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SOCIETY
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EDITORIAL COMMUNICATION

The objective of the special issue of **Bioscience Biotechnology Research Communications Vol 13 No (10) 2020 on "Recent Research on Management, Sciences and Technology**" is to provide a platform to researchers where they are able to publish their original research work in different avid areas related to Management, Sciences and Technology.

We are happy to share that quality research work addressing important issues like Psychological Wellbeing among Secondary Teachers, Women and Gender Bias, Women Empowerment, Hygiene and Safety in the Era of COVID-19 Pandemic etc. are published in this special issue. This Special issue also has articles related to Leadership effect, Supply Chain Management, E-Learning, ICT and Social Media Marketing. Articles related to applied science and technology in various areas of artificial intelligence, software applications, energy management have also been published in this issue.

This special issue aims to foster the growth of a new research community, acting as an international forum for researchers and practitioners in academia and industry to present research that will definitely play a very important role in changing the landscape of our near future.

The published research articles have been aimed to motivate the next generation researchers working in various emerging research areas. The articles published in this issue will be helpful for the researchers working in these new emerging areas. We express our heartfelt gratitude to all the contributors from different colleges and universities of India and Abroad for giving us an opportunity to publish their research work in this Special Issue on Recent Research on Management, Sciences and Technology.

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Power Estimation Using Linear and Logistic Regression

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ABSTRACT

It is tedious to make the process of finding the power for given inputs, outputs and the number of gates because it relies on the compilation of the HDL code (Verilog or VHDL) and it is difficult to carry out the power estimation in simulation as well. In order to get a faster and quicker way, power estimation can be done in machine learning. Here, it is achieved by taking the ISCAS Benchmark circuits for training the system and it is tested with random circuits for the estimation and it is compared with the power estimation taken from the power analyzer tool. The process is tested in different algorithms and regressions and it is compared. The detailed analysis result of ISCAS Benchmark circuits is taken to train the model. Then the model is applied for the estimation of the power. The Neural Networks Prediction is made possible for effective Error Rate and Run Rate.

KEY WORDS: KNN, BENCHMARK CIRCUITS, BPNN, MACHINE LEARNING, POWER ANALYZER CIRCUIT.

INTRODUCTION

Power calculation of VLSI circuits in traditional methods in more complicated circuits is more complicated. And the Power calculation technique is always a trade-off between time and precision. Simulation-based calculation of power provided the most reliable yet time-consuming performance. Here, VLSI power calculated in Monte-Carlo and other statistical approaches is less dependent on simulation and with less time obtained accurate performance. The Monte-Carlo methods or experiments in Monte-Carlo are a wide variety of computational algorithms focused on repeated random sampling for numerical results. The underlying principle is to use randomness to solve problems that could be solved in theory. The whole point of the power estimation is not just through the input, output or number of gates but also depends on the pattern generation or the test patterns obtained from the source.

Test manufacturing is a vital part of the growth and advancement of the chip process. It would probably discover faulty equipment and sort them out. A test set shall be prefabricated and applied to every chip produced. The on-chip structures are actively used to guarantee quick and low-cost research, which creates unsustainable operating conditions. The chip's power efficiency is firmly regulated through the control functions to meet the stringent power requirements. In this case poor working conditions, such as those used to hit the power limit during the test process. This could result in incorrect test results and even damage to the chips. Tests must therefore be reviewed in advance to ensure that they meet the power criteria for ensuring the protection of test data. Another related issue is the IR-drop which can cause breaches of timing.

Exact simulation techniques must be implemented prior to the tape-out process to achieve true results at the sign-off point. Nonetheless, a few cycles should take the right steps

to reduce the IR decrease of each case independently. Exact power and timing simulations, sadly, require substantial resources and more run-time. In addition, the analyzes must be conducted in a later stage of the production phase near the tape-out phase.

Literature Survey: The related increase in chip density [1] and operating frequency has rendered power consumption a major concern in VLSI design. Modern microprocessors are very hot: the power PC chip of Motorola consumes 8.5 W, the Pentium chip of Intel consumes 16 W and the alpha chip of DEC consumes 30 W. Excessive power dissipation not only discourages their use in a portable setting for integrated circuits but also causes overheating, which degrades performance and decreases the chip life. High-power chips require complicated and costly packaging and sinking heat to control their temperature levels. This, combined with the recent growing demand for portable low-power communications and computing systems, has generated the need to reduce power consumption in many chip designs. Nonetheless, the Semi-Conductor Industry Association has defined low-power design techniques as a critical technological necessity."

Managing the power of an IC network [2] adds to a growing list of problems facing both IC designers and network managers. Computer aided design (CAD) tools are needed to help with the tasks of power management. CAD tools are especially needed to estimate power dissipation during the design process in order to achieve power requirements without costly redesign. The chip components (gates, cells) only draw power supply in CMOS and BiCMOS technologies during a logical transition (if we ignore the minor leakage current); while this is considered an attractive low-power function of these technologies, it is highly dependent on the switching activity within these circuits. Quite clearly, the more power a more active circuit consumes. This makes the Manuscript obtained 31 August 1994 difficult. The author is Structured Research Laboratory, University, with IEEE Log Number 9406369. Illinois Urbana-Champaign, Urbana, US IL 61801. The problem of power estimation because the power is a moving target-it depends on the input pattern."

This pattern-dependence problem [3] therefore seriously complicates the easy and straightforward solution of estimating power using a simulator. Input signals are usually unknown during the design process because they depend on the system (or module) in which the module (or functional block) is ultimately used. Additionally, it is nearly impossible to quantify power by simulating the circuit for all" possible inputs. Several techniques have recently been proposed to resolve this problem by using probabilities to classify the set of all possible logical signals and then measure the strength of all those signals. This formulation achieves some degree of pattern-independence which helps one to efficiently estimate and manage power dissipation."

The earliest proposed techniques [4] to estimate power dissipation were based on circuit simulation which was highly pattern-dependent. One can simulate the circuit where the supply voltage and current waveforms are regulated, which is then used to calculate the mean power. Such techniques are not only highly dependent on trends but also too slow to be used on large circuits where high power dissipation is a issue.

Many advanced methods have been suggested to overcome [5] the limitations of simulation-based techniques, concentrating, as described above, on combinational digital CMOS circuits embedded in a synchronous design environment. The main problem regarding the power consumed in a combination circuit whose inputs are synchronized. The use of the probabilities was first suggested for capability estimation in 1191. In this analysis, a zero-delay model was assumed, and a temporary independence assumption was made so that the probabilities of shift could be determined using the signal probabilities. The signal probabilities at the primary inputs provided by the user are propagated to the circuit, taking into account the spatial independence, and the power was measured. The toggle control was ignored, as a zero-delay model was used. A probabilistic power estimation method, called probabilistic simulation, which measures the toggle power and does not allow the assumptions of zero delay or temporal independence. Within this technique, the use of probabilities has been expanded to allow specification of probability waveforms. This approach presumed spatial independence, and was not restricted to only synchronous circuits."

This also provided an algorithm to propagate the transition [6] density into the circuit. This approach does not presume zero delay, it just allows for the presumption of spatial freedom. Nevertheless, this assumption of independence has the effect of making the measured density values insensitive to internal circuit delays. A further probabilistic approach was proposed in which binary decision diagrams (BDD's) were used to take into account internal node correlations and switching power, at the cost of increased computation. This approach can become computationally costly, particularly for circuits where the power to switch dominates. We refer to the above methods as probabilistic, because probabilistic" "information is directly propagated into the circuit.

To do so, special models must be developed for circuit blocks (gates) and stored in the cell library. Other methods do not, by comparison, require sophisticated circuit models, which we will call statistical. Instead, they use traditional simulation models and simulate the circuit for a small number of randomly generated input vectors while controlling the power. These vectors are generated from probabilistic knowledge about user-defined circuit inputs. Using statistical estimation techniques, it is possible to determine when to stop the simulation so that a certain specified error is bound and illustrated below. All probabilistic and statistical approaches referred to above are for combinational circuits only. We

demand that the user define the latch outputs operation information. Power estimation in sequential circuits.

Regressions In Machine Learning: Regressions are set of algorithms or formula which can be implemented in calculating any form of quantity like power estimation, area measurement, etc. In simple words it is basically a method of modelling the targeted values based on some predictors. The predictors are mostly independent in nature. This method is used for comparing between two dependent or independent variables to either forecast or to find out the cause and effect between the two variables. These techniques usually differ on what type of regression variables we use and the number of variables we use. The simplest Regression is Linear Regression. The simplest Linear regression is finding out whether the independent variable (for instance x) and the dependent variable (for instance y) has a linear relationship if it is plotted in a graph. The most familiar type of graph is linear graph in any mathematical graphs. The simplest formula of the linear regression is the equation which is mentioned below. The equation has an independent variable which mostly a constant and the other on is a dependent variable.

$$y = a\_0 + a\_1 * x$$

To plot the equation with selected values it may be approached with the values mentioning in the blue dots for the values and the red line as the linear regression graph. The behind the scenes of this regression which is hidden for any programmer from the front end is basically two main parameters. These parameters make us understand the concept of linear regression in way more in depth.

Figure 1: Simple representation of linear regression
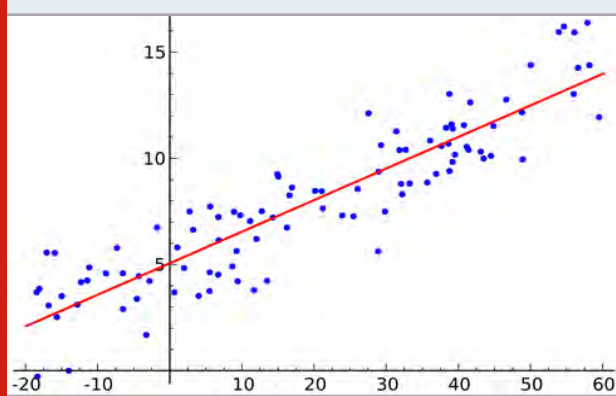
Logistic Regression: Alongside of the linear regression, the second most used regression is logistic regression. Though it is named as logistic regression, it mainly focus on the classification algorithm which is used to differentiate the input data in to its classes. The main difference of this regression from the linear regression is the term called "multi-class classification". The binary-class classification cannot classify more than two distinct classifiers.

Figure 2: Flow chart representing methodology
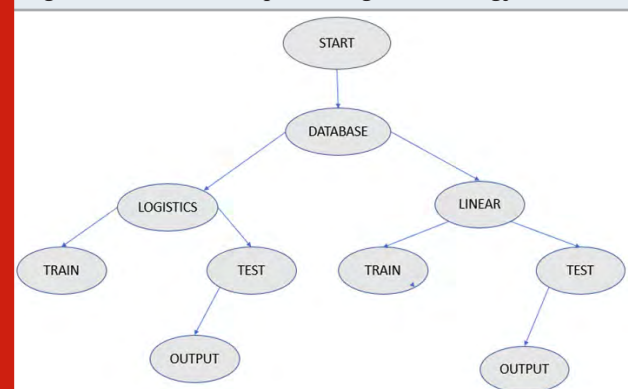
Table 1. ISCAS Benchmark circuits

List Of Circuits	Inputs	Outputs	Total Gates Used	Nand	And	Nor	Xor	Not	Or	Power
					ISCAS'85					
c17	5	2	6	6	NIL	NIL	NIL	NIL	NIL	0.00698
c432	36	7	236	79	7	19	18	40	NIL	0.00912
c499	41	32	256	NIL	56	NIL	104	40	2	0.01856
c880	60	26	437	87	117	61	NIL	63	29	0.0162
c1355	41	32	768	416	472	NIL	NIL	72	2	0.01065
c1908	33	25	995	377	63	1	NIL	277	NIL	0.00903
c2670	233	140	1244	254	333	12	NIL	321	77	0.01172
c3540	50	22	1821	298	498	68	NIL	490	92	0.03743
c5315	178	123	2830	454	716	27	NIL	581	214	0.02831
c6288	32	32	3840	NIL	256	NIL	NIL	32	2128	0.01292
c7552	207	108	3833	1028	776	54	NIL	876	244	0.02458

In this regression, the model approach is numerical values but the values are corresponded to the probabilities of the data given in the input which belongs to a particular class. The name "logistic" in the logistic regression justifies the another function to the weighted sum of the data given in the input and the model with which the parameters depend on. This function can be defined as "sigmoid function"The sigmoid function has the output values between 0 or 1 by mapping the values in a particular range and calculating the probabilities of the data given in the input from the given class. The function of the sigmoid is

$$\text{Sigmoid}(x) = 1/(1 + e\text{-}x)$$

Figure 3: Snippet code for the project

Figure 4: Estimated power graph
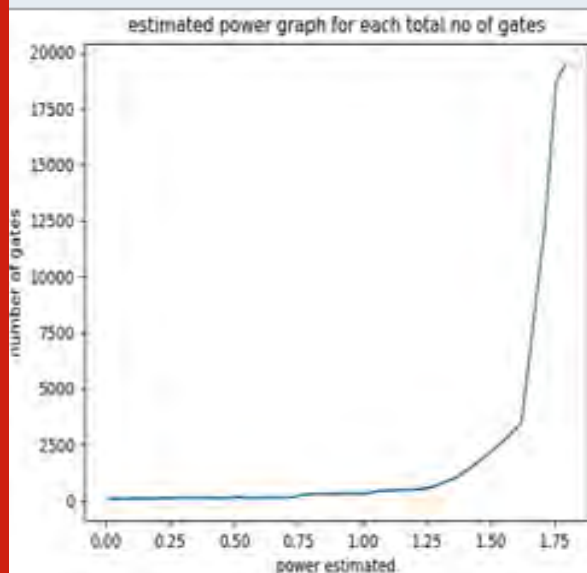
Flowchart Representation: The flowchart of this power estimation defines two important regressions (linear and logistic regression). The databases are collected from the ISCAS BENCHMARK circuits and collected in a ".csv" file. The sample data set is given below. The sample data given below does formed with the Monte Carlo method. This data is separated into two different datasets for each regression. This datasets in (.csv)excel file is taken as a training datasets in the process. Both logistic and the linear regressions are trained using this Monte Carlo dataset with the help of python software by the required library files. Then this whole process is now tested with the random circuits by giving a functional unit example (i.e) giving number of inputs, number of outputs, and the number of gates.

CONCLUSION

We have presented a power estimation approach to predict the estimation complexity of multiple inputs and outputs in a functional unit. This helps the floor plan engineer to predict the power after the production of IC chips but before the testing. Based on Mante-Carlo Method, we collected the data set which includes as number of inputs, number o of outputs and number o of gates in a particular circuit which is trained by two regression namely, linear and logistic. Thus, the experimental result shows the estimated of the ISCAS benchmark circuits for the collected data sets. The advantage of this power estimation model is that it can be easily characterized and it also has a framework for the inputs and outputs. In addition, the simulation and the delay points are very feasible. The predicted capacitance is combined with the average estimation to get high level power estimation. Estimated power for the given dataset of ISCAS BENCHMARK circuits is shown below.

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A Study of Sustainable Components in Green IoT Architecture

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ABSTRACT

The IoT is capable of connecting zillion of devices together on a huge scale, and it will continue to grow in the following years. The existing system is an integration of sensors on connected network collecting data onto the cloud through networking devices making purely dynamic, self-adapting, context free intelligent decision without human intervention. Therefore, there is an increase in the power consumption, cell congestion, signaling storms, truck rolls, communication delays in mass deployment of IoT devices and implement new technologies. There are several techniques of improving the IoT system. This paper stress on the using the concept of Green ecosystem as one of the techniques for components in IoT to sustain a Green IoT architecture.

KEY WORDS: GREEN TECHNOLOGY, IOT ARCHITECTURE, GREEN IOT, GREEN RFID, GREEN WNS, GREEN FOG COMPUTATION, VIRTUALIZATION IN IOT, GREEN DATA CENTERS.

INTRODUCTION

As the human race has improved life in its various industry revolution, it has also cause mismanagements of our energy resources and global warming leading to a very grim picture of the planet unable to sustain human life. Saving Environment is the global concern our priority is to make world green and clean. Currently in the world of digital network communication. Enormous amount of data is transmitted and received over the world for doing business, education and social networks. The ideas of machine to machine communication without the intervention of humans has throught about the idea of IoT. IOT is the technology to support remote connectivity of everyday devices which sends and receives data and information through internet. This system is purely dynamic, self-configured, self-adapting , context free, integrated into a knowledge system to take intelligent decision automatically. All of which would consume power and use various energy resources for its working. Green IoT basically focuses on the energy, efficiency in the IoT principles. Green IoT is defined as the energy efficient ways in IoT either to reduce the green-house effect caused by existing applications or to eradicate the same in IoT itself. IoT system tasked with enabling a greener society.

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Green Technology and It Features: Green technology is sustainable technology for environmental benefits, Sustainable chemistry, Environmental science and monitoring are few technological processes that protect the environment. Products are innovated modified to make it environmentally friendly are green products. Some of the properties like energy efficiency, recycling, health and safety concerns, renewable resources are some that must be maintained to making of a green product or technology [25].

Features To Attain Green Technology: It is seen that energy generation and consumption and managements have been the key features to sustain a green ecosystem. The usage of renewable energy production technologies like energy generated by wind turbines, bioreactors, Photovoltaics, recycling waste are safe and low cost on input resource. Using sustainable resources management practices in the categories of businesses, agriculture, society, environment, and personal life with electronic devices and gadgets will improve the usage of resource utilization. [26] Implementing eco- friendly practices like paperless environment, data warehousing and vitalization through cloud would improve green computing. The use of green accreditations with products, venders and partners like Energy Star.

Green Plus, EPEAT (Eco Labelling), American Consumer Council, Green Business Bureau would set up a criterion to improved green devices. [27]. For this change globally it would be necessary to assert global cooperation to attain good green practices. The UNEP Green Economy Initiative (GEI) is designed to assist governments in greening their economies by framing policies to reshaping and refocusing, decisions about investments and spending in various sectors like clean technologies, water services, renewable energies, transportation, waste management, buildings and agriculture and forests [28]. Government and international design policies and laws that would encourage the use of unrenewable resources and application of Green technology.

Ecofriendly Green Technologies: Green Technology has made progress in the innovation of harvesting renewable energy, waste managements and recycling, water purification, reduction in pollutants and emission of greenhouse gases in industry as well as in consumer product manufacturing that are energy efficient and multi-functional to make it ecofriendly.[37]. The wastewater treatment includes membrane filtration, nanotechnology, microbial fuel cells, implementing of biological treatments plants and wetland as natural treatment systems. It makes water drinkable or significantly. It reduces the existence of pollutants from being flushed into waterbodies like rivers, lakes and sea.

To elimination of industrial emissions industries such as chemical, petrochemical, medicine and drugs, automotive, etc. must stop their emissions so that they do not cause serious environmental damage. Experts and expert infrastructure are deployed in the treatment of emissions from industries. It can manage the air pollutants in industries and can significantly decrease and lessen the greenhouse effect.

For creating self-sufficient buildings, their constructions are designed to function by generating energy without the need of an external resources. For greater production the same surface of photovoltaic panels is included in a smart solar tracking system, thus utilizing the solar radiation to its maxima. Vertical gardens do not need watering routines as they are aligned with walls of the building structure.. They reduce the noise pollution that comes from the outside and inside, it isolates the high temperatures that causes climate change, resulting in savings in energy, heating and air conditioning. If this technology is implemented to farms, we can save a lot of water and take care of the fertile soil.

The steps in recycling and waste management include technologies like automated biowaste and food waste tracking systems, smart containers, and smart optical scanning can help in sorting mixed plastics, separating and disposing them. Managing solid waste must be a commitment of companies, individuals. others. Depolymerization, Gasification, Pyrolysis, Plasma Arc Gasification are few methods used generates energy from trash. Generating energy from the waves: The wave energy management unit equipments are semi submerged in the sea and are responsible for transforming the movement of the waves into electrical energy. Pelamis has capacity equal to 2.25 MW is generated which generates electricity to 1500 homes max. In harnessing solar energy the solar energy conversion uses high vacuum tube for hot water, photovoltaic collector to produce electricity, polypropylene collector for hot water, and solar streetlamps. These technologies aim to reduce dependence on energy from hydrocarbons and fossil fuels and prove alternate energy resource.

Use of Natural gas boilers is another alternative. Boilers which consume less fuel or renewable energy are called Green Boilers. Natural gas a fossil fuel in them. It gives out more water vapour, less carbon dioxide, less emission of greenhouse gases. Fossil fuel produces 204 grams of CO_2 per thermal kW/h. Therefore, natural gas boilers condense, recovers the heat from the water vapour coming out of the chimney, giving higher thermal yields with less air pollution.[30] The manufacturing of consumer products that are made of recyclable, nontoxic material, that use less packaging conserving energy and resources will not only create a new market but also cost-effective products, low maintenance, positive brand image and loyalty adhering to the need of a green environment.[36] Eco-friendly vehicles are designed to run on battery and eco-friendly fuel hence has no negatively effects on the environment, contributing to reduction of the polluting gases presence in the atmosphere like carbon dioxide (CO_2), nitrogen oxide (NOx), carbon monoxide (CO), unburned hydrocarbons and compounds of Sulphur dioxide and Lead.

IoT Architecture And Its Elements: In 1998 Kevin Ashton stated that the IoT's has the capability to alter the world, in a similar way as Internet did. The IoT is a seamless smart environment of sensors and devices linking up and servicing people anytime anywhere and anything through the internet medium. It has connected the smart embedded system to the internet. The main elements of Internet of things are sensing, communication, data processing, data consolidation and delivery of information. IoT gathering information as points of activity through sensors and sensing technology, communication that transmitting of information sensed by device level things to cloud based service for processing the it from the end user is consolidated from other IoT devices and resources. This information is delivered to end user from devices to devices in M2M or a simple transfer [31].

