of Faridpur Tehsil where Sarus crane occupies the entire year. The examination technique comprised with the assortment of information from essential and optional assets. Essential information were gathered by direct field visits, site examination (Singh and Sharma, 2011). Multistage arbitrary examining was utilized to chosen study palces. Faridpur Tehsil is made out of 385 towns. During the current investigation a sum of 32 towns of Faridpur Tehsil were broadly overviewed for the presence of Sarus cranes. Out of these 10 towns chose for the examination which is 2.59 % of the entire (Plate 1 and 2).

The survey was conducted to determine the clutch size, examine the present state of habitat, and determine how Sarus cranes (*Grus antigone*) in the area exploit food resources. The agricultural fields, wetlands, river banks, and ponds were all observed in the field. Several visits were made to the Sarus cranes in the designated communities in the early morning and late evening.

During the study, to know the information's on various aspects of bird cultch size, hatching pattern and breeding census *Ad libitum sampling* (Altmann, 1974) was used. Nest monitoring was also performed to know the various aspects of the bird nesting behavior. To ascertain the number of bird's nestling and the number of young birds was estimated through nesting census and brood census (Singh, 2009). Sample count, foot transect and territory mapping was used for nesting census and brood census of Sarus crane.

Secondary data was gathered from published literature, including management plans, government documents, official statistics, prior studies on the Sarus crane, technical reports, scholarly journals, review articles, books, computerized databases, world-wide database magazines, and newspapers (Shell, 1997; Cnossen, 1997).

Statistical Analysis

Data from both quantitative and qualitative sources was gathered and analyzed statistically. Data was collected, tabulated, analyzed, and the results were interpreted. In the study, typical statistical analysis procedures such as mean, median, and standard deviation were applied to meet the requirements (Snedecor and Cohran, 1994).

Results and Discussion

Clutch size

Sarus Crane is slow a reproductive species. The clutch size varied from 1-2 eggs. Out of the 8 nests encountered with eggs, 7 (87.50%) were having the clutch size of two eggs, followed by only one nest (12.50%) with clutch size one. The interval between lying of first and second egg ranges from 46-50 hours. The eggs are laid close to each other and located in the middle of the nest.

Egg morphology

Sarus Crane eggs colour is chalky white with pigment spots of varying size attain at the time of lying and the pigmentation increases with time. The pigment spots ranged from dark brown to light crimson in colour. Pigment dots were discovered on all of the eggs. The first egg in a clutch was always larger than the second egg. A distance of 10 to 15 cm was observed between the two eggs of the same nest. The eggs were long oval in shape. The length, diameter and weight of 7 eggs were measured (Table 2).

The survey was preformed to access the number of eggs of Sarus cranes in the areas. The numbers of eggs along with their maximum length and breadth in (cm), Weight in (g) were recorded in surveyed village. The mean eggs length was recorded to be 10.17±0.02 cm, the mean of egg breadth recoded to be 6.27±0.05 cm and weight mean recorded to be 210.71±0.08 g.

Hatching and Nesting success

$$\text{Hatching Success} = \frac{\text{Number of eggs hatched}}{\text{Total Number of eggs laid}} \times 100$$

Out of the 15 eggs laid in the nests present in ten villages, 12 hatched successfully with the hatching success of 80%. (Table 3)

$$\text{Nesting Success} = \frac{\text{Number of nests with egg}}{\text{Total Number of nests}} \times 100$$

Out of the 11 nest observed 8 (72.72%) were filled with egg, however 3 (27.27%) nest had no eggs. Hence, the nesting success was 72.72%. No nest was seen in Khanpura Village (Table 3).

Incubation

The incubation period ranges from 28–34 days. Both sexes of Sarus crane participate in egg incubation with the interval of 43 to 58 minutes. The Sarus sit with its breast bone on the ground while incubating the eggs. At the time of incubation Sarus crane mostly feed near the nest. One mate incubates the egg while the other goes for feeding. While feeding also pair mates always try to remain in face-to-face position. They show aggressive behavior if disturbed during incubation. They don't allow the farmers in the paddy field to go close to nest. Some time they scare the farmers with their long plumage, loud trumpet call and occasionally attacking on them.

Hatching pattern and physical feature of hatchling

The egg hatched with the interval of 48 hours. After hatching, Sarus removes the hatched eggshell from the nest.
The hatchlings were able to walk in 2–4 days after hatching. The colour of hatchling is brownish. However, this coloration varies with age. At the age of 3–4 month, the plumage of young was grey with light brown neck and upper head and light black or no stripes at breast region whereas at the age of 5 month it is grey with light red head and upper neck (Table. 4; Plate 3).

Brood census

The egg incubation and hatching were monitored regularly. Number of egg successfully hatched and produced alive hatchling were counted. In this way the brood census was done. 15 eggs were seen in 8 nests, which after hatching produced 12 broods,

however only 10 birds reached to successful fledgling. Therefore, the projected number of successful fledglings in Faridpur Tehsil was 81 whereas the area colonized by the Sarus Cranes was projected to be 228.8896 km^2 and total surveyed area was 28.31967 (Table.5).

Brood care and feeding

For hiding the hatchling, parents fell the paddy crop and make a path for walking of young ones. The hatchlings are fully dependant on parents in the first week; gradually they start following the parents and start feeding by themselves. The parents help them in food search. However, feeding by parents was reported up to three and half months. Initial diet comprises of panicles of paddy crops, insects, small fishes and the roots of grass. The parents never leave the hatchling alone. They change their place of stay frequently for the safety of young ones. At the time of any danger, they use to hide the hatchlings in sugarcane and paddy fields and stay away from them for some time. For any call of parents, they make a responsive call. They start flying at an age of 3.5–4 months. The young stay with parents for more than 5–6 months of age.

In the period of study two eggs were noted in almost all the nests whereas only one egg was noted in a nest in Piperthara village. Jonhnsgard, 1983 stated that all *Grus* sp. typically laid two eggs. Handschuh 2010, reported that Clutch size was recorded for 171 of the 254 nests. Twenty-two nests (12.9%) contained one egg and 147 nests (86%) contained two eggs.

The interval between lying of first and second egg ranges from 46-50 hours recorded. The eggs are laid close to each other and located in the middle of the nest. Similarly Ali, 1927 measured that nearly always two eggs are laid, and according to some remarkably detailed observations on the species by the Mogul emperor Jahangir (reigning A.D. 1607

1627), the interval between the laying of the two eggs is 48 hours.

The colour of the egg was white, chalky white with very little shade of cream, pale blue or pinkish with pigment specks of varied sizes, according to Mukherjee *et al.* 2000. The pigment's colour ranged from dark brown to pale red, with a variety of tints in between. Mukherjee *et al.* (2000) reported a mean fresh weight of 206.57 g for the Sarus crane.

The egg incubation period was 28–34 days, and both sexes were involved in the process. According to Sunder and Choudhury (2005), both sexes share incubation chores; both adults actively shift egg position before beginning an incubation bout and during incubation periods. In a similar vein, Ali (1972) observed that this phase normally lasts 31–36 days, but can be as short as 28 days.

The hatching interval between two eggs lying was reported to be 48 hours in the current study. To avoid injuring the yolk sac, Jonhnsgard, 1983 calculated that the hatching process takes roughly 36 hours. The chick should only be provided help if it has not completed hatching after 48 hours. Sarus removes the hatched egg shell from the nest after it has hatched. The female picked up the larger shell fragments one by one and either dropped them beside the nest (n=2) or flew up to 100 meters before depositing them in water, according to Sunder and Choudhury (2003).

The hatchlings were able to walk in 2–4 days during the trial. Similarly, Sunder and Choudhury (2003) discovered that precocial chicks leave the nest permanently after two or three days and never return after a week. The hatchlings were a brownish colour. This colouring, however, varies with age.

The hatchlings were reported to be fed by their parents in the first week; progressively they start following their parents and feeding by themselves. However, feeding by parents was reported up to three and half months. In 1974 Klika observed that while chicks can feed independently when only two days old and Johnsgard, 1983 reported that they are fed by their parents for a prolonged period. Fledglings start flying at an age of 3.5–4 months.

Conclusion

It was concluded that wetland conservation is the first requirement to conserve the Sarus Cranes and their nesting sites. The census of the Sarus cranes should be conducted every year to know its population status and conservation issues. The marshlands inhabited by Sarus cranes in different villages should be notified and given due protection by the Forest Department and village community. A patrolling party should be constituted for monitoring of breeding pairs, nesting and guarding of hatchlings and fledglings. It will also guard the birds against the risk of destruction of nests, eggs and hatchlings by stray dogs, poachers etc. The awareness programs should be conducted by the Forest Department involving villagers, school and college students and forest front line field staff to give them knowledge about the Sarus Cranes conservation. Involvement of local media, newspapers and TV channels should also be ascertained. Development of the collaboration between regional and national government agencies involved in wildlife conservation including NGOs for effective Sarus Crane conservation. Promote further research on various aspects of Saru Crane conservation involving the areas inhabited by Sarus Cranes.

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Table 1. Name of two Blocks and total area of Faridpur Tehsil

Tehsil	Block	Area (Hectare)	Area (km²)	Block Headquarters	Distance from Headquarter (Km.)
Faridpur	Faridpur	29838	298.38	Faridpur	22
	Bhuta	32384	323.84	Bhuta	34
Total area	-	62222	622.22	-	-

Table 2. Diametrics of Sarus crane (*Grus antigone*) eggs encountered in different villages

Village name	No. of eggs	Maximum Length (cm)	Maximum Breadth (cm)	Weight (g)
Pachomi	1	10.30	6.50	220
	1	10.00	5.80	200
Khanjanpur	1	10.50	6.70	240
	1	10.00	6.00	200
Hasanganj	1	10.40	6.50	220
	1	9.80	6.00	190
Billaua	1	10.20	6.40	205
SM		**10.17**	**6.27**	**210.71**
SD		**0.25**	**0.33**	**16.93**
SE		**0.18**	**0.21**	**1.55**

Table 3. Number of nests and eggs encountered in different villages

S.No.	Village	No. of nests	Number of eggs laid	Number of eggs hatched	Number of unhatched eggs	Hatching Success
1	Pachomi	1	2	2	2	50%
		1	2			
2	Khanjanpur	1	2	2	0	100%
3	Hasanganj	1	2	2	0	100%
4	Khanpura	0	NA*	-	-	-
5	Billaua	1	2	1	1	50%
6	Piperthara	1	1	3	0	100%
		1	2			
7	Badra	1	0	0	0	0
8	Mewa	1	0	0	0	0
9	Kaherua	1	0	0	0	0
10	Navada van	1	2	2	0	100%
Grand total		**11**	**15**	**12**	**3**	**80%**

NA*-Not Available

Table 4. Colouration of hatchlings at different ages

S.No.	Age	Colour
1	At hatching	Brown
2	One month	Light grey with light brown neck and upper head
3	Two month	Light grey with light brown neck and upper head with black stripes at breast region
4	Three month	Grey with light brown neck and upper head with black stripes at breast region
5	Four month	Grey with light brown neck and upper head and light black or no stripes at breast region
6	Five month	Grey with light brown head and upper neck
7	Six to eight month	Grey with light brown head and upper neck
8	Nine month	Grey with light red head and upper neck
9	Ten months	Grey with light red head and upper neck

Table 5. Brood census in different villages

S.No.	Village	Number of eggs laid	Brood numbers	Number of successful fledglings
1	Pachomi	4	2	2
2	Khanjanpur	2	2	2
3	Hasanganj	2	2	2
4	Khanpura	NA	NA	NA
5	Billaua	2	1	1
6	Piperthara	3	3	2
7	Badra	0	0	0
8	Mewa	0	0	0
9	Kaherua	0	0	0
10	Navada van	2	2	1
Total number		**15**	**12**	**10**
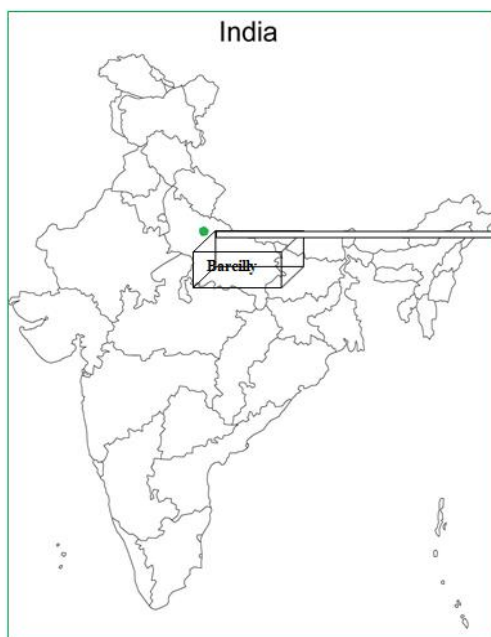
1 (a) Map of India showing Bareilly district   1(b) Map showing different tehsils in Bareilly district
Plate 1: Location map of Faridpur tehsil under Bareilly district of Uttar Pradesh, India
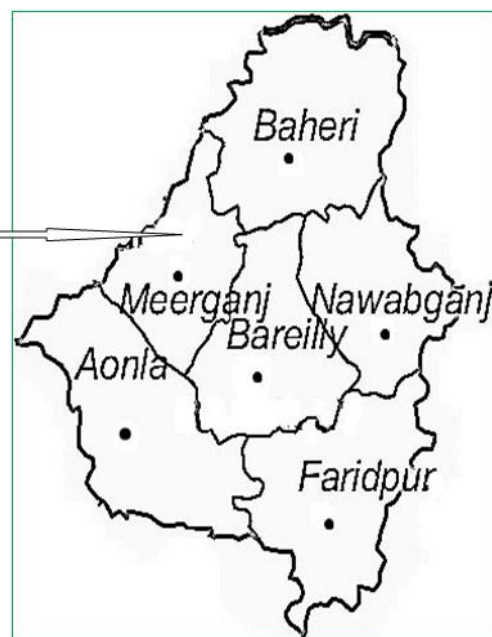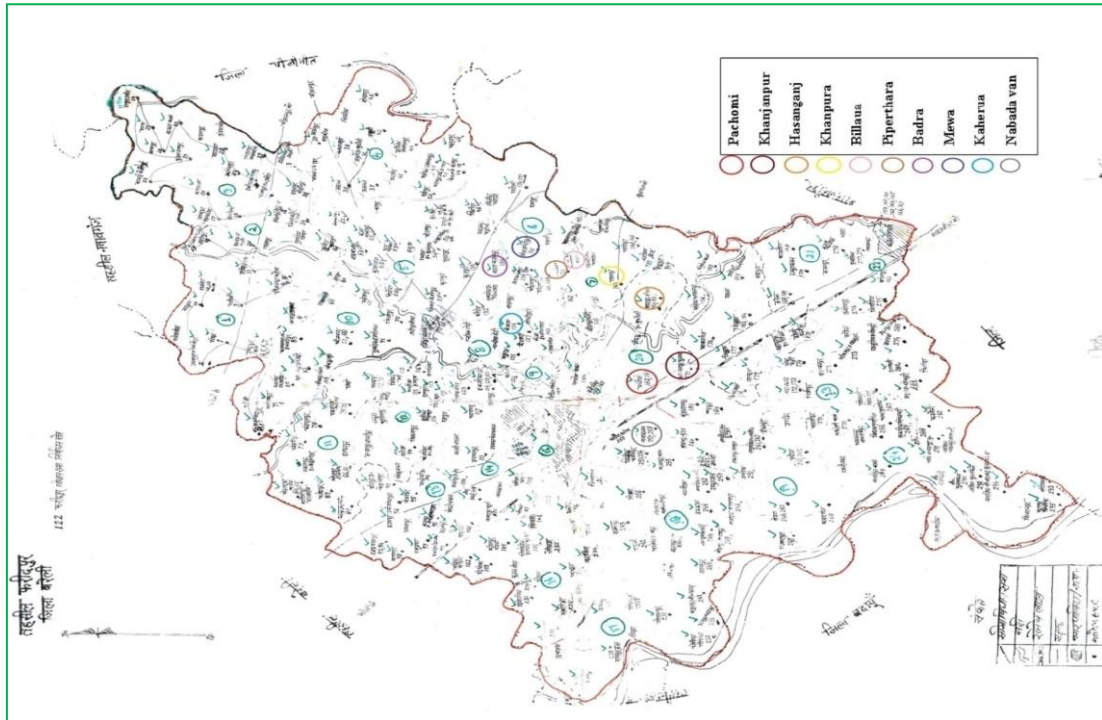
Plate 2: Map of Faridpur Tehsil showing different villages

1. A nest with the fresh egg of Sarus crane in a wetland area	2. Nest fillup with second egg after 48 hours layed by Sarus crane
3. Pic shows the pigment spots on chalky white egg of Sarus crane	4. A egg was layed on the bund of paddy crop field

5. A pair member of Sarus crane incubate the egg of the bund of paddy	6. Photographs shows the Sarus crane aggressive behaviour in their nest
7. A pair of Sarus crane agressive position near the nest	8. A pair of Sarus crane nestling in bund of paddy crop field
9. A nestling of Sarus crane in weland area	10. A fledling of Sarus crane at four month age in mustared crop field
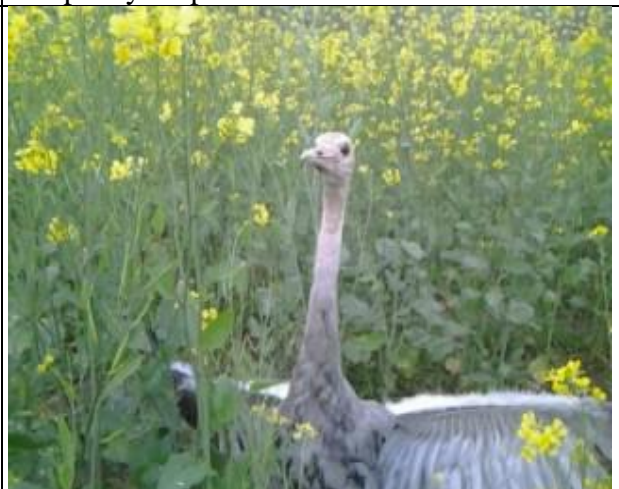
11. A pair of Sarus crane with their fledling	12. A pair of Sarus crane with their feldling in Sugercane field
13. A pair of Sarus crane with their both fledgling in wheat crop field	14. A pair of Sarus crane flight with their young

Plate 3: Different Activities of the Sarus Crane at the study area.

RETURN AND VOLATILITY PATTERN OF INDIAN STOCK MARKET DURING COVID-19 PANDEMIC

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ABSTRACT

This paper examines the COVID-19 Pandemic's impact on the Indian stock market.As a result of this investigation, the NSE (Nifty 50) daily data for the period July 2019 to July 2021 has been examined using the fundamental model of GARCH (1,1). A three-part sub-period analysis of the stock market's behaviour was then carried out using the data. COVID-19 spread (March, 2020 to February, 2021) and COVID-19 revival phase (March, 2020 to February, 2021) are defined as sub-periods in the pandemic timeline (March, 2021 to July,2021). First, we apply Unit Root test (ADF) and found that data for all the three series is stable. Then to check the arch efficiency Arch Test is adopted which shows that data has the arch efficiency. At last to measure the return volatility pattern we apply Garch (1,1) Model which shows that during the Pandemic and afterwards volatility exists with constant growth rate.

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Keywords: Return, Volatility, Heteroscedastic, COVID-19, ARCH effect .