Table 1. The components and key technologies of the IoT with it 4 layer architecture.		
Layers	Components and key technologies	Key Technologies
Perception layers	Sensors, Actuators	RFID
Network Layer	ADC , Microcontrollers and SOC (Arduino and raspberry pi) connecting devices	Bluetooth, WiFi, Z-wave, Zigbee, LTE adv, NFC, 6LoWPAN Wireless Sensor Network
Middleware layer	Fog nodes Servers Big Data analytics	Context detection and processing with Service -based IoT middleware, Actor-based IoT middleware Cloud-based IoT middleware,
Application Layer	Schematic	Resource describing Framework, XML, Web orthogonal Language

The existing IoT infrastructure consists of hardware devices sensing, actuating, communication, services and management. Mass deployment of the "things" or devices would create inefficiencies and other insecurities. Defective IoT device can affect the performance and power consumption of the network of things. Some of the problem could be cell congestion which is local in the mobile network, disruptions of the signals in a wide area due to capacity of the provider core network, degradation in performance and quality in the IoT services due to delay in communication and outage. Due to which there a raise in the trunk rolls, increasing the cost of the time to solve the problem and maintenance in general. As there is a reduction of the life of the IoT device, it consumes more power due to wrong communication during error handling. Since the wireless network is assume a generalised profile of devices, it is necessary that it need to optimize the deployment of the IoT devices for better coverage. [37].

The manufacturing of IoT devices cadmium, lead, mercury and various toxic elements. The growing usage of electronic devices among within society has resulted in an unrestrained disposal of e-waste is grave threat to human health and environment. Making the entire network of "things" inclusive of the manufacturing of these devices, selection of the right component, deployment of components on network, and using different computing techniques for leveraging it to build a reducing carbon footprint, conserving resources, and promoting better techniques for energy usage. It is the reason for moving towards green IoT. [38].

Converting of Iot To Green IoT: Green IOT is the term used for collective technologies of IoT where in components gets recycled and reused number of times.[21]
- Usage of Green sensors
- Usage of green RFID tags
- Usage of different networking topology structure in WSN and protocol
- Usage of green fog computation
- Usage of visualization techniques Usage of green cloud computing

Table 2. The various sensors present in the IoT devices are:[3]	
Sensors	Power Usage
Temperature sensor	0.5mW–5mW
Pressure sensor	10mW–15mW
Proximity sensor	2.4W
Accelerometer	3mW
Infrared sensor	0.2W
Gyroscope sensor	0.817 W
Gas Sensors	500mW–800mW
Image Sensor	150mW
Optical sensors	1mW to 10 nW
Smoke sensor	0.1mW

Sensors: Sensors in IoT devices: IoT technology is used where we need to collect and transmit data without human intervention. This done with the of sensors.

The electronic and telecommunition industries have contributed to the development of green tags like TI Sensor Tag C2650 [35] uses low power of 0.24 mA and runs 10 sensor in 0.33 mA. The data rate 100 ms/sample and broadcast BLE is 5.5 mA. It supports Bluetooth, 6LoWPAN and ZigBee. They adhere to non-plastic , biodegradable, low power, renewable green properties of green technology certification.

Green RFID: RFID technology is used to identify, detect, and track objects with radio frequency signals. RFID is the combined term of RF and ID where RF refers to wireless communication technology. RFID Tagging is the number system done by wireless microchip, which has a power source and an antenna. It is used to energize and transmits data to RFID reader or interrogator. The reader changes the radio waves to utilizable form of data. The classification of the RFID systems is based on Frequency and Tags

1) On Frequency
i) Low Frequency (LF) RFID: These RFID systems operate in the 30 KHz - 300 KHz range, and can read ranges of upto 10 cm. It performs best in the presence of metal or liquids and a short read range is acceptable.

High Frequency (HF) RFID: HF systems operate in the 3 MHz to 30 MHz range and provide reading distances of 10 cm -1 m. Near Field Communication technology (NFC) is based on HF.

Table 3. Comparison of cloud and fog computation [34]		
Requirement attribute	Cloud Computing	Fog Computing
Latency	High	Low
Delay Jitter	High	Low
Location Of Service	Within Entire Internet	At the edge of the Local Network
Distance between client and server	Multiple Hops	One Hop
Security	Undefined	Can be defined
Attack on the data route	High Probability	Very Low Probability
Location awareness	No	Yes
Geo Distribution	Centralised	Distributed
Number of Server Nodes	Few	Very Large
Mobility	Limited	supported
Real Time Interaction	Supported	Supported
Last mile connectivity	Leased Line	Wireless

Ultra–High Frequency (UHF) RFID: These RFID systems have a range between 300 MHz and 3 GHz , offer read ranges up to 12 m. It has quick data transfer rates global standard and other applications where large volumes of tags are required.
2)On Tags.

i) Active RFID tags: Active RFID tags has a transmitter and battery power source onboard the tag. In some instances the magnitude read can extend upto 100 m. Active tags are larger, more expensive and equipped with sensors for the measuring and transmitting temperature, humidity, light, and shock/vibration. There are two variants of active tags. a) Transponders turn on reception of radio signal from a reader and transmit conserve data. This conservers battery life. b) Beacons transmits one signal at a pre-set time interval. This tag is used in RTLS.

ii) Passive RFID tags: Passive RFID is a solution where the tag receives a signal from the readers antenna, which power the tag and sends energy back to the reader It is called as tag backscatter. These tags are usually smaller, less expensive, more widely used and more flexible than active tags.

ii) Battery–Assisted Passive RFID tags: BAP tag is hybrid RFID tag that is semi-passive RFID systems, has a built-in power source in passive tag. The energy from power source is totally captured from the reader and is used to returns the signal, that improves magnitude of reading distance and data transmission. BAP tags do not have their built-in transmitters. [29].
3) Green RFID tags
The features of Green RFID tag

- Green RFID tags are manufactures with less amount of energy and are recyclable or compostable, thereby leaving less material behind.
- Their inlays will be subject to the manufactures Green tag label certification.
- To meet the standard of green technology, they must be plastic-free.[32] .
- A Green Tag has a green certification to NHF and UFC tags as it omits heavy metals and the adhesives.
- The chemical etching processes on tags are implemented to products and packaging which are be recycled.
- Recyclable or compostable paper are used in the substrate.
- Etching with chemical on aluminium antennas

is avoided , which makes the aluminium residues reusable once the tag is discarded.

- Minimal adhesive is used for chip bonding and printable antennas that are printed on cardboard, which is compostable or recyclable. [33]
- Reducing the sizes of RFID tags because recycling the tags is not easy An energy efficient technique is a frequency-doubling tag method implanting the tags directly to cards, both paper-based antennas and organic diodes provides a perfect green solution at very low cost of production .[4, 5, 6].
- Dynamic Framed Slotted ALOHA (DFSA), where Gen2 specifies its concrete application maximize its throughput and identify all tags , thus necessary to give the correct estimate of the interrogating tags as well as size of the subsequent frame.[7]
- EAFAS based algorithm is a solution that makes RFID adapt to energy-aware scenarios that meets the future need of energy efficiency with high throughput requirements in green IoT applications [8].

Green WNS: A WSN is a large network of nodes build of sensors that are spread and deployed across an area where local computations is preformed on information gathered from the other surroundings networks. Each node battery life are different and difficult to recharge batteries. The following measures are taken to attain a green WSN.

1. The IEEE 802.15.4 standard, covers the physical as well as MAC layers for low-power and low-bitrate communications.
2. The most efficient energy conserving operation is keeping the radio transceiver at low-power sleep mode when communication is not necessary. Hence giving an energy efficient duty cycle [9]
3. Radio optimization techniques (e.g., transmission power management, modulation optimization, cooperative communication, directional antennas, energy-efficient psychological feature radio (CR).
4. Energy efficient routing techniques like cluster architectures, energy as a routing metric, multipath The use of MAC protocol will reduce wastage of energy in WNS. It improves network lifetime. S-MAC variants like T-MAC and DSMAC are implemented without time synchronization. Usage of CDMA are adapted to change in the network. But as the network grows there are layered multi-hop network architecture in which network nodes has the same hop count to the nearest base station that are clustered into the same layer. Channel access is done by TDMA- based MAC protocol combined with CDMA or FDMA.[10]
5. Based on the table of comparison MAC Protocols is the main protocol performance better than the protocols. The PRIMA-RT has maximum energy consumption of 0.015 J/packet/node and maximum latency of 15 Seconds 0.015 J/packet/node is a good MAC protocols for green WSN.
6. In WNS cluster heads communicate with one another to forward data to the base station. Cluster

heads closer to the base station get overloaded with heavy relay traffic and tend to die early, ignoring uncovered areas of the network, causing network partition.[10]

7. A packet processing based on an event along with redundant data eradication can be used in data processing just before communicating data or information to cluster head or sink on network. The nodes generate data packets periodically that are reported to the destination through multi hop or single hop routes based on distance to the cluster head. This data reporting and routing schemes decreases the transmission loss with an increase in the network life time.[11]
8. viii) The ME-CBCCP (Minimum Energy Consumption Chain Based Algorithm) is used to reduce communication distance between all the objects to compensate the power consumption in the lower layers of the IoT framework and To minimize the energy consumption in this framework, the minimal energy consumption that chain objects transmission algorithm is proposed as a solution to the optimization problem.[12]

Green Fog Computation: In general, all the data form the WNS of the IoT is transmitted to the cloud, this has limited bandwidth which provides service. With fog computing, all the processing of data is done on devices located nearer to where the data is collected, rather than sending it to the cloud. Instead of routing all the data through a centralize data centre in cloud, data could be stored in local computers and storage devices. This give a quick response time, a reduction in network latency and traffic as well as supports the saving in the backbone bandwidth for achieving a better QoS. It helps in selecting of transmitted applicable data to the cloud. As traditional cloud architectures need smallest data to be transmitted to the central cloud via edge node devices for analysis and computation.

This can delay computation. Fog Computing permits the edge node devices to carry out data processing locally, latency reduction, cache data management for improving QoS, load balancing, local resource pooling and device management, dense geographical distribution with edge node analytics which results in an enhanced user experience. Following points refer to assert the need to use Green fog computing

- Decentralizing the infrastructure for computing in which data, compute, storage and applications
- Intelligence and processing is brought nearer to the data from where is created reduces communication time
- Fog computing reduces the needed bandwidth and the communication between sensors and the cloud and visa versa. This can reduce the negative effect on IoT performance.
- Provides data aggregation

Green IOT through Virtualization: Virtualization plays an vital role to manage resources environments and to addresses the limitations of resource in IoT. The SDN and

NFV are the two solutions that provide virtualization in communication [13].

Benefits of SDN include:

1. It allows network managers processes to manage, configure, secure with optimized network resources direct network programmability dynamically through direct network programming
2. It can monitor network-wide flow installations and traffic flow control through logically centralized nodes giving a global wide view of the network, hence it collects network intelligence
3. It maintains an independent open standard for vendor simplifying network operations and design.
4. Benefits of NFV includes:
5. It replaces dedicated hardware with commodity servers replaces.
6. It is able to host SDN applications like security functions, load balancing, data collection & analysis through deployment of on-demand virtual network functions (VNFs).
7. This enables and enhanced scalability & elasticity for deploying vendor independent commodities with reduced cost, optimizes computing, memory, storage, and networking capacity of network devices.
8. Benefits of SDN-based IoT
9. ISDN can make routing easy and efficiency, facilities high data transmission, good resource allocation and network management for the devices at the edge, with an increase in the user demands [14]
10. SDN solutions in an IoT environment resolves primitive network issues like heterogeneity, scalability and interoperability among IoT edge devices, inefficient and less dynamic service deployment, slow adjustments to
11. New services and network upgrade time consumption, and insufficient user experience guarantees with minimum bandwidth problems [15]
12. Different IoT architectures with SDN-based were suggested and commercial solutions such as AR2500 Series is agile IoT gateways can also be deployment
13. SDN based IoT architecture clearly separates the concern between services provided in the control plane, the data plane and management solution with secure

Green Cloud Computing: The green cloud computing is a technique to carry out green cloud data centre operations. These operations are classified as:

(a) virtualization of resource management (b) sustainability of energy that can be renewed including waste heat utilization, (c) resource scheduling with evolutionary algorithms [17]. Below are the green cloud computing work with IoT devices

1. The virtualization helps in consolidation and management of data center resources in cloud by using multiple backup techniques like resource snapshot and migration of resources [18]
2. A virtual resource residing on a 40% utilized server can be migrated to another 40% utilized server with the former operates is in low-power idle mode. [19]

3. The intra-data center Virtual Machine migration network cost can be reduced with placing related, talkative VMs in optimal closer server distance to limit their communications to a section of the network. [20]
4. Data compression and duplication techniques over distance networks minimizes the cost between inter-data centre virtual machines migration process [21]
5. Green Cloud data centres uses renewable energy resources that lead to zero greenhouse gas emissions. Sun and wind energy can be generated by on-site or off-site installations. [22]
6. For the integration of sustainable energy to cloud data centre hybrid power supplies are fully utilized with ATS, To match the power generation for dynamic real time data centre workload of the data centre the ATS is used to shift between renewable energy resources and grid. [23]
7. Green cloud data centres provide enormous opportunities for re-use of wasted heat in the cooling process. The heat generate from servers is accumulated in the vapour absorption-based cooling systems which has reversible heat pumps transferring thermal energy to cooler space. In cooler places, data centres can be co-located with residential buildings for centralized heating. [24]

Merits of using Green Computing: Considering the need to include Green in entire scope of IoT is observed that these measures will have benefits in the overall green computing. It lowers the energy consumption with the usage of non-toxic materials in its IoT equipment. This green equipment is low priced and will be effective economically uses for the future due to efficient consumption of resources. Hence designers plan to make future IoT devices more eco-friendly across its entire life span, from manufacture to recycling. Energy-intensive manufacturing of IoT parts can be minimized by making manufacturing process more energy efficient. The replacement of petroleum-filled plastic with bioplastics-plant-based polymers-require less oil and energy to produce electronic parts, the challenge here is to keep these bioplastic components cool so that electronics won't melt them.

Instead of having landfills for e-waste one can make use of the devices by upgrading and repairing in time to make processes and processing easier and cheaper. It can also save energy and materials needed for new innovations for modifying old ones. With various visual interface on the IoT that use up a large amount of power, displays can be replaced with green light displays made of OLEDs, or organic light-emitting diodes. Silver and Copper ca replace toxic material like lead. Making recycling of IoT devices could be expensive and time consuming, it is more effective by recycling parts separately with a option of reuse or resale. In the future all electronic devices and especially IoT components will reduces energy use just by replacing memory storage with solid-state that is a low wattage parts. [39].

CONCLUSION AND FUTURE SCOPE

From the study of the properties required for implementation green technology to the IoT there is a need to implements the green attribute at all the four levels of IoT architecture More study can be carried out in an effective way of harnessing the potential of fog computation to reduce the dependency on the cloud in the circumstance of data aggregation. Virtualization give a natural bourn ide to implement green resource management.

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Psychological Wellbeing Among Secondary Teachers: Role of Mindfulness And Burnout

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ABSTRACT

Teachers have been at the centre of attention in the present times. Not only do they teach, but also train, facilitate, mentor and guide the students towards their welfare. They play an important role in the lives of children. In addition to facilitating learning, teachers are the key agents of socialization, helping students reach their highest potential and develop into responsible citizens. But, over the past years, teaching has become increasingly stressful. Today, teaching is one of the most stressful occupations in India. Teacher's stress impacts their health and well-being, work attitudes (e.g. job satisfaction) and turnover. Not only that, teacher's stress is also linked to teaching performance and student academic outcomes. Numerous research studies have indicated towards such findings. High stress levels are causing teachers to leave their profession, which causes instability among students and the community.

In this highly stressful world, teachers need a well-balanced mind to perform well and encourage students to perform well academically. Mindfulness has been considered as a successful way of life and has been found to come to the rescue of many. The present study focuses on the role of mindfulness and burnout on the psychological wellbeing of secondary teachers in the schools of Mumbai. The study was conducted on a sample of 311 secondary school teachers. The study adopted the descriptive method of the correlational type. The results of data analysis exhibit that there is a high relationship between psychological wellbeing of teachers with mindfulness. Also, there is a moderate negative relationship of psychological wellbeing with burnout. Thus, higher the psychological wellbeing, higher will be the level of mindfulness and it is likely that the burnout of teachers will be lower. The study also ascertains the differences between psychological wellbeing, mindfulness and burnout among secondary teachers on the basis of their gender and teaching experience.

KEY WORDS: SECONDARY TEACHERS, PSYCHOLOGICAL WELLBEING, MINDFULNESS, BURNOUT.

INTRODUCTION

Teachers perform a wide range of functions, fulfil responsibilities and assume many different roles to support school and success of the students. These roles may be assigned formally or informally, the teachers may carry out these tasks alone or share with others, very often they are the ones who ensure the entire school is set to improve. "In one day, we not only teach, we manage behaviour, plan lessons, assess learning, counsel students, carry out first aid, reply to a long list of emails, write reports, tidy classrooms, create resources, mark books and create displays – the list is endless." (Teacher, 2013).

Teachers play an important part in the lives of children. In addition to facilitating learning, teachers are the key agents of socialization, helping students reach their highest potential and develop into responsible citizens. But, in the past few years, teaching has become one of the most stressful occupations in India. Teacher's stress impacts their health and well-being, work attitudes (e.g.

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job satisfaction, commitment, efficacy) and turnover. Not only that, teacher's stress is also linked to teaching performance and student academic outcomes. (Tahir, 2011; Lambert & McCarthy, 2006). High stress levels are actually leading teachers to decide against work and that encourages them to leave their profession, ultimately causing instability among students and the community (Kyriacou, 1987).

So it is important to reduce such stress by mindfulness or stress management programmes. (Roeser, 2013). Mindfulness helps teachers develop coping and awareness skills and lead to reduced anxiety, depression, and improved health (Flook et al, 2013). Teachers who practice mindfulness can lessen their own stress level in a better way, prevent burnout and increase psychological wellbeing. (Beshai et al, 2016). A well-balanced mind of the teacher is the key to perform work without stress and promote academic growth among students. A teacher's mindfulness, psychological wellbeing and burnout has a significant impact on almost everything he/she does, on the way he/she engages in activities, deals with challenges and interacts with others. (Poulin et al, 2008)

Need of the Study: Psychological wellbeing and burnout have been ongoing challenges in the field of education. Burnout of teachers may be reduced by providing resources to increase their sense of personal efficacy and capability to manage stress. Reducing and managing stress is part of promoting a healthy classroom atmosphere. Mindfulness has been proposed as a type of professional development (Roeser, 2012), that can help teachers manage the demands of teaching. This may surely be able to alleviate stress and burnout and increase psychological wellbeing amongst them. Overall wellness and happiness greatly depends upon the greater psychological wellbeing and reduced burnout levels. Mindfulness has been a well-researched topic and its relevance to healthy and happy living has been emphasized time and again. (Grossman et al, 2004; Murphy et al, 2012). It has been seen as a quality that can change the entire course of life of an individual. (Hülsheger et al, 2013). Given the stressful and challenging life of a teacher in the current times, it is of utmost importance and the need of the hour that the level of mindfulness, psychological wellbeing and burnout is assessed for teachers and attempts be made to improve their standard of life by taking appropriate steps.

When teachers exercise mindfulness, they not only get personal benefits such as reduced stress and better psychological wellbeing but their schools also do as well. (Hawkins, 2017; MacDonald & Shirley, 2009). It has been known through research that employees with high levels of psychological well-being and low level of burnout perform better at work than those with lower levels of psychological well-being and higher level of burnout. Hence it is extremely important to understand the mindfulness, psychological wellbeing and burnout in the teaching profession. Evaluating teacher's mindfulness, psychological wellbeing and burnout can be an effective method for understanding how each of these concepts affect each other and it is useful for schools as well as for teachers to improve their efficiency.

Mindfulness: Mindfulness is a receptive state of mind in which attention, informed by a sensitive awareness of what is occurring in the present, simply observes what is taking place. (Baer et al., 2006). According to Kabat-Zinn (1994), Mindfulness is described 'as paying attention in a particular way: on purpose, in the present moment and non-judgementally.'

Psychological Well–Being: Psychological Wellbeing has two important facets. The first refers to the extent to which people experience positive emotions and feelings of happiness. This aspect of psychological wellbeing is referred to as subjective wellbeing (Diener, 2000). Ryff (1989) had identified aspects that constitute wellbeing in his works: autonomy; environmental mastery; positive relationships with others; purpose in life; realisation of potential and self-acceptance.

Burnout: Burnout is 'a prolonged response to chronic emotional and interpersonal stressors on the job, and is defined by the three dimensions of exhaustion, cynicism, and inefficiency.' Exhaustion is the feeling of not being able to offer any more of oneself at an emotional level; cynicism is contemplated as a distant attitude towards work, the people being served by it and among colleagues; ineffectiveness is the feeling of not performing tasks adequately and of being incompetent at work. (Maslach et al., 2001).

Aim Of The Study: The study was conducted with the following broad aim. To study the mindfulness, psychological well-being and burnout among secondary school teachers working in schools affiliated to CBSE, SSC and ICSE boards in Mumbai.

Objectives Of The Study
1. To ascertain the relationship between mindfulness (FFMQ), psychological wellbeing (PWB) and burnout (BO) among secondary school teachers.
2. To ascertain the difference between PWB, Mindfulness and Burnout among secondary teachers on the basis of their

a)   Gender
b)   Teaching experience

Null Hypotheses of the Study
1. There is no significant relationship between mindfulness, psychological wellbeing (PWB) and burnout among secondary school teachers.
2. There is no significant gender difference between PWB, Mindfulness and Burnout among secondary school teachers.
3. There is no significant difference between PWB, Mindfulness and Burnout among secondary school teachers on the basis of their teaching experience.

Scope and Delimitations of the Study: The study included secondary schools situated in Greater Mumbai

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affiliated to CBSE, ICSE and SSC boards. Only secondary teachers teaching in these schools were considered for the study.

Methodology of the Study: The descriptive survey method of the correlational type has been adopted in the present study.

Sample Size and Sampling Techniques: The study adopted a two-stage sampling technique for selecting the sample. At the first stage, secondary schools situated in South, North and central Mumbai were selected using stratified sampling technique. At the second stage, teachers were selected from these schools using simple random sampling technique. A total of 311 teachers were selected randomly from secondary schools from Mumbai region.

Data Collection Tools: As the data required for present study is from teachers of secondary schools, standardized rating scales were adopted as the data gathering instrument. Three tools were used to conduct a survey on secondary school teachers.

Five Facet Mindfulness Questionnaire (FFMQ): (Baer et al., 2008) is a 39 items instrument, based on a factor analytic study of five independently developed mindfulness questionnaires. The five facets are: Observing, Describing, Acting with awareness, Non-judging of inner experience, and Non-reactivity to inner experience. Items were rated on a 5-point metric of frequency (1 = almost never and 5 = almost always). A higher total score means a higher level of mindfulness.

Ryff's Psychological Well–Being Scales (PWB): The 42-item version of PWB scale was developed in 1989. The PWB scale incorporate six dimensions: autonomy, positive relations with others, environmental mastery, personal growth, purpose in life and self-acceptance. Respondents rate how strongly they agree or disagree with 42 statements using a 6-point scale (1 = strongly agree, 6 = strongly disagree).

Copenhagen Burnout Inventory (CBI) (Italian version) developed by Kristensen, Borritz, Villadsen, & Christensen (2005), evaluates the level of physical and psychological fatigue experienced by people with respect to personal, work-related, and client-related burnout. The three separate parts of the questionnaire are applied in different domains. The scales have high internal reliability and are widely used across the world for checking burnout levels.

Data Analysis and Findings: The first null hypothesis was tested using multiple correlation. The following table shows the correlation coefficients of Mindfulness with Psychological Wellbeing and Burnout.

The correlation coefficient of Psychological Wellbeing with Mindfulness is 0.611 and with Burnout is -0.455. It is evident from the table that there is a significantly high relationship of Psychological Wellbeing with mindfulness. It means that if teachers are more mindful, their psychological wellbeing is definitely going to be high and vice versa. It is seen that there is a moderate negative and inverse correlation between Psychological Wellbeing and Burnout as well. The higher the level of Psychological Wellbeing, lower the level of burnout.

Since Mindfulness and psychological wellbeing are key personality traits for happy and contented teachers, it is important that psychological wellbeing be enhanced and burnout level be checked. The employer can ensure effectiveness in teaching by providing teachers with mindfulness based programmes that will bring down their anxiety, stress and burnout. (Shapiro, Brown & Biegel, 2007). It will also support psychological wellbeing. The following table shows the regression coefficients of the Psychological Wellbeing and Mindfulness and Burnout.

Table 1.2. Regression Coefficients of Psychological Wellbeing And Mindfulness And Burnout

	b	β	R	β x rxy	Variance
FFMQ	1.0378	0.5092	0.611	0.3109	31.09
BO	-0.4194	-0.2283	-0.455	0.1038	10.38
Multiple R2 = 0.4147 (p<0.0001)					
Multiple R = 0.6439					
Total Variance Explained = 41.47%					

Table 1.3. Relevant Statistics of the Ffmq, Pwb And Bo Scores of Male And Female Teachers

Variable	Group	N	Mean	t-ratio	p value
FFMQ	Female	245	128.71	1.4	0.16
	Male	66	126.19		
PWB	Female	245	182.03	2.22	0.03
	Male	66	173.95		
BO	Female	245	44.77	2.43	0.02
	Male	66	49.56		

From the preceding table, it is seen that the multiple R of PWB with Mindfulness and BO is 0.6439 which is significant at 0.0001 level. Hence the null hypothesis is rejected. This correlation is high in magnitude. The R2 of PWB with Mindfulness and BO was found to be 0.4147 which implies that 41.47% of the variance in PWB

Table 1.1. Correlation Coefficients of Pwb With Ffmq And Bo

	FFMQ	BO	PWB
FFMQ	1	-0.445	0.611
BO	-0.445	1	-0.455
PWB	0.611	-0.455	1

is associated with Mindfulness (31.09%) and Burnout (10.38%).

II. The second hypothesis states that there is no significant gender difference between Mindfulness, PWB, Burnout among secondary school teachers. The following table shows the relevant statistics of the FFMQ, PWB and BO scores of male and female teachers.

1. From the above table it can be inferred that the p-value is 0.16 and the obtained t-ratio for gender difference in FFMQ of teachers is 1.4 which is not significant at 309 degree of freedom. Hence the null hypothesis that there is no significant gender difference in FFMQ of teachers is accepted.
2. It can be inferred that the p-value is 0.03 and the obtained t-ratio for gender difference in PWB of teachers is 2.22 which is significant at 309 degree of freedom. Hence the null hypothesis that there is no significant gender difference in PWB of teachers is rejected.
3. It can be inferred that the p-value is 0.02 and the obtained t-ratio for gender difference in BO of teachers is 2.43 which is significant at 309 degree of freedom. Hence the null hypothesis that there is no significant gender difference in BO of teachers is rejected.

Conclusion: There is no significant gender difference in mindfulness of teachers. This implies that male and female teachers do not differ in their level of mindfulness. However, there was a significant gender difference observed in the PWB and BO of teachers, that is, male and female teachers differ in their psychological wellbeing and burnout levels.

DISCUSSION

The findings show that there is no significant gender difference in mindfulness of teachers. It implies that both male and female teachers are equally mindful. This may be because males and females are exposed to similar environment within the schools. The influence of principal, administrative staff, resources available, relationship with colleagues and other factors do not seem to influence male and female teachers differently. The findings show that PWB of male and female teachers is found to differ. Psychological wellbeing of males and females in their place of work is significantly different. PWB of male teachers is slightly lower than that of female teachers. Females are more confident and positive than their male counterparts.

The findings also show that BO of male and female teachers is found to differ. Burnout of males and females in schools is significantly different. Female teachers get stressed faster and easier than their male counterparts. This may be for the reason that the female teachers have to carry out a lot more responsibilities at home along with that of the school. The third hypothesis states that there is no significant difference between PWB, Mindfulness and Burnout among secondary school teachers on the

basis of their teaching experience. The technique used to test this hypothesis was 'One–way ANOVA'. The groups that were formed on the basis of teaching experience of teachers were below 5 years of teaching experience, 5 to 15 years and above 15 years of teaching experience. The following table gives the analysis of variance of FFMQ on the basis of teaching experience of teachers.

Table 1.4. Analysis of Variance of Ffmq of Teachers on the Basis of Teaching Experience

Sources of Variance	Sum of Squares	df	Mean Squares	F-ratio	p-value
Between Groups	533.31	2	266.66	1.6	0.203
Within Groups	51372.29	308	166.79		
Total	51870.62				

Interpretation and Conclusion: From the preceding table, it can be inferred that F-ratio for degree of freedom 2 and 308 is 1.6 and p-value is 0.203. The F-ratio is not significant and hence the null hypothesis that there is no significant difference in mindfulness of teachers on the basis of teaching experience is accepted. This implies that teachers below 5 years of teaching experience, 5 to 15 years and above 15 years of teaching experience do not differ in their level of mindfulness.

DISCUSSION

The findings show that there is no significant difference in mindfulness of teachers on the basis of their teaching experience. It implies that teachers who have less than 5 years, 5 to 15 years or more than 15 years of teaching experience do not have differences in mindfulness. This may be because of the fact that all employees are treated equally by the principal and the management. All teachers whether old or new in the institution follow work ethics and are governed by a clear and consistent set of values. They work hard to achieve 'win-win' solutions when disagreements occur between them. This may also be applied to the involvement of students in the daily proceedings of the school. This ensures mindful and happy teachers.

Table 1.5. Analysis Of Variance Of Pwb Of Teachers On The Basis Of Teaching Experience

Sources of Variance	Sum of Squares	df	Mean Squares	F-ratio	p-value
Between Groups	13761.45	2	6880.73		
Within Groups	202971.74	308	658.99	10.44	<.0001
Total	215491.48	310			

The following table gives the analysis of variance of PWB on the basis of teaching experience of teachers.

Interpretation and Conclusion: From the preceding table, it can be inferred that F-ratio for degree of freedom 2

and 308 is 10.44 and p-value is <.0001. The F-ratio is significant and hence the null hypothesis that there is no significant difference in psychological wellbeing of teachers on the basis of teaching experience is rejected. This implies that teachers below 5 years of teaching experience, 5 to 15 years and above 15 years of teaching experience differ in their level of psychological wellbeing.

The post hoc Tukey HSD test on VassarStats suggested a significant difference in the PWB of teachers with below 5 years of teaching experience and above 15 years of teaching experience. There is also a significant difference between the PWB of teachers with 5 to 15 years of teaching experience and above 15 years of teaching experience. The noted p-value is less than 0.01. The mean score of PWB of teachers with below 5 years of teaching experience is 178.2326 whereas it is 189.94 for those above 15 years of teaching experience. This means that the psychological wellbeing of teachers with above 15 years of teaching experience is more than the teachers with below 5 years of teaching experience.

The post hoc Tukey HSD test on VassarStats also suggested a significant difference in the PWB of teachers with 5 to 15 years of teaching experience and above 15 years of teaching experience. The noted p-value is less than 0.01. The mean score of PWB of teachers with 5 to 15 years of teaching experience is 174 whereas it is 189.94 for those above 15 years of teaching experience. This means that the psychological wellbeing of teachers with above 15 years of teaching experience is also more than the teachers with below 5 to 15 years of teaching experience.

DISCUSSION

The findings show that there is a significant difference in psychological wellbeing of teachers on the basis of their teaching experience. It implies that teachers who have less than 5 years, 5 to 15 years or more than 15 years of teaching experience have differences in their psychological wellbeing. The teaches with above 15 years of teaching experience are highest on psychological wellbeing, may be because of the fact that their adjustment levels with the schools are higher than those who have spent lesser number of years with the school. This may also be because of the fact that they feel more comfortable with the kind of work they do at school and have attained mastery with all their portfolios during the time they have spent at the school. The following table gives the analysis of variance of BO on the basis of teaching experience of teachers.

Interpretation and Conclusion: From the preceding table, it can be inferred that F-ratio for degree of freedom 2 and 308 is 11.69 and p-value is <.0001. The F-ratio is significant and hence the null hypothesis that there is no significant difference in burnout of teachers on the basis of teaching experience is rejected. This implies that teachers below 5 years of teaching experience, 5 to 15 years and above 15 years of teaching experience differ in their level of burnout.

The post hoc Tukey HSD test on VassarStats suggested a significant difference in the BO of teachers with below 5 years of teaching experience and above 15 years of teaching experience. There is also a significant difference between the BO of teachers with 5 to 15 years of teaching experience and above 15 years of teaching experience. The noted p-value is less than 0.01. The mean score of BO of teachers with below 5 years of teaching experience is 46.75 whereas it is 40.37 for those above 15 years of teaching experience. This means that the burnout of teachers with above 15 years of teaching experience is less than the teachers with below 5 years of teaching experience.

The post hoc Tukey HSD test on VassarStats also suggested a significant difference in the BO of teachers with 5 to 15 years of teaching experience and above 15 years of teaching experience. The noted p-value is less than 0.01. The mean score of BO of teachers with 5 to 15 years of teaching experience is 49.63 whereas it is 40.37 for those above 15 years of teaching experience. This means that the burnout of teachers with above 15 years of teaching experience is also less than the teachers with below 5 to 15 years of teaching experience. So overall, the burnout level is least in teachers having more experience in teaching profession. However, teachers in the beginning of their career get more stressed and burnout in schools.

Table 1.6. Analysis Of Variance Of Bo Of Teachers On The Basis Of Teaching Experience

Sources of Variance	Sum of Squares	df	Mean Squares	F-ratio	p-value
Between Groups	4533.95	2	2266.97		
Within Groups	59716.39	308	193.88	11.69	<.0001
Total	63823.99	310			

DISCUSSION

The findings show that the teachers with above 15 years of teaching experience have least levels of burnout, may be because of the fact that their adjustment levels with the demands of schools are higher than those who have spent lesser number of years with the school. The work that is assigned to them is taken with ease and they are able to discharge their duties in a more professional manner than getting it on their nerves and worrying over them. They may also have attained mastery with all their portfolios during the time they have spent at the school leading to ease of work without any burnout.

CONCLUSION

Psychological Wellbeing of teachers is an important area of inquiry and must be studied for its improvement. Mindfulness wields positive effect on work engagement

(Glomb et al, 2011; Schultz et al, 2015) by enhancing positivity, hope, and optimism. Well-being is directly influenced by mindfulness (Poulin et al, 2008; Reb, Narayanan & Ho, 2015), and hence exerts additional indirect influence. This study throws light on the fact there is a close relationship between Psychological Wellbeing, Mindfulness and Burnout among teachers. The study suggests that if the Psychological Wellbeing of teachers is to be enhanced, it may be possible with the introduction of mindful practices. Mindfulness has the potential to alleviate stress and burnout through its various activities. This study could be an important groundwork for future studies based on similar themes.

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Women and Gender Bias: with Specific Reference to Women Cultivators and Farmers

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ABSTRACT

In midyear of 2019, Hon'ble Minister of Agriculture & Farmers Welfare, Shri Narendra Singh Tomar was asked about the 'Woman Farmer Certificate' which was proposed in Women Farmers' Entitlements Bill 2011. He brushed aside this question by just saying that now since the women farm workers have registered themselves as cultivators there is no need for providing them certificate of farmers. The farm landowners are called farmers. Others who are working on the farm land are called cultivators. This categorization has been done by the government to easily qualify the farmers to get the subsidies which are only for farmers. The cultivators on the other hand don't get any subsidy from the government. The women folk who are generally the wives of the farmers work on the field. They are not owners of land; they are called 'cultivators'. The women are working on the field as cultivator consist of 87% of the farmland workers. It means that all these populations are not going to get any subsidy from the government. In 2019 Oxfam India reported that these kinds of obstacles are working negatively towards the productivity of women folk. M.S. Swaminathan who was a famous scientist working on Agricultural Products understood the situation and presented a bill for women farmers called Women Farmers Entitlement Bill, 2011.

He is the same person who is famous for bringing in the Green Revolution in India. He proposed that the women farmers should get a certificate called 'Woman Farmer Certificate'. This would give the women farmers the smuch-required status of a farmer. After getting the status these women could avail the visibility of 'Kisan credit cards' which would very easily give them institutional credit. Because of the requirement of being farmers it is very easily available to men but not in the same manner to the women. In 2011 when the census was done, the data showed that 3.6 crore women were labelled as cultivators. That means that these many women were working on the field as farmers but were labelled as cultivators and thus had no access to the subsidies provided by the state. Since the land falls in the state list, the state has to make laws on it and unfortunately States have termed the workers working on field without any ownership of the land to be considered as cultivators. The paper looks into the implications of the women farmers categorized as cultivators for want of land owner category, with a case study of Maharashtra Agricultural and Land laws with special emphasis on the rights of women farmers v. cultivators and their current status as cultivators.

KEY WORDS: WOMEN CULTIVATORS, FARMERS, WOMEN FARMERS' ENTITLEMENTS BILL 2011, KISAN CREDIT CARDS, MAHARASHTRA.

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INTRODUCTION

India is an agriculture and farming based country. The Economy majorly relies on agricultural development and its produce. In recent times, there has been a decline in the production through agriculture, still India is considered to be an agriculture based economy. Most of the people's livelihood depends upon agriculture. The culture based economy produces the income to the capacity of being the second position holder in the world in terms of Agricultural production (Bala. N, 2010). Various kinds of Agricultural production which are done in India for example plantation crops, livestock, field crop, fruit crop, forestry. It is considered then the agricultural economy industry recruits around 52% of the workforce of the country (NSDA, 2018). As understood the Urban population is generally not associated with agricultural activity it majorly is shown in the rural population.

If we consider the GDP of our country, we can see a decline in the agricultural produce and the economic status of it but still it is one of the leading industries of the country because it is supporting the social economic intensity of India. The leading states it can be considered as agriculture place based states are Maharashtra West Bengal Bihar Haryana Andhra Pradesh Uttar Pradesh Madhya Pradesh and Punjab. it has also started giving the importance to the produce from agriculture not only from the economic aspect but also from the job perspective and international market. The government has started various schemes through its own policies as well as NGOs and also must private Agencies to invest in this particular industry. Technology has also started playing an important role in agricultural production. one can say that there has been a remarkable development in this field, but one thing has not changed even now. The women force who were working on the farmland are still considered to be low life and have not been given status of even farmers.

Problem Statement: In the past decade the sector has actually seen a major infusion of Science and technology brought from the developed nations. This particular change has actually increased the productivity of Agricultural produce. The farm labourers specially men are also being trained by the government to use the latest technology. The woman who actually consists of almost two third of the employment as farm labourers are still considered to be a helping hand rather than the major worker (Jai Kisan, 2018). They are still not considered as employed labourers. The women force is actually considered to be a housewife or the woman who are supposed to look after the family responsibilities and maintenance. The work which they do on the field is termed as family labour because it is considered as their secondary work apart from household chorus.

Apart from these there are other issues Attached with women for example they are mostly illiterate they are devoid of development they are mostly without employment and are ridden with poverty. Adding insult to injury they are not even considered as issues for women, the initiative which is there for the rural population does not consider any of the issues mentioned above. This creates a kind of a divide among women workers and men farmers who are working on a similar platform but have been given a different card to play. the women soap generally have shown their potential in agricultural productivity economic vitality household food security family health and welfare.

If "invisible workers" consisting of women is considered it is believed that they comprise of around 45.5% of the labourer working in agricultural field but id they are removed it boils down to 38.5%. Therefore, it can be said that around 7% of the women workforce are not seen at all. The paper looks into this disparity with the specific instance on the female cultivators who are deemed to be farmers.

Literature Review: Martha A. Chen, (2009) talked about women's work in Indian agriculture in specific agro-ecologic zones. She discussed about how the meeting of needs of landless and land poor women is very difficult. Swarna S. Vepa, (2005), has discussed the feminisation of agriculture and marginalisation of their economic state. Bhim Reddy and Abhishek Shaw, (2013), have written a sarcastic comment on the land owners as 'New Landlords' and their non-capacity to work on farmland i.e., 'Too Poor to Farm' or 'Too Busy to Farm', Alka Parikh, Sarthi Acharya and Maithreyi Krishnaraj, (2014) Gender Budgeting Analysis: A Study in Maharashtra's Agriculture,

Research Questions
1. What is the participation of women workforce in agriculture sector across India and specifically in Maharashtra?
2. Whether there is a specific support given to farmers as against to cultivators?
3. What are the hardships felt by women cultivators in absence of farmer's certificate and will it be resolved with the procurement of the certificate?

Research Objectives
1. To get the clarity on participation of women workforce in agriculture sector across India and specifically in Maharashtra
2. To understand the specific support given to farmers as against to cultivators
3. To enquire about the hardships felt by women cultivators in absence of farmer's certificate and will it be resolved with the procurement of the certificate

METHODOLOGY

The study is a mix of doctrinal research and analysis of secondary empirical data regarding the plight of women farmers categorized as cultivators. The doctrinal research has been used to evaluate the relevance or effectiveness of laws, concepts, legal institutions or governmental policies. This methodology is essentially a library based

study. For the study, data was collected from both primary as well as secondary sources. The method used in such research involved the obtaining of information on a systematic basis and then examining and evaluating it in order to arrive at some conclusion.

Women Work Force in Agriculture: Women are considered to the support system rural scenario and platform. According to the 2011 Census, around three fourths of the population of females in India are from the family of farmers falling in the category of either small or even marginal. A substantial amount of them are also cultivators who work as labourers in someone else's agricultural land. (Census, 2011) The women in agriculture is an association which can be considered as an age-old practice. This age old practice is now being talked about on the parameters of economic scale. The gap is visible regarding the image and perception of actual labour and economic gain. If population is considered, they are to the tune of 50%. If number of hours are compared that are at 60% higher to men which means around one third, the time higher than what is required norm.

Still, they are only paid around 10% of what the men folks who are labourers are paid (Gupta, Monica, 1987). There are changes in perception though over the years. There is a sense of realization, although gradual,

that women have an important role to play as part of development in agri field. Also, their contribution in the field of agriculture, food security, horticulture, processing, nutrition, sericulture, fisheries, and other allied sectors is not overlooked now. Interestingly the major work force actually working in the agricultural field are women. Especially in India. Women are not only involved in exercising labour from the perspective of output through physical means but also better in terms of quality and competence.

Women in India are working in the fields to produce agricultural outputs in various capacities. Their role is not defined specifically and therefore the contribution cannot be quantified in terms of number and degree. The data although cannot but in some states it becomes clear that women contribute to the tune of 60%-80% in production of food (Table 2). Another reason for the quantifying of the contribution of labour and produce by women in agricultural field is that in most agricultural households both men and women are involved in crop production. Attempts can be made to come to specific percentage for above issue by hypothetically categorizing one type of crop to be grown by women and other by their counterparts. After this they can be collated together and come to a conclusion on the input and output by women.

Table 1. Women Participation in Agricultural & Non – Agricultural Activities calibrated state wise (Source: Ghosh, Mun Mun, Ghosh, Arindam (May. 2014): 'Analysis of Women Participation in Indian Agriculture', IOSR Journal of Humanities and Social Science (IOSR-JHSS) Volume 19, Issue 5, Ver. IV PP 01-06).

State	Total Female Workers	Percent of Female workers in Agriculture	Percent of Female workers in Non-Agricultural Activities
Himachal Pradesh	630521	82.47	17.53
Manipur	229137	55.59	44.41
Nagaland	279166	82.66	17.34
Andhra Pradesh	9585381	73.44	26.56
Rajasthan	4595570	81.07	18.93
Madhya Pradesh	5046293	79.45	20.55
Karnataka	5467914	61.11	38.89
Tamil Nadu	7454473	59.30	40.70
Maharashtra	10331758	74.53	25.47
Gujarat	3544508	57.12	42.88
Orissa	1584529	60.47	39.53
Tripura	170238	52.78	47.22
Assam	1265065	42.47	57.53
Punjab	1409704	24.51	75.49
Bihar	3541857	83.56	16.44
West Bengal	3528612	32.62	67.38
Uttar Pradesh	4999389	65.87	34.13
Kerala	1776280	21.27	78.73

Government does not collect data in the form of contribution by women separately than men. Even if they try to collect, they could not do it easily because the work is not divided in clear terms for both men and women work force in the fields in equal capacity or sometimes one more than the other. Generally, they both work together if one of them is sowing the field, then the other one is taking out the weeds. If one of them is watering, the other one is planting the seeds. So they are working together. The gender disparity cannot be found out in this particular instance.

It is also not easy to clearly mark the work of both the genders. A study done by United Nations Organisation found out that almost all agricultural producing countries showed that women were producing more than 60 to 80% of the food production. It is well understood that women are major key players in the working in the farmland but it cannot be categorised with particular data. Although this is data provided by UNFAO, we can say that there is major contribution on the farm land by women (UNFAO, 2011). This particular data can vary in numbers from state to state, across the country. Taking into account the state, it is advised that the government comes up with a clear policies and provisions for women workforce on the feet tuition.