Introduction

The rapid spread of the COVID-19 epidemic put the entire world at risk and changed the world's worldview. SARSCoV2 was initially discovered in Wuhan, Hubei Province of China in December 2019 and immediately spread throughout the globe." Besides being a health disaster, the current pandemic is also causing a catastrophic decline in worldwide economic activity. As several countries implemented severe quarantine rules to combat the unseen pandemic, their economic operations were abruptly halted. A reduction in international transportation has slowed down global economic activity to a significant degree. Customers and businesses have avoided their typical consumption habits due to the panic it produced and the anomalies it created in the market. Uncertainty and risk have had a huge influence on the global economy, hurting both established and rising countries, such as the United States, Spain, Italy Brazil, and India. In this environment, the financial market responded strongly and badly affected. Global financial markets have become more vulnerable to pandemics because of this (Zhang et al., 2020). Investors have already

lost enough money due to a lack of confidence. Due of the pandemic, the global stock market lost nearly $6 trillion in the week of February 24 to 28. (Ozili and Arun, 2020). A 30 percent drop in the S&P 500 index's market value has occurred since the emergence of Covid19. In the words of Azimili (2020), a stock's present market value is influenced by its necessary rate of return, which in turn impacts the stock's current price. Existing empirical research show that COVID-19 has a significant influence on the financial sector despite its small literature. Financial markets and banks were affected by the COVID-19 pandemic, according to a study by Baret et al. (2020) on financial markets and banking. Jim (2020) feels that the company's productivity has been significantly impacted owing to social distancing measures, which has resulted in lower revenue, higher operational costs, and cash flow issues. Since 1987, Europe's Financial Times Stock Exchange 100 Index has seen a steep decrease on a single day (BBC News, 2020). According to Igwe (2020), the economic and financial systems of three nations would be adversely affected by an increase in volatility caused by this disease. Major financial markets throughout the world

have been badly impacted by this unanticipated outbreak. In March 2020, the US stock market, a prominent economy, triggered the circuit breaker mechanism four times in 10 days (Zhang et al., 2020). The Eurasian stock market also soared in response. On March 12, 2020, the FTSE 100 index in the United Kingdom plummeted more than 10 percent (Zhang, 2020). December 2019 had a 20% drop in the Japanese stock market according to Vishnoi and Mookerjee (2020). Similarly, the stock markets in Spain (25.1%), Hong Kong (14.75%) and China (11.1%) all plunged by more than a quarter. During the period of March 8th to March 18th, 2020. (Shehzad, 2020). Shehzad (2020) also showed that this had a detrimental effect on the total return of 4,444 equities in the S&P 500 index, but the effect on the Nasdaq Composite Index was insignificant. Georgieva (2020) noted that the COVID19 epidemic has moved the globe closer to financial crises, which is more hazardous than the global financial crisis of 2007-2008. In recent months, the pandemic's severe consequences have been felt in developing nations. For developing economies, we see a bleak picture in the financial markets since oil prices have had the greatest impact on their economies. As a result of the COVID19 pandemic, the importance of this photograph has been elevated. A 1% recession will hit developing countries in 2020 when key emerging economies such as Brazil, Russia, and Mexico begin to implement stringent liquidity controls (Herfero, 2020). KOSPI dropped below 1,600 after 10 years in South Korea because of a coronavirus infection (So, 2020). As a result of COVID19-induced uncertainty, China's equities returns have been volatile (Liu, 2020). March 22, 2020, was set as the date for India's Janata curfew by the country's administration. By keeping the lockout regime in place until March 24, 2020, the disease will be kept under control. Lockdown policy announcements by the government caused a sudden cessation of economic activity. In India, the stock market has seen significant volatility as a result of the worldwide brand's demise. Volatility in the Indian stock market was exacerbated by the global financial crisis. Covid19 epidemic began with it, and it was first to be afflicted

The following is the outline of this paper. The introduction is followed by a review of the literature, a description of the data sources and techniques, a discussion of the findings, and a conclusion. The remainder of the paper is divided into five sections.

Objectives and Importance of the Study
Objectives:
From 2019 through mid-2021, researchers plan to explore the following features of NSE (Nifty 50) Index:
1. The extent and pattern of daily returns and volatility on NSE (Nifty 50).
2. During the COVID-19 Pandemic, several stages of the Indian stock market's rebound and volatility are compared.
3. To estimate the volatility of returns.

Importance of the study:
Investment is the back bone of stock Index which comes through the investors who invest their savings in different securities for profit making. That's why this study is important because it will reveal the return and volatility picture in front of investors and researchers. This study describes how COVID-19 happened and spread into the other economies. Also the study is helpful in future prediction because prediction is based on historical data. The impacts of COVID-19 may be examined using historical data spanning the years 2019 to 2021, allowing us to make an informed judgement on the Index's stability, growth, and prospects for the future. In addition, no one wants to invest in a stock that is going to lose money. The financial future does not have to

come as a surprise, but rather as the result of a well-planned financial strategy if you take the time to look at the Index's shareholder reports, press releases, industry publications, and other publicly available material with an analyst's eye. So, this type of study will helpful in future strategy planning.

Literature Review and Hypothesis Formulations

"Xie, Hong and Li, Jian (2009) Based on high-frequency trading tactics, we studied intraday volatility of S&P 500 stock index futures products. The GARCH series, which includes GARCH (1, 1), EGARCH, and IGARCH, is used to run the aforementioned models via the GARCH In Means method. The results reveal that the EGARCH model is the best model for predicting intraday volatility of future products of the S&P 500 stock index, while the I GARCH model is the best model for predicting the sample. Otherwise, the I GARCH model is the best choice for out-of-sample estimation, and the E-GARCH model is the best." At least in this experiment, the GARCH (1, 1) model did not do well. The end result will be a market study of microstructure and volatility arbitrage in high frequency trading methods. Goudarzi, Hojatallah, and Ramanarayanan, CS (2011) employed an asymmetric ARCH model to explore the influence of good and negative news on the volatility of the Indian stock market during the global financial crisis of 2008-09. Using the BSE 500 stock index, a 10-year period of Indian stock market volatility was measured. The EGARCH and TGARCH models, two widely utilised asymmetric volatility models, are in use. The return series BSE 500 was found to react asymmetrically to both positive and negative news. Leverage indicates that negative innovation (news) has a stronger influence on volatility than positive innovation (news). As shown by this stylised fact, the advent of unfavourable news on the market will lead to a surge in volatility that is greater than that caused by positive news. We find that poor news in the Indian stock market may lead to more volatility than good news.

Su, Chang (2010) evaluated the return volatility of the Chinese stock market before and after the crisis era to see if long-term volatility was more prevalent during the crisis period than before to the crisis. Before and after the financial crisis, everyday data from January 2000 to April 2010 is used to create a time series. The study makes use of GARCH and EGARCH models in tandem. The EGARCH model beats the GARCH model in terms of forecasting volatility in Chinese stock returns, according to empirical data. In addition, the data show that long-term volatility is more volatile during a crisis. When China's stock market is in crisis, bad news has a stronger impact than good news. COVID19's impact on financial markets and stock markets has been studied extensively in both developed and developing countries. The literature on this subject is littered with contradicting conclusions. Ozili and Arun (2020) conducted an empirical investigation on the effects of social distancing measures used to control the transmission of the coronavirus on four continents. According to the report, the 30-day social separation or blockade strategy of hurt the economy by reducing stock prices. Quantile regression was also employed by Azimili (2020) to investigate the influence of the coronavirus on the degree and structure of US risk-reward reliance. A decrease in returns from diversification was observed at the top quantile when COVID19 was discovered, as evidenced by an increase in dependency on market returns. As part of his research, the author looked into GSIC-stock performance correlations and discovered that they were not linear. The bottom tail has nearly double the negative impact on returns as the top tail. Xie Zade and co-authors (2020) An analysis of nonlinear financial market behavior in the

United States, Italy, Japan, and China was undertaken using the GARCH model with asymmetrical power. In the analysis, 4,444 equities from the S&P 500's index were shown to have negative returns due to COVID19. But the Nasdaq Composite Index appears to have just a little influence on its value. COVID19-related news and the profitability of the stock markets of the most impacted nations were studied empirically by Cepoi (2020). COVID19-related information asymmetry is being investigated using panel quantile regression. Osage and co-authors (2020) Nigeria's stock returns were negatively affected by COVID19 when the quadratic and exponential GARCH models were applied to the data, which suggested that the country's political stability, incentives for local businesses, economic diversification and flexible policies were all factors that could help the country. Improved financial markets are a result of the introduction of a currency exchange rate system Becker (2020) found that a shift in oil prices was a severe concern for the economy, as the country relied largely on oil money. The 20 percent devaluation of the currency and the 70 to 80 percent decline in oil prices creates a large discrepancy between the two. According to Herfero (2020), the third wave of the COVID19 pandemic had an impact on commercial activity. Financial costs are becoming increasingly dangerous as a result of the shock of this magnitude. With its high dependency on external funding, Latin America is the region most impacted by it. Exports declined by 4,444 as a result of transportation issues. The tourist business was affected and income was reduced as a result of travel restrictions on a global scale. Hyun Jung (2020) studied South Korea's stock market, which is another prominent rising economy in the world. According to his study, the economy is exhibiting a roller coaster-like tendency. January, February, and March had a declining trend in monthly exports; the same was true for

March and June. Compared to Raja Ram, the country's exports have declined by 11.2 percent. " (2020). His study indicated that COVID-19 had wiped off the entire worldwide market share. Following the collapse of the global financial market, the Indian stock market too faced significant turbulence. The Indian stock market's performance was also harmed by the collapse in FPI's share price. According to this source, COVID-19 is one of the few "black swan" events. In the next section, he looked at fluctuations in the Indian stock market. experts have concluded that they cannot reliably predict economic recovery unless the public health system is stabilised. Prior to and following COVID-19, Ravi (2020) analyses the Indian stock market's performance. Since both the BSE Sensex and NSE Nifty both fell by 38 percent, many were apprehensive about COVID-19. During the first quarter of this year, this has resulted in a 27.31% drop in market share. Due to traffic restrictions, the stocks of some other industries such as hotels, tourism and entertainment have decreased by more than 40%. Mondal (2020) closely analyzed the death pains of the Indian stock market fatal pandemic. The results showed that BSE Sensex had the largest one-day drop of 13.2%, surpassing the notorious drop on April 28, 1992. Nifty's fell by 29%, more than the 1992 disaster. (Rakshit and Basistha, 2020)

Hypothesis

First and foremost, this work attempted to examine the return and volatility patterns across time. The ARCH test may be used to examine the volatility clustering signal. There are a number of ways to determine whether data is stable, such as using an ADF test:

H0: Unit Root is existing

H1: Unit Root does not exist

It is required to check for conditional heteroscedasticity in the variance before

estimating volatility using the GARCH (1,1) model. The testing hypotheses are as follows:

H0: Non- ARCH Efficiency

H1: ARCH Efficiency

Research Methodology

The Instrument

Daily closing prices data has been collected from NSE's official website.

Sample

The primary goal of this article is to examine the influence of COVID-19 on the Indian stock market return and volatility, hence daily NSE (Nifty 50) data from July, 2019 to July, 2021 has been examined. On the Nifty 50 index, which comprises the largest and oldest Indian enterprises, this paper can gain a deeper understanding by investigating the Nifty 50 index. Finally, the entire research period is broken into three separate phases, allowing for the examination of stock market returns and volatility in each step of COVID-19. Early stage of pandemic (July,2019 to Febuary,2020) spread of COVID-19 (March, 2020 to Febuary,2021) and revival period (March, 2021 to July,2021).

Statistical Tools

The stock market return and volatility are two of the most important factors in this study. Each sub-stock period's market return is computed as follows:

Rt = ⌈Log (Pt) - Log (Pt-1)⌋

Where Rt is the daily return of Nifty 50 at day *t*, Pt is the closing price at day *t* and Pt-1 as the closing price at day *t* – 1.

When it comes to volatile factors, there is no way to measure them. Consequently, it is common practise to use square returns or absolute returns as a proxy for volatility in financial markets. Preliminary examination of the observed return series for each subperiod were carried out using the Augmented Dickey-Fuller test (ADF). If ARCH effects are identified, the GARCH model can be used. It was found that, once ARCH effects were discovered, most studies piloted for volatility investigation continued to use the fundamental GARCH (1,1) model for computing conditional variances.

Reliability of Data:

Daily stock return data is used in this paper and the results of all the test are significant. So, data is reliable for investigation.

Results

Descriptive Statistic

To determine whether or whether the data is normal, a statistical description is performed. It is calculated using the closing prices of the NSE (Nifty 50) index every day. Descriptive Statistics for Return and Volatility both are calculated which are as follows:

Here Period-I = July,2019 to Febuary,2020

Period –II = March, 2020 to Febuary,2021

Period – III = March, 2021 to July,2021

Tables 1 and 2 summarized the return and volatility series information for each step in Table 1. The NSE (Nifty 50) Index has, on average, seen negative returns since the beginning of the subprime crisis, as shown in Table 1. During the early stages of the Subprime crisis (Sub-period I), the mean returns decreased, although a slight bounce was found following the lockdown period.

There were no significant changes in mean returns in Table 3. COVID-19, on the other hand, causes stock returns to climb in volatility, and this increase is found to be consistent throughout sub-periods (refer the mean values in Table 2.). Prior to the lockdown and pandemic, Table 3 results indicated a considerable rise in volatility, although the degree of the increase in volatility seems to have been greater.

Unit Root Test

For testing the Stationary feature of the data, we normally test it by ADF test. Graphically Presentation also describes the stability of data. For all the sub periods graphs shows that stock return found stable which means data is stationary. Further Results of ADF test for all the period as per the Table 4. shows that data is stationary as null hypothesis that returns have unit root are rejected for all the sub periods due to low t value in comparison to ADF critical values. AIC & SC values are less in period I but during Period II & III they are larger and remain constant which was spread of COVID-19 (March, 2020 to Febuary,2021) and revival period (March, 2021 to July,2021).

Arch Test

To test the hypothesis that whether there is arch efficiency or not, we first apply heteroscedasticity test. Under which we select ARCH test. As per the results of ARCH test for sub period I ,II & III the values of Probability for Chi- square test (see table 5.1) all are less than 5% which means data clear the heteroscedasticity test and eligible to run Arch family Model. We can reject the Null hypothesis of Non ARCH efficiency which means there exists Arch efficiency for available data.

Garch (1,1) model: after Applying Arch test next step is to estimate volatility by Garch (1,1) model. Results of table 5.2 Shows that during the sub period I which is before recession period the return volatility is high with minimum AIC & SC values i.e -5.87 & -5.82. For sub period II Values of AIC & SC are -4.78 & -4.72 and for sub period III Values are -5.75 & -5.74. both the values of sub period II & III are more than sub period I. So, we can conclude that garch model is best fitted in early stage of pandemic & volatility prevail afterwards with constant growth rate.

Managerial Implications/ Suggestions

The Result of study suggest that before the pandemic the performance of stock index was better but during the pandemic and afterwards returns volatile with high frequency. So, investors should react according to the situation and can minimize the losses.

They acquire stocks with the purpose of selling it for a profit at some point in time. So, in order to do so successfully, they need spend just as much time and effort organising their exit strategy as they do researching the reasons why investors should acquire the investment. This paper used the historical data and describes the behavior in different periods which suggest the strategy of buy low during pandemic period and sell high during recovery period.

This study also suggests that taking small losses is much better than taking big losses and always invest in low risk situation.

Limitations and Future Research

- The paper does not include rest of the major indexes of the economy and other economies.
- Intraday volatility is not calculated since high frequency daily data is used in the article.
- The paper analyzes the data for July, 2019 to July, 2021 only.
- It was hard to find out the most important event which affected the stock returns and volatility.
- This paper divided time period into three parts and analyze data but total effects have not studied because full period is not considered.

It is now clear that stock return behavior changes during a pandemic and may be used to anticipate the stock return behavior and dynamics of the first two minutes during any pandemic situation for future research.

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IMPACT OF GENDER IN INVESTMENT DECISIONS: A STUDY OF DELHI NCR

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ABSTRACT

This research aims to investigate the gender disparities in tolerance of financial risks and investment decisions using the Consumer Finance Survey, a comprehensive national representative dataset. The effect of the explanatory variables in the model could change between men and women in order to deconstruct sex differences in financial risk tolerance. The results show that variations of gender in tolerance are based in relation to financial risk, and that gender disparities do not come from gender in and of itself, according to the individual drivers of financial risk tolerance. Revenue uncertainty and net value are individual factors which diminish the gender-specific relationship and high-risk tolerance and reduce the gender-tolerance relation by uncertain revenue. Financial trustees should understand disparities in income insecurity and net worth between men and women and how such variances relate to risk tolerance.

Keywords: Risk tolerance, Gender Differences, Household behavior, Personal finance.

1. Introduction

Risk management is an important aspect that economists examine in order to explain individual behavioral variations. In household decisions on portfolios, risk tolerance that shows how willed a person is to accept risks plays an essential role and impacts both consumers and financial service providers. Tolerance to financial risks is the degree of discomfort a person wills to tolerate while risking present riches for future gain. An investment might expect a better return for a greater degree of risk in efficient markets. As such, investors with higher risk tolerance choose to invest in higher risk assets such as equities to generate larger long-term returns and build up higher fortunes. An investment with a lower tolerance of risk requires additional compensation in order for it to accept uncertainty when faced with a variable investment. There may thus be more challenges for investors with low levels of risk tolerance to accomplish their financial goals and establish enough pension funds since they are unable to invested in equities. Understanding financial risk tolerance for investors is crucial in the post-global financial crisis climate for financial service provider, including the recently released fiduciary rule by the U.S. Department of Labor (DOL), 2016, April). In the past, sales-based consultants were subject to a standard of appropriateness. As a consequence of this regulatory amendment, more consultants have a greater fiduciary level of responsibility for a larger variety of consultations. This means that the personalized suggestions given are in the customer's best interests, and two important requirements to meet this necessity are a proper awareness of the risk tolerance of investors. However, research indicates that financial advisors are unable to understand fully the tolerance of women for financial risk and underestimate tolerance of women's risk. Consultants are required to better understand and evaluate the tolerance of women to risks through trustworthy, legitimate techniques to provide suggestions in the best interest of the customer.

2. Literature Review

In early psychological study, it was frequently assumed that attitudes to risk or the location of a person in the continuum between risk and danger was a personality attribute (Plax & Rosenfeld, 1976). Risk tolerance thresholds were based on particular tasks, policy frameworks and IT Strategies (Schoemaker, 1990; Weber & Milliman, 1997). An important driver of asset allocation chooses, security choices and target planning methods was

considered to be the individual financial risk tolerance (Grable & Lytton, 2001). The financial risk tolerance was observed by Van De Venter, Michayluk & Davey (2010) to be generally constant over time. The evaluation of tolerance for financial risks is becoming a matter of interest among researchers, practitioners and policymakers as a component of their financial decisions. (Gilliam, Chatterjee, & Grable, 2010).

Gender and risk tolerance

Variations in gender tolerance reported autonomously have often been examined. Empirical results largely acknowledge that in their financial decisions, women are on average less risk-tolerant than men (Byrnes, Miller, & Schafer, 1999; Gibson et al., 2013; Grable & Lytton, 2001; Hawley & Fujii, 1993; Jianakoplos & Bernasek, 1998; Olsen & Cox, 2001; Palsson, 1996). Hallahan et al. (2004) found that sex is a key predictor of risk tolerance that increases women's risk. Cuuples etal. [2013] revealed that women are not risky, with education as mediators and reduced gender gaps in their profile of risk tolerance.

Several research have examined the link between marital status, sex and risk tolerance. Sung and Hanna (1996) have shown that the risk tolerances for men or married couples have been less high on their own. In the same way, females are less likely to tolerance on their own than men in Sunden and Surrette (1998). The Yao et al. (2004) data suggest that both married women and unmarried women had a lower risk tolerance than married men and that unmarried males had a greater risk tolerance. Yao and Hanna (2005) showed that there was highest risk tolerance between married men, unmarried men, unmarried women and married women. Yao et al. (2011) found that risk tolerance among non-matrimonial women was negatively linked. In contrast to the above findings, Gender was a key predictor of financial risk tolerances, as reported by Grable

and Joo(1999) and Hanna and Gutter and Fan (1998). Researchers have also studied gender inequalities in the management of financial risk. Xiao (1995) demonstrated that the risk of women holding inventors and holding banking credentials is lower than that of men. A study by Dwyer, Gilkenson and List (2002) show that while choosing on investment mutual funds, women take lesser risks than men. Bajtelsmit et al. (1996) examined the gender inequalities in defined contribution benefits for pensions, concluding that women invest in their assets more carefully. Research shows that, with exceptions nevertheless, women are less tolerant to danger than men in general. For example, the gender disparity in dollar holdings in 1995 was not identified between Zhong and Xiao; Arano, Parker and Terry (2010) were unable to discover gender differences in a sample of academics from universities in Kansas' retirement funds ratio. The results of Neelakantan (2010) show a gender risk tolerance of around 10 percent of the gender disparity for cumulative wealth based on health and retirement (HRS) statistics, focusing on older Americans. Cupples et al. (2013) noted that the whole impact of gender on tolerance of risk diminished when education was added as a mediator. These findings demonstrate that several other factors impact the gender difference in financial risk tolerance. Limited study explored whether gender variations in risk tolerance are related to gender or to other factors that reduce the link between risk tolerance and sex. This research thus adds to the literature by a large collection of nationally representative data which dissects the difference between genders in risk tolerance.The previous literature offered some evidence of the elements interacting with the tolerance of the sex. However, this is the first study to carry out a detailed analysis of sixth gender effect on risk toleration, whether this impact is attributable to gender solely, or

additional factors that moderate the gender effect on risk tolerance.

3. Objectives of the study

The objectives of the study are

1. To examine if there exists any significant difference in the investment choice of men and women
2. To examine if various sources of information for men and women change the investing choices individuals make.

4. Sources of Data

The data utilised are primary data and gathered by means of the questionnaire. Prior to performing the real survey, a pilot study was performed with a sample of 10 respondents. Questions were rephrased which were ambiguous or unclear. The selection of the respondents was carried out using a convenient sampling approach. The respondents were individuals who are stock market investors and do not limit themselves to India or Delhi NCR. 108 properly completed surveys were obtained from 210 questionnaires issued. The data were processed and evaluated with a tables so that the results may be readily transmitted.

Mann Whitney Rank Sum Test was utilised for the analysis of the selection of investment avenues between men and women. ANOVA was utilised in the study to investigate the risk levels between men and women.

5. Data Analysis and Interpretation Hypothesis

Hypothesis 1:

H_0 The investing choices between male and female investors have no substantial variation.

H_1 The investing choices between male and female investors are considerably different

Hypothesis 2:

H_0 The risk-taking rate between male and female is not significantly different.

H_1 There is significant difference in the risk-taking level between male and female.

Hypothesis 3:

H_0 There is difference in the information sources between male and females.

H_1 The information sources between men and women are not significantly different.].

Analysis and interpretation
Classification based on gender and age

Table 1: Classification based on Gender and Age

Age group	Female	Male	Grand Total	Percentage
16 - 25 years	8	32	40	37%
26 - 35 years	12	18	30	28%
36 - 50 years	14	13	27	25%
Above 51 years	2	8	10	9%
Grand Total	36	72	108	100%

Table 1 above shows the sexual and age-friendly categorisation of the respondents' investor profile. The data reveals that the bulk of the investors in the women's group is between the ages of 36-50 and for men, 16-25. Female investment is higher or equivalent to males in the age bracket of 36-50 years. In the 51-year age group, males are more likely than the others, as women in this age group do not invest owing to uncertainty. In the age group over 51 years the smallest amount of investors is observed, which suggests that individuals do not invest much in hazardous assets at this age due to the different limitations.

Classification   based   on   Gender   and   Educational Qualification

Table 2: Classification based on Gender and Educational Qualification

Educational qualification	Female	Male	Grand Total	Percentage
Professional	5	10	15	14%
Post Graduate	18	32	50	46%
Undergraduate	12	28	40	37%
Secondary	1	2	3	3%
Grand Total	36	72	108	100%

The classification of respondents for their gender-based and education qualifications is shown in Table 2. It may be concluded from the table that most investors are postgraduates. Investors hold a 97% bachelor's degree or above. Investors are educated and the proportion of graduate investors is more or less identical in both genders. The option of investment includes stocks, mutual funds and commodities, as well as investment decision among investors.

Investment choice between Gender Groups

Hypothesis 1:

H0 The investing decision between male and female investors makes no meaningful impact.

H1 The investing choices between male and female investors are considerably different.

Table 3: Group Statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
What sources of funds do you utilize to invest in stock market?	Male	72	2.4583	1.22115	.14391
	Female	36	2.4167	1.18019	.19670

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of What sources of funds do you utilize to invest in stock market? is the same across categories of Gender.	Independent-Samples Mann-Whitney U Test	.861	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

As we estimate the meaning value of 0.861 and p below 0.05, we thus accept the null hypothesis that there would be no significant difference in investing options between male and female investors.

Level of Risk

Hypothesis 2:

H0 There is no substantial change in the risk taking rate between men and women.

H1 The amount of risk taking between male and female is significantly different.

Table 4: Group Statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
What kind of investing / trading do you adopt?	Male	72	1.7917	.62658	.07384
	Female	36	2.1111	.52251	.08708

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of What kind of investing / trading do you adopt? is the same across categories of Gender.	Independent-Samples Mann-Whitney U Test	.009	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Because our estimated importance is accepted as alternate, (.009) and p should be lower than 0.05, thus we reject the zero hypothesis and we reject female investors because our calculated importance value is based on the substantial difference in risk levels between males and females.

Information sources of men and women are different

Hypothesis 3:

H 0 There is difference in the information resulting in a difference in the investment choices sources & investment choice between male and females. they make.

H 1 There is no major difference between male and female sources of information and investment decision.

Table 5:

	Gender	N	Mean	Std. Deviation	Std. Error Mean
What sources of funds do you utilize to invest in stock market?	Male	72	2.4583	1.22115	.14391
	female	36	2.4167	1.18019	.19670
What information sources d you use to trade in a particular stock?	Male	72	4.9861	2.75012	.32411
	female	36	4.8056	2.76529	.46088

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of What kind of investing / trading do you adopt? is the same across categories of Gender.	Independent-Samples Mann-Whitney U Test	.009	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Group Statistics

Since it should be (.0866, 0.749) p based on our hypotheses, our estimated significance value should be (p<0.05), We accept null assumptions and reject the alternative hypothesis that there are substantially different sources of information/investment between men and women."

Conclusion

The paper's major objective was to assess the gender role in the making of financial choices. The major aim is to find out whether gender disparities exist among male and women investors in investing and risk taking. The article also analyses if the discrepancy is because of the information difference. In contrast, there were numerous hypotheses and the main research was done on a sample size of 210 respondents, with 108 correctly completed questionnaires.

This study demonstrates a danger of differentiating between men and women. The findings supports the risk taking of males more than of women. In its choice of investment alternatives, there is also a discrepancy among the risk capability of women and men. The findings show that women prefer free investment, whereas men choose risky investment. Women investors are less confident in their investment choices, and hence have lower enjoyment levels. This research shows that the gender differentiation influences investment behaviours. Male and female investors have a very different degree of risk. The information given to men and women investors is also noticed to be different and hence the choice on their investment has a difference.

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DETERMINANTS ON RETIREMENT PLANNING IN INDIA: ANALYSIS OF REGISTERED PENSION SCHEMES.

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ABSTRACT

In India, retirement planning has recently gained tremendous relevance among the workforce; it has never been more important than it is today. Everyone looks forward to joyfully spend years of retirement. Retirement financial planning includes a number of wealth accumulation actions to meet the demands in the post-retirement period of life. A survey on registered pension programme in Delhi NCR aimed mainly at studying the factors of pension planning in India. The research population consists of members of the registered Nairobi pension plans. Stratified sampling was utilised to choose interviewees from each system. The Test was used to review the data for the purpose to see whether the link between financial literacy and retirement schemes is significant. The findings of this study can draw several conclusions that demonstrate the link between financial and retirement planning literacy and different social-economic features. The results show that financial literacy, income and the degree of education of the respondent play an important role in the pension planning process. On the other hand, age and years of marriage do not have important determinants of pension planning. However, in general, financial literacy was a key predictor for pension plan members, mainly because financial literacy affects both savings and portfolio choice. We may infer thus that financial literacy is an important factor in pension planning for members and a link exists between financial and jubilatory literacy.

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1. Introduction

The ageing of the population has become one of the most significant societal changes in the 21st century. The number and proportion of the population of the elderly is increasing in every country in the globe. According to predictions by the PRB, contained in the World Population Data Sheet 2018, the world's population will reach 9.9 billion by 2050, up 2.3 billion or 29 percent of the anticipated 7.6 billion people by now. The percentage of the worldwide population of older persons (65+ years) has risen from 5% in 1960 to 9% in 2018 and is expected to climb to 160% by 2050. The segment of older individuals is expected to increase most quickly in 85%. Children (0-14 years) are down from 37% in 1960 to 26% in 2018 and are predicted to shrink to 21% by 2050. The age structure changes differ per nation in time and pace, and these changes have major social and economic consequences. It is thus very clear that more resources will have to be allocated to the elderly. The need to save and prepare for retiring is becoming increasingly more essential with life expectancy still on the increase. (Format, 2013). The pension plan, both individually and for the Indian people as a whole, has a major necessity.

Return savings are quite essential. Everyone looks forward to joyfully spend years of retirement. Most nations have their own pension schemes and the system differentiates between employees in the public and private sector (Hassan et al, 2015). Only 11 percent of the entire Indian populations have a formal pension plan. Employees in the public sector who joined before 2004 would get a monthly pension. However, there is no system like this for employees that joined the workforce following 2004 and those working in the private sector. In these situations, retirement planning is subject to substantial requirements. In India, retirement planning has recently gained tremendous relevance among the workforce; it has never been more important than it is today. Everyone looks forward to joyfully spend years of retirement. Retirement financial planning includes a number of wealth

accumulation actions to meet the demands in the post-retirement period of life.

Retirement planning is essential to:
- Prepare for unexpected situations
- Maintain a positive outlook to life
- Beat Inflation
- Invest in top - notch medical care
- Secure family's future
- Keep oneself updated on retirement plans and benefits
- Safeguard one's saving

The negative consequences of inadequate planning for retirement not only affect individuals, but also their extended families.

2. Review Of Literature

Roshan and Hareendra (2015) Evaluated the level of financial literacy of students at the Sri Lankan higher education centre and its influence on the level of financial literacy of demographic variables. In order to measure the financial literacy using logistic regression, a sample of 319 students has been polled. The results showed, in terms of financial learning (inside the whole and in general knowledge, and saves and borrowing under dimensions) that non-business managers (i.e., English or Information technology) are less familiar than business managers (i.e., Accounting and Business Management). These findings were expected to have significant implications for education policy, including the introduction of financial alphabency topics for all of the students in their formation stages and the introduction in non-business major curricula of course components relating to accounting and financing. **Lucía et al. (2015)** focused on the potential driving factors of saving for retirement in Portugal and Spain by using the data from the Survey of Health, Ageing and Retirement in Europe. The multivariate analysis highlights that saving for retirement in Portugal and Spain is low. The study conclude that the decision to save for retirement is positively related to level of formal education, job 43situation, saving habits, area of residence and homeownership, and negatively related to financial risk aversion and right-wing political orientation. **Mansor et al. (2015)** investigated the factors that contribute to the retirement planning among Malaysian health sector based employees. The study revealed that age, education level and household income are positively related to planning for retirement and gender was negatively related. **Deepak Sood** and **Dr. Navdeep Kaur (2015) examined the** Relationship between the pattern of savings and investment amongst the employed, Chandigarh being specially mentioned. The positive association between age, income, wise work, persons education and annual savings using one way ANOVA was observed. There is also a favourable relationship. It was said that LIC and bank deposits were the favoured investment choices and high yields, tax benefits and security were the main reasons affecting investment selections. Meena Chaturvedi (2015) has stated that the Indian Pension Policy is historically funded via the involvement of employers and employees. As a result, coverage was confined to the accounted workers and access to official pension benefits channels was denied to the bulk of workers in the informal sector. In the financial crisis, Lusardi and Mitchell (2014) evaluated how well-equipped families today are to make complicated financial choices. The study focused on people's financial literacy, their capacity to comprehend economic information and take educated judgments on financial planning, building of wealth, liabilities and pensions. The study concludes that it is important to further deepen theoretical saving modelling and financial decision-making so that financial knowledge is a kind of human capital. It also adds that further study on the subjects of causation between financial knowledge and economic well-being would be helpful. Geetika Batra (2014) intends to

explore and assess the possibilities for investing to plan people's withdrawals. Mainly how savings and retirement investment may be planed. This research also investigates the advice offered by websites and autonomous pension schemes for investors. Moeinadin(2014) has studied the impact on financial literacy of students' demographic factors. The study shows a favourable relationship to financial literacy in terms of population age, gender, education and financial independence. Financial freedom affects student financial literacy positively. In comparison with their peers, the students who are financially independent had a better level of financial knowledge. **Sharon Kerosi Kerubo (2014)** in his project examined the effects of demographic characteristics on financial preparedness amongst employees of international nongovernmental organizations (INGOs) in Kenya. The study found that a significant positive relationship exists between gender and employee preparedness for retirement. The attributes that positively influence the levels of financial preparedness for retirement are time to retirement, financial literacy, household income and levels of education. The attributes that negatively influence financial preparedness for retirement are employees' attitude, number of financial dependents and marital status which commits their financial resources. The study recommends that there should be increased pension awareness sessions supported by the government, private pension schemes and employers. **Wang and Shi (2013)** Empirical data were investigated as to how the retirement process is connected to different human qualities, work and organisational variables, family factors and socioeconomic contexts. They also examine retirement outcomes in terms of financial wellbeing, physical well-being and mental well-being for retired people. Praveen Jha and Nilachala Acharya (2013) says that, while the significance of universal social

security is becoming a major component of progressive public policy in most emerging nations, only a minority of the population has been subject to the social security safety net. A number of government governments have drawn up social security systems and initiatives, both for the organised and non-organized sector. The investment options of wage classes in Namakkal Taluk, Tamilnadu (India) were reviewed in 2013 with the aid of 100 interviewer representatives, and showed that investment in different directions depends on the amount of revenue of the employees. Also essential for investing is the age element. **Gargi Pant (2013)** evaluated the awareness of female faculty members towards investment for retirement planning. The analysis found that that married women are more aware about the retirement planning and planned more for retirement when compared to unmarried. The survey also showed that the female professors have moderate risk and choose to invest in less hazardous routes. In order to examine the implications of financial education on financial learning and economic results, Hastings et al.(2013) reviewed research on financial literacy, financial education and consumption financial outcomes. FOLK et al. (2012) analysed the effect of financial knowledge on preparedness for financial pension schemes. The study shows that there was some mediating impact between a financial learning and a personal finance behavioural evaluation and that older age groups had a mediating influence on the link between financial learnings and a subjective view of personal finance satisfaction. In the prediction of retirement planning behaviour, Krishna Moorthy (2012) discovered numerous relevant variables including the levels of age, education and earnings. The The study showed that early preparation makes for a sound financial foundation for individuals. Krishnamurthy (2012) identified the link between pension planning and pension planning behavioural

variables. The study shows possible conflicts in pension planning, retirement attitude and objective clarity are important determinants of pension plan behaviour. The study finds that early retirement plans provide benefits and advantages. **Dhiraj Jain and Parul Jain, (2012**) examined the savings and investment pattern of school teachers of Udaipur District, Rajasthan. The study concluded that in the current generation money plays a vital role in an individual's life and that the importance of money has started being recognized by the working people. Individuals know the importance of money and hence they are initiated by themselves to prepare the future budget and lessen down their expenses to meet the future contingencies. The survey shows that most school instructors preserve their money to determine education, marriage and retirement safety for their children. Topa et al. (2012) expand Hodges' retirement planning model to include psycho-social factors in a predictive perspective on objective and subjective financial planning metrics. Then the model was used by the first wave of SHARE research in a representative sample of 1272 immigrants across Europa. Structural equation modelling (SEM) analysis shows that ill health, the migration senior ship and employment demand, among other variables, predict the overall projected pension volume. Wage, employment tenure and migratory seniors were projected to contribute to the total years of pension contributions.

3. Objectives Of the Study

The Main objective of the study was to explore the determinants of Retirement Planning in Delhi NCR a survey of registered pension schemes in Delhi.

4. Research Methodology

4.1 Research Design

This was quantitative descriptive research to determine the link between financial and retirement schemes. In a descriptive research, Cooper and Schindler (2003) describes who, what and how a phenomena can be found. The objective of this study was to provide the context and a thorough and precise image of a scenario, hence it was descriptive. The research target population consisted of members of the Delhi registered pension schemes. There are 787 registered pension plans in Delhi, depending on data on the RBA web site at the time of the study. Roscoe (1975) provides a thumb rule to determine the sample size and argues that for most studies, a size of between 30 and 500 is suitable. Due to the enormous number of people engaged, a sample of 10% (79 schemes) was not viable to reach the whole population of interest. Randomly chosen and non-proportionally stratified samples of participating systems were utilized to select from each scheme 2 members to 158. Retirement planning data analysis was assessed using the cumulative sum of money that people saved for retirement. Financial literacy was measured between 0 – 4 where interviewees were asked to identify the degree to which they understood and practiced the different idea of finance on a five-point scale (not to a very significant level). They did not (0) suggest they were not knowledgeable, but they were sufficiently knowledgeable to a very significant level (4). The revenues were measured by a person's monthly income; the age was measured by a person's present age, married years were measured by the number of years married, whereas educational levels were assessed by the greatest degree of education.

5. Findings And Interpretation

5.1 Determinants of Retirement Planning

One reason people do not plan or fail to plan their retirement is because they are financially illiterate. In this situation, individuals do not understand the function of compound interest, inflation, and risk (or might find it difficult to solve problems with them). For a number of population groups research connects financial literacy to the strategy for retirement (Lusardi, 2008, Lusardi and Mitchell 2007a, 2008a, 2009, 2011). This additional data set is useful to determine if this discovery is resilient and true. To achieve this, the factors of retirement schedules are linked using multivariate regression analyses. Inquiries were limited to those who were less than 60 years old members of Delhi's pension systems. We also removed individuals under the age of 21 to get rid of those who are or are not at school. The retirement plan against five independent factors was rectified in this study. This included financial instruction, age, revenue, marital situation and degree of education.