Women And Unpaid Job: Women are born with equal capacity to work as men. Society has characterized a certain definition for women and men which make them fall in certain brackets. This consecutively results in segregation of work accordingly for both genders. Generally, women are attributed to look after the children and elderly at home. Since they are staying at home for this purpose, they are also made responsible for looking towards raising of cattle and other animals which are small. There seems to be considerable change with time and various culture though. Although they are working but these jobs are unpaid as well as time consuming. In addition, they limit her to only those kinds of income earning business which can be done from home in addition to fulfilling her responsibility of household chores. They are abstained from getting involved in high income work which require minimum eight or more hours of work and some tie to get return. (Lanjouw, J.O. et al. 2001).

This characterization of work load according to gender is understandably a demarcation quite visible at the level of work force. The work load difference can be experienced across countries. According to 2001 World Development data, it is projected that women spent around 85-90% of the time on responsibilities at home like chorus and cooking apart from child care and looking after the needs of elderly, across a varied kind of countries (Fontana, M. et al. 2008). The rural women folk are generally married in a joint family. It means the above mentioned chorus is time intensive and tiring. Time-allocation studies have shown that women work significantly. As can be seen in Indian households, school going girl child also works and helps in house hold chores as compared to boys who generally attend schools, barring a few who

help in farms. Himachal Pradesh data shows that apart from other activities mentioned above, the care giving is also added to the time and energy consumed in work by girls, one can conclude that girls do far more work than men (Ilahi, N. 2000).

Figure 1: Women Participation in Agricultural & Non–Agricultural Activities calibrated state wise (Source: Ghosh, Mun Mun, Ghosh, Arindam (May. 2014): 'Analysis of Women Participation in Indian Agriculture', IOSR Journal of Humanities and Social Science (IOSR-JHSS) Volume 19, Issue 5, Ver. IV PP 01-06).
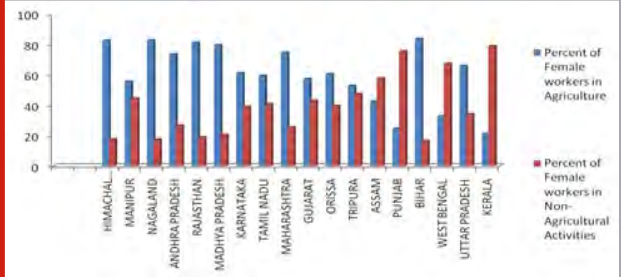
States which are having a growth rate intensified, are Nagaland, Himachal Pradesh and Rajasthan. Nagaland is only one of those states which shows highest CGR in case of both the gender of cultivators (Cheryl Doss, 2011).

Women Farm Workers In Maharashtra:
Development programmes in agriculture, implemented for more than 15 to 20 years and likely to continue in the foreseeable future, are the following: -
• Promotion of crop agriculture - in sorghum, maize, pulses, cotton, oilseeds, sugar cane, and rice; -
• Horticulture development; -
• Irrigation, and soil and water conservation; -
• Animal husbandry and dairying; -

Rural development - primarily anti-poverty programmes like the Integrated Rural Development Programme (IRDP) (and its later versions), Employment Guarantee Scheme (EGS), or dry area development schemes like the Drought Prone Area Programme (DPAP). Each of these is discussed here in brief. The crop programmes appear to be gender-blind since at no stage does gender find mention, except for one programme on promotion of women farmers in one district. But to an extent they could be conducive to benefiting women farmers in general, because they aim to upscale agriculture. Horticulture development will be developed only in small pockets. Nevertheless, it could benefit women farmers and labourers because it is labour intensive, particularly female- labour intensive. Women's engagement in kitchen gardens for vegetables does not however attract any policy interventions. Irrigation is a priority programme.

Seen in the gender perspective, irrigation is per se neutral, but due to its employment effects, it could benefit men and women workers through the labour demand route. In terms of a regional spread, there is a regional asymmetry emerging from water (non) availability both between

and within regions. Irrigated agriculture thus attracts migrant workers in a few locations. On the distribution of gains by gender, the following could be said: first, women labourers gain in incomes but relatively less compared to men, because of their restricted mobility; second, they might be burdened with extra responsibility when their spouses are away on work to distant locales; and third, irrigation projects are usually accompanied by land consolidation and intensification in casual labour work, and women get jobs at the lowest rung. Indirect effects of irrigation are occupational diversification, and women could gain if they have the requisite skills and wherewithal. Animal husbandry is an important anti-poverty as well as occupational diversification programme within the agricultural sector. However, most milk cooperatives in Maharashtra, unlike say in Gujarat, are bastions of male domination. Hence intensification of this a household but not necessarily women.

Table 2. Compound Growth Rate (CGR) of Indian Cultivators and Agricultural labourers (Source: Ghosh, Mun Mun, Ghosh, Arindam (May. 2014): 'Analysis of Women Participation in Indian Agriculture', IOSR Journal of Humanities and Social Science (IOSR-JHSS) Volume 19, Issue 5, Ver. IV PP 01-06).

States	Cultivators		Agricultural Labour	
	Male CGR	Female CGR	Male CGR	Female CGR
Andhra Pradesh	1.002	0.996	1.015	1.010
Kerala	0.989	0.973	1.007	1.039
Tamil Nadu	0.994	0.994	1.016	1.014
Karnataka	1.004	0.994	1.016	1.015
Gujrat	1.006	0.989	1.022	1.012
Maharashtra	1.005	1.000	1.013	1.056
Madhya Pradesh	1.001	0.987	1.015	1.011
Punjab	0.989	0.953	1.012	1.020
Uttar Pradesh	1.003	0.987	1.017	0.999
Rajasthan	1.008	1.003	1.021	1.016
Himachal Pradesh	1.011	1.008	1.025	1.019
Bihar	0.997	0.972	1.020	1.003
Orissa	0.999	0.980	1.013	1.015
West Bengal	1.001	0.992	1.019	1.018
Assam	1.000	0.981	1.024	1.040
Nagaland	1.019	1.016	1.037	1.026
Manipur	1.004	1.004	1.063	1.058
Tripura	1.000	0.990	1.030	1.050

The EGS, a state government sponsored programme was initiated from 1974-75. From 9th Five Year Plan (1997-2002) onwards, horticultural development, well digging on lands of small and marginal farmers, and other work on private lands have also been included within the ambit of EGS works. EGS has often been identified as a 'woman-friendly' programme; at least 50 per cent or more workers are women in any year. The programme is set up in such a way that most women workers find it not too difficult to work on it, even though the type of work is arduous.

For example, work is provided near the villages and there are facilities for child-care. Also, the work payment schedule is not weighed against women workers, and there is equal payment for equal work. EGS, above all, has helped in stabilization of the wage rate, which is so necessary for ensuring livelihood for all. A programme - the Maharashtra Rural Credit Programme (MRCP) - was experimented with between 1993-2002. This was an improved version of IRDP with a strong group-focus, women's participation, participation of the whole village, technical assistance, etc. Like IRDP, this programme continued to provide individual credit as well, along with lending to groups. Not only was it successful, it benefited women considerably (Acharya et al 2001). It is believed that SGSY has been established on the model of MRCP. SGSY aims to provide both individual and group focus in its implementation, it has a strong women's focus and also specially targets SC/ST communities.

It emphasizes the promotion of micro enterprises. DPAP aims to develop wastelands/degraded lands, promote the socio-economic status of people in these lands through employment generation, mitigate the adverse effects of diverse climatic conditions, and restore ecological balance and conserve natural resources. Watershed programmes are generally gender neutral. In the construction stage, however, there are a lot workers required; this creates employment, and women workers also participate in them extensively. Later, since there is an increase in productivity in the whole area, women

could again benefit from the distribution of gains. Ready availability of drinking water also partly reduces women's (unpaid) work burden. Some special schemes within community participation include forming self-help groups, SHG training, exposure tours, and so on, where women could be targeted beneficiaries. In its present form, however, the notion of joint ownership of land by both men and women, has not found place; consequently, all that which goes with land ownership - credit, skill formation, etc., for women - also get missed out in watershed programmes in rural Maharashtra.

Women Farmers' Entitlements Bill 2011: In 2011 when the census was done, the data showed that 3.6 crore women were labelled as cultivators. That means that these many women were working on the field as farmers but were labelled as cultivators and thus had no access to the subsidies provided by the state. Since the land falls in the state list, the state has to make laws on it and unfortunately States have termed the workers working on field without any ownership of the land to be considered as cultivators (Census, 2018). The farm landowners are called farmers. Others who are working on the farm land are called cultivators. This categorisation has been done by the government to easily qualify the farmers to get the subsidies which are only for farmers. The cultivators on the other hand don't get any subsidy from the government. The women folk who are generally the wives of the farmers work on the field. They are not owners of land and are called 'cultivators'. The women who are working on the field as cultivator consist of 87% of the farmland workers. It means that all these populations are not going to get any subsidy from the government. In 2019 Oxfam India reported that these kinds of obstacles are working negatively towards the productivity of women folk (Bedi, Bani 2018).

NDTV report worked on the plight of farmers in Andhra Pradesh. farmers had committed suicide in the state because of issues related to agriculture. The government in Andhra Pradesh was headed by Y S Rajasekhara Reddy. he had categorised the farmers as those who were owning the land and were working on it. These farmers were called genuine farmers. when they were committing suicide the government was acknowledging that as a farmer's suicide full stop so according to the government does suicide in 2012 was of 90 farmers. NDTV reported that it was more than three times of what the government was showing. as only 90 farmers were recognised by the government they were only compensated for this suicide. The others who are more than 180 in number were not compensated full stop; this compensation was given under the order of the government in 2004 called 'Go 421'.

NDTV also reported that these numbers which were not considered to be farmers had actually committed suicide because of agriculture related problems. more than half of them were women and they were not owning the land. This was actually unfortunate for them and their family because they were not compensated for the suicide. An appalling incident was of Sangishetty Yadaiah, who was a farmer in Hyderabad. He had committed suicide because of agricultural issues and the lending of money for farmland. The Government and the reporter said that in place of her if you had died the family would have been compensated. This felt like a blow to that farmer because he had already lost his wife and now they were not compensating for this loss of his. Instead, they were saying that he should have died in place of her. He was reportedly given the answer that only farmers are to be compensated and not anyone, even though he is a cultivator working on the farm land.

Woman Farmer Certificate: M.S. Swaminathan who was a famous scientist working on Agricultural Products understood the situation and presented a bill for women farmers called Women Farmers Entitlement Bill, 2011. He is the same person who is famous for bringing in the Green Revolution in India. He proposed that the women farmers should get a certificate called 'Woman Farmer Certificate'. This would give the women farmers the much required status of a farmer. After getting the status these women could avail the visibility of 'Kisan credit cards' which would very easily give them institutional credit. Because of the requirement of being farmers it is very easily available to men but not in the same manner to the women. In an interview with The Wire, he cited "An identity card for women is useful for access to entitlements. The Kisan Credit Card for example requires land ownership title" (Bani Bedi 2018).

Social activist, Reema Nanavaty (SEWA 2019) is of the opinion that an i-card could assist womenfolk get right of entry to useful resource from the authorities for farming. When requested approximately the question presented inside the Lok Sabha, she uttered, "With the feminisation of agriculture, as men migrate for urban labour, the brunt of agricultural work is borne through women. While the 2011 Census record might also discover women cultivators, it does not deliver them the label of 'farmer'." The Census which took place in 2011, does no longer delves into the matter of the owner of the land which is used for agriculture. It best discusses functional land, which is utilized for agricultural. It divides tillers as: important farm workers, who till for as a minimum six months period at a stretch and negligible employees, who are agri-labourers or worker's generally. It does not postulate land possession or mention the marker of 'farmer' in any respect.

Recognition Of Land Rights For Women: The census is not the only authority and the issue for deciding the women and their rights over the land of their recognition as farmers. an economist by profession Ritu Dewan who also had the post of president at the Indian Association of women's studies has a very different viewpoint. She says that the only solution is to give access to women in equal capacity as men. "Land rights for women must be recognised in village land records, like the Saath Baara Utara (form 7/12) in Maharashtra. This form does not even have a column for gender." Records have been converted into digital format. if they are edited then it will automatically convert the women cultivators

into farmers which will be e as is accepted by the government. According to her, the solution provided by MS Swaminathan is not practical. she fees that even if the card is issued the problem of the women farmers will not be eliminated. "We don't need the Aadhaar or different kinds of cards. India has a national register to recognise these land rights," she said.

Female economist and writer Bina Agrawal has written a book in 1994 full stop the book was titled A Field of One's Own. In this particular book she has made a connotation of the issue of land ownership by women to female subjugation in India. she was that the women will become empowered and have the power to take decisions only when the land is owned by her in the household. This 1994 book had actually led to various movements where the women understood their rights and started walking towards it from a gender sensitive legislation point of view.

Government Laws And Reforms On Women Farmers' Rights: There have been various laws and policies by the government which have specifically worked towards the distribution of land to those people who are working on it. The movement started specifically after the Ninth five-year plan (1997-2002) where the redistribution of the land to place in actual certainty. The land was distributed in the name of major only men but around 40% of the women were able to get the land but the rest had to jointly share the ownership of the land with her husband.

By the time the Tenth five-year plan came the government became more active. the government came up with a scheme where it was giving some incentive to female workers who bought property in their own name. The incentive was given in the form of concessions. In the Legislature, the main change happened in Hindu Succession Act. In this act the girl child or the daughter had the right of equal ownership in the property of her father or ancestor. The Maharashtra government also launched a program in 2009, where it lends the land to women under self-help groups. Also law has supported women on various counts but social recognition and the implementation of law has always been in controversy. researches have shown that the legislature even the formed has not helped many women who are in need especially in India. even though the law has given the right to girl child to ask for property rights in a father's property but the social norms does not dictate this law full stop the land records need to be updated and accepting this law then only there might be changes in the concept of societal acceptance.

CONCLUSION AND RECOMMENDATIONS

The society has by and large not accepted from cultural and traditional basis the inheritance of land to women. The patriarchal society norms have always given preference to Man of the house to own the land and other properties. the girl when she marries she goes to her spouse's house and her positions pass on to her husband not to herself. she is not given that authority to decide on her land or her property even if she has inherited it from her parents in case of absence of a brother.

For the change to happen to the women farmers it is required that the woman is given the societal acceptance of owning the land and power to decide for her own land. problem of not being accepted as farmer but being given the tag of cultivator has led to a woman being devoid of various schemes by the government for example loan for cultivation loan waivers Crop Insurance subsidies or even compensation to the family if they commit suicide in the worst case scenario.

On July 22 this year, Chief Minister of Uttarakhand, Trivendra Singh Rawat, announced that they would amend the Zamindari Abolition and Land Reforms Act of 1950. He stated that they are going to amend the 70-year-old law to give land ownership rights to women along with their husbands. This can be a path breaker and a light to show other states the path towards women empowerment in near future.

The age old theory of owning a piece of land to be considered a farmer as is recognized by government, needs to be amended at the national level. Even if these farm working women are not considered farmers, the policy need to change to include them for accessing the benefit given to farmers.

The disparity in the treatment is a clear hindrance towards sustainable development and empowerment of women in India. The Bill of 2011 should be approved with the amendments regarding the rights given to the women farmers who are designated as cultivators today.

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Reference Groups and Opinion Leadership Effect on Purchase Decision of Consumer Durables

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ABSTRACT

In this research article, authors made a fundamental study on consumers to find the repercussion of the reference group and opinion leader on consumer behavior and the decision-making process. In addition this proposed research work attempts to understand the fuzziness insight into how consumers evaluation in purchasing FMCD products decisions and alternatives. This research study focused to explore the reviews of various literatures in depth on the effect of opinion leadership as well as Reference groups on Consumer Decision Making Process or durable goods. Consumers with whom one intermingles, such as friends and family, and those who one admires, like celebrities, can persuade one's choices and buying decisions to a huge extent. Considering the marketers, the analysis of interpersonal communication amongst the different clusters of consumers became essential. The researchers have assessed and comprehensively presented the outcome of the various pertinent research output. This research has revealed that family, friends and word-of-mouth by Opinion leaders play significant role during purchase decision - making process of Durable Goods on an offline basis. Further concludes that the market needs to develop a strong relationship with opinion leaders in their merchandising practices geared towards customers in less time to influence possible consumers to buy back and retain the trust of customers.

KEY WORDS: CONSUMER BEHAVIOR, REFERENCE GROUPS, OPINION LEADERSHIP, CONSUMER DECISION MAKING, FUZZINESS, AND MARKETERS.

INTRODUCTION

Human being in common likes to be a part and parcel of a variety of groups, in which the group consists minimum of two or more than two individuals those who have several common goal or several common aspirations values, and beliefs. The relationship among group members can be either explicitly defined like that of club association, family and so on, be implicit like that of a group of highly influential celebrity's stars who are referred to as a group by their fans. On the other side, reference group is a group of individual person who act as type of the point of reference, with respect to the formation of attitudes behavior. Marketer usually looks at reference group are the most influencers of purchase decisions of the individuals.

Reference Group (RG) as a term was used by Hyman where he found that respondents measure up to themselves and they are influenced by either person or groups (Hyman, 1942)[1]. The concept was further polished under behavioral sciences studies, where-by a person is anticipated to be part of the community, or seeks to fit in to or search for not to be a piece of community (Stafford, J. 1966)[2]. Studies on RG persuade differ from men to women where gender is regarded as to be an influential

element in consumer buying behavior (Schiffman and Kanuk, 1996)3. The same persuade is also dissimilar for different product categories (Nair & Pillai, 2007; Holmberg & Ohnfeldt, 2010)4. RG persuade has also been found to be pertinent in understanding the very noticeable attention of the product (Xihao,H., & Yang, J, 2006)8. Studies pointed out that public luxury services were more vulnerable to RG influence as contrast to private necessity (Mehta et.al, 2001)5.

Venkatesan (1996)6 has confirmed that whenever Consumer makes a decision of buying very high priced products they take the help of society. In view of the fact that, the automobile is used to truly move in the region of and to be noticed, it is significant to be familiar with what things persuade youthful executives before customers to construct their buying choice in terms for a particular color, type, size, design of car. The RG's are the compilation of friends, celebrities' family members and opinion leaders. RGs are in general influence the state of mind and behavior of a person. These RGs acts as a focal point to build values and standards. This occurrence leads to think of preferring specific brands of products which makes a path to purchase related products. According to Abideen & Latif, S. Saleem and (2011)7 said that the spots personality and famous persons have greater impact on the behavior of consumers. His study has depicted that formal RGs are the important groups which influence young executives for the buying decision of the durables products.

Reference Group: RG's Consumer assesses their situations, attitudes, values qualities, and behaviors10. RGs work as a reference to Consumer to assess their undertakings, their role, recital and goal. A RG have the option of forming membership groups. According to Lin and Chen (2009)9 he focused on the persuade of buying plan on re-buy resolutions, and to examine the sensible effects of RGs and expected hazard. The paper identified that; buying intention will have positive influence on re-purchase decision.

RGs validate and find out the nature of purchaser/ consumer/ buyer or group's personality and sociological characteristics. It is fact that the cluster where the purchaser seeks to relate her/himself mentally. It is very important to recognize a purchaser's perception, mind-set. RG can be classified as direct and indirect RGs, on the basis of interaction with the referent. In the direct referent groups, there is personal interaction with the referent, say, a family member, friends, peer. In an indirect RG, there is no personal interaction with the referent, such as in the case of politicians, cricketers, or movie stars. Someone you admire for good dress sense but have not ever talked to is also an indirect referent. According to Al-Duhaish (2014)11 the study focused at revising the consequences of the RG on the purchase decision for the Youth Consumer at Saudi. The outcome of the study showed that the work colleges majorly influence on the clothes or garments purchasing choice, thereafter celebrities, friends, stars and family.

Fast Moving Consumer Durables (FMCD): The taste and preference of the consumer is extensively ranging and frequently. The accurate forecast for consumer durable decisions are complex (Sonnenberg and Erasmus, 2005)12 while the ultimate purchasing judgment of the consumer will vary between decision styles and profiles cannot be directly applied to distinctive purchase conditions wherein the level of involvement of the consumer differs. Involvement of the consumer in purchase making decisions may be product involvement or purchase involvement. Product involvement is the enduring interest of consumer in a commodities or brand and buying participation linked to the requirement of the product. An individual who felt the need to buy van, for example, is expected to have high purchase involvement and not the product involvement. The Personal factors and situational factors make it complex to forecast the Consumer decisions beforehand (Sonnenberg and Erasmus, 2005)12.

The author Cooper (1994,) 13 defines that the durability means strength of the product to play a vital role over a long period of time under normal circumstances without any expense on repair or maintenance. Durability of a product are measured based on the number of years it exist, hours of use and operational cycles etc., 14. Every product which is durable should be capable of fine-tuning to scientific and technical developments15. Having reverence to consumer behavior towards this category, consumers are likely to spend maximum effort for comparison, evaluation of criteria, and point of purchase sources, inspection, trial and purchase. The internet has emerged as a significant and the largest external source of information. Research study has revealed that the consumers who look for brand and product through online are the persons who purchase online more compared to persons who do not search through internet16. Further to the proposed work considered three important segmentations of Durable Goods in India and these consumer durables usually have low volume but high unit value, they are as fallows.

A. Large electronics goods or White goods: These are the large electrical items Goods utilized domestically which are finished with white enamel like air conditioners, Refrigerators, washing machines and so on.

B. Light Electronic Appliances/kitchen appliances / Brown Goods: Normally these are light weight electronic items such as Mixer, Grinder, radios, and Micro ovens and so on.

C. Consumer electronic goods: It refers to any electronic devices used by consumers for daily inside a house. It includes Tablets, Televisions, Computers, Laptops, MP3 Players, DVD Player and so on.

Opinion Leader: In RG Consumer look for advice from Consumer whom we believe experienced in a particular thing, product/brand. Many such populaces around us are treated or viewed as proficient person in one or the other area or thing. People looking for advice or suggestions from the person who are expertise in

their area are considered as Opinion Leaders (OL) and consumers are in search of suggestion from opinion leaders are identified as opinion seekers. With regard to home appliances OL play very important role in decision making. Katz and Lazarsfeld (1966)17 said, the opinion leaders especially in mass media exposure go ahead of non-opinion leaders. For an example, a family member who have enough experience regarding scooter and runs a garage can demonstrate to be enhanced source for the required information when a scooter require to be acquired than a near colleague or an associate who is very familiar regarding present trends. Hence an OL acts as a word-of-mouth correlation among opinion seeker and giver.