5.2 Multiple Regression Model Analysis

The study analyzed the total data to discover whether financial literacy and pension plan are related. Pension planning was utilized as a dependent variable and as a dependent financial literacy, as well as an independent variable age, income, years of marriage and education. Table 1 shows the summary of the model;

Table 1: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.665[a]	.442	.416	.762

Source: Research Findings

Adjusted R^2 The value of the adjusted R square was 0.416, indicating that 41.6 percent of the pension planning variation existed because of changes in financial literacy, age, income, years of the recipient was married and education. is called the determination coefficient, and it shows the changes of the dependent variable as a result of the changes in the independent variable. From the R research, it was revealed that the correlational coefficient (r) of 0,665 demonstrated substantial link between retirement planning and financial alphabetization, age, income, years and education level.

The findings of the regression analysis to assess the link between financial literacy and retirement planning are shown in Table 2 below.

Table 2: relationship on financial literacy and retirement planning

Model	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	3.477	.569		6.108	.000
Financial Literacy	.213	.105	.125	2.033	.043
Age	.029	.134	.033	.216	.829

Respondents Monthly Income	.411	.071	.558	5.810	.000
Years in Marriage	-.034	.096	-.051	-.349	.728
Respondents Education Level	.192	.033	.424	5.760	.000

Source: Research Findings

We discovered the beta values and the equation fitted was: Retierment Planning: =3.477+0.213(financial literacy) +0.029(Age)+0.411(Income)-0.34(Financial literacy) (Years respondents have been married) +0.192Level of education) The estimations for regression imply many intriguing results. First, financial literacy, income and the education of respondents are substantially and positively linked to pension planning and statistically significant findings are seen at traditional levels; (P value less than 0.05). At the conventional level, respondents of age and years have been married because they have a P value of larger that 0.05.

5.3 Interpretation of Findings

Our findings on financial literacy indicate a 52 percent (0.52 percent on scale 0-1) total financial literacy score with 3 percent variation. This showed that interviewees were somewhat financially informed. These results further strengthen the findings of the Bernheim/Hogarth (1995) and Moore/Moore (2003) Financiales Surveys, which show that most respondents do not understand basic financial concepts, especially in bonds, stocks, mutual funds and compound interest; that people do often not understand the loans or, in particular, mortgages. The results are also reinforced by the findings of those respondents. It is worth noting that our eight questions of financial literacy revealed a comparable lack of understanding, even if these questions are a bit shorter and are targeted to respondents who may be more finally knowledgeable, given the

exposure of financial contracts throughout life. Failure to learn and financial savvy can have significant repercussions. Calvert, Campbell, and Sodini (2006), for instance, indicate that consumers with more financial expertise are more likely to engage and invest more effectively on hazardous asset markets. Further evidence of the significant relationship between financial and financial knowledge is seen in Hilgerth, Hogarth and Beverly (2003). The aforementioned results demonstrate, in relation to retirement planning in Table 3, the amount of the respondents saved is significantly differentiated. Older retirement respondents (51-60% of the overall retirement fund) saved more on the grounds that they had been employed for a much long duration and had a higher average income compared to the remainder (79,286/month). The study validates the claims of Arnone (2004); Bell & Al (2005), RBA (2005) and Edmiston & Gillet-Fisher (2006) that the risk of aged staff becoming greater and therefore more literate about pensions and hence better preparing for retirement is increased.

In accordance with the regression model provided in Table 5 above, financial literacy, age, income, years of marriage and education levels at constant zero would be reduced by 3 477, which determined that an increase in literacy in the financial sector will increase by 0.213 the saved amount on retirement; a change in age would cause amount saved for retirement to increase by a factor of 0.029, a change in the respondents monthly income would cause amount saved for retirement to change by a factor of 0.411, The change in the number of years of marriage of the respondent

would result in a 0.034 retirement savings factor, additional changes in the education of the respondents would lead to changes of 0.192 in the retirement savings. We are therefore capable of concluding the investigation.

6. Conclusions and Recommendations

6.1 Conclusion

The findings of this study can draw several conclusions that demonstrate the link between financial and retirement planning literacy and different social-economic features. The results show that financial literacy, income and the degree of education of the respondent play an important role in the pension planning process. On the other hand, age and years of marriage do not have important determinants of pension planning. However, in general, financial literacy was a key predictor for pension plan members, mainly because financial literacy affects both savings and portfolio choice. We may infer thus that financial literacy is an important factor in pension planning for members and a link exists between financial and jubilatory literacy.

6.2 Recommendations

Members can better prepare for retirement, because the RBA enables members to make extra voluntary contributions to their contributions, and consequently to enhance their savings, by raising their pension contributions. You are also allowed to join individual pension plans (IPP) established in the nation by different insurance undertakings. Financial literacy is often somewhat higher than average (52%), members are able to increase their financial literacy skills by completing courses in finance and reading

financial periodicals and taking business concerns into account.

In promoting financial education for individuals, governments and different policy makers have a role to play. RBA has conducted and needs to be enhanced numerous training sessions among its members. The Retreat Schemes Association (ARBS) has done numerous trustee training sessions but it should guarantee that this is done exclusively for each member and not the trustees. Education programmes especially targeted at certain sub-groups can also be better adapted to meet significant disparities in preferences and saving requirements.

6.3 Suggestion for Further Research

In order to discover the same results, the current study needs be repeated to include pensioners in different parts of the country. The sample size should also be expanded to obtain a more representative sample and to draw additional findings.

It should also be duplicated in order to include Indians working in the informal sector, and to see if they save for retirement or save through personal retirement schemes or bank savings.

The study can involve those who have already retired or are beyond 60 years of age, while this study has been confined to those under 60.

A wider study may be done to determine the influence of financial literacy on the overall net value of an individual. This project requires more resources and takes at least three years to train people and to assess the impact. An investigation may also be conducted to assess the role that policymakers can, if any, play to enhance the degree of financial literacy in the country.

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APPLICATION OF BUSINESS ANALYTICS FOR RETAIL MARKET: CHALLENGES AND OPPORTUNITIES

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ABSTRACT

This paper endeavors to understand opportunities and challenges of business analytics in retailing sector, researcher have studied the difficulties and patterns related with business analytics in retailing. it deliberately inspects the writing about business analytics, with a specific spotlight on the retailing. Business analytics has basic worth in e-trade. business analytics has been utilized in customers satisfaction study and instore behavior investigation. the main factor for the worth of retailing and business analytics is the customer delight. Future examinations could look for an upgraded comprehension of Business analytics through quantitative investigation, the rising demand for information creates need for better tools to analyze the data. The business analytics is used by corporates for better strategic planning, after application of bigdata, they can benefit from variety of big data, velocity of data generation and volume of the data. In this paper relevant literature was studied to evaluate the application of business analytics in retailing sector.

Keywords: Business Analytics, Retailing, E commerce, BA, Data mining, FMCG, e trade.

Introduction

What is Business Analytics -BA? Is it about data, is it about use of available information, is it science fiction? NO it is about taking right decisions at right time, by making use of descriptive analytics, predictive analytics and prescriptive analytics. The retail sector is characterized by humongous amount of data available, and generating continuously while we are visiting any store for shopping, data is generated, this includes past information like sales, most popular products, frequency of sale, trend and pattern of sales and predictive analysis like what will be the sales, and what customers likes and dislikes. BA as it is popularly known, revolves around data, it is useful for taking decisions like optimum pricing, perfect segmentations, understand bottlenecks in supply chain and how to maximize the customer satisfaction, BA is used to predict repeat purchasing behavior of customers, due to powerful analytical software now it is possible to predict, the sales and demand for products. For accurate decision-making BA is useful, there are possibilities for customization in product offerings in retailing, due to BA. Now retailers can get the information about customer purchasing behaviors, and modify the offers as per expectations from the customers. It is possible to extract information and use it for marketing

campaigns. Market basket analysis is useful to know which products are purchased frequently, what has to be the layout of store, using videos, media to check and investigate customers preferences while shopping in the store. Big data can be used for growth of retailing business.

For Retail Applicationsin retail, organisations can safeguard specific realities of each exchange, allowing them to perceive benefactor conduct in a better way. Information mining can be nearly completed by performing bin evaluation, deal anticipating, data set publicizing, and distributing making arrangements and designations.Crate examination can show what articles are, for the most part, sold all in all. Deals anticipating show time-basically based styles that can be expected while a customer is most prone to purchasing a specific kind of article. For amazing advancements, data set publicising makes use of benefactor profiles.Marketing arranging and distribution utilises records to allow shops to investigate store styles in places which may be demographically similar, such as upgrading making arrangements and assignments, notwithstanding making save formats. Organizations can utilise records about customers to rebuild retail control. This rebuilding and utilisation of insights routinely happens in unique bookings and specialist

assessments. Through powerful booking, organisations advance staffing by means of prescient planning programming basically dependent on prescient client site guests. Laborer timetables can be changed in response to refreshed estimates at short notice. Client examination allows retail partnerships to assess labourers through contrasting every day deals with every day site guests in a shop. The utilisation of customer investigation data influences the administration of retail workers in a marvel known as refractive observation. The form of refractive observation portrays how the social occasion of records in one organisation can influence and consider the overseeing of a completely explicit establishment. Prescient examination is the utilisation of data, verifiable calculations, and AI calculations to decide the probability of future outcomes dependent on chronicled information. The objective is to go past essentially recognising what has happened to give the most dependable conjecture of what will happen later on. Predictive analytics is used in a variety of industries to forecast future events using machine learning and artificial intelligence.

Research Methodology

It is a paper based on secondary data regarding challenges and opportunities of use of business analytics in retailing sector, this is conceptual paper written for the understanding of available literature on the topic of business analytics, Researchers are going to use secondary data from the previous literature review of Business Analytics and its application in retail. we have studied around ten most relevant research work. The article concludes with a survey of the Business Analytics literature. BA primarily focuses on how to gather, organise, and evaluate data so that relevant agencies may make successful decisions in the face of ambiguity in order to achieve the organization's purpose. In this assignment, we will attempt to establish a relationship between the BA component and the actual use of BA in the given span of time.

Review of Literature

Ramanathan, R., Philpott, E., Duan, Y., and Cao, G. (2017). - This paper depicts a subjective report pointed toward understanding issues looked by retail firms when they start a venture of carrying out business examination (BA) and understanding the effect of BA execution on business execution. Utilizing contextual analyses like case studies of nine retailers in the U.K., they recognized seriously fascinating inclusion of business analytics in retailing

A proposal for a company research technique that determines consumer visits to the store has been made. Griva, A., Bardaki, Pramatari, K., and Papakiriakopoulos, D. (2018) characterised the visit as well as the shopping expectations or objective behind it. For instance, a "breakfast" trip to purchase grain, milk, bread, cheese, and so on. The approach utilised to modify the elements in the scientific classification model has a major impact on the data framework outcomes. The suggested method gathers knowledge that may be used to assist a range of scenarios, including marketing campaigns tailored to certain customer segments, shop layout redesign, and strengthen its market.

(Kaur. J, Bali, S. et al. 2020). - Here combination an innovative proposition very competitive retail business has considered, It was emphasized that "Customer is the King" to the next level. It has been seen how mix of advances in business analytics alongside scientific ideas of video investigation, online media examination, remote investigation and smart vision frameworks on promoting ideas like value based customer segmentation have effect on customer satisfaction. The purpose of this article is to understand the creative concepts as well as the effect on business data analysis in the supermarket industry, as well as to attract the best happy people using imagining, marketing, then advertising systems.

S. Lekhwar, S. Yadav, and A. Singh (2019).The principal objective of this paper is to check out the application and benefits of business examinations in the retail industry and to research the possibilities and possible results directed by the enormous amount of information in the retail industry. Retail has an assortment of tremendous data sources. As in other fields, large information in retail needs to be managed to minimise hardships and openings. Today, separating the data and

relying upon it for dynamic purposes is a key part of retail. The paper, in a similar manner, displays various troubles and issues that the critical piece of the retail industry is going up against. In the long run, the paper looks at the possible habits by which these troubles and issues can be restricted and how retail can profit from the large information project and can use it to extend client affiliation.

Paper by Olexov, C. (2014) is paper on BI, Business Intelligence (BI) tools are studied, and how they are adopted by more and more companies within the current environment that needs companies to work as efficiently as possible. The paper investigates a BI adoption during retail chain. It was supported by qualitative research methods; it analyses the Business Intelligence life cycle; it evaluates factors impacting the adoption from the Diffusion of Innovations perspective. One among the findings was that requirements engineering is critical, and even small issues have a possibility to cause big problems. The research identifies benefits that are considered to be the foremost important by the retail chain managers.

Chandramana, S. (2017). It was tracked down that the power to streamline on serving business measures while fulfilling client assumptions has never been more significant. Accordingly, overseeing and channelizing enormous data for client delight and producing sound benefits is critical to enduring prosperously, as in the case of huge retail players in India. Huge information examination is presently being applied to each phase of the retail cycle-following arising well-known items, anticipating deals and future interest through prescient recreation, and improving item positions and offers.

Garg, P., Gupta, B., Dzever, S., et.al. (2020) They studied that social media investigation (SMA) may be a dynamic field which has gotten significant consideration from both academics and executives. How can we utilise online media for the advancement of retail in India? Therefore, the connection between SMAP and BP (Business Promotion) was concentrated here. Underlying Equation Modeling was utilised to dissect the data and get the exact information. The exploration shows that there's a big positive connection between SMAP and BP. Gallino, S., and Moreno, A. (2014). In this paper, it was found that there was an incorporation of the web and disconnected directs in retail. The execution of this task is related to a discount in online deals and a rise in future sales and traffic. These results are often explained by two concurrent wonders: (1) extra store deals from clients who utilise the BOPS usefulness and purchase extra products within the stores (strategically pitching impact) and (2) the shift of certain clients from the web to the blocks and concrete channel and, subsequently, the conversion of noncustomers into store clients. has concentrated on making headway in retail. This article centres around "The Future of Retail" by featuring five key regions that are pushing the field ahead with innovation and instruments to work with dynamic, visual showcase and product offer choices, utilisation and commitment, enormous information assortment and use, and investigation and benefit. Shaw, S., & Grant, D. B. (2017). The paper is about the challenges of BA and its application for value creation. The case studies supported the Delphi findings and emphasise the various challenges within the surface need for clear, accurate information in visible form and analytics plan of action, the trend in society to affect information in visible form-driven enlightening change, and to handle the data turnover in one's organisation in visible form and with information morality when utilising information in visible form for competitive advantage. All these issues are discussed in this paper on creating value from BA.

Fig. 1: Customer behaviour analysis

challenges For many years, the retail business has leveraged previous year's experiences to develop new deals and plans. The basic example of looking at a client's previous purchases and then displaying offers based on this information creates a shopping experience that immediately seems more personalised. For a long time, personalised communication between store and customer looked to be extremely difficult to achieve and wasteful for anybody other than luxury shops who could bear the time, effort, and assets necessary. Retailers today provide more information than ever before, yet their massive pools of data seldom provide productive outcomes. Predictive Analytics with Big Data With the introduction of Vast Data, it has become much easier for such merchants to analyse and use

this big data to their benefit. They may be proactive and forecast future trends based on real-time data with the aid of predictive analytics. Following such an investigation, they devise fresh methods and offers to entice additional clients. It not only assists businesses in identifying the most popular items, but it also assists them in determining the products or combinations of products that clients like. Even for smaller businesses, integrating these insights with predictive analytics may reveal new sales possibilities, identify developing trends, and even provide ideas for new goods that potential customers demand.

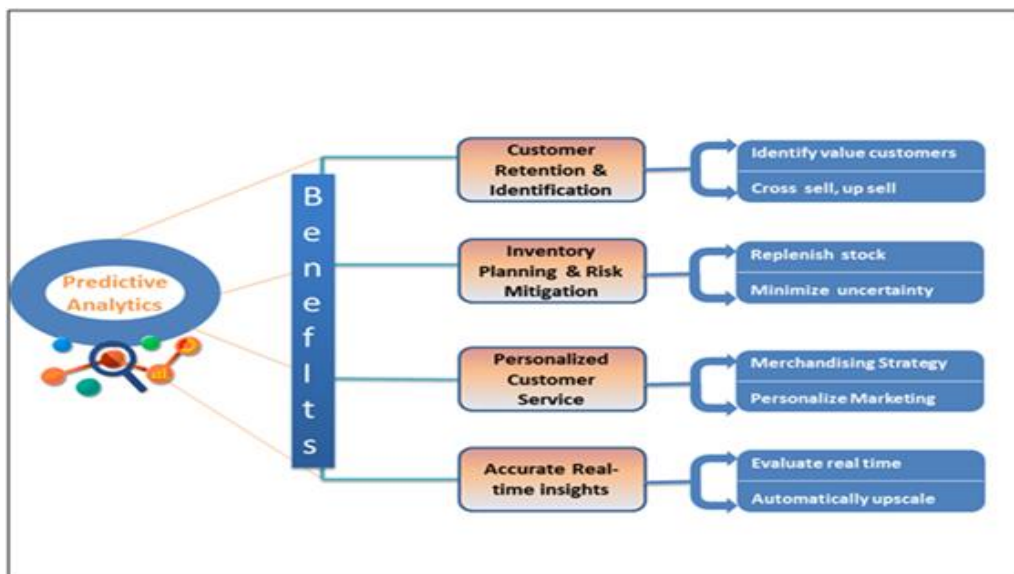**The Benefits of Predictive Analytics for Data-Driven Retailers**

Figure 2: The Advantages of Predictive Analytics

Figure 2: The Advantages of Predictive Analytics Customer identification and retention Proof of client distinction and upkeep With the assistance of investigation, it is feasible to distinguish esteemed clients and hold them, as well as recognise expected clients and draw them in with significant offers.

Stock Planning and Risk Mitigation Prescient Analytics uses enormous amounts of information and enables retailers to plan their own stock, reestablishment organization, and advancement techniques, as well as limit danger and vulnerability. It isn't simply critical to anticipate the example for an enormous scope, but additionally to check out the moment's subtleties. Personalized Customer Service: Customer Service That Is Tailored: With this colossal measure of data, it's not difficult to begin evaluating shoppers on a more granular level. Prescient examination can modify the displaying methodology rather than embark on an immense mission that costs thousands and has restricted impact. Accurate insights in real-time, exact encounters step by step. Enormous information gives oversight and gives a greater picture, but it likewise gives knowledge about a person. With prescient investigation, one can look at each individual and evaluate their purchasing inclinations constantly to definitively anticipate what they will buy considering their specific buying affinities. Additionally, prescient investigation can do most of this normally and at scale.

Discussions and Conclusions

The advancement in technologies and the rise of data analytics also create issues about how to handle and analyse this amount of data. Skilled data analysts are required for it. Business Analytics, or Business Intelligence, is progressively being viewed as the key differentiator that gives a strategic advantage to organisations across ventures. While India has long been recognised as an ideal destination for IT administrations, there are opportunities and challenges to explore and understand this emerging field of BA. The technological challenges associated with integrating data from multiple sources into Business Analytics, collaboration between industry and academia, the utilisation of new scientific models and investigations into the fruitful use of Business Analytics, particularly in retail, assume an essential part in the utility of BA in the retail area.Predictive Analytics is a huge help to the retail industry since it enables them to understand and identify with their customers' wants and requirements. Grocery retail merchants might need prescriptive real-time data in many more areas of their business, both front-end and back-end. Retailers are modifying analytics to gain insights about their customers. This information is being used to build a new sort of retail: one that is efficient, astute, and beneficial in terms of empowering brand dependability and improving client experience.