The opinion leadership takes place in the following situation

- When an entity looks for guidance from others persons.
- During an entity willingly gives facts to others.
- At what time the related fact to be produced during normal communication with a group.

Opinion Leadership Model: A model for perceptive is how various factors influencing a consumer buying process, and a model is proposed as shown in Figure 1. Opinion Leadership is the method wherein the OL unofficially persuades the attitudes of consumers; either consumer is the possible opinion receiver or only opinion inquirer. An opinion receiver recognizes the OL as a highly convincing, objective source of product details who can help to reduce the consumers search and analysis time and professed hazard. The OL process normally occurs among friends, neighbors and colleagues that frequent physical propinquity.

Figure 1: Opinion Leader (OL)
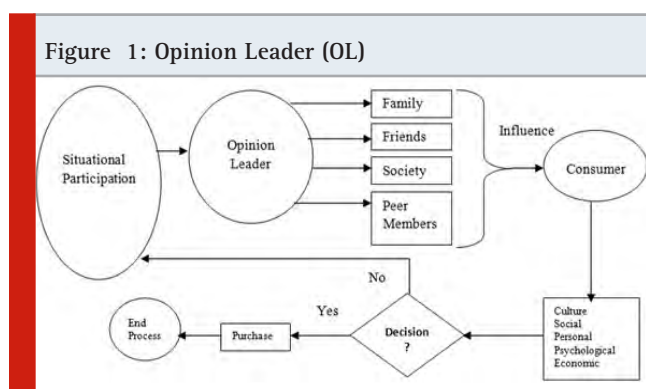
Therefore OL process has ample opportunity to seize comfortable product related conversations. The above such conversations generally transpire naturally in the perspective of the product-category usage. In turn these group influence consumer to purchase the product and consumer takes into consideration various factors for purchase decisions. If the consumer is confident enough to purchase the product without any fuzziness, consumer proceeds to purchase the product and end the process. Suppose if the consumer in a dilemma or fuzziness leads to reject the decision of purchase.

Consumer Decision Making: Consumers make a decision on a usual basis. A decision is merely making a choice. These choices can be concerning various brands, products, stores, etc. now and then; the consumer does not get to make options as there is only one option accessible, so one has to choose that only. The purchase decisions taken during such single product situation are known as 'Hobson's choice'. Several consumer researchers view consumers as cognitive or thinking decision makers who actively seek pre-purchase information, evaluate options, and then reach a certain decision. This view also holds that in this era of information overload, consumers will not try to obtain all the information for each and every decision and would rather stop looking for more information if consumer feel that they hold sufficient information to make a 'satisfactory decision'.

Emotions like achievement, fear, success, love, and so on, frequently persuade one's purchase decisions. Consumer moods also persuade decision making. Research of consumer frame of mind and their effects on decision making can be particularly significant for service encounters, point-of-purchase stimulus, context and content of marketing communication (Gardner & Meryl Paula, 1985)18. Store image can also impact the mood of the consumers and affect decision making. The store ambiance can lift the spirit of the consumers, or it can displease them. A store with good music, lively colors may lift the consumer's spirits and can influence time and money spent in the store, number of items purchased and revisit intentions of consumers (Smith, et al, 1993)19.

Review of Literature based on RG and Opinion Leaders: The numerous definitions about the consumer, the classification of the consumer buying processing and decision makings opined by the scholars revealed since 7 decays that the various role initiator, influencer, decider, buyer, user, maintainer, disposer are played by parents, children in the family which in turn impact on the behavior in the family in decisions making. With regard to the buying rules the scholars pointed out towards the compensator buying rules that consumer that they mostly apply even in the online purchase that is., in e-commerce. However research conducted take up the analysis of existing reviews of the proposed work limiting to the concept of RG and OL. Following are the few listed works since 1942 to till date have been considered in this research paper work. (Park and Lessig, 1977)20 stated that RG may be in various form, it may be imaginary or real having major influence upon a person's assessment. Hyman (1942)1 elaborated the term 'RG'.

According to (Stafford, J. 1966)10 the cohesive groups are attractive to the members of group persons and RG cohesiveness induces persons brand choice. Mourali (2005)21 pointed out that social and RG influence has significant role in decision-making procedure, which might be accepted by most consumer behavior models. In addition, a considerable number of studies regard as RG persuade as one of the important factors which influences the consumer purchase decision-making

process. The relationship between RGs and consumer's purchasing decision making has been brought out, and the importance of study those together has also been suggested (Yang et al., 2007)8.

Bourne (1957)23 state that various group induce in marketing re-search and concluded RG has a greater influential role on marketing studies. According to (Hawkins et al., 1998)22 stated that RG not only includes regular contact group for instance acquaintances, colleagues work associates family members, and so on, however the RG also covers groups that a person do not have contact with persons in a certain social rank. According to Singh and Kaur (2004)24 examined that diverse income group and their customs, ethics and children's role in family is the most important factors supports in the household in decision making. According to Kau and Jung (2004)25 established that uniqueness manifests in behaviors in the path of opinion leadership, information distribution, RG influence, family orientation of a person.

Dalrymple, Shaw and Brossard (2013)26 reveled that, the author group have conducted a range of studies wherein the researcher have identified that OLs have noteworthy role on the individual behaviors of varied other individuals. Authors Diaz and Maria (2013)27 has recognized that when pricing strategies like skimming pricing is offered for the product with high prices, and afterward with lesser ones, they stated that consumers are desired to buy the product at lesser prices. This means that vendor of the product can alter the intellectual condition of the buyers by encircling with prices to induce the consumers to make purchase decisions. Bruno and Hustad (2013)28 in their research collaboration has recognized that the important position played by opinion leaders as a linking pin between the public and media. Authors' stresses on the opinion leaders get information from the forum and convey that information to associates of the cluster based on their own interpretations.

Figure 2: Individual consumer
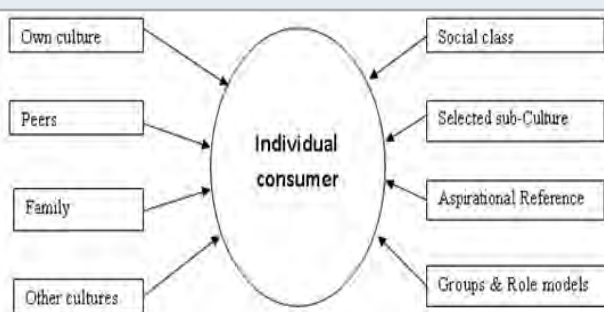
Reference Group and Opinion Leaders: The RG may be identified as having a positive or negative reference for an individual. Group's form which people try to distance themselves due to their negative influence are known as avoidance groups. An individual RG may be as small as a family or as big as a nation or culture as drawn association in Figure 2.

1 Types of influence by Reference Group: RG can be of various types. RG has influenced in consumers' decision making. Influences exercised by RGs are mentioned below in Figure 3:

Figure 3: Types of Reference Group
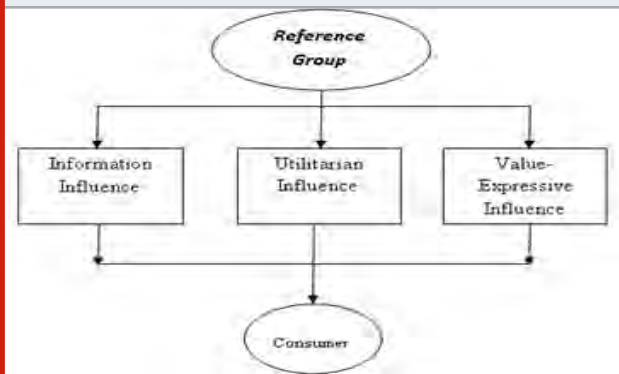
Information Influence: Consumer seeks out information regarding various brands from a union or groups of experts and from others who employee with the trade in as an occupation. Generally it is the inclination to admit facts from known personals as confirmation concerning genuineness (Deutsch and Gerard, 1955)29. While formulating the purchase decision, usually consumers have a propensity to look for supplementary measurements of unrelated different options or obtain wrapping up from the different brands RG associates acquire (Park and Lessig, 1977)20. Persons performing as reference may possibly give guidance as a clarification to a fuzziness (Burnkrant and Cousineau, 1975)30.

Utilitarian Influence: The person's decision to buy or purchase of a specific brand product is induced by the choice of associate workforce or with whom he or she has societal communications (Park and Lessig, 1977, 1977)20 .This RG influence is alike to the fact that people change their thoughts and values to be acknowledged by others (Deutsch and Gerard, 1955)29, traditional values outlines of its dangerous not to act in a manner" (Asch, S.E. (1952)31. A person's branded product purchasing conditions can be predicted to act in accordance with the preferences of another person or group.

Value-Expressive Influence: The individual thinks it is better to be similar nature of person that advertisement demonstrates utilizing specific trademark or brand. The person sense that the custody of a selective brand, which is used by certain people, whom he has a high regard for, will also give him the same type of picture (Park and Lessig, 1977)20. Deliberate fulfillment to group regulations may trigger from a person's aspiration to get enhanced picture by recognizing with the regulations of respected group (McGuire, 1969; Park and Lessig, 1977)32, 20.

Reference Groups and Brand Associations: Brands utilized by aspiration and member groups from time to time connected to mental state individual as brands are used to depict and generate ideas (Escalas and Bettman,

2003)33. belongings and brands in various situations accustomed to fulfill emotional needs as they produce individual ides, strengthening individual identity and differentiating self from other individual persons (Ball and Tasaki, 1992; Belk, 1988; Fournier, 1998)34, 35, 36. Possessions and brands merely serve as a social status and attach to one's society and cultural grouping. (Muniz and O'Quinn, 2001)37. Even though author has experimented the concept of group influence on the individual members it holds stand even today that every individual buyers and having much more influencing factors that makes buyer to make a decision.

Important Reference Groups and Appeals: Friends are major influencers of a lot of consumption choices of individuals and come next only to the family. Friends provide the first social circle an individual has outside family and provide a sense of companionship. Shopping groups are the people who accompany while they go out shopping and they help in selecting appropriate products and brands. Brand communities consist of people who are users of a particular brand. Many marketers have identified the importance of brand communities, which not only emotionally bond the consumers to the brand but also enhance consumer loyalty38. Many RGs that a consumer consults while making a purchase decisions includes works group consists of peers, subordinates, and superiors all are part of work group. Consumer- action Groups are effectual influence in consumer decision making as well as common behavior for example disaster control, public health, anti-drugs campaign, or any other cause that affects people in common.

DISCUSSION ON DECISION MAKING

It is quite natural and common practice that most human beings tend to takes a number of decisions to solve their day to day problems without preventing to believe about the procedure involved in arriving at such judgments. Decision making is a process of selecting appropriate options or many more alternatives. While shopping any customer enjoys the liberty of selecting a specific brand or product in a bunch of similar product categories. Understanding the Consumer buying rules have been playing vital role in purchasing any product and it is been a very important for the marketer to understand the rules which the consumers apply while purchasing the products. To be more precise opinion leaders enthusiastically gain and accept the information distributed by the mass media, process and pass on them, while the majority of the public depend primarily on the interpersonal communication with the opinion leaders to get information in order to guide their own proceedings.

Here, as a medium of information, opinion leaders have vital influences on the community. Visibly, the 2-step Flow (by sociologist Paul) of Communication stress the persuade of opinion leaders towards the thoughts of the wider population, and stresses the reality that the influence of interpersonal communication towards the public is more recurrent and more effectual than the influence of the mass communication towards the same spectators. Due to the widely available Internet and its applications, online resources the opinion leaders are come into sight. 'Opinion followers, with lesser tendencies and self-confidence, prefer the recommendation of others'. Buyer often takes the help of opinion leaders for any purchase decisions. 'Opinion leaders are in general people and are very conversant regarding specific product or service than the usual buyer. In fact, opinion leaders can depict how a product is observed. (Boundless, 2016).

OL are normally best for put into practice the word of mouth system, a marketing practice in which normal people converse with others their own opinion on a specific product or service. The exquisiteness of this method – it is basically free of cost. It necessitates more or less no investment on the part of an alliance. According to numerous reports, dominant people can influence the buying habits of the persons by word of mouth. In case of online purchaser, it bounded up to about 8 people on an average. The Excellencies of the product will be yet focused by opinion leaders and the decision-maker whenever he wants to take purchase decision he looks for their advice. People avoid taking risk in purchasing, if judgments are hard. In common, most of the consumers are definite to be in-contact with the opinion seeker to obtain the recommendation from the OL.

In marketing the word-of mouth communication creates consumer publicity which can play a part as an imperative responsibility in the success of a product39. Unfounded information can every now and then have negative impact on the brand. Sporadically tenuous conversation certainly affects the image that a company has built since many years. It is significant to make a note of those consumers who are not satisfied normally pass on negative comments to more populace than satisfied consumers and the negative information is weighted more deeply than positive information, by the undecided new product adopters40.

OL in common, are those who have proficiency or having higher knowledge about one particular product or activity, and has additional skill of persuading other Consumer. OL most of the time is of different category depending on their understanding and induce the buying decision of the recipient. In general, OL are the Consumer who has dominance in variety of subjects and are difficult to find out. Generally, OL are well versed about on product groups and these OL have high participation in associated field. Market Mavens are relating to a separate class of opinion leaders who have deep market-Participation. They enthusiastically hunt for the source of information about the market in which market Mavens feel it is helpful for acquaintances and other who help unconditionally (Fieck, Lawrence, 1987)41.

Surrogate buyers are the expert persons and they are hired by buyer to filter the available verity of alternative products and brands. Surrogate buyers make suggestions

to the buyer and in several situations consumer make dealings on account of their head or employer (Michael A Solomon, 1986; Aggarwal, Praveen & Cha, 1997)42,43. Purchase comrades are believed to be fairly dominant OL at the place where buyer makes purchase decisions at physical location. Purchase pals helps buyer to bring down the stress and wariness an individual faces at the time of making a purchase, especially these Purchase pals helps in expensive product. The strong fix purchase friend provides psychological support and gives helps the individual selects the products that fit into his/her taste (Kiecker, Pamela & Hartman, 1994)44. The opinion leadership process occurs because of various reasons of both revels that the OL, opinion receiver and the opinion seeker. Following are the four foremost reasons behind the functioning of OL.

A. Firstly self –participation, advising others, provides higher satisfaction to the OL in terms of the attentiveness they receive. The role of OL also includes a feel- better factor of facilitating others to think and to make a decision furthermore raising the familiarity of opinion seekers and receivers.
B. Secondly the product involved OL might sense the inevitability to speak to opinion receivers regarding the product whether it is excellent or terrible. The detailed facts conveyed would be confident if they are contented with the product or brand, and pessimistic, if OL are disappointed with it.
C. Thirdly societal association OL tend to disburse their item for consumption experience with Consumer in general as an expression of bonding. In this scenario, the OL does not feel the urge to talk about the product/brand due to positive or negative experience, as in the case of product association.
D. Fourthly in message involvement with a rising numeral ads being focused at consumers, these ads frequently turn into the matter of debate. Consumers while making buying decisions to purchase durable products, consumers apply various decision rules, which include compensatory and non-compensatory decision rules.

CONCLUSION

In this research paper work we present the outcome of the significant study on several insights of the impact of the Reference Groups, Opinion Leaders on consumer behavior and the decision-making process on an offline origin. Further the study has provided approaching ways into how consumers evaluate, arrived at purchasing decisions and alternatives, particularly in purchasing FMCD products. According to the above revise, friends, relatives, and opinion leaders influence consumer behavior on a large scale. Opinion leaders play a significant role when making purchasing decisions. It is very significant to note that the market buzz is a strong tool in the hands of marketer. Word-of-mouth greatly affects consumer behavior, which, if positive, it is certainly leads to create huge profits for the seller and, if negative, negatively affect the consumer decision-making process. The marketer needs to develop a strong

relationship with reference group and the opinion leaders as a part of marketing practices to reach customers in a little while to influence consumers to buy back and retain the trust of customers. The current market trends for the durable products are more aggressive and are very competitive. Hence, the manufacturers of the durable products must consider the consumer interest to increase their production and sales.

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Impact on Employee Morale Post-Merger of Telecom Giants in India

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ABSTRACT

Merger of any two organizations has many different reasons. Many organizations merge to increase their market reach and reduce costs. In a merger, the consideration is mostly given to the finances and very rarely to people. In such a scenario it is essential to understand the impact on the people, particularly the employees affected by it.Through the following research paper we have tried to study the impact of merger on the morale of employees in telecom sector in Maharashtra. A questionnaire based on Gallup G-12 survey and literature was designed and circulated across employees of the merged organizations to understand their morale post-merger. The finding would help organizations design policies for development of the employees. Mergers have an impact on employees as much as it has on the finances and assets of the organization. The onus lies on the board of management to ensure a smooth transition post-merger that leads to a healthy working environment.

KEY WORDS: MERGER, MORALE, EMPLOYEES, TELECOM SECTOR.

INTRODUCTION

Today economy is growing every moment, whereas, organisations are face challenges to maintain existing market share for its existence. There are quest between companies to gain competitive advantage by providing value added services, innovation, excellent customer experience, transformation projects and automation. All this ways are excellent for growth but still organisation many a times have to take big strategic decisions like "Merger" to gain competiveness, growth, diversification, economics of scale, synergy or to create global presence.

Merger broadens the portfolio of an organisation and reduce business threat; Merger helps in entering a new markets or geographies to capitalize on economic scale. Merger sometime become a tactical requirement for an organisation looking for market expansion in particular sector or geography, this can also be an outcome of high completion and disruption pressure. Merger is when two organisation come together to form one single entity to increase profit margins and shareholder value. Merger is trending in various industry mostly seen in Telecommunication and Service sector.

Merger play a critical role in the success of many modern organizations. By increasing market capitalization, merged organisations can compete with other larger and well-established companies, whereas other benefits and goals of Merger include market penetration, vertical expansion to control supply and distribution sources, market entry, identifying asset potential and economics of scale (Eccles, Kersten & Wilson, 2001). India is showing increasing trend of merger in last two decade, but post liberalization for many years' mergers was not a common

trend. In early years, there exist various limitation such as lack of rules and laws supporting merger. However, in last two decades we can see many mergers happening within India. In the latest EY latest report, Indian Merger & Acquisition for the year 2017 was with 1022 deals as compare to 895 deals in 2016, which was highest since 2010, whereas the deal value was lower by 12% in each previous years. Amongst all Telecommunication sector led with the highest yearly deal value of (USD 14.7 billion) recorded in last 10 years.

Figure 1: Merger & Acquisition in last 5 years with deal value and numbers.

Source: EY analysis of Thomson ONE data
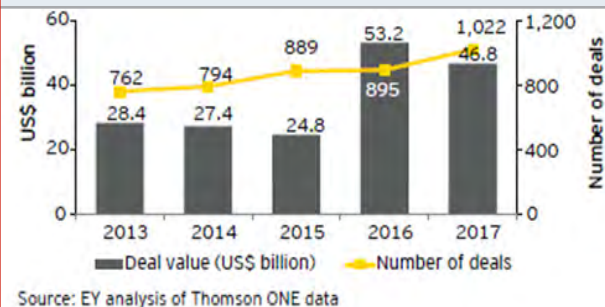
Figure 2: Merger & Acquisition in last 5 years across market sectors.

Source: EY analysis of Thomson ONE data
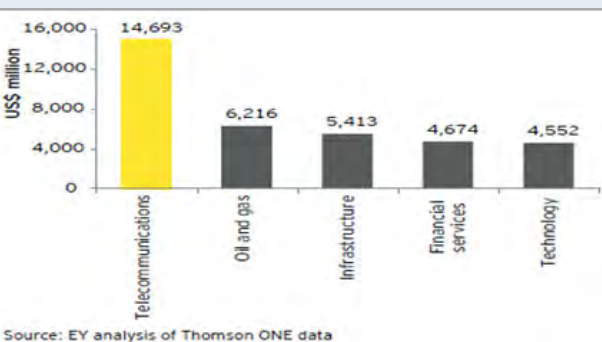
Telecommunication sector in India is facing tremendous changes and stiff competition for many years. With huge customer base available in India, tariff rates are hitting their bottom line and in addition, telecom companies are broadening their spectrum acquisition and infrastructure. The situation got aggravated in year 2016 with the entry of Reliance Jio, which act as a disruption to the complete telecom business model. Jio offered free voice and data services to its subscriber. This forced the other companies to drastically cut their tariffs rates, which create pressure on their market share and profitability. All these factors triggered a long-awaited union in the telecom sector, causing announcement of mergers within this sector.

Some of the important Merger happened in last few year are:
1. Bharti Airtel Limited with Norway-based Telenor's India unit Telenor India
2. Vodafone Group PLC's India unit and Idea Cellular Limited. The merged entity will be India is largest Telecom operator by revenue and subscribers.
3. Bharti Airtel Limited bought Tikona Digital Networks Private Limited's.
4. Tata Teleservices Limited and Tata Teleservices Maharashtra merge their consumer mobile business with Bharti Airtel Limited.
5. Reliance Jio Infocomm Limited bought the wireless spectrum, tower assets, optical fiber network and media convergence node assets of Reliance Communications Limited.

With the current transformation in Indian telecoms market, there is a movement from uneven industry distribution to more balanced market with 3 to 4 main market players. Hence, industry will be more stable with tariff rates and can focused on stabilizing their merged entities to bring collaboration. With new National Telecom Policy launched, it will affect the regulation of rates and other factors effecting company profits. As a next phase, it is expected to see more such tie-ups in future to gain new technologies and business models, such as building IoT capabilities and mobile virtual network operator (MVNO) market, which will build new revenue streams and help in fighting competition (Ernst & Young LLP, Transaction Annual: Highlight of 2017 and Outlook of 2018).

Well merger is a healthy move for organisation strategically; this brings tremendous profit in terms of financial gains and market share. However, Mergers represent an ultimate change for an organisation. Merger is the biggest change that can happen in the life cycle of an organisation, hence it become more difficult, challenging or chaotic than anticipated. Employees on the other hand, often find it difficult to cope up with the ambiguity surrounding with merger. When two organisation culture and environment comes together to form one entity, It collide by bringing differences in the ways of working of operating model, It reduces the levels of commitments and trust for the new merged organisation. Employee feel insecure as merger bring duplication of services and staff, which may let to redundancy of roles and job cuts. This anxiety and confusion affects the morale of the employee, leading to employee related issues like lack of job satisfaction, increased employee stress, absenteeism, low motivation, decrease in creativity and innovation, lack of inter-organizational employee collaborations and attrition of high performing employees; which at the end effects organizational objectives and effectiveness.

Literature Review
1. (Cindy Kangetta, Margaret Kirai, 2017) explains the business significance of mergers and acquisitions and its effect on employee morale in the Kenyan insurance sector, the author explain the importance of employee morale and it is essential for organisational effectiveness. The study indicates that high morale can enhance positive job performance, job satisfaction that helps to have a long-term association with employee with organization irrespective of the business changes like merger. Instead, low morale in employees because of merger led to increase in costs,

absenteeism, poor job performance, low motivation and interest, lack of creativity and innovation, lack of inter-organizational collaborations, all this in turn effect organisation performance. The finding helps define that merger companies acquire virtuous work environment to enhance job satisfaction, which in turn translates to increased employee morale.

2. (Jeff Badrtalei, Donald L. Bates, 2007) studied the effect of organizational cultures on Mergers and acquisitions: The Case study on DaimlerChrysler. The objective of this study is to look at employee behaviour because of merger and the lesson learned from its success and failure. It emphasise on organizational culture as one of the key in such cross-national mergers. The finding of this study enhance the literature of merger and acquisitions and conclude that organisational culture plays an important role in the integration process of merger. It suggested that a detail study of culture must happen in advance, where two different culture must be blended rather than changing it completely. It also talks about viewing employees as assets not liabilities. As merger bring reduction of employment cost, many a times such work force projections are not done adequately during merger, led to lay-off or job cuts, which in turn effects employee morale. With such low morale, merged organisation suffer heavy absenteeism, and labour turnover, which has a direct impact on organisation performance.

3. (Keisha Chambers, Andrew Honeycutt, 2009) study aimed to look at Mega-Mergers in Telecommunication sector, for examining Impact of merger on employee morale and turnover intention. The evidence shows that mergers and acquisitions majority of the time has failed to show better performance and achieve expected strategic growth as set in the premerger planning phase. The primary reason for performance failures was based on various human resources factors such as lack of management support, cultural differences, poor motivation, attrition, low morale and low job satisfaction (S. Cartwright and C. L. Cooper's 2000). The results suggest that, merger undermines employees feeling about the company and its confidence for future belongingness, hence leading to morale is low, which prompts employees to look out for better opportunity and leave the organization. Therefore, employee's perceptions on merger is important to study right from the beginning of merger to handle employee turnove

4. (Bruner 2005) explain that merger brings value to the organisation to fight competition and provide return on investment. Its bring together employees of both the organisation to create a new work environment and a mutual objective to achieve. However, human reactions towards any such big change are often difficult and disturbing. It involves factors psychological and sociological behaviour of employee. The new organisation need to scrutinize this change very closely understanding the behavioural and sentiments of employees of both the organisation, which will then provide an idea of what the new working environment, would look like.

If the changed in behaviour due to merger is not been handled properly it may hinder the progress of the project. It difficult to manage employee behaviour individually and it get more complicated when huge group of employees are involved. Organisation should be more sensitive towards employee's values, cross-country cultural diversity, practices, past experiences and culture.

5. (Kusstatscher and Cooper, 2005) talks about the essential component for a successful merger which is effective communication and constructive interaction between the merging organisations, this allows to create an atmosphere to collaborate and build capability. The author reported that if both partners harmonize, understand and respect each other's organizational values, culture, structure and operating model, that aids to transfer, and integration of capabilities for a successful merger. In addition, the willingness to collaborate and with the availability of financial and nonfinancial resources are vital for supporting integration process of two organisation (Haspeslagh & Jemison, 1991). Hence, it provides light on, how top managerial behaviour is very crucial for merger to drive transformation.

6. (Meschi, 1997) talks about the important factors of a successful merger between two companies depends greatly on how well the integration is managed. It brings the light to the previous literature that the most successful and best mergers happens when managers of both companies are align with each other on the understanding of ways of working and how to manage the people factor of this change (Fisher 1994). The leader's plays an important role in managing the change and must be willing to create a new culture that makes use of the best parts from both partners. In order to make change go smooth with both the companies, it is essential to be honest with employees with effective communication from the beginning phase of merger, which include sharing all aspects of agreements, providing assurance of job security and building trust for the new organisation. it is crucial that the two organizations build a strategy for cultural integration and value creation.

Research Objective

To understand the impact of merger on morale of employees in Telecommunication sector within Maharashtra.

1. To analyse the impact factors affecting the morale of employees post-merger
2. To compare the factors affecting the morale of male and female employees

Research Hypothesis

1. a. H0 = There is no significant relationship of organizational system support to the morale of employees post-merger
b. H0 = There is no significant relationship to peer and management behaviour towards moral of employees post-merger
c. H0 = There is no significant relationship to the

importance given to an individual for growth and learning and the morale of employees post-merger
2. H0 = There is no significant difference between the factors affecting morale of male managers to that affecting the female managers post-merger.

Research Methodology, Tools And Techniques: The morale of employees has been compared to the factors related to behaviour exhibited post-merger. The demographics consist of age, gender, total years of experience and years of experience in the company.

Research Design: The approach to the research included the exploratory research wherein the attributes of the population were determined by the convenience sample data obtained through online survey method. The questionnaire was constructed using data from Gallup G12 questionnaire and literature based on merger of companies. The data has been accumulated and treated according to the requirement of the analysis.

Sample Design: Convenience sampling has been used with data collected across primarily merged organizations in a couple of locations across Maharashtra

Data: Primary data consisting a sample size of 129 has been used for analysis. The data is collected from a couple of organizations across a couple of locations in Maharashtra. The data has been obtained through an online survey that consisted of approximately 23 questions including five demographic questions. A five point Likert scale has been used to understand the parameters, which resulted in the factors for the study. Three distinct factors that can serve as independent variables have emerged by conducting factor analysis. SPPS software has been primarily used to conduct the analysis. Factor analysis has been used to classify the attributes under distinct parameters through factorization. Linear Regression has been used to test the hypothesis. SPSS version 22 has been used to find out the reliability of the questionnaire, which is at a Cronbach Alpha value of 0.948.

Data Interpretation and Analysis
Source of data: SPSS

On testing the reliability of the questionnaire it can be seen that the data is very much reliable (Cronbach's Alpha = 0.948) as it is close to 1 the data is highly reliable. Hence, we can proceed ahead and analys the data

Table 1.1	
Reliability	Statistics
Cronbach's Alpha	N of Items
.948	18

Table 1.2. The above table shows that almost 71% of the variation is explained by the three factors

Component	Initial Eigenvalues			Total Variance Explained					
				Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.539	53.368	53.368	8.539	53.368	53.368	4.742	29.638	29.638
2	1.457	9.104	62.472	1.457	9.104	62.472	4.288	26.802	56.440
3	1.349	8.431	70.903	1.349	8.431	70.903	2.314	14.463	70.903
4	.895	5.594	76.497						
5	.645	4.032	80.528						
6	.621	3.882	84.411						
7	.568	3.551	87.962						
8	.420	2.627	90.589						
9	.387	2.420	93.009						
10	.250	1.565	94.574						
11	.216	1.351	95.925						
12	.193	1.207	97.132						
13	.170	1.064	98.196						
14	.141	.879	99.075						
15	.091	.566	99.641						
16	.057	.359	100.000						

Extraction Method: Principal Component Analysis.

Table 1.3

Rotated Component Matrixa	Component		
	1	2	3
I know what is expected of me at work		.784	
I am not given work outside my defined role]			.541
At work,I have the opportunity to do what I do best every day]		.726	
I have the materials and equipment to do my work right]		.885	
I get good support from my co-workers for any help required in my work]		.717	
Co-workers from other organization have been very supportive post-merger]			.534
The work culture has not changed much post-merger]	.792		
In the last seven days,I have received recognition or praise for doing good work]	.749		
My supervisor, or someone at work, seem to care about me as a person]	.725		
My supervisor has not changed post-merger]	.722		
There is someone at work who encourages my development]	.763		
At work, my opinions seem to count]	.779		
The mission/purpose of my company makes me feel my job is important]	.675		
My associates (fellow employees) are committed to doing quality work]			.641
I have a best friend at work]			.639
Post-merger I feel my job security is under threat]			.818
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.a a. Rotation converged in 6 iterations.			

- From the rotated component Analysis we can see that three distinct attributes that emerge after conducting dimension reduction on the above 16 parameters
- The factors being:
1. Post-merger system support (7 parameters)
2. Relation with peers post-merger (4 parameters)
3. Individual importance and recognition post-merger (5 parameters)

- Regression was used to find out the relation between the morale and the factors affecting morale for employees post-merger.
- Morale was taken to be a combination of two factors namely
1. Employees being appreciated for work in the past 6 months post-merger
2. Employees getting opportunity to learn and grow post-merger

a. Predictors: (Constant), importance and recognition, peer relation, system support
b. Predictors: (Constant), importance and recognition, peer relation
Table 2.2

a. Dependent Variable: morale
b. Predictors: (Constant), importance and recognition, peer relation, system support
c. Predictors: (Constant), importance and recognition, peer relation

a. Dependent Variable: morale
b. Predictors in the Model: (Constant), importance and recognition, peer relation
From table 2.1 it can be seen that adjusted R square value is 0.745 and the p value is less than 0.05. Hence the regression model is healthy and justifies about 75 % variation caused by dependent factors on the independent factor
a. Predictors: (Constant), importance and recognition, peer relation, system support

Table 2.1

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.865a	.749	.743	.55507
2	.865b	.749	.745	.55296

Table 2.2

ANOVAa

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	114.736	3	38.245	124.133	.000b
	Residual	38.512	125	.308		
	Total	153.248	128			
2	Regression	114.722	2	57.361	187.601	.000c
	Residual	38.526	126	.306		
	Total	153.248	128			

b. Predictors: (Constant), importance and recognition, system support

a. Predictors: (Constant), importance and recognition, peer relation, system support
b. Predictors: (Constant), importance and recognition, peer relation system support.

a. Predictors: (Constant), importance and recognition, peer relation, system support
b. Predictors: (Constant), importance and recognition, peer relation

a. Dependent Variable: morale
b. Selecting only cases for which Gender = Female
c. Predictors: (Constant), importance and recognition, peer relation, system support
d. Predictors: (Constant), importance and recognition, peer relation.

Dependent Variable: morale
b. Selecting only cases for which Gender = Female
c. Predictors in the Model: (Constant), importance and recognition, peer relation
From table 3.1 the R square value is 0.866 which is significant shows that 87% of variation is explained by the model. Since the p value is less than 0.05 the model is significant
Inference
We identified 16 parameters and when tested for dimension reduction we could bifurcate them into three distinct factors, i.e.

Table 2.3

		Coefficientsa				
		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	-.719	.304		-2.366	.020
	System support	.020	.093	.014	.211	.834
	Peer relation	.209	.098	.125	2.146	.034
	Importance and recognition	.964	.085	.774	11.401	.000
2	(Constant)	-.694	.278		-2.492	.014
	Peer relation	.215	.094	.128	2.281	.024
	Importance and recognition	.974	.070	.782	13.950	.000

Table 4.1

	Model Summary			
Model	R Gender = Female (Selected)	R Square	Adjusted R Square	Std. Error of the Estimate
1	.934a	.872	.866	.34576
2	.933b	.870	.866	.34587

Table 4.2

	ANOVAa,b					
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	51.371	3	17.124	143.237	.000c
	Residual	7.532	63	.120		
	Total	58.903	66			
2	Regression	51.247	2	25.623	214.194	.000d
	Residual	7.656	64	.120		
	Total	58.903	66			

Hypothesis 1
a. H0 = There is no significant relationship of organizational system support to the morale of employees post-merger
From table 2.3 it can be seen that there is no significant relation established between organization support system and morale of employees post-merger
Hence we fail to reject H0
b. H0 = There is no significant relationship of peer and management behaviour to moral of employees post-merger
From table 2.3 it can be seen that there is significant relation established between the relationship with peers and management and morale of employees post-merger

Hence we reject H0
c. H0 = There is no significant relationship to the importance given to an individual for growth and learning and the morale of employees post-merger From table 2.3 it can be seen that there is significant relation established between the relationship the importance given to an individual for growth and learning and morale of employees post-merger

Table 4.3

Model		Coefficients[a,b] Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-1.129	.440		-2.565	.013
	System support	-.089	.088	-.053	-1.021	.311
	Peer relation	.273	.088	.144	3.108	.003
	Importance and recognition	1.150	.067	.916	17.260	.000
2	(Constant)	-1.406	.347		-4.053	.000
	Peer relation	.282	.087	.149	3.230	.002
	Importance and recognition	1.117	.058	.889	19.269	.000

Hence we reject H0

Hypothesis 2: H0 = There is no significant difference between the factors affecting morale of male managers to that affecting the female managers post-merger. From Tables 3 and 4 it can be seen that the significant factors impacting the morale of male employees are system support and importance given to growth and learning, whereas the significant factors impacting the morale of female employees are relationship with peers and management and importance given to growth and learning, which is different from that of male employees. Hence we reject H0.

Limitations

- The study has been conducted in the Maharashtra region and hence has a geographical limitation.
- The study has been conducted on the perception of the managers and other employees of the organization. Hence, there is a possibility for further study in the same after a certain time gap.
- The factors affecting the morale has been derived from limited literature and opinion of managers. There is a scope to enhance the study of the factors.

CONCLUSION

Morale is a critical aspect that builds the organization culture. On merger, there is a lot of uncertainty regarding the future of the organization. In such a scenario, it is imperative to nurture the employees and keep them in high morale. Through the study, we can identify the important factors that affect morale. Incidentally organization support system, relation with peers and management and importance given to individual growth and learning. The factors although critical are not same for males and females. Hence, we can say that the organizations can look into adoption op policies in these aspects post-merger. Overall, for a smooth transition the organization should support the employee in all terms without creating much turbulence in the mind of the employees.

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Mobile Supply Chain Management System Diffusion in Retail Firms

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ABSTRACT

Mobile supply chain management (SCM) is gaining recognition as a major source of cost reduction and supply chain performance improvement. The current literature related to mobile SCM needs to be extended further in order to provide insights into how retail firms can implement mobile SCM successfully. This study attracts its survey responses from a set of retail corporations so as to analyze the factors that have an effect on the diffusion of mobile SCM. The results of this study can facilitate call retailers higher perceive the implementation method of mobile SCM and formulate methods for productive diffusion of mobile SCM.

KEY WORDS: MOBILE SUPPLY CHAIN MANAGEMENT, RFID, GPS, EDI, WI-FI.

INTRODUCTION

Business today operates in a competitive and complex global environment. In order to compete with their rivals, manufacturing firms are implementing strategic supply chain management (SCM) practices to operate more efficiently and to reduce operating costs. Management strategies such as resource bootstrapping or bricolage has also found to improve the supply chain and firm performance [9] .Internet technologies are one of the key technologies that help facilitate the implementation of SCM [3].Internet technologies such as electronic data interchange (EDI) and business-to-business (B2B) enable seamless integration and information sharing between supply chain members. Increasingly, governments in many countries are treating the application of information technologies (IT) in SCM as an important part of their national plans. In Taiwan, the government has worked closely with the electronics industry to develop implementation plans and financial incentives to support the adoption of Rosetta Net – an e-business standard used in supply chains [10]. Singapore's government provides educational programs and promotions on EDI to encourage EDI adoption [1].Technologies such as EDI and B2B allow better sharing of information, and this leads to uncertainty reduction and improvement in supply chain performances [11].

Mobile technologies such as radio frequency identification (RFID), Wi-Fi and global position system (GPS) allow for the seamless flow of information between supply chain members anytime, anywhere. The applications of mobile technologies in the supply chain have created a term known as mobile SCM. Mobile SCM could be a comparatively new and rising space in provide chains, and it refers to the utilization of mobile applications and devices to assist the conduct of provide chain activities.

With mobile SCM, a supply chain with an "internet of things" can be built up. "Internet of things" is a network that allows firms to track their products through the supply chain globally and run multiple applications simultaneously. Mobile SCM offers more than just the application of RFID. When manufacturers implement mobile SCM, they are using mobile technologies such as RFID, GPS, wireless sensors, personal digital assistants (PDA), and geographic information systems (GIS). Mobile SCM has great potential to transform the manufacturing industry and has attracted the attention of large automotive manufacturers such as Volvo Trucks [7][4], Volkswagen [4], and Ford [7][4]. Huang stated that mobile/wireless technologies are fast emerging as the next generation of advanced manufacturing technology [8].

Literature Review
Overview of Mobile SCM: Mobile SCM involves the integration of software application with mobile technology for example: Mobile Phone and Other online devices to provide a ubiquitous wireless environment. Mobile SCM in the retail sector include stock updating, customer service and tracking the product. Information in the Mobile SCM is board casted live without waiting time this real time information reduces response lag time and delay in processing transaction and ensure accurate forecasting of product demand and improve customer service.

A mobile SCM environment could involve connecting the mobile device to a company's server via wireless infrastructure such as GPS or Wi-Fi. This will allow information to be shared in the supply chain without the physical constraints of wire connections. Products in the supply chain can also be automatically identified, traced, and tracked throughout the supply chain using RFID. As RFID tags contain microchips with an antenna, the RFID reader will be able to collect product information (for example, product expiration, service history, storage history, and product location) from the tag through radio waves [6]. All these enable the integration of business processes between the supply chain members. With mobile SCM, supply chain members are able to track products without scanning the products, for example using barcode technology. The precise data information on product location, characteristics, and inventory levels offered by mobile SCM, also helps eliminate manual inventory counting, mispicking goods in the warehouse, and mistakes in order numbering [12].

Mobile SCM diffusion: Most of the stage-based diffusion models can be summarized in three stages: evaluation, adoption, and routinisation. The evaluation stage is when a firm evaluates the International Journal of Production Research 1199 potential benefits of mobile SCM. During this stage, it signals a firm's intention to use a technology before actual adoption. The adoption stage is when a firm has made the decision to use mobile SCM. Resources will be allocated at this stage to acquire mobile SCM. As Zhu stated, adoption does not necessary result in widespread usage of mobile SCM by a firm [13]. The routinisation

stage involves the installation and integration of mobile SCM throughout the firm and possibly with other supply chain members as well, which signals that mobile SCM has passed the adoption stage, and has a widespread, regular use in the firm. This research adopts the three stages evaluation, adoption and routinisation from the past literature.

METHODOLGY

SData: The survey was taken over on the different retail firms. A weeks upon distributing the survey, phone calls and emails were made to the firms to follow up with their progress in completing the survey. The survey was distributed to more than 20 retail firms of the 20 firms we were able to collect data at a rate of 100%

Measure: The measurements items were developed based on a review of the existing literature, as well as feedback from managers of several manufacturing firms. Consistent with the approach from Zhu [13], most of the survey items were adapted from previous research by [6], Wang [12] and Chong [2]. A total of 12 questions were used to measure the support for the mobile SCM in retail sector. Mobile SCM diffusion was measured by using evaluation, adoption, and routinisation. Responses to the items were made on a five-point Likert scale format ranging from 1, strongly disagree, to 5, strongly agree.

Figure 1: Company using mobile scm (a) Intends to use, (b) Business activities, (c) Functional areas, (d) easy to integrate, (e) comfortable in sharing information, (f) believes in privacy, (g) capital is high compare to industry, (h) knowledge, (i) financial resources for purchase, (j) previous knowledge to use, (k) trust and (l) satisfication.