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DPSC's: FUTURE PROSPECTIVE IN REHABILITATIVE PROSTHODONTICS

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ABSTRACT

Stem cells are pluripotent hemetopoeitic and mesenchymal cells that can differentiate into different types of specialized cells. SCT has been used widely to treat many of the degenerative disorders in medicine. Dentistry is also evolving rapidly, use of SCT for dental regenerative treatments are the newest. Stem cells extracted from dental pulp tissue with a potential of differentiating into dental hard and soft tissues promises a new reconstructive and regenerative therapeutic options in various dental conditions. This paper reviews the various types of stem cells and their application in rehabilitative prosthodontics.

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Introduction

Cells are the basic functional units of human body. Some of these primary cells that regenerates into any functional unit which are termed Stem Cells or Somatic Cells. They undergo numerous multiplication and differentiation cycles in their primitive form to evolve into specialized tissue.[1] The regenerative potential of the stem cells implies to their application as a treatment option in various medical and dental conditions.[2] The damaged cells are substituted or repaired by somatic cells in Stem cell therapy.

Stem cells are categorized into three types based on their source:

i. Embryonic stem cells (ESC) are cells capable of differentiating into adult tissue of any lineage, originated from the innermost layer of blastocyst after the peri-implantation process. ESC's ability to regenerate into ectodermal, mesodermal and endodermal germ layers contributes to its wide usage in treatment of degenerative disorders.[2,3]

ii. Adult stem cells or somatic stem cells with the ability to multiply and regenerate into similar cells and with minimal capability in differentiating into other cells.[2]

iii. Induced pluripotent stem cells are the newest concept in which the pluripotent cells are prepared by culturing of genes extracted from the ESC. Similar to the ESC, these cells are able to differentiate into different germ layers.[4]

Dental Pulp Stem Cells (DPSC)

Heterogenic stem cells extracted from permanent tooth pulp, characterizes as mesenchymal stem cells called as dental pulp stem cells. Dr. Songtao Shi, a Pedodontist first extracted the stem cells from his daughters deciduous teeth and named it as stem cells exfoliated from human deciduous teeth (SHEDs). These are found in both adult and young teeth. Later, Miura et al.,[5] described the differentiation potential of SHEDs into various dental progenitor cells. DPSC's are with high capacity of proliferation and differentiate in to adipocytes, Osteoblasts, chondroblasts and mesenchymal stem cells.[6] Dental follicle progenitor stem cells (DFPCs), periodontal ligament stem cells (PDLSCs) and stem cells from apical papilla (SCAPs), stem cells derived from oral mucosa, human dental epithelial stem cells (hDESC), stem cells derived from periosteum and salivary glands are other dental stem cells. PDLSCs was first described by Seo et al.[7] by their regenerative ability to transform into periodontal ligament cells. The pluripotency as well as multipotency of SHEDs and DPSCs, as they are derived from the neural

crest cells represents initial markers of neuro-ectodermal and mesenchymal stem cells.[8] The different types of stem cells and their origin are given in Table.1.

Table. 1: Different types of stem cells and their applications

Type of stem cell	Source	Differentiation	Applications
Dental Pulp Stem Cells, DPSCs	Adult third molars	Pre-osteoblasts, Odontoblasts like cells, Dental pulp like tissue	Tooth regeneration, Hypodontia, Dental pulp regeneration
Stem cells from Human Exfoliated Deciduous teeth [SHEDs]	Exfoliated deciduous teeth	Odontoblasts Osteoblasts Neuro-like cells Adipocytes	Angiogenesis Anti apoptosis Anti-inflammation
PerioDontal Ligament Stem Cells [PDLSCs]	Roots of extracted permanent teeth	Differentiate into cementum, alveolar bone and periodontal ligament	Immuno-modulation therapy Regeneration of supporting tissues of teeth Restoring lesions using cellular therapy
Dental Follicle Stem Cells [DFSCs]	Follicles of third molar	Osteoblasts Adipocytes Pre cementum like cells Neuro-like cells	Periodontal regeneration Reconstruction of alveolar bone
Stem Cells from the dental Apical Papilla [SCAPs]	Isolated from upper dental papilla of teeth with wide apical opening such as third molars.	Osteoblasts Odontobalsts Adipocytes	Revascularization in regenerative endodontic treatments

DPSC's can be non-invasively extracted from the dental pulp, and can be cryopreserved for longer duration. Recently, DPSC's has been widely used in treatment of various medical conditions such as diabetes mellitus, Alzheimer's, blood disorders, degenerative neurological diseases, and diseases of hard tissues.[9,10,11]

The application of Dental Pulp Stem cells in regenerative dentistry has been the major thought of discussion for dental researchers during the recent years. Literature evidences suggest that DPSCs with the feature of progenitor cells have the capacity of differentiating into odontoblasts or dentin forming cells. Figure.1 and figure. 2 shows the processes in preclinical characterization, invitro multilineage differentiation potential of dental follicle stem cells. Tooth tissue regeneration opens the wide range of treatment options in prosthodontics. This paper reviews the various methods and application of Dental Pulp Stem cells in Regenerative Prosthodontics.
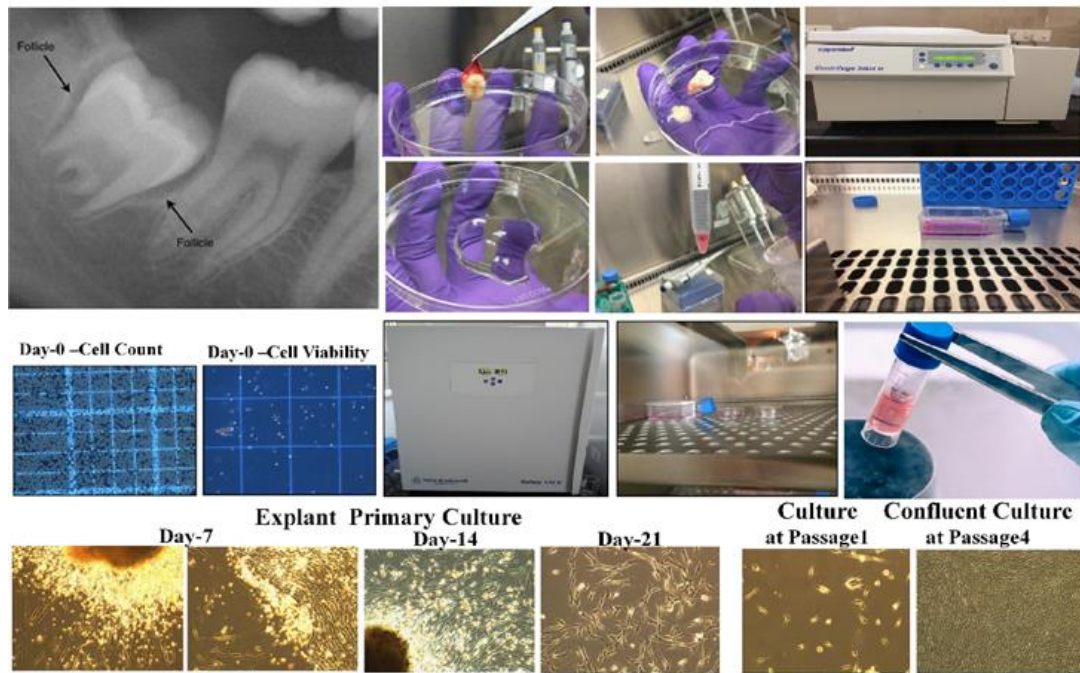
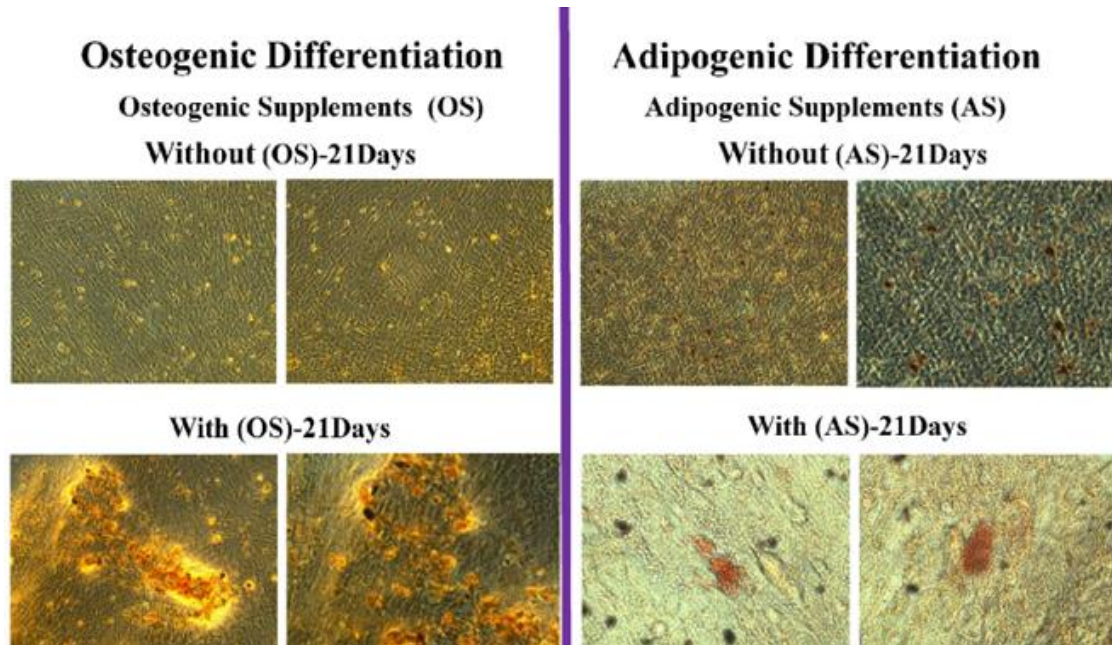**Fig 1. Pre-Clinical Characterization Of Dental Follicle Stem Cells**

Fig 2. Invitro Multilineage Differentiation Potential of Dental Follicle Stem Cells

Implications of stem cells in the field of dentistry

Stem cells plays an important role in regeneration of cranio-facial and dental structures such as jaw bones, condyle of mandible, clavarial bones and subcutaneous adipose tissues. Regeneration of the anatomy and restoring the functions of the damaged dental tissues can be achieved by regenerative stem cell therapy including root regeneration, repair of damaged periodontal ligaments and gingival regeneration.[1,12] Recent researches suggest tissue engineering with the use of stem cells by gene transferring techniques in accelerating oral wounds and in rapid healing of long standing and non-healing oral ulcers. Replacement of missing tooth with whole regenerated tooth from stem cells are recent milestones in stem cell research.[13,14]

Regenerative Prosthodontics

Prosthodontics is the "branch of dentistry pertaining to the diagnosis, treatment planning,

rehabilitation and maintenance of the oral function, comfort, appearance, and health of patients with clinical conditions associated with missing or deficient teeth and/or maxillofacial tissues using biocompatible substitutes" (Academy of Prosthodontics, 2005).[15] The specialty has been tremendously evolving since past few year, and with the introduction of application of stem cells in tooth regeneration opens up more possibilities of prosthodontics in replacement of tooth structures. Some of the prosthodontics applications of stem cells includes dental tissue regeneration, periodontal ligament regeneration, alveolar bone regeneration, cranio-facial regeneration and muscle regeneration.[16] Figure. 3 illustrates the conventional or traditional methods and regenerative methods applied in prosthodontics.

Regeneration of dental hard and soft tissues using stem cells with the help of tissue engineering has been successfully experimented in animal studies. Traditional prosthetic dental implant system could be replaced with the newest stem cell regenerated tooth and periodontal ligament.
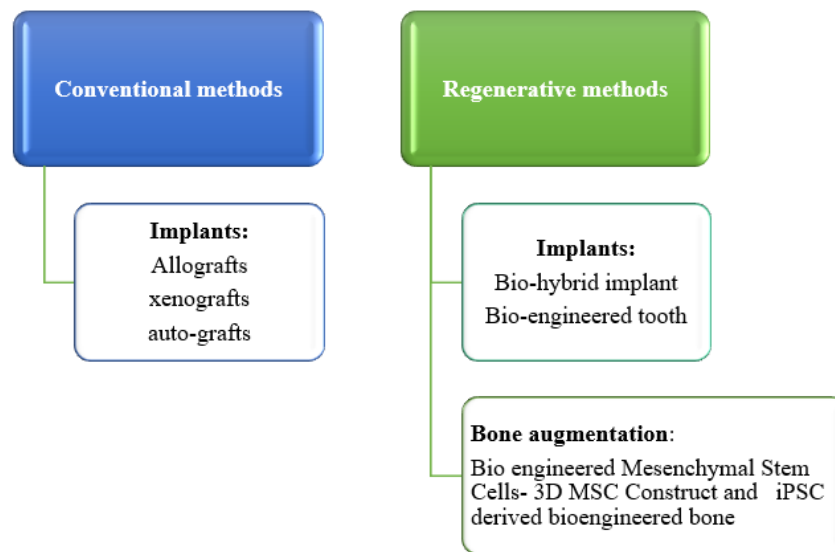

Conventional methods

Implants:
Allografts
xenografts
auto-grafts

Regenerative methods

Implants:
Bio-hybrid implant
Bio-engineered tooth

Bone augmentation:
Bio engineered Mesenchymal Stem Cells- 3D MSC Construct and iPSC derived bioengineered bone

Fig 3: Stem cells in regenerative prosthodontics therapy

Regeneration of soft tissue

Stem cells extracted from post-natal preserved stem cells or those prepared from external scaffoldings which contains bone morphogenic proteins, growth factors and nutrients are used in pulp tissue regeneration. Using patients own stem cells for transplantation rather than external donors could reduce the chance of immune rejection. Pulpal regeneration also helps in revascularization and re-innervation of the root canal pulp which in turn can produce new dentin. More researches are required in newer technology with 3D printing of the cells and gene therapy into the root canal for preserving the tooth vitality.[17]

Periodontal regeneration with allografts, alloplasts, autologous bone grafts and other synthetic bone graft materials, even though widely used are not acceptable in certain clinical conditions. Mesenchymal stem cells derived from the iliac crest and PRP (platelet rich plasma) are applied in restoring periodontal loss and furcation defects.[18] Literature evidences suggests periodontal regeneration from the in vitro cultured periodontal ligament cells.[6,19]

Muscle regeneration has been successful in laboratory studies using DPSCs in regeneration cardio-myocyte like cells in mice. . In vitro studies proves the efficiency of DPSCs in differentiation into muscle cells producing dystrophin. Muscular regeneration could open a wide treatment option for muscular disorders including muscle dystrophy. Further researches are required to confirm the implication of this in regeneration of human muscle tissue.[20]

Regeneration of hard tissue

Prosthodontics rehabilitations sometimes requires regeneration of hard tissues including

alveolar bone reconstruction or temporo-mandibular joint regeneration. Alveolar bone defects, fractures, and tumour reconstruction sites are major challenges during a prosthodontics rehabilitation. MSCs capable of differentiating into osteoblasts and chondroblasts induces bone formation.[21] Injectable smart hydrogel along with periosteal stem cells are used in the reconstruction of bone segments. Bio engineered TMJ reconstruction using MSCs in a biomimetic scaffold have gained much popularity.[22] Osteoinductive and osteoblastogenesis feature of the scaffolds induced with miRNA shows increases functionality. The regeneration of the teeth itself from the stem cells provide opportunity to have more anchorage and support for further prosthetic replacements. Odontogenesis acquired through mesenchymal and epithelial interactions extracted from pre natal and post natal tooth germs are shown to have promote odontogenesis. Compared to the postnatal tooth germs, pre natal tooth germs holds preference due to its higher potentiality in differentiating into normal dental structures.[17,18]

Success rate of Stem Cell Therapy (SCT)

Extraction socket serves as a site for an abundant amount of Stem cells also, serves as an appropriate site for SCT. Case reports suggests an excellent results in bone regeneration and rapid healing when the sockets are immediately filled with bone marrow derived grafts.[23]

Challenges

The regenerative stem cell therapy introduced a greater choice in replacement prosthodontics which used traditional denture and dental implants traditionally. Better scope and prognosis were there for those rehabilitations with severe alveolar bone loss and requiring bone augmentation surgeries. Bone augmentation Bone marrow derived mesenchymal cells (BMSCs) though successfully used in maxillary sinus floor reconstructions and alveolar bone regenerations, the survivability of the transplanted scaffold remains to be questionable due to the insufficient vascularization.[24,25]

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QUALITY OF SANITATION AND CLEANLINESS IN RURAL SCHOOLS

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ABSTRACT

Background of study: *Considering the present COVID 19 situations have forced the people to think and be safe in the manner of hygiene factors. COVID-19 specially focuses on the human beings who need to wash their hands and keep themselves clean to stay healthy and have a safe life. As a result, we may conclude that providing safe drinking water and sanitation facilities is a critical need in the twenty-first century, allowing Indian society to progress toward a healthy and prosperous lifestyle. Furthermore, because appropriate water supply and cleanliness aspects are key difficulties in rural regions, proper water usage and more check dams should be established in rural areas so that water supply can be maintained in the society. In light of this, the research was conducted to determine the state of school sanitation and the elements that will play a significant role in analysing the cleanliness and quality of sanitation, as well as the hygiene factors that must be maintained in society.*

Methods: *For the study, a cross-sectional study design was used, with all 50 schools participating (Private as well as Public). Data of both qualitative and quantitative sorts was obtained. Students and personnel working in the schools were asked a series of questions about sanitation and cleanliness, and their responses were gathered. A Questionnaire containing 2 parts of survey was been forwarded through google form to the respondents and the data was collected. For analysing the data, I have used SPSS version 20 statistical packages. The detailed study is been presented in my research paper.*

Results: *In my research 69.2% were the government schools and 30.8% were private schools. More government schools were considered in order to determine whether sufficient sanitation was being provided. Overall, 53.8 percent of people believe the sanitation is of good quality. From the various kinds of wastes the highest proportion was 32% of stagnation waste. 53.8% Respondents stated that the dustbins were cleaned on the daily basis. The usage of water is used from the tap and their own bottle in 34.6% and 38.5% respectively. Nearly 46.2% in total uses the RO water for drinking water. Finally, I would like to say that 73.1% respondents found themselves in the protected environment.*

Keywords*: Schools, sanitation, hygiene, water, Wash.*

Introduction

As it is properly said, "school is our second home," Students have the right to basic amenities such as safe drinking water, sanitation, clean washrooms, and a pleasant environment. The basic learning to the students come from the schools and what is experienced is share by the teachers. So, it is rightly said that teachers educate the students and develop their awareness towards a healthy living society. In 1999, the Indian government began the school sanitation and hygiene education initiative, which included the construction of latrines in schools. The same is carried over by our Prime Minister, Narendra Modi in form of Swachh Bharat Abhiyan.

To prevent students from infectious disease discipline of good personal hygiene is required. Because proper personal hygiene is a discipline that helps students prevent communicable diseases in particular, it is beneficial to them. Therefore, as the awareness of the personal hygiene and cleanliness if will be spread it will help and enhance the consisting society.

As per the research paper and evidences collected by Snow M (2008), Ejemot (2008), it has been found out that students who are regularly practicing handwash are less prone to diseases like respiratory and gastrointestinal problem, diarrhoea etc.