(c)

(d)

(e)

(f)

(g)

(h)

(i)

(j)

(k)
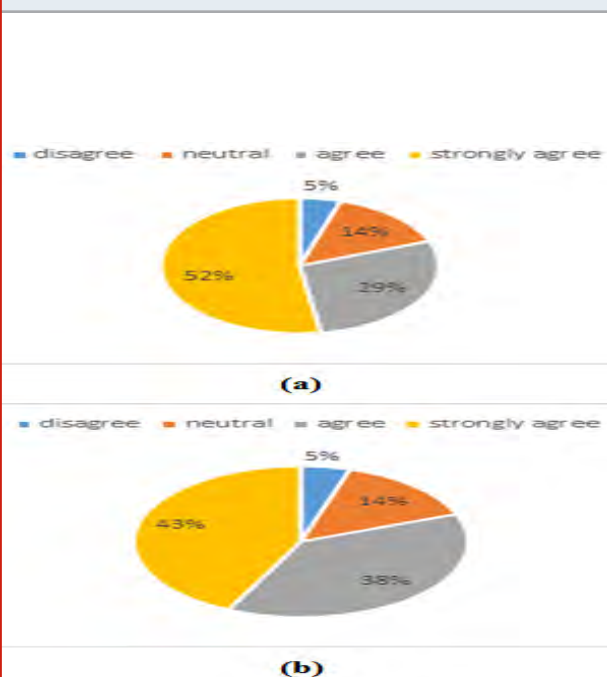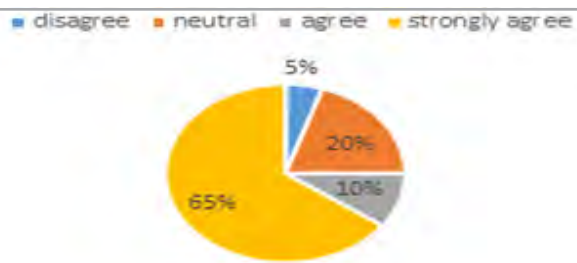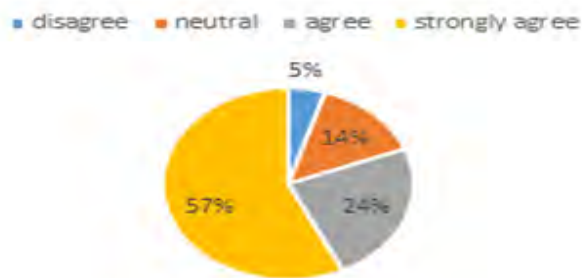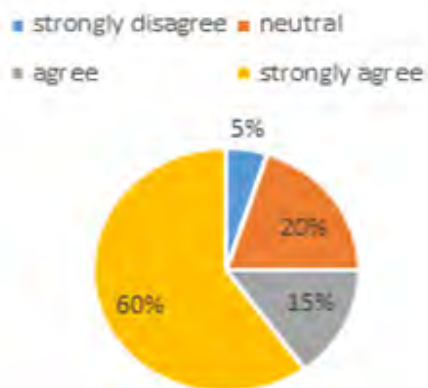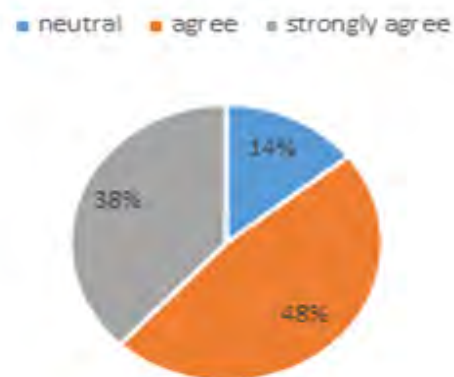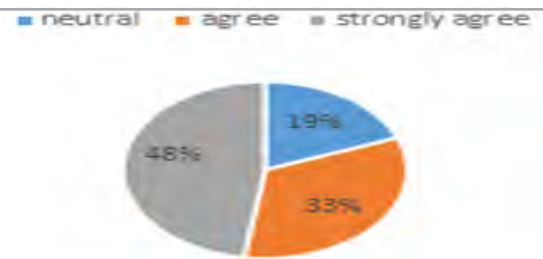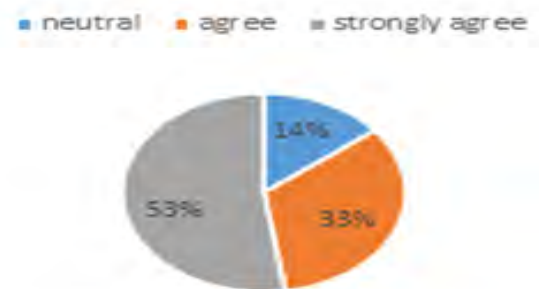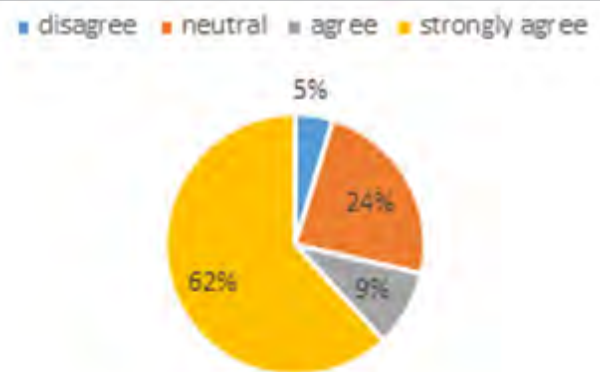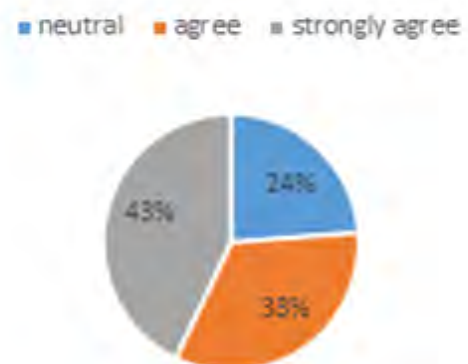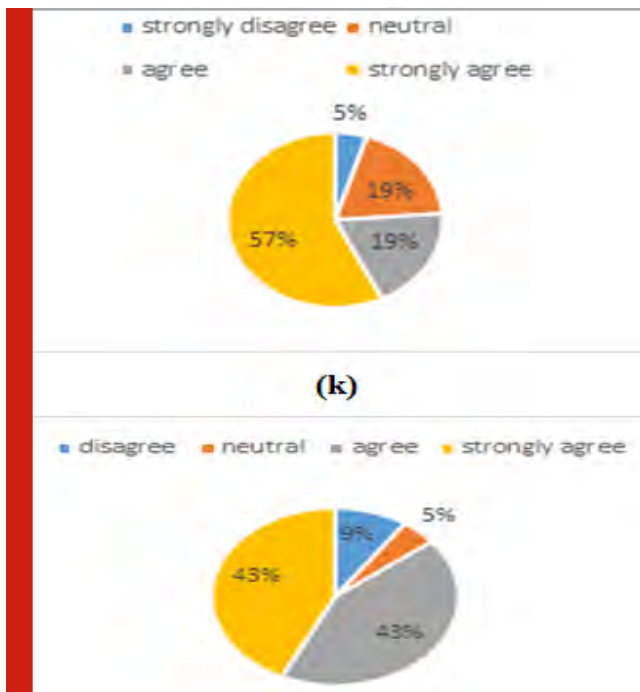
RESULTS AND DISCUSSION

This study empirically examined the application of mobile scm on the field of the retail sectors and the interest of each firm to adapt the scm in their sector which can make the smooth movement of firms. This was clearly understood by the question and the response which was given by each firms for the set of 12 questioner as shown in the below graphs.

CONCLUSION

The effect of a SCM strategy has become increasingly evident in the past decade, but a robust model linking SCM strategies to competitive priorities is yet to be developed. Given the number of SCM techniques introduced in recent years, managers need a decision framework to help them implement SCM strategies that are consistent with the competitive priorities of the firm so that scarce resources can be allocated efficiently. Mobile SCM is an emerging trend in the field of SCM [8]. This is an empirical studies on the factors affecting the diffusion of mobile SCM in the retail industry. Furthermore, this study examines mobile SCM diffusion by evaluating a staged-based model. This study has main implications. First, examines the research model in mobile SCM diffusion.

Second, this study also studies diffusion based on a stage based diffusion model. Third, this research helps decision makers in firms to formulate strategies in implementing mobile SCM. The result shows the key role during the mobile SCM. As such, one of the key deciding factors in ensuring that mobile SCM can be fully diffused in the supply chain is to establish relationships by building trust, collaboration, and information sharing.

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Design of Triband Textile Microstrip Antenna with High Directivity use Foam Substrate

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ABSTRACT

This article introduces the new design of a textile microstrip antenna with foam substrate. We designed a triband textile antenna with a large directivity. The antenna measured the wide bandwidth of 34% in the range of frequency is (3.561GHz-4.796GHz) ,8.8% (7.141GHz-7.813GHz) and bandwidth 7.7% (10.12GHz-10.91GHz) .Foam substrate is used in textile antenna .A shorting strip of H shape structure designed with foam substrate material having dielectric constant is 1.7 and conducting copper metal foil is used as radiation material. This textile materials are very flexible and it is washable. Here the measured and simulated results of the proposed antenna are satisfactory and provides to validate the importance of the designed textile antenna. So this antenna can be work in different frequencies bands such as WLAN, UWB.The simulated and measured results of directivity are in good agreement. Various radiation patterns analyzed.

KEY WORDS: STACKED BASED ANTENNA, FOAM SUBSTRATE, EFFICIENCY, DIRECTIVITY, TRIBAND APPLICATION.

INTRODUCTION

In recent years the textile wearable antenna is another approach in wireless power transmission system. In compact textile antenna has used very low dielectric constant which reduces the wave losses in surface .Also increases the impedance bandwidth. Due to the low profile structure the textile microstrip antenna is the best choice for wireless power transmission. Common textile material like flannel is used as substrate [1-2]. Wearable textile antenna has capability to provide the information of the garments or cloths by means of communication purpose. The wireless textile antenna has major scope in biomedical applications. Main two things to design textile wearable antenna are perfect flexible substrate material and planar

structure[3].The most basic antenna parameters such as return loss,gain,bandwidth and radiation pattern can be easily measured by this textile antenna .The measured results have been compared simulated observations which exhibits the good concurrence. Another use of the textile antenna to study of environment behavior in emergency extinguishing system. Wearable textile antenna can easily monitor bio signals and communicate with local environment. In this article, we design, development the textile wearable antenna with high directivity and study its performance.

Antenna Design And Development: To design the proposed antenna we used the low dielectric substrate material as jeans having the value of dielectric constant is 1.7 and conducting copper metal foil is used in ground and patch of the textile antenna. This antenna operates in three different band of frequencies in wireless communications systems. Here conducting copper foil sheet is paste in the textile substrate with adhesive tape. Textile material may be used as cotton, jeans or flannel materials [4-6]. Proposed textile antenna geometry shown in Figure 1.The fabricated proposed textile antenna with foam substrate shown in Figure 2.

Figure 1: Proposed antenna geometry (a) middle & (b) bottom view

(a)   (b)
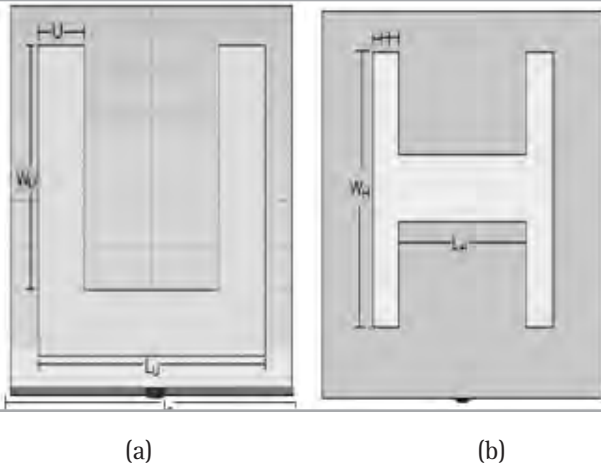
Figure 2: Fabricated antenna geometry (a) middle & (b) bottom view with foam substrate

The different antenna parameters calculated by equation (1) of textile antenna with foam substrate material are given below Table 1.

$$a = \frac{87}{fr} \cdot \frac{94}{\sqrt{\varepsilon_r}}$$

Table 1. Antenna parameters and dimensions

Parameters	Value taken
Substrate thickness	2.9 mm
Dielectric constant	1.7
Length of lower patch Lu	93.5 mm
Length of slotted patch LH	40.56 mm
U upper edge	13.98 mm
H	8.8 mm
Loss Tangent	0.025
WH	63 mm
WU	54.8 mm

Where fr resonance frequency and ε_r is dielectric constant.

Table 2. Simulated results of textile antenna

Resonance Frequency (GHz)	S_{11} (dB)	Band width (GHz)	Directivity (dBi)	Band Width (%)
3.624	-20.65	1.235	7.123	34
7.588	-15.11	0.672	5.447	8.8
10.254	-13.97	0.793	5.170	7.7

Figure 3: S_{11} parameters and frequency characteristics of proposed Textile antenna with foam substrate.
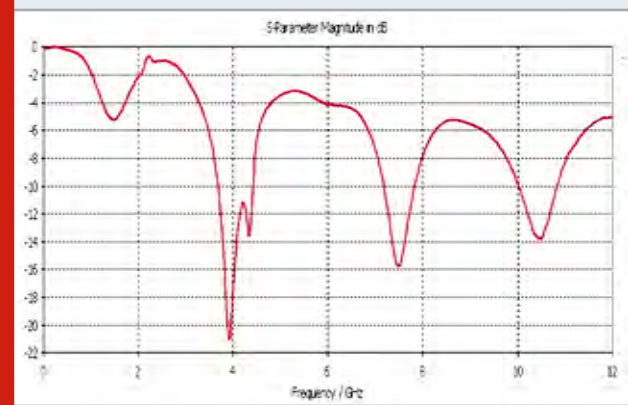
Antenna Results and its Performance: We investigate the designed antenna performance whose substrate thickness and dielectric constant are 2.9 mm and 1.7 respectively. The antenna simulated with IE3D software and we found the triband frequency pattern .The S_{11} parameter results with different frequencies shown in Figure 3.We obtained the three band of frequencies from this proposed textile antenna are 3.561-4.796 GHz, 7.141 -7.813 GHz and 10.12–10.91GHz.Also the textile antenna has achieved the directivity is about 7.123dBi at resonance frequency at 3.624GHz.At resonance frequency 3.624GHz the S_{11} parameter value is -20.65 dB. We found that the maximum percentage of bandwidth at resonance 3.624GHz is about 34%.The proposed textile antenna has the different parameters results at different band of resonance frequencies as given in Table 2.

The 3D radiation pattern for different band of frequencies shown in Figure 4.The different values of directivity of the three bands of frequencies are shown in Figure 5.Here it is observed that at the frequency 3.624GHz, maximum directivity was found .This maximum value of directivity is 7.12dBi. Now we fabricate the proposed textile antenna and measured the different parameters .The variation results of S_{11} parameter with resonance frequency are compared with the simulated results obtained by IE3D simulator. The comparison results shown in Figure 6. We study the bandwidth and losses of the proposed antenna. Textile material is very flexible

Figure 4: S_{11} parameters and frequency characteristics of proposed Textile antenna with foam substrate.
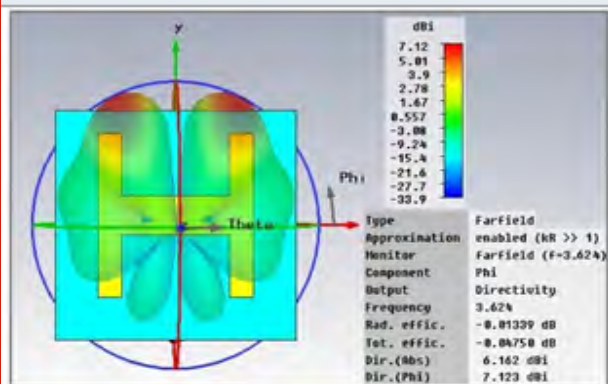
(a)
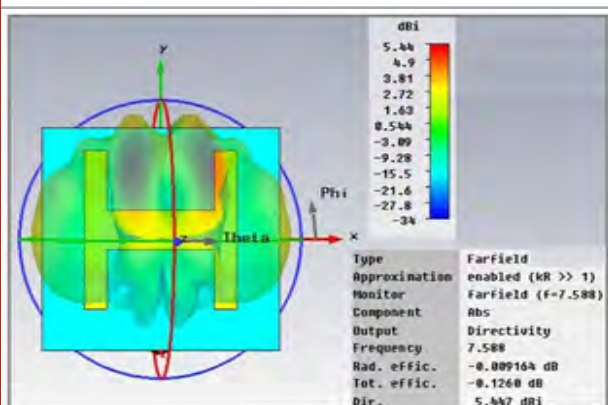
(b)
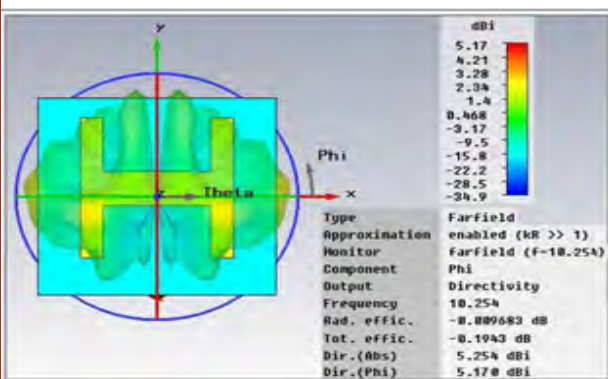
(c)

in nature. So triband variation of the textile antenna has been easily analyzed.

CONCLUSION

In the present paper, a triband textile microstrip antenna has been studied and the substrate of the proposed

Figure 5: 2D radiation pattern at (a) 3.624GHz (b) 7.588GHz (c) 10.254GHz of proposed Textile antenna.
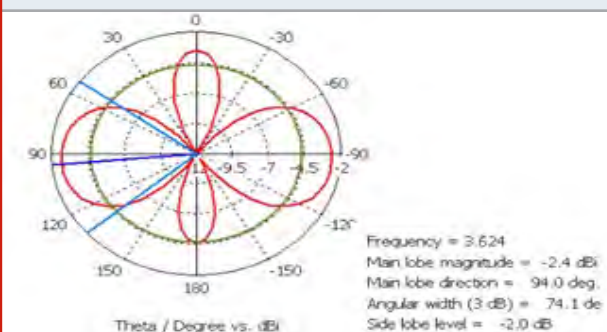
(a)
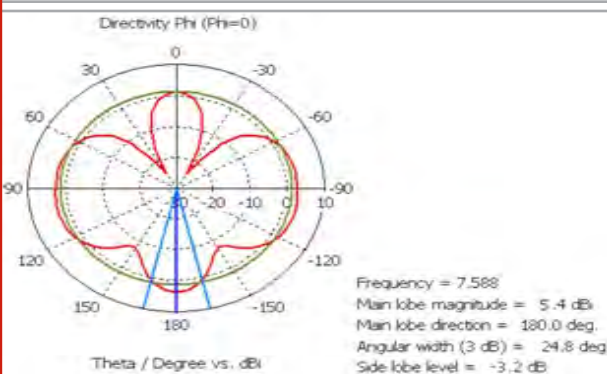
(b)
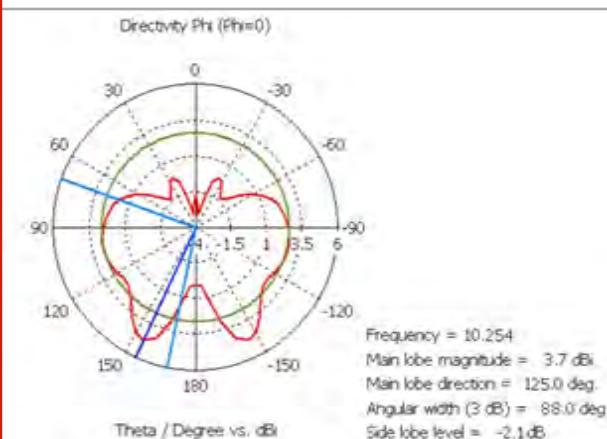
(c)

Figure 6: Comparison characteristics of simulated and measured results of textile antenna
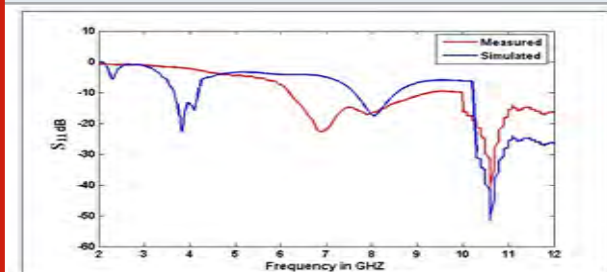
antenna designed with foam substrate material. The Antenna performance obtained by analysis the results. The different radiation patterns obtained for various frequencies. The proposed antenna provides three different band of frequencies .We obtained large impedance bandwidth is about 34% with high directivity. So this textile antenna is most suitable and compact for multiband application in wireless power transmission.

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Effectiveness of Peer Assisted Learning Strategies (Pals) in Teaching of Science

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ABSTRACT

Peer Assisted Learning Strategies (PALS) is a peer tutoring technique in which students work in pairs. This addresses the challenges faced by teachers in reaching all the students in the classroom. This study attempts to see the effectiveness of PALS in Teaching of Science among students in Grade VII. This paper can give an insight to Teachers, Teacher Educators and Researchers those who are searching for effective teaching strategies.

KEY WORDS: PALS, PEER ASSISTED LEARNING STRATEGIES, PEER TUTORING, STRATEGIES FOR TEACHING, TEACHING OF SCIENCE.

INTRODUCTION

Diversity in the classroom creates special challenges to teachers. Teachers need more effective strategies to reach children with different abilities and learning styles. Peer Assisted Learning Strategies (PALS) is a Peer tutoring technique in which it supplements the core curriculum through intervention. This is an evidence based approach and fits with many instructional methods and helps the teachers to address all kinds of students in the classroom. Moreover, PALS would be beneficial to teachers for teaching science and can target students who need more support.

In PALS, Students will work together in pairs to study and then answer questions through different activities provided in the program. As a facilitator the teacher monitors the whole program, extends support wherever necessary and provides feedback. Paired teams are not assigned randomly but rather high-achieving students are paired with average-achieving and likewise average-achieving with struggling learners. Students in pairs help and motivate each other to achieve the goal. Hence this study was conducted to find the effectiveness of PALS in teaching Science.

Objectives
- To find the effectiveness of PALS intervention in Teaching of Science
- To study the impact of PALS intervention in Teaching of Science with respect to Gender and Medium of Instruction

METHODOLOGY

The study was conducted in secondary schools in Coimbatore district. The sample was selected from GradeVII Students for both Experimental and Control Group.Both groups had similar in type of school and

location. This paper discusses the effect of PALS conducted in an Experimental group.

Pre test was conducted before starting the intervention. Based on the pretest score, the students were paired. The student with the highest marks was paired with the student of the lower marks. The students will act as a Tutor and Tutee. The Investigator had taught a lesson from their science textbook and provided sample scripts for students to practice the roles. The tutor and tutee reciprocated the roles and the teacher monitored and provided feedback. Reading is the first step in the intervention in which each student in a pair took turns to read the text. Each student took turns to reread and the first reader restated the main idea of the paragraph in ten words. After five minutes, the students switched roles and restated the main ideas in the second paragraph.

In Paragraph Shrinking, both the tutor and tutee were asked to underline the sentences provided in a worksheet and then they were to discuss the underlined sentences to clarify and evaluate. After this phase, a quiz was given to tutees by tutors to practice what they have learnt. This method will make them comfortable asking questions to another student rather than to a teacher. As the last step a project was assigned to each pair. With collaboration and cooperation they have to complete the task and should present it in front of all the groups. The investigator evaluated the project and gave feedback. Post test was conducted, the scores were analyzed and the results were given below.

RESULTS AND DISCUSSION

The table 1 reveals that the t – value of PALS was significantly different between pre and post mean scores at 0.01 level. Therefore, the null hypothesis stated as "There is no significant difference in the Mean Scores of PALS before and after intervention" is rejected stating that the PALS made significant influence in Teaching and learning Science.