To know the difference between sanitization, disinfecting and cleaning

Cleaning gets rid of germs, disinfecting gets rid of germs, and sanitising gets rid of germs. Cleaning of germs is the process of removing dirt and contaminants from things or surfaces. The goal of cleaning with just water, detergent, or soap is to physically eliminate microorganisms from the surface. It is not necessary for this method to destroy germs, but it is certainly utilised to remove germs as well as the risk of infection spreading. Disinfection of germs from items, on the other hand, relies on the use of chemicals to destroy germs. This procedure kills bacteria on the surface after cleaning, rather than cleansing the filthy surface or removing germs. It also minimises

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the risk of killing infections. Sanitising lowers the number of germs on surface to safe level by public health standards or requirements. This method either disinfects or cleans, and it can also be utilised to reduce the risk of infection spread.

Clean and Disinfect surfaces and objects that are touched often

Follow the school standards for the routine and regular disinfecting and cleaning. Typically, it means daily surface sanitization, objects sanitization which are often touched such as door mobs, computer keyboards, phones, etc. some schools may also require for disinfecting the items.

Handle waste properly

Follow your school standards by handling waste by wearing gloves, places no touch waste basket, where they are easy to use. Through disposable items to clean surfaces avoid touching used tissues and other wastes when empty waste baskets. After removing the waste from the basket, wash your hands with soap and water.

Sanitation can be viewed as the arrangement and practice of securing wellbeing through clean measures. In the perspective on the World Health Organization (WHO) (2007), sanitization for the most part alludes to the arrangement of offices and administrations for the sheltered removal of human waste and dung. It has been understood that improving disinfection is known to significantly affect wellbeing both in families and across networks (WHO, 2007). Likewise, Iheke (2010), considers disinfection to be the way toward keeping places spotless and sterile particularly by giving a sewage framework and a perfect water gracefully. Sterilization alludes to all conditions that influence the wellbeing of individuals in a geological region. The word sanitization operationally alludes to the upkeep of cleanliness conditions, through administrations, for example, trash assortment and waste water removal so as not to jeopardize the wellbeing and government assistance of individuals and furthermore for the social and ecological impacts, it might have on individuals. All through the world, an expected 2.5 billion individuals need essential sanitization.

Fundamental disinfection is depicted as approaching offices for the protected removal of human waste (defecation and pee), just as being able to keep up clean conditions, through administrations, for example, trash assortment, mechanical/perilous waste administration, and wastewater treatment and disposal.(World Health Organization and UNICEF, 2012).According to WHO and UNICEF (2012), without prompt quickening in progress, the world won't accomplish the United Nations' Millennium Development Goal (MDG) sterilization target (i.e., to divide the extent of individuals without practical admittance to essential sterilization by 2015). Essential Sanitation is significant in all spots and situations particularly schools.

School disinfection alludes to sterile practices that happen in schools. Coppens (2005) consider School Sanitation and Hygiene Education as the blend of equipment and programming parts that are important to deliver a solid school condition to create or uphold safe cleanliness conduct.

Flexibly of drinking water and offices for hand washing and the safe removal of excreta and strong waste in and around the school compound. The product segments are the exercises that advance clean conditions at schools just as practices of school staff and youngsters that help to forestall water and disinfection related infections and parasites. Helpless sterilization in school condition will have certain negative impacts on learning

A sanitisation framework's main goals are to ensure and improve human wellness by providing a clean environment and ending the cycle of illness. There are numerous aspects to consider while deciding which framework to choose. The elements to be considered incorporate; understanding of the client, excreta and wastewater assortment strategies, transportation or movement of waste, treatment and reuse or removal of squanders. Not disapproving of the sort of framework picked, disinfection is of different kinds (eg: dry sanitation, ecological sanitation, and environmental sanitation).

Places For Sanitzation In Education Sector

In an institution personal and experienced staffs is required for the purpose of cleaning a wide array of facilities. They must be educated in general cleaning techniques, hard surface cleaning, floor care, carpet cleaning, and furniture cleaning. All the cleaning programs individually tailored to the proper vendors and it can include:
1. Cleaning and sanitization of rest rooms
2. Sanitization of Hostel rooms
3. Mopping and Sweeping and even scrubbing of floors
4. Carpeted area must be vacuumed through vacuum pump
5. Refreshing and Stripping
6. Cleaning of Elevators and stairs
7. Cleaning of Lobbies, Foyers and common areas
8. Horizontal and vertical surfaces should be dusted.
9. All Conditional air condition vents cleaning.
10. Cleaning of light, Fixtures, baseboards etc.
For protection and peace of mind institute employees are screened and are neat in appearance.

1. Kitchen, Pantry Mid-day meal and Launch Cleaning:
Weather common areas which comprise of launch, classrooms, fully equipped mess, cafeteria, a clean environment is essential for the image of the institute or educational institute to understand the importance of the cleaning of these areas. To satisfy the institute's special needs, a quality cleaning programme must be introduced, which includes replenishing towels, tissue dispensers, soap, and washing cabinet faces, among other things.

2. Customised Programs
Dirty, unsanitary facilities can lead to poor morale, decreased number of admissions, loss of school revenues and health issues. Influenza HIN1, Viral diseases, bacterial diseases as well as aggressive conditions like asthma, allergy, are created due to unclean surfaces.

3. Green Eco-Friendly Cleaning
School maintenance is proud to provide a green cleaning option for environmentally conscious social work that would like to provide their employees, their students, their societies with a healthy, chemical free environment and campus.

4. Corona Virus (Covid 19) Services
In this pandemic situation the school is dedicatedly involved in different sanitization services. School also recognises that the importance of services to the health, well-being, and peace of mind of workers, students, hostellers, and residents has never been greater. Keeping in the mind the school management determines to install sanitization tunnels, thermal scanning thermometers, regular sanitization in classrooms, hostels, corridors. In fact, the institutes have been in the frontline at nursing homes and medical facilities in this current pandemic situation.

Definition
The evolution or origin of the word hygiene has occurred from late 1500s. It ultimately comes from the Greek hygiế(s), meaning "healthy." The suffix -ine means "pertaining to."
As a science, hygiene involves the study of methods for maintaining health and cleanliness on a large scale.

Materials And Methods
This research paper is based on qualitative approach and respondents were selected from government and public school including both teachers as well as students by a non-convenience sampling. A total of 50 schools were considered for filling the questionnaire which were collected through google forms and various questions related to personal hygiene and cleanliness were asked to the respondents. The research was carried out between COIVD 19 and COIVD 20. For all of the needed questions, an in-depth investigation was conducted, and quantitative analysis was performed using ANNOVA.

Objectives
Following objectives were identified during the research work:
1. To identify the acquaintance of personal hygiene of students of private and public schools
2. To determine the level of concern for personal hygiene among students in both private and public schools.
3. To analyse whether the awareness is put into regular practice in the individuals.

Hypothesis

H1: Students of private and government schools have the understanding of personal hygiene and cleanliness which lead to a Qualitative and healthy life.

H2: Students of private and government schools do not have the understanding of personal hygiene and cleanliness which will not lead to a Qualitative and healthy life.

Results Of Research

1. Demographic Details

Demographic details based on questionnaire of research paper is as per the table no.1.

This study included 100 students from both public and private schools. 42 percent of the students are in the age category of 13 and up, 33 percent are in the age group of 10-12 years, and the rest are in the age group of 8-10 years. Majority of the students are from rural areas.

Table 1: Demographic Data			
Sr. No.	Parameters	Frequency	Percentage
	1. Age		
	8-10 years	25	25
	10-12 years	33	33
	13- above	42	42
	2. Class		
	5th Std	20	20
	6th Std	35	35
	7th Std	23	23
	8th Std	22	22
	3. Teachers Background Edu.		
	Commerce	15	42.9
	Science	15	42.9
	Arts	5	14.2
	Others	0	0
	4. Background of students.		
	Urban	35	35
	Rural	65	65

Source: Authors Calculation

2. Awareness of Personal Hygiene

Considering the respondents awareness for the personal hygiene is shown in table no2. Nearly 100 % students are taking bath on regular basis. When it comes to brushing their teeth, 41% brush twice a day, 19% brush twice a day but infrequently, 37% wash their teeth once or twice a day, and 3% do not brush their teeth at all during the day. Nearly 67% students cut their nails on regular basis while 27% students on frequent basis and only 6% students cut their nails sometimes. We also analysed the student's willingness to come to the college wearing the footwear or not. In research we came to a conclusion that 70% students prefer to wear footwear and 30% do not prefer.

Table 2: Personal Hygiene- Awareness			
Sr. No.	Parameters	Frequency	Percentage
	1. Bath on Daily Basis		
	Always	100	96.9
	Frequently	2	3.1
	2. Brushing the Teeth on Daily Basis - twice a day		
	Always	41	41
	Frequently	19	19
	Sometimes	37	37
	Never	3	3
	3. Cut nails - On Regular basis		
	Always	67	67
	Frequently	27	27
	Sometimes	6	6
	Never	0	0
	4. walk to school -without footwear		
	YES	70	70
	NO	30	30

Source: Authors Calculations

3. Valuation of Personal Hygiene

Table no. 3 shows the respondents' awareness of personal hygiene. Nearly 98 percent of students wash their hands before eating, and 2% do not believe it is vital to wash their hands before eating. Among which Ninety percent of students wash their hands with soap, whereas ten percent do not. Similarly, when it comes to the usage of soap after using the restroom, I found that 98% of students use it, but 2% of students do not because they come from a rural background. Eighty percent of students consume clean water, whereas twenty percent do not check the water quality before drinking. Finally considering the uniform to be cleaned and been used where I came to know that nearly 75% students used the clean uniform whereas 25% students do not consider the clean uniform to be a must.

Table 3: Personal Hygiene- Valuation			
Sr. No.	Parameters	Frequency	Percentage
1. Wash hands before meal			
	YES	98	98
	NO	2	2
2. Use of soap for washing hands			
	YES	90	90
	NO	10	10
3. Use of soap after toilet			
	YES	98	98
	NO	2	2
4. use of washroom between the classes			
	YES	43	43
	NO	57	57
5. use of Clean and Covered water for drinking			
	YES	80	80
	NO	20	20
5. Use of Clean Uniform for school			
	YES	75	75
	NO	25	25

Source: Authors Calculations

4. ANOVA Result

ANOVA TABLE - Outcomes						
Parameters	sample size	sum of squares	df	mean square	f- Value	Sig
Cutting nails regualrly	100	4.048	2	2.024	10.87	0.000
Brush the teeth regularly	100	3.936	2	1.968	20.089	0.000
Drink the Protected water	100	8.033	2	4.016	27.042	0.000
Baths on regular basis	100	5.098	2	2.549	12.837	0.000
Use the soap and wash hands after toilet	100	26.201	3	8.734	29.368	0.000

It is evident from the table that the hypothesis is accepted, and that the parameters in question contribute to a qualitative and healthy existence for the students. It is apparent that students who clip their nails on a regular basis are aware of the importance of personal cleanliness. From

the table it is also clear that the hypothesis is accepted which clears that closed lid container provides protected water.

From the table, it can be stated that the hypothesis is correct, and that having a bath on a regular basis and washing hands with soap after using the restroom help to maintain personal cleanliness and a healthy lifestyle.

Discussion

Students in rural and urban areas, regardless of whether they attend public or private schools, are very conscious of hygiene and cleanliness standards and are working hard to keep themselves clean, especially in COVID 19 settings, which is a significant contribution to society. The determinant factors resulting for hygiene and cleanliness were studied in depth for the rural as well as the urban area.

- Out of 100 respondents' students 42% are in the age group of 13 and above.
- Nearly 65 percent of respondents live in cities, while the rest live in rural areas.
- 22% students are in 8th std.
- 100% of teachers have received training and are instilling personal hygiene and cleanliness in their students.
- Every Students clean their teeth twice a day in 41% of cases.

- 98 percent of students used soap to wash their hands before eating.
- After using the restroom, 98 percent of students wash their hands with soap.
- 75% students wash their uniform and wear a clean uniform before going to the school.
- Maximum of the students are motivated by the teachers and learn from them to keep themselves aware and update about the cleanliness.
- Protected water is used by 80% of students as a source of drinking water.
- Considering all the above-mentioned parameter the framed hypothesis was accepted.

Conclusion

It has been shown that elementary school students in both the public and private sectors are aware of personal hygiene practises. It has been totally neglected that rural area students are less aware of personal hygiene practices. Teachers teaching in rural areas are motivating their class students to follow the personal hygiene practices in their life. The only issue with the surrounding environment is that it must be kept clean in order to improve overall quality of life.

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POPULATION, ENERGY CONSUMPTION AND CLIMATE CHANGE-A CASE STUDY OF INDIA

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ABSTRACT

India is an emerging economy whose population is 18 percent of the global population and has 2.4 percent of the landmass area. Its quest for rapid economic development is putting tremendous pressure on the country's natural resources. In recent years India is facing twin challenges to maintain sustained economic growth along with reducing Co2 emission and tackling climate change. STIRPAT model with some modification has been used. It decomposes four factors; Co2 emission per capita, Total population, GDP per capita, energy consumption. The data under study is collected on an annual basis for the period of 1971-2014. The econometrics test which has been used in this paper includes stationarity augmented dickey fuller test for stationarity of variables (ADF), BG-LM test for serial correlation and CUSUM test for model stability. ARDL and VECM. Partial 'F' Bounds Co-Integration test. Further error correction model was fitted and it was found that the coefficient of ECM was negative and statistically significant thereby implying adjustment mechanism from short-run to long-run equilibrium. To ensure the long-run relationship in the model, the speed of adjustment as indicated by the co-efficient of ECM should be significant with negative signs. The augmented dickey fuller stationarity test showed that all variables were stationary at first difference.

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Keywords: GDP per capita, Population, Climate change, Co2 emission.

Introduction

In 1992, at RIO DE Janeiro, Brazil, The United Nations Conference on Environment and Development elaborated on the linkage between Population growth and Environmental degradation (United Nations 1993). When the first world population was observed, the total global population was 5.25 billion but today population is about to cross the mark of 7.7 billion. India will try to accomodate1450 million people in the year 2100 according to data provided by the PEW research center. The PEW research center while projecting comparison between the years 1950 and 2100 claims that India will surpass China by 2100. India's total population is 18 percent of the global population covering only 2.4 percent of the landmass area. 35% population of India is living in three states that are Bihar Utter Pradesh and Maharashtra. The increasing population is impeding the growth of an economy. Poverty is a harsh reality today.

In India's quest for development and rapid growth, energy consumption is expected to increase which would result in increased air pollution. According to a report of BP's authoritative review of world energy, global coal consumption exceeded by 10% for the first time whereas India's consumption of energy rose by 5.2% in 2015. About 5.3% of the total global emission of Co_2 generates in India. India is ranked as the world's fourth-largest emitter of Co_2. Co_2 emission plays a vital role in global warming and Ozone depletion. One of the worst pollutants contributing to the environmental issue is Co_2 (Houghton 1996).

Energy consumption and Co_2 emission nexus is mainly due to the combustion of fossil fuels like natural gas, crude oil, coal and due to chemical reaction industrial processes emit Co_2. Carbon dioxide is the major greenhouse gas emission (GHG) released to the atmosphere due to fossil fuel burning 80 percent and burning of forests 20 percent. According to BP energy outlook, India's energy consumption set to develop 4.2% a year by 2035 faster than that of all major economies in the world. In 2018, primary energy consumption of India rose by 7.9% which is the highest growth rate since 2007. Coal consumption grew by 8.7% in 2018 and accounted for 70% global increase in coal consumption. Renewables grew by 27% highest for the last 11 years. India was one of the fourth largest generators of renewable energy in 2018 after China, the US, and Germany. The growing energy demand combined with a reduction in carbon intensity leads to a 7% increase in carbon emission.

India is a large country. The majority of people depend on agriculture, which is subject to irregular monsoon, flooding, rising sea levels, and higher temperatures. Climate change is going to erratic throughout the monsoon. the change in climate is likely to hurt livelihoods, cropping pattern and food security. India has signed the historic Paris Climate Agreement on April 22nd recognizing the importance of adopting corrective measures to condense global warming along with 170 countries. In recent years India is facing twin challenges to maintain sustained economic growth along with reducing CO_2 emssion and tackling climate change. Population growth has long been considered to be responsible for the degradation of the environment. With India being the second-most populous country in the world, it now is racing towards achieving higher economic growth. Now there arises a question: Is the race to achieve higher economic growth increasing greenhouse gas emission i.e CO_2 depleting environment leading to climate change?

Literature Review

The academic review of papers that dealt with the relationship between co2 emission, population, energy consumption, and climate change were studied and analyzed.The main theme of all these papers points to the fact that co2 emission is dependent on population and energy consumption resulting in climate change.

Mahalik, M., &Mallick, H. (2014): The study attempts to explain the impact of energy consumption and economic growth on CO_2 emission using johnson co-integration.The research has through lights on three aspects 1) the relationship between environmental pollution and economic growth to validate the Environment Kutznets curve hypothesis.2)economic out-put and energy consumption.3) out-put-energy or out-put pollution relationship. **Yu Benjamin Fu1, el at (2014)** analyzed the debate on the shape of EKC. They estimated that the progress of the present pollution abatement techniques could lead to the formation of an inverted U shaped

EKC curve. At the same time, positive population growth adds an extra burden on the environment quality. This was partially supported by empirical evidence from china. **Biddlecom et al (2005)** studied the relationship between environmental degradation and the size of the family in Nepal.It was found that higher family size was positively correlated with higher environmental degradation. **Knies, Gerhard; Lauk, et al (2008**): depicted that the demand for energy is positively correlated with economic growth. **Bremner, J., et al (2010)** reviewed the existence evidence and offers a conceptual structure to examine the relationship amongst population growth, environmental depletion, poverty and climate change. **Rawshan Ara Begum, el at (2015**): studied that only per capita energy and per capita GDP has significantly impacted on CO_2 emission in Malasiya. **Qin Zhu,Xizhe ,Peng (2012)** :The research paper examines the impact of population characteristics and consumption patterns in China for a period of 1978-2008 on CO_2 emission. It was found that population structures and not population size affected carbon emission. Changes in consumption pattern were also found to be an important factor which was influenced by consumption structures, production, technology and energy structures. **Deitz and Rosa in 1997** assessed the impact of populaton affluence and technology on CO_2 emission. They proposed that there were diseconomies of scale for the large countries and anticipated that with GHG emission, population and economic growth will intensify the problem. **Researchers, other than Deitz and Rosa, York et al,2003 a,b,Fan et al(2006)** has also used STIRPAT Model to anlyse the impacts of population, affluence and technology and found that instead of the working-age population, economic growth impacted CO_2 emission significantly. **Shoufulin,et al (2009)** : analysed the effect of population urbanization level and

energy intensity on the environment of China using the STIRPAT Model. Energy consumption was assumed to be the main source of GHG emission but they found that population is the main factor affecting the environment,**Steve Sorrell (2015)** explains the correlation between increased wealth and increased energy consumption.They found that effect of policies to diminish demand for energy is both constrained and congested and large scale transformation in the socio-technical system is required .that provide energy services such as thermal comfort and mobility.**David Satterthwaite in 2009** analysed the impact of growth of population and urbanisation on change of climate. They concluded that instead of the growth in urban or rural population, growth in consumers and their pattern of consumption is responsible for greenhouse gas emission. **Victoria D.Markham in 2008** has published a report on U.S.population Energy and Climate Change and described the different factors including the number of people , rate of growth of population, the method of living, energy consumption pattern and natural resources that are responsible for climatechange.

Sources of Data

The data under study have been taken from www.worldbank.org on annual basis for the period of 1971-2014.

Objective of the study

In recent years India is facing twin challenges to maintain sustained economic growth along with reducing CO_2 emission and tackling climate change. The main aim of this research paper is to study the environmental impacts of population and energy consumption in India which is the root cause of climate change.

Research Methodology and model Specification

STIRPAT model has been used in this paper. This model is a modified form of IPAT Model, proposed by American ecologist Ehrlich and Commoner in 1970. According to the study, of Ehrlich and Commoner, there are three factors namely, population (P), affluence (A) and Technology (T) which affect the environment (I). symbolically-

I=PAT

This model consists of the three variables namely population, affluence and technology level with same proportional change among the three. Adding scholastic nature to the IPAT model gives the widely used STIRPAT Model which is as follows-

$$I=\alpha P^a A^b T^c e \qquad (1)$$

The natural logarithm form of equation (1)-ln $I=\ln \alpha +a\ln P+b\ln A+ c\ln T+\ln e$ (2)

Rewriting all variables in equation (2) as Follows:

$$\ln CO_2 = \ln\alpha_0 +a \ln pop +b \ln GDP +c \ln Energy + \varepsilon \qquad (3)$$

Where , I is the impact of the environment which is denoted as India's total Co2 emission; unit used as kilo tones. P is the population of India in millions, A is the per capita GDP measured in $US. To measure the economic status of a country, Gross Domestic product per capita (GDP)has been taken. GDP is defined as the monetary value of all final goods and services produced in one period.(Lequiller&Blades,2006).. T is Energy Consumption (Energy)- energy use (Kilo tone of oil equivalent) . α represents a constant term of proportion. The a, b, and c represent respectively the elastic coefficients of the three variables, e represents the random error of the model that has been taken to measure the level of environmental degradation STIRPAT model with some modification has been used to see the impact of population, GDP per capita and energy consumption per capita on Co2

emission . We have summarises all the variables under study as mentioned in equation (3) in the following table The table shows the measurement units and the proxy of variables under study.

Table 1 Variables used in study alongwith their units of measurement

Variables	Defination	Units in used
CO_2 emission(CO_2)	India's CO_2 emission.	Kt (Kiloton)
Population	Total population of India	(millions)
GDP per capita(GDP)	India's Current GDP per capita	$ US
Energy Consumption	Energy use	Kilo ton of oil equivalent

Source: World Bank

The data under study covers a period of 1971-2014. Data has been taken from world bank.org. To begin with, we start with a statistical description of data which includes mean, skewness, correlation. We also test the normalcy of data using Jarque-BeraStatistics.The econometrics test used, includes augmented dickey fuller test for stationarity of variables (ADF), BG-LM test for serial correlation and CUSUM test for model stability. ARDL and VECM. Partial 'F' Bounds Co-Integration Test has been used.

(1) Test for Stationarity of variables:
In this study, Augmented Dickey Fuller Test (ADF) has been used to test stationarity of variables. whether the series is stationary or non-stationary depends upon the results of ADF test.The ADF test is of the form-

$$\Delta Y_t = \beta_1 + (\beta_2-1)Y_{t-1} + \sum_{i=1}^{k} \beta_i \Delta Y_{t-1} + \beta_4 t + \varepsilon t$$

Here,

$H0$: $\beta_2 = 1$ the series has unit root or the series is non stationary
$H1$: $\beta_2 \neq 1$ the series is stationary

we get following equation after applying the Augmented Dickey Fuller Test for stionarity for one of our variable energy and with similar procedure we can cheak the stationarity of other variables under study.

$$\Delta \text{ lnenergy}_t =: \beta_1 {}_+ (\beta_2-1) \text{ lnenergy}_{t-1} + \Sigma^m_{i=1} \beta_i \Delta \text{lnenergy}_{t-i} + u_t$$
(4)

(2) Serial correlation
Serial correlation is a test which tries to estimate relation between residuals of variables and lag residuals.The null hypothesis shall be no serial correlation.

Decission rule accept the null if $R^2 (n-p) > \chi^2 n$

$$\text{lnenergy}_t = \beta_1 + \beta_2 \text{lnenergy}_{t-1} + \beta_3 \text{lnenergy}_{t-2} \ldots + \beta_p \text{lnenergy}_{t-(p-1)} + u_t \ldots(5)$$

$$u_t = \beta_1 + \beta_2 \text{lnenergy}_{t-1} + \beta_3 \text{lnenergy}_{t-2} \ldots + \beta_p \text{lnenergy}_{t-(p-1)} + \psi_1 u_{t-1} + \psi_2 u_{t-2} + \psi_3 u_{t-3} + \psi_n u_{t-n} + et \ldots(6)$$

(3) ARDL (Auto regressive distributed lag) and ECM (Error correction model) Model
An autoregressive distributed lag (ARDL) model is a model which is applicable for both non stationarity time series as well as mixed order of integration. Error correction model(ECM) is a model that is most commonly used for data where there exist long run relationship amongst variable

$$\Delta lnCo_2 = \beta_1 + \beta_2 lnCo_{2(t-1)} + \beta_3 lnPOP_{(t-1)} + \beta_4 lnGDP_{(t-1)} + \beta_5 lnEnergy_{(t-1)} + \beta_6 \sum_{i=1}^{k} D(lnCo_{2(t-i)}) + \beta_7 \sum_{i=1}^{k} D(\ln POP_{t-i}) + \beta_8 \sum_{i=1}^{k} D(\ln GDP_{t-i}) + \beta_9 \sum_{i=1}^{k} D(lnENERGY_{t-i}) + \varepsilon_t$$
(7)

(4). Partial F-Bounds Test- determines if the results of the ARDL model show long term co-integration

Null Hypothesis, H0= long run Co-integration between variables is not established.

The following shall be Accept/Reject criteria for our null hypothesis.

Accept the Null,IfF'$_{computed}$<Lower Bound criteria(3.79)

Reject the Null If F'$_{computed}$> Upper Bound Criteria(4.85)

(5) CUSUM (Cumulative sum of squares) parameter stability test: we define CUSUM as

$C_t = \sum_{t+1}^{n} wt/\sigma ct$

Σct is defined as $\sqrt{\sum_{t=k+1}^{n} wt - \frac{wt}{n} - k - 1}$

(6) Error Correction Model

$\Delta \ln Co_2 = \lambda_1 + \lambda_2 ECM(-1) + \lambda_3 \sum_{i=1}^{k} D(\ln Co_{2t-1}) \lambda 4 \sum_{i=1}^{k} D(\ln POP_{t-i}) +$

$\lambda 5 \sum_{i=1}^{k} D(\ln GDP_{t-i}) + \qquad \lambda 6$
$\sum_{i=1}^{k} D(\ln ENERGY_{t-i}) + \varepsilon_{t}.........(8)$

Equation (8) depicts the error correction model along with the short run co-efficient.λ_1, λ_2, λ_3, λ_4, λ_5,and $\lambda_6$are co-efficient of short run model that are to be estimated where λ_2 is the coefficient of ECM model. In order to insure long run relationship in the model , the speed of adjustment as indicated by co-efficient of ECM should be significant with negative sign.

(7) Testing of Hypothesis.
H0: There is no long-term relationship (Cointegration)between variables under study
H1: There is long term relationship between variables under study

Both long run and short run relationship (cointigeration) has been depicted by Equation (7) The co-efficientβ_1, β_2, β_3, β_4, β_5, β_6, β_7, β_8 ,and β_9, are Co-efficient of ARDL Model.If the results of ARDL Bound test reveal co-intigeration then we move to error correction model.

Empirical Results: Table 1-5
Table 1 (A): Descriptive statistics of variable Co_2 emission (kt) , total population, GDP per capita, energy consumption(kg of oil equivalent per capita).

	Co_2	Population	GDP	Energy Consumption
Mean	13.40507	20.61350	5.978636	5.920298
Skewness	-0.040047	-0.224223	0.433782	0.476036
Jarque-Bera	2.716361	2.997982	1.901126	2.866338
Observations	44	44	44	44

The data of population (-0.224223)and Co_2(-0.209058) is negatively skewed while the data of   GDP per capita(0.433782) and Energy Consumption(0.476036)   is   positively skewed.The value of Jarque-Bera is less than 5.99,therefore all the variables are normally distributed.

Table 2 (A): Result of Stationarity Testing (Level)

TYPE OF TEST USED	Null Hypothesis	CO2		Population		GDP		Energy Consumption	
		't' Statistics	p-value	't 'Statistics	p-value	Statistics	p-value	't' Statistics	p-value
ADF	Unit Root	0.31077	0.9762	-7.685016	0.0000	0.267254	0.9738	3.795295	1.0000

Table 2 (B): Result of Stationarity Testing (1st difference)

TYPE OF TEST USED	Null Hypothesis	CO2		Population		GDP		Energy Consumption	
		't' Statistics	p-value	't' Statistics	p-value	't' Statistics	p-value	't' Statistics	p-value
ADF -	Unit Root	-6.332293	0.0000	0.506605	0.9848	-5.899737	0.0000	-4.792842	0.0003

Table II(A) and Table II(B) shows that variables, Population, is stationary at level while others (C02, GDP,Energy consumption) are stationary at first difference.When some variables are significant at level and some are significant at first difference then appropriate co-integration model is ARDL model

Serial Correlation LM Test,

Null Hypothesis:

Ho: No Serial Correlation

Table 3: Breusch-Godfrey Serial Correlation LM Test

F-statistics	1.010170	Prob.F(2,28)	0.3770
Observed R-squared	2.732266	Prob. Chi-square(2)	0.2551

Since the P-value of LM test is not significant we accept the null hypothesis.That there is no serial correalton.

F-Bounds Test- determines if the results of the ARDL model show long term co-integration
Null Hypothesis ,
H0= long run Co-integration between variables is not established.

The following shall be Accept/Reject criteria for our null hypothesis.
Accept the Null,IfF'$_{computed}$<Lower Bound criteria(3.79)
Reject the Null If F'$_{computed}$> Upper Bound Criteria(4.85)

Table 4: Partial 'F' test results for long run co-integeration.

Sample	Relation established	'F' value computed		I(0)	I(I)	Inferences
INDIA (C02)	Energy Consumption	5.471861		2.86	4.01	Cointegeration proved
	GDP					
	Population					

Since calculated Probability value of F is more than 0.05 that is why we accept the null hypothesis.Since F calculated is 5.47 it is more than upper critical value

Table 5 Levels equation and error correcting mechanism.

Variable	Co-efficient	t-statistics	Probability
D(LNENERGY)	1.849082	11.48567	0.0000
D(LNGDP)	0.182741	0.984586	0.3443
D(LNPOP)	5.826098	9.820222	0.0000
ECT(-1)	-0.391499	-2.490543	0.0284

Ec=D(LNCO2) - (1.8491*D(LNENERGY) + 0.1827*D(LNGDP)+5.8261*D(LNPOP)-0.3915*ECT(-1)

The table V depicts that D(lnenergy) D(lnpop) and ECM(_1) are significant at 5% level of significance.The result shows thatco_2 emission increases by 1.84%.as energy consumption increases by 1% and co_2 emission increases by 5.8%.as population increases by 1% The result clearly shows that population and energy consumption has direct and significant effect on co_2 emission in India.The coefficient value of ECM term is -0.391499,meaning that the adjustment towards longterm equilibrium will take 2years 7 months approximately.

CUSUM (Cumulative sum of squares) parameter stability test:
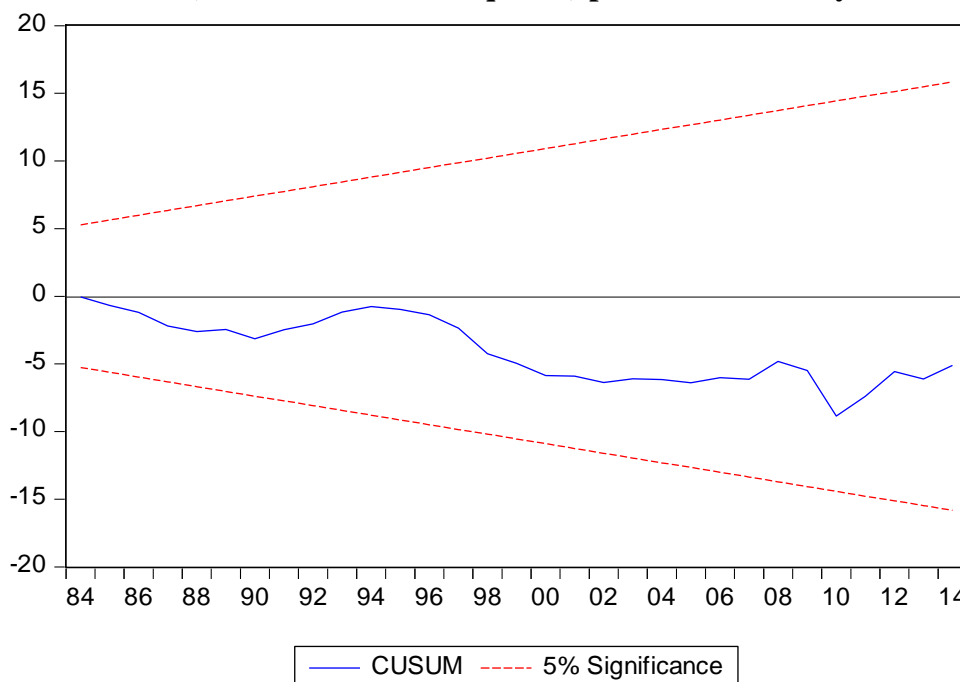
We have tested the stability of model by applying cusum test and found that the estimated values lies between the lines having 5% level of significance,meaning that our model is stable.

Conclusion

To conclude we began by testing how the environment is affected by population GDP per capita and energy consumption using STIRPAT Model which is generally used to study how in an economy population affluence and technology impact the environment. The result shows that energy consumption and population significantly affect CO_2 emission where ARDL approach has been used.The result proved long run positive cointegrating relation between energy consumption population and GDP per capita..This was shown by partial F bound testStationarity of variables serial correlation & parameter stability has been tested as the prerequisite for model an d all the prerequisite are found to be satisfactory.. Further alongwith ARDL model, error correction model was fitted and it was found that coefficient of ECM were negative(-0.3914490) and statistically significant (0.0284). It is found thatCO_2 emission increases by 1.84%.as energy consumption increases by 1% and CO_2 emission increases by 5.8% as population increases by 1%.At this rate the CO_2 emission in India will be 5 times in next 12 years. Already high level of CO_2 emission affecting to climate change which in turn is affecting agriculture,hydrologicalcycle,environment degradation and extreme events like drought and floods.The population growth needs to be further reduced so as to mitigate the impact of co2 emission.Increasing use of energy consumption due to rapid industrialisation is again a significant factor for higher CO_2emission.The environment and climate is adversely affected by the excessive use of energy.The share of manufacturing in India GDP which is currently 15% has expected to increase to 25% as per the government's planning.This will lead to even more energy consumption leading to higher CO_2emission.The need of the hour is to generate energy for industrial manufacturing use through green and renewable solutions like solar energy,wind energy etc.The reliance on coal and diesel petrol will be 30% by 2030 as per the agreement signed in Paris climate change agreement. Khare et al.(2013) in their research has shown that India has ambitious plan to generate 1.75lak MW of renewable energy (including 1 lac MW from solar and 60 thousand MW from wind power) by 2022 which is three times more of present capacity and at present the country has achieved 62 thousand MW of total installed capacity in the renewable energy sector. Even if that materializes, India would still need to consume large amount of carbon emitting coal to meet its growing energy needs as mentioned in the following table:

Table 6 Wind and solar power energy scenario in India

Year	Wind Power (MW)	Solar Power (MW)
2017 (Installed at the end of Mar, 2018)	34061	21651
2022 (planned)	60000	100000

Source: Khare et al., 2013

Implications of the study

India is an emerging economy. Many constructive efforts have been initiated to reduce carbon dioxide emissions as a policy measure.Further India has taken steps along with other countries to declare a prohibition that industries should not produce temperatures exceeding degrees.

In her quest to march towards development, the primary responsibility of the government is to protect the environment. Efforts must be initiated to reduce the increasing pressure of population on resources to control global warming and thereby climate change.

As energy is strongly integrated with the environment, the need of the hour is to generate energy for industrial manufacturing use through a green and renewable solution like solar and wind

Renewable sources of energy for Industrial purposes must be encouraged to mitigate the adverse effect of carbon emission and it will help to control greenhouse gas emission too. New technologies to generate electricity should be introduced. Cost savings worth more than 50,000 crores approx and thereby a reduction in about 4 cores of tonnes co2 emission has been mitigated due to the implementation of an energy efficiency programme. Enabling Inclusive Growth through affordable reliable and sustainable energy 2018-19 economic survey mention that even if India has 18% of the world's population, It uses only around 6% of the world's primary energy.

India has kept reforestation on a priority basis to mitigate global climate change. Annually about 0.8 million hectares of land have been set aside by the government for forest establishment.

Climate change is a major challenge, the world is facing today. The increasing population again is putting pressure on resources, making the situation as grave. Growing urge to move on the path of development leading to an increase in Co_2 emission is worsening the environment, depleting ozone layers increasing temperatures and climate change.

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ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING TECHNIQUES FOR DATA SCIENCE USING PREDICTIVE MODELS SYSTEM

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ABSTRACT

Machine Learning for Predictive Models of data, such as Internet of Things (IoT) data, cyber security data, mobile data, business data, social media data, health data, etc. To intelligently analyze these data and develop the corresponding smart and automated applications, the knowledge of artificial intelligence (AI), particularly, machine learning (ML) is the key. Various types of machine learning algorithms such as supervised, unsupervised, semi-supervised, and reinforcement learning exist in the area. Besides, the deep learning, which is part of a broader family of machine learning methods, can intelligently analyze the data on a large scale. In this paper, we present a comprehensive view on these machine learning algorithms that can be applied to enhance the intelligence and the capabilities of an application. Thus, this study's key contribution is explaining the principles of different machine learning techniques and their applicability in various real-world application.

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Introduction

We live in the age of data, where everything around us is connected to a data source, and everything in our lives is digitally recorded For instance, the current electronic world has a wealth of various kinds of data, such as the Internet of Things (IoT) data, cyber security data, smart city data, business data, smartphone data, social media data, health data, data, and many more. The data can be structured, semi-structured, or unstructured, discussed briefly in Sect. "Types of Real-World Data and Machine Learning Techniques", which is increasing day-by-day. Extracting insights from these data can be used to build various intelligent applications in the relevant domains. For instance, to build a data-driven automated and intelligent cybersecurity system, the relevant cybersecurity data can be used to build personalized context-aware smart mobile applications, the relevant mobile data can be used and so on. Thus, the data management tools and techniques having the capability of extracting insights or useful knowledge from the data in a timely and intelligent way is urgently needed, on which the real-world applications are based. Artificial intelligence (AI), particularly, machine learning (ML) have grown rapidly in recent years in the context of data analysis and computing that typically allows the applications to function in an intelligent manner [1]. ML usually provides systems with the ability to learn and enhance from experience automatically without being specifically programmed and is generally referred to as the most popular latest technologies in the fourth industrial revolution or Industry is typically the ongoing automation of conventional manufacturing and industrial practices, including exploratory data processing, using new smart technologies such as machine learning automation. Thus, to intelligently analyze these data and to develop the corresponding real-world applications, machine learning algorithms is the key. The learning algorithms can be categorized into four major types, such as supervised, unsupervised, semi-supervised, and reinforcement learning in the area [2], discussed briefly in Sect. "Types of Real-World Data and Machine Learning Techniques". The popularity of these approaches to learning is increasing day-by-

day, which is shown in Fig. , based on data collected from Google Trends [4] over the last five years. The x-axis of the figure indicates the specific dates and the corresponding popularity score within the range of 0 (minimum) to 100 (maximum) has been shown in y-axis. According to Fig. , the popularity indication values for these learning types are low in 2015 and are increasing day by day. These statistics motivate us to study on machine learning in this paper, which can play an important role in the real-world through Industry 4.0 automation. In general, the effectiveness and the efficiency of a machine learning solution depend on the nature and characteristics of data and the performance of the learning algorithms. In the area of machine learning algorithms, classification analysis, regression, data clustering, feature engineering and dimensionality reduction, association rule learning, or reinforcement learning techniques exist to effectively build data-driven systems Besides, deep learning originated from the artificial neural network that can be used to intelligently analyze data, which is known as part of a wider family of machine learning approaches [6]. Thus, selecting a proper learning algorithm that is suitable for the target application in a particular domain is challenging. The reason is that the purpose of different learning algorithms is different, even the outcome of different learning algorithms in a similar category may vary depending on the data characteristics [2]. Thus, it is important to understand the principles of various machine learning algorithms and their applicability to apply in various real-world application areas, such as IoT systems, cyber security services, business and recommendation systems, smart cities, healthcare and context-aware systems, sustainable agriculture, and many more that are explained briefly in Sect. "Applications of Machine Learning". Based on the importance and potentiality of "Machine Learning" to analyze the data mentioned above, in this paper, we provide a comprehensive view on various types of machine learning algorithms that can be applied to enhance the intelligence and the capabilities of an application. Thus, the key contribution of this study is explaining the principles and potentiality of different machine learning techniques, and their applicability in various real world application areas mentioned earlier. The purpose of this paper is, therefore, to provide a basic guide for those academia and industry people who want to study, research, and develop data-driven automated and intelligent systems in the relevant areas based on machine learning techniques.

The key contributions of this paper are listed as follows:

- To define the scope of our study by taking into account the nature and characteristics of various types of real world data and the capabilities of various learning techniques.
- To provide a comprehensive view on machine learning algorithms that can be applied to enhance the intelligence and capabilities of a data-driven application.
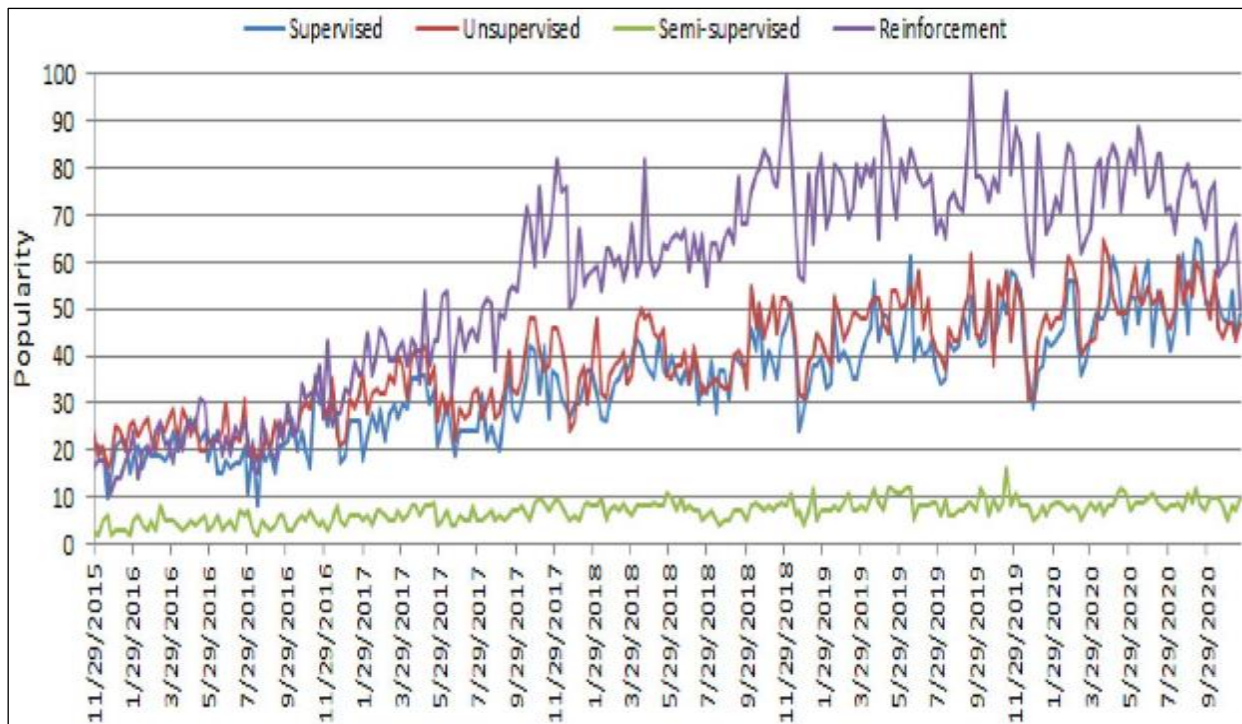
Fig. 1 The worldwide popularity score of various types of ML algorithms (supervised, unsupervised, semi-supervised, and reinforcement) in arange of 0 (min) to 100 (max) over time where x-axis represents the timestamp information and y-axis represents the corresponding score.

To discuss the applicability of machine learning- based solutions in various real-world application domains.

- To highlight and summarize the potential research directions within the scope of our study for intelligent data analysis and services.

The rest of the paper is organized as follows. The next section presents the types of data and machine learning algorithms in a broader sense and defines the scope of our study. We briefly discuss and explain different machine learning algorithms in the subsequent section followed by which various real-world application areas based on machine learning algorithms are discussed and summarized. In the penultimate section, we highlight several research issues and potential future directions, and the final section concludes this paper. Industries are currently going through "The Fourth Industrial Revolution," as professionals have called it, a term also known as "Industry 4.0." (I4.0) Integration amongst physical and digital systems of the production contexts is what mainly concerns Industry 4.0 [1]. With the appearance of I4.0, the concept of prognostics and health management (PHM) has become unavoidable tendency in the framework of industrial big data and smart manufacturing; plus, at the same time, it oers a reliable solution for handling the industrial equipment health status. I4.0 and its key technologies play an essential role to make industrial systems autonomous [2, 3] and thus make possible the automatized data collection from industrial machines/components. Based on the collected data type machine learning algorithms can be applied for automated fault detection and diagnosis. However, it is very cruel to select appropriate machine learning (ML) techniques, type of data, data size, and equipment to apply ML in industrial systems. Selection of inappropriate predictive maintenance (PdM) technique, dataset, and data size may cause time loss and infeasible maintenance scheduling. Therefore, this study aims to present a comprehensive literature review to discover existing studies and ML applications, and thus help researchers and practitioners to select appropriate ML

techniques, data size, and data type to obtain a feasible ML application. The industrial equipment predictive maintenance (PdM) can perceive the degradation performance because it was designed to achieve near-zero; hidden dangers, failures, pollution, and near-zero accidents in the entire environment of manufacturing processes [4].

These huge amounts of data collected for ML contains very useful information and valuable knowledge which can improve the whole productivity of manufacturing processes and system dynamics, and can also be applied into decision support in several areas, mainly in condition-based maintenance and health monitoring [5]. Due to the recent advances in technology, information techniques, computerized control, and communication networks, it is now possible to collect vast volumes of operational and processes conditions data generated from several pieces of equipment in order to be harvested in making an automated Fault Detection and Diagnosis (FDD) [6]. The datasets collected can also be applied to develop more efficient methodologies for the intelligent preventive maintenance activities, similarly known as PdM [7]. ML applications provide some advantages which include maintenance cost reduction, repair stop reduction, machine fault reduction, spare-part life increases and inventory reduction, operator safety enhancement, increased production, repair verification, an increase in overall profit, and many more. These advantages also have a tremendous and strong bond with the procedures of maintenance Moreover, fault detection is one of the critical components of predictive maintenance; it is very much needed for industries to detect faults at very early stage Techniques for maintenance policies can be categorized into the following main classifications

1. (R2F) Run 2 Failure: also known as corrective maintenance or unplanned maintenance. It is the simplest amongst maintenance techniques which is performed only when the equipment has failed. It may lead to high equipment downtime and a high risk of secondary faults and thus, create a very large number of defective products in production.

2. Preventive Maintenance (PvM): also known as scheduled maintenance or time-based maintenance (TBM). PvM refers to periodically performed maintenance based on a planned schedule in order to anticipate the failures. It sometimes leads to unnecessary maintenance which increase the operating costs. The main aim here is to improve the efficiency of the equipment by minimizing the failures in production

3. Condition-based Maintenance (CBM): this method of maintenance is based on a constant machine or equipment monitoring or their process health that can be carried out only when they are actually necessary. The maintenance actions can only be carried out when the actions on the process are taken after one or more conditions of degradation of the process. CBM usually cannot be planned in advance.

4. PdM: known as Statistical-based maintenance: maintenance schedules are only taken when needed. It is based on the continuous monitoring of the equipment or the machine, as like CBM. It utilizes prediction tools to measure when such maintenance actions are necessary, hence the maintenance can be scheduled. Furthermore, it allows failure detection at an early stage based on the historical data by utilizing those prediction tools such as machine learning methods, integrity factors (such as visual aspects, coloration different from original, wear), statistical inference approaches, and engineering techniques. It is required that any maintenance strategy ought to minimize equipment failure rates, must improve equipment condition, should prolong the life of the equipment, and reduce the maintenance costs. An overview for the maintenance classifications is shown in Figure . PdM turned out to be one of the most promising strategies amongst other strategies of maintenance that has the ability of achieving those characteristics ,

thus the strategy has been applied recently in many fields of studies. PdM captivates the attention of the industries,

hence it has been applied in the era of I4.0 due to it is capability of optimizing the use and management of assets.
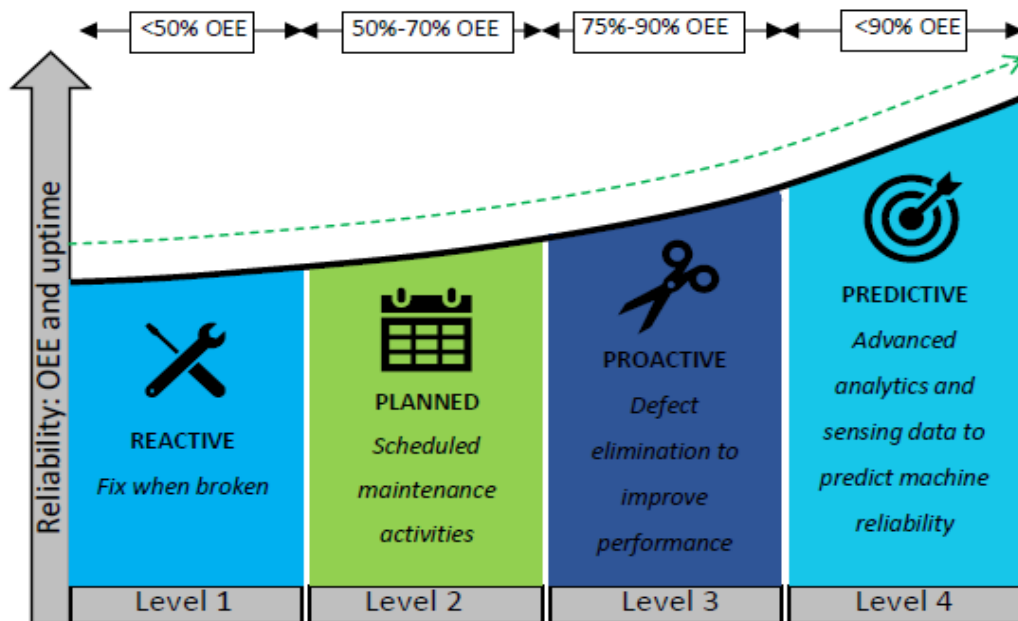

Fig, 2 Maintenance types

ML, within the contexts of artificial intelligence (AI) (Figure 1, copyright permission of Figure has taken on 20 September 2020), lately, has appeared to be one of the most powerful tools that can be applied in several applications to develop intelligent predictive algorithms. It has been developed into a wide field of research over the past decades. ML can be defined as a technology by which the outcomes can be forecasted based on a model prepared and trained on past or historical input data and its output behavior According to Samuel, A.L. ML mainly means that if computers are allowed to solve without specifically being programmed in doing so. ML approaches are known to have tremendous advantages, as they have the ability in handling multivariate, high dimensional data and can extract hidden relationships within data in complex, dynamic, and chaotic environments.

However, depending on the ML approach chosen, the performance and advantages might differ. As of today, ML techniques have been widely applied in several areas of manufacturing (such as maintenance,

optimization, troubleshooting, and control) consequently, this paper aims to provide the recent advancements of ML techniques applied to PdM from an ample perspective. Predominantly, this ample review uses Scopus database while acquiring and identifying the articles used. From a comprehensive perspective, this paper aims to pinpoint and categorize based on the ML technique considered, ML category, equipment used, device used in data acquiring, applied data description, data size, and data type.

Types Of Real-World Data And Machine Learning Techniques

Machine learning algorithms typically consume and process data to learn the related patterns about individuals, business processes, transactions, events, and so on. In the following, we discuss various types of real-world data as well as categories of machine learning algorithms.

Types of Real-World Data

Usually, the availability of data is considered as the key to construct a machine learning model or data-driven real world systems Data

can be of various forms, such as structured, semi-structured, or unstructured .

Besides, the "metadata" is another type that typically represents data about the data. In the following, we briefly discuss these types of data.

- Structured: It has a well-defined structure, conforms to a data model following a standard order, which is highly organized and easily accessed, and used by an entity or a computer program. In well-defined schemes, such as relational databases, structured data are typically stored, i.e. in a tabular format. For instance, names, dates, addresses, credit card numbers, stock information, geolocation, etc. are examples of structured data.

- Unstructured: On the other hand, there is no pre-defined format or organization for unstructured data, making it much more difficult to capture, process, and analyze, mostly containing text and multimedia material. For example, sensor data, emails, blog entries, wikis, and word processing documents, PDF files, audio files, videos, images, presentations, web pages, and many other types of business documents can be considered as unstructured data.

- Semi-structured: Semi-structured data are not stored in a relational database like the structured data mentioned above, but it does have certain organizational properties that make it easier to analyze. HTML, XML, JSON documents, NoSQL databases, etc., are some examples of semi-structured data.

- Metadata: It is not the normal form of data, but "data about data". The primary difference between "data" and "metadata" is that data are simply the material that can classify, measure, or even document something relative to an organization's data properties. On the other hand, metadata describes the relevant data information, giving it more significance for data users. A basic example of a document's metadata might be the author, file size, date generated by the document, keywords to define the document, etc.

Types Of Machine Learning Techniques

Machine Learning algorithms are mainly divided into four categories: Supervised learning, Unsupervised learning, Semi-supervised learning, and Reinforcement learning , as shown in Fig. In the following, we briefly discuss each type of learning technique with the scope of their applicability to solve real-world problems.

- Supervised: Supervised learning is typically the task of machine learning to learn a function that maps an input to an output based on sample input-output pairs. It uses labeled training data and a collection of training examples to infer a function. Supervised learning is carried out when certain goals are identified to be accomplished from a certain set of inputs , i.e., a task driven approach. The most common supervised tasks are "classification" that separates the data, and "regression" that fits the data. For instance, predicting the class label or sentiment of a piece of text, like a tweet or a product review, i.e., text classification, is an example of supervised learning.
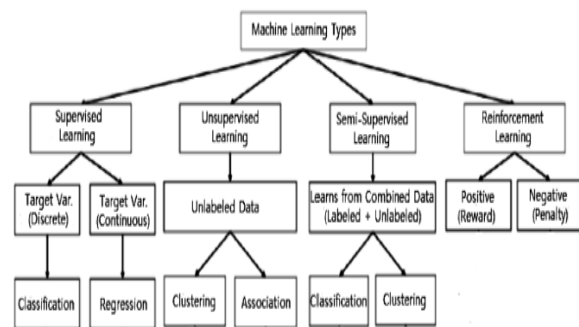

Fig. 3. Various types of machine learning techniques

- Unsupervised: Unsupervised learning analyzes unlabeled datasets without the need for human interference, i.e., a data-driven process . This is widely used for extracting generative features, identifying meaningful trends and structures, groupings in results, and exploratory purposes. The most common unsupervised learning tasks are clustering, density

estimation, feature learning, dimensionality reduction, finding association rules, anomaly detection, etc.

- Semi-supervised: Semi-supervised learning can be defined as a hybridization of the above-mentioned supervised and unsupervised methods, as it operates on both labeled and unlabeled data . Thus, it falls between learning "without supervision" and learning "with supervision". In the real world, labeled data could be rare in several contexts, and unlabeled data are numerous, where semi-supervised learning is useful. The ultimate goal of a semi-supervised learning model is to provide a better outcome for prediction than that produced using the labeled data alone from the model. Some application areas where semi-supervised learning is used include machine translation, fraud detection, labeling data and text classification.

- Reinforcement: Reinforcement learning is a type of machine learning algorithm that enables software agents and machines to automatically evaluate the optimal behavior in a particular context or environment to improve its efficiency i.e.,

an environment-driven approach. This type of learning is based on reward or penalty, and its ultimate goal is to use insights obtained from environmental activists to take action to increase the reward or minimize the risk [27]. It is a powerful tool for training AI models that can help increase automation or optimize the operational efficiency of sophisticated systems such as robotics, autonomous driving tasks, manufacturing and supply chain logistics, however, not preferable to use it for solving the basic or straightforward problems. Thus, to build effective models in various application areas different types of machine learning techniques can play a significant role according to their learning capabilities, depending on the nature of the data discussed earlier, and the target outcome. In Table , we summarize various types of machine learning techniques with examples. In the following, we provide a comprehensive view of machine learning algorithms that can be applied to enhance the intelligence and capabilities of a data-driven application.

Table 1: Various types of machine learning techniques

Learning Type	Model Building	Examples
Supervised	Algorithm or models learn from labelled data (task-drive approach)	Classification, Regression
Unsupervised	Algorithm or models learn from unlabelled data (D-drive approach)	Clustering, Association, Dimensionality reduction
Semi-supervised	Models are built using combined data (labeled+unlabeled)	Classification, Clustering
Reinforcement	Models are based on reward or penalty (environment-driven approach)	Classification, Control

Conclusion

In this paper, we have conducted a comprehensive overview of machine learning algorithms for intelligent data analysis and applications. According to our goal, we have briefly discussed how various types of machine learning methods can be used for making solutions to various real-world issues. A successful machine learning model depends on

both the data and the performance of the learning algorithms. The sophisticated learning algorithms then need to be trained through the collected real-world data and knowledge related to the target application before the system can assist with intelligent decision-making. We also discussed several popular application areas based on machine learning techniques to highlight their applicability in various real-world issues. Finally, we have

summarized and discussed the challenges faced and the potential research opportunities and future directions in the area. Therefore, the challenges that are identified create promising research opportunities in the field which must be addressed with effective solutions in various application areas. Overall, we believe that our study on machine learning-based solutions opens up a promising direction and can be used as a reference guide for potential research and applications for both academia and industry professionals as well as for decision-makers, from a technical point of view.

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