Table 1. Pre and Post Test mean scores of PALS						
Variable	Testing	N	Mean	Std. Deviation	Std. Mean Error	t-Test
Score	Pre Test	30	7.27	2.288	0.418	0.000**
	Post Test	30	18.83	4.786	0.874	
** Significant at 0.01 level						

Table 2. Pre and Post Test mean scores of PALS with respect to Gender						
Testing	Gender	N	Mean	Std. Deviation	Std. Error Mean	t-Test
Pre Test Score	Male	15	7.80	2.305	0.595	0.932^{NS}
			6.73	2.219	0.573	
Post Test Score	Female	15	19.13	5.181	1.338	0.529^{NS}
			18.53	4.518	1.166	
^{NS}– Not significant						

Table 3: Pre and Post Test mean scores of PALS with respect to Medium of Instruction						
Testing	Medium	N	Mean	Std. Deviation	Std. Error Mean	t-Test
Pre Test Score	Tamil	16	6.81	2.664	0.666	0.157^{NS}
			7.79	1.718	0.459	
Post Test Score	English	14	18.25	5.196	1.299	0.613^{NS}
			19.50	4.363	1.166	
^{NS}– Not significant						

It is clear that while comparing the Pre and Post test mean scores of Male and Female it reveals that t- value (t = 0.932, t = 0.529) for both tests are not significant. Therefore, the null hypothesis stated as "There is no significant difference in the Pre and Post Test mean scores of PALS with respect to Gender" is accepted.

There was no significant difference in the comparison of Pre and Post test means scores of PALS with respect to Medium of Instruction. Therefore, the null hypothesis stated as "There is no significant difference in the Pre and Post Test mean scores of PALS with respect to Medium of Instruction" is accepted.

CONCLUSION

Application of PALS can be beneficial to all the teachers who search for new ways to enhance learning. PALS bridges an important gap in learning and reading. This study results showed that PALS is found to be effective in teaching science. Diversity in learning can be addressed through this intervention strategy.

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Measures in Controlling of Contamination by Covid-19 in Dental Office

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ABSTRACT

On 31 December 2019, the World Health Organization (WHO) was informed of cases of pneumonia by unknown microbial aetiology. It was associated with Wuhan City, Hubei Province, China. Later, WHO declared that a novel corona virus had been recognized in samples taken from these patients and it spread rapidly around the world was called Corona Virus disease 2019 (COVID-19). On 11 March 2020, WHO declared it as a pandemic. Clinical trials and investigations are ongoing to learn more about the virus and its management. In oral healthcare, aerosols are generated during dental treatment and COVID-19 spreads by respiratory droplets and also by aerosols. Airborne contamination should be controlled by triage, engineering, and workplace controls followed by personal protection equipment (PPE) which are necessary for oral health care workers.

KEY WORDS: COVID-19, PERSONAL PROTECTION EQUIPMENT (PPE), WORLD HEALTH ORGANIZATION (WHO).

NINTRODUCTION

COVID-19 is a family of enveloped RNA viruses which cause illness in people such as common cold, severe acute respiratory syndrome [SARS], Middle East Respiratory Syndrome [MERS]. Characteristic features of this disease include fever, cough, dyspnoea, Myalgia, Nausea, Diarrhea, hyposmia, dysgeusia, abnormal chest X-ray and computed tomographic (ground-glass opacities are typically found in the chest) while some patients may be asymptomatic. SARS COV 2 can be diagnosed by Conventional or Real Time RT-PCR test. Sample should be taken from throat and nasal swab, bronchoalveolar lavage, sputum and tracheal aspirate which is collected in Viral Transport Medium and transported in cold chain. Antibody based tests for detection of antibody (IgM and IgG) against SARS COV 2 can be used as a diagnostic test, which is rapid and cost effective. The incubation period of COVID-19 is in between 1 to 14 days with a median of 5 to 6 days. Complications of this disease include multi-organ failure, pulmonary edema, septic shock, severe pneumonia, and acute respiratory distress syndrome.

The pathophysiology of COVID-19 is not fully known; however, it has been noted that SARSCoV-2 binds to the angiotensin-converting enzyme-2 (ACE2) receptor in humans, which is a similar pathogenesis as SARS.[1,2] It has a unique structural feature of the spike glycoprotein receptor which is responsible for the entry of the virus into host cells. It spreads person-to-person in community and healthcare settings with local transmission. The virus exists on plastic and stainless steel for 72 hours, on copper for 4 hours and on cardboard for 24 hours.[3] In dentistry, a lot of rotary and ultrasonic instruments are used which make direct contact with hard tissues. Often,

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these instruments are used in conjunction with air, water, or both which leads to the generation of aerosols, fine particles, and splatter. Severe acute respiratory syndrome (SARS) and COVID-19 are transmitted by respiratory droplets and aerosols from infected individuals.

With the occurrence of new pathogens, the risk of respiratory diseases in oral healthcare workers has exponentially increased.[4] So, all aerosols generating practices should be limited in oral healthcare settings and correct personal barrier protocols should be followed.[5]. Thus, this review article reported the characterisation of aerosols in dental procedure and the general measures or method of reducing the burden of aerosols, to prevent transmission of corona virus through surfaces in dental office.

Definition and Characteristic features of Aerosol in Dentistry: Aerosols are defined as "liquid or solid particles that are present in the air and produced by humans, instruments, machines or animals and bio-aerosols are aerosols that contain particles of any kind of organisms."[6] The term 'aerosol' and 'splatter' was first introduced by Micik et al.[7] They reported that the particles size of aerosol is <50 μm in diameter and particles size larger than 50μm in diameter are defined as splatter. They also said that particles from 0.5 to 10 μm have the greatest potential for infection transmission. Aerosols cause the greatest threat in dentistry because it stays in the air and may enter in respiratory passages. After completion of the procedure, it may suspend in the operatory for about 30 min. All procedures which are carried out by engine-driven or ultrasonic devices generate aerosols and these aerosols contain body fluids which include saliva, blood and microbes.

Results were obtained in many studies to confirm that "aerosols are contaminated with microbes". Harrel SK and Molinari J in 2004[8] and Jacks ME[9] in 2002, reported that droplet nuclei expelled from patient suffering from Mycobacterium tuberculosis is most serious potential threat in aerosols. Zemouri et al.[6] in 2017 stated that high serological titers of Legionella spp. and high rates of asymptomatic tuberculosis is found in dental practitioner and hospital staff, and also Pseudomonas species were found in aerosols from the instruments in contact with tap water. Zemouri et al., Harrel et al. and Kobza et al.[6,8,10] reported in their study that nasopharyngeal and saliva secretions in aerosols and splatter consists influenza virus, SARS virus (Severe acute respiratory syndrome), pathologic streptococci and staphylococci along with hepatitis B and C virus and HIV. Fungi from Cladosporium and Penicillium species were most commonly found. Baseer et al.[11] in 2016 confirmed that MERS-COV(Middle East respiratory syndrome – corona virus) transmitted through droplet and contact, and healthcare professionals were worst affected. Thus, the knowledge of the composition of aerosols and splatter is very important for safety of oral healthcare professionals.

Prevention: Personal Protective Equipment for Dental Practitioners - Protective equipment contains standard PPE kit, goggles, face protection, face shield, gloves, mask, gown or coverall, head cover, and rubber boots to protect eye, oral, and nasal mucosa.[12,13].

Surgical masks and surgical respirators are very important to wear during procedure but they fail in respiratory protection due to lack of tight seal.[14,15] The mask should be changed for each patient every hour of long treatment and in every 20 min in highly aerosolized environment.[4,15] Respirators used should be certified by the National Institute for Occupational Safety and Health.[4] There are three types of filter class- N95 (Non-resistant to oil), R99 (Resistant to oil) and P100 (Oil Proof particles). Surgical respirators are designed to filter the particles size of 0.3μ.

Cleaning of Potentially Contaminated Surfaces: The dental office surfaces can be broadly divided into high touch and low touch surfaces, which depends on frequency of contact and risk of exposure. The high touch surfaces may include door handles, faucet knobs etc. and high risk surfaces may include dental chair. Low touch or low risk surfaces include floor, ceiling, walls etc. High risk surfaces should be cleaned and disinfected after every patient attended and low risk surfaces may be cleaned and disinfected at the beginning and end of the day. 70% isopropyl alcohol based disinfection is preferred for metal surfaces. Plastic surfaces can be disinfected by 1% hypochlorite solution. Floor wet mopping can be done by using 1% hypochlorite solution. Triple bucket system should be preferred. Walls up to seven feet to be disinfected by 1% hypochlorite solution. Hydrogen peroxide based wipes can be preferred in high risk areas.

Use of Mouth Rinses: To reduce the burden of microbes during dental treatment, 0.1% chlorhexidine should be used for 1 minute during preprocedural rinse.[16] It has been shown that, it significantly decreases the count of floating bacteria in the mouth.[17] For influenza virus and SARS-coronavirus, 1% hydrogen peroxide or 0.2% povidone iodine mouthwash should be used in patients with high viral load.[18] For cleaning dental unit waterline (DUWL), 3-ppm sodium hypochlorite, 0.12 CHX, 1:10 dilution of listerine mouthwash, and 1% hydrogen peroxide should be used.[16].

Use of HVE and rubber dam: The use of high-volume evacuator (HVE) reduces 78% of airborne contamination. [9,19] Jacks ME reported that 90% aerial contamination should be removed alone by HVE.[9] They also reported that the contamination of bacteria when using air turbines or air–water syringes can be kept minimum using a rubber dam. Use of rubber dam in practising helps in eliminating all the bacterial and viral contamination which arise from the blood and saliva except for the tooth to be working upon.[19].

Use of negative pressure rooms or airborne infection isolation rooms: Emergency dental treatment of patients

with active or suspected infections by SARS and COVID-19 should not be carried out in routine dental settings, instead these patients should be treated in negative pressure room or airborne infection isolation room by using mask or respirator.

Dental ventilation guidelines which is given by Indian health service has reported the specific ventilation requirements in dental facilities.[20] Air change per hour (ACH) corresponds to air volume added to or removed from a space divided by the volume of the space. For enclosed operatories minimum ACH is 12 and 6 for open operatories. Rautemaa R et al stated that 63% of aerosols are eliminated from the environment, if proper air change ratio is maintained.[21] Spagnolo AM et al revealed that high-efficiency particulate arrestor (HEPA) filters eliminate the contaminants size 0.3 μ and greater with 99.97% efficacy with laminar airflow.[22] Singh S et al also stated that HEPA filters reduce the concentration of airborne particles as well as in disease transmission. [16].

CONCLUSION

In oral healthcare settings, generation of aerosols and splatter has the ability to spread infection. It can be reduced to a substantial level but cannot be completely avoided. Sars-CoV-2 is a very infective virus. Because of the oral route of transmission of this pathogen dentists are among the health professionals who are at high risk of exposure. So, triage, initial screening, and special precautions should be taken while treating them.

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A Study on Adapting Green Techniques in Software Engineering Process to Reduce Energy Consumption.

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ABSTRACT

Technology is emerging day by day and also the usage of software too in all sorts of fields along the globe. The primary concern in the world now is pollution due to natural disasters and also by the man made inventions for living modern life in society. During usage the carbon emitted from these devices will have higher impact on the overall pollution of the world .So we indeed have to find a solution to minimize the co2 emission from these devices by implementing sustainability in every activities of software development process by applying different JIT green techniques in it. In this paper the section one introduces what is need of green software engineering and its best practices, the section two introduces best practices for sustainable software and energy efficient framework of software ,the section three describes green implementation of different software process methodologies and the final section will show the improvements after implementing green techniques in life cycle.

KEY WORDS: GREEN COMPUTING, CARBON FOOTPRINT, VIRTUALIZATION, GREEN DATA CENTERS.

NINTRODUCTION

There is tremendous changes in the environment due to global warming and it became an issue to the government and private sectors as they have to abide the regulations of environmental protection schemes.so everyone is finding ways to green every activity of work performed by the organization. Also, now every individual has to take onus for healthful adaptation sustainable practices to reduce the energy consumption at home. The developers and the end users are having different perspective in case of Energy consumption of devices, the developers says that due to battery users and the end users generally think, it is due to the application programs. As more recently, economically sensible energy conservation is required.

The insight for this change comes from a) increase in awareness of global warming issues like GHS b) and increasing sense of national Energy saving security c) growing business process needs prevention of cost and energy in activities of business process d) obtaining an efficient software and hardware[2]will indirectly reduce the perverse effect in the environment.[4] For this, we need to consider a software engineering process development steps [4] in order to obtain sustainable and green software products [6]which help to minimize the negative impacts on the environment. Hence, it is possible to help and guide project managers, engineers, developers and users to better collaborate to produce efficient software applications using eco-friendly environment [8].

Green software and Software Engineering: Software: is a set of instructions or programs instructing a computer to do specific tasks as per the requirement of the user. Green software: "It's is a software made and used and

used to reduce environmental issues", provided by Murugesan in Harnessing-Green-IT Practices. Green Software: Green software to full-fill the following three high level requirements: a)The required software engineering activities of software development, maintenance, and disposal must save resources and reduce waste. b) Software execution must save resources and reduce waste. c) Software must support sustainable development.

Green sustainable –software engineering: is the skill of creating green and sustainable software in relation to the process of green software engineering. The skill of describing and making software products in a way, the positive and negative effects on sustainable developments of the Life Cycle process constantly assessed. The assessed details are maintained as records and may be utilized for a software product process optimization.

Best practices and sustainable software [02]: Can be for green implemented in all aspects of software development.

a) Defer initialization of till we need it for execution
b) Efficient data traffic to transfer data without delay
c) Decrease algorithmic complexity to keep the software with less space and time
d) Power down peripherals to reduce the energy consumption d)Efficient UI to interact the system faster
e) Efficient query to retrieve the data rapidly
f) Load balancing to distribute data and reduce overloading
g) Virtualization
h) Just-In-Time compiler to enhance execution i) Reduce transparency.

Related Study

1.3.1.Gustavo Pinto, Fernando Castor,2017,In this paper[13] The major issue in preventing software developers from identifying, fixing, refactoring as well as the removal energy consumption hotspots are the insufficiency of knowledge and the non-occurrences of tools . These problems is handling both the problems. Also further they discussed about, the relationship between software and energy consumption. Energy consumption (EC) is an accumulation of power dissipation (PD) over time t, that is, $EC = PD \times t$. Power PD is measured in watts, whereas energy EC is measured in joules. As an example, if one operation takes 20 seconds to complete and dissipates 10 watts, it consumes 100 joules of energy. Also we need to consider on the software which are in under execution, hardware platform, given context also during a given time. To understand the importance of a hardware platform, consider an application that uses the network. Any commodity smartphone nowadays supports, at least, Wi-Fi, 3G, and 4G.

1.3.2. Shantanu Ray,2013,The impact [14] of carbon emission and the necessity of sustainability in software development is mentioned. Using methods SCRUM, Extreme programming and Sprint helps in minimizing the problems related to the efficiency and flexibility .Suggested visualization of server and use natural resources for energy consumption. Monitor the energy difference through normal energy and adaptation of sustainable natural energy. They also proposed a tool OGSA-DAI-used in university of Edinburgh to enhance optimization.it is a sustainable software ,and create during better user interface.it is an innovative user interface and provided with innovative solution for data access management.

2.0.Green Design and coding in Life Cycle: Focus on creating green and sustainable software in relation to the process of it.The skill of describing and making software products in a way, the positive and negative effects on sustainable developments of the Development Life- Cycle process constantly assessed. The assessed details are maintained as records and may be utilized for a software product process optimization [2].

2.1: A Framework for Energy–Efficient Software: Software energy consumption plays a vital role in minimize carbon footprint. Initially, the hardware and software were tightly mingled and mostly indistinguishable. But now the hardware and software are varying, the number of software layers is constantly increasing to provide encapsulation and abstraction for software applications We can develop a green software by applying green analysis ,design, building and testing (fig:1) and perform the energy reduction from the developing stage, from the end user side as well as the customer side by collecting requirement to measuring the energy profile at every phases of the software development to enhance the software.

Figure 1: Green software Engineering Frame work
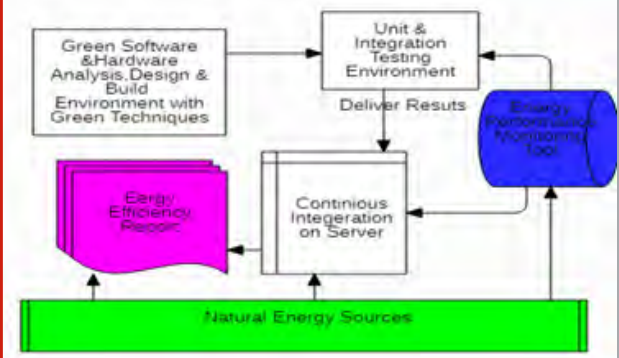
Also, Different Natural energy sources[13]should be provided to the system to reduce power consumption .There are several models and techniques available to

measure the consumption of in processor, memory, storage ,network and peripheral devices.

3.0: Reducing The Energy Through Green Software Engineering Life Cycle: To implement energy efficient software engineering process ,need to implement green activity every stages of the life cycle.

3.1.Green Requirements phase: It is initial phase of software development process analyses, trace, prioritize, and agree, and communicate to all stakeholders on functional and technical specifications. Plan for energy efficiency at all levels of software. Developers strike with issues for applying green during the development of product that due to lack of tools, guidelines, textbooks. Considering the power states of software, applying energy saving technique like computational &Idle efficiency and Data efficiency.

3.3. Sustainable Green Design coding: Design should consider hardware and software level. The coding style should be optimized and can have automatic code generators to save time in developing the process for maintaining the complete coding as clean code There is misconception that by reducing the execution time ,will reduce execution time, but it actually increases the context switching and increase the CPU execution cycles. Also can adapting energy efficient agile programming practices.

3.4 Green Testing Distribution and disposal: Perform testing with efficient test cases, Have energy profiler modules. To find the energy consumption of application unit testing level to integration level. In case of higher computation sent to the remote computer similar like mobile offloading.

Table 1. Devices chosen for power adjustments		
S.no	Power Management Features Enabled systems	Number of Devices
1)	Number of desktop computers	100
2)	Number of desktop monitors	100
3)	Number of notebook computers	50
4)	Number of notebook displays	50

4.0. Applying green power management techniques in software to reduce energy consumption in the devices: A software tool called carbon calculator is used to evaluate the power consumption and co2 emission. In Table1.the total number of devices used for the power adjustment is given.

After selecting the number of devices for the experiment. We need to set parameter for the desired power

management to Desktops –Monitor and computer as well as to the notebook display and the computer are shown in table2.

Table 2		
Desktop Monitor	Low power sleep mode in minutes	15min
Desktop Computer	System Standby /Hibernate mode in minutes	30min
Notebook Screen	Low power sleep mode in minutes	15min
Notebook Computer	System Standby /Hibernate mode in minutes	30min

Table 3. PC usage in organization		
1)	Number of hours work in day?	8 hrs
2)	How many days in a work week in your organization	5 days
3)	How many days leave in organization in an year.	22 days

Table 4. Result of energy saving.		
Saving criteria	Energy (kWh)	Prevention of Co2
Desktop monitors transcended sleep mode:	16,849.2	38.9
Notebook displays transcended into sleep mode:	1,741.9	4.0
Total energy reduction from	18,591.2	42.9
Notebook computers going into sleep mode	22,328.6	51.6
Total savings from computer sleep mode	1,658.8	3.8
Total energy saved on the computer during sleep mode	23,987.4	55.4
Total saving	42,578.6	98.4

After setting the parameters in the system components in the organizations ,we need to find the amount of working hours and number of days in a week the organization is working as well as how many number of holidays in the organization, In order to find the devices used Table-3,so that it help as the find the usage of devices able 2: Power adjustments parameters. total energy saved prevention of carbon emitted can observed in Table 4.

CONCLUSION

The main challenges of the current are the global impacts of the environment are due to electronic devices. For developing the software application. This work proposes a new software model where focus is only on energy efficiency and energy consumption sustainability in every activities system. In future research can be conducted on implementing enhanced energy efficient metrics.

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Optimal Robust Design for Wood and Berry Distillation Column Using Multiobjective Genetic Algorithm Tuned Model Predictive Controller

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ABSTRACT

Distillation column is the most common and frequently used process in chemical engineering. Improved control strategy can help reducing the cost and improving the quality of the product. Main concern in distillation column is the purity of output product. An optimal robust design has been implemented for Wood and Berry distillation column, a multivariable system with dead time. To achieve the desire robust response and tracking performance, infinity norm of the sensitivity function $(\|S(jv)\|)_\infty$ and infinity norm of complementary sensitivity function $(\|T(jv)\|)_\infty$ *are minimized simultaneously using multi-objective genetic algorithm (MOGA). By tuning of the Mo*del Predictive controller (MPC) parameters using MOGA, an optimal set of solutions are generated and the ideal solution is selected from the Pareto optimal set using level diagrams. From the simulation results it is clear that MOGA tuned MPC is robust in nature and it also performs the proper tracking of the desired distillation composition and bottom composition in wood and berry system.

KEY WORDS: MODEL PREDICTIVE CONTROL, MULTI-OBJECTIVE GENETIC ALGORITHM, CONTROL HORIZON; PREDICTION HORIZON, ROBUST CONTROL, MULTI INPUT MULTI OUTPUT, WOOD AND BERRY SYSTEM.

INTRODUCTION

Wood and Berry distillation column is widely used in the petrochemical applications. Distillation process is one of the important aspects in process industries, to improve the quality of the process and reduce the cost. Prime aim in distillation column is purity of the liquid/chemical. Quality of the product and profit of the industries are directly dependent on the tuning of the control system.

Distillation process is multi input multi output (MIMO) system with dead time. Due to interaction part in MIMO system, it becomes difficult to design the controller for a system with interaction. It will increase the wastage of the input raw material and also affect the quality of the product. Distillation column generally has a time delay or dead time, which makes the system design more challenging.

Model Predictive Control (MPC) is an optimal control strategy based on the mathematical optimization of the performance index. Moving horizon control (MHC) is one of the well known names of MPC and it is prominent for the control dynamical system eg. Chemical plants, process control, gas pipeline control etc. At each control interval the controller optimizes the performance index of the plant by estimating the future response of the plant and future manipulated variables.

MPC has become one of the best computer controlled algorithm that are currently used in industries, because of the computational technique of MPC that has improved the performance of the process [1], [2], [3], [4], [5]. The main advantage of the MPC is that it gives better response for multi input multi output (MIMO) system with large number of control variables. Generalized MPC for MIMO system using the state space interpretation is proposed by A. Gambier [1]. While tracking, error is minimized over prediction horizon with constraints on the input, states and the output of the system. The settling time required in a system must be less than the prediction horizon, because if it is greater than the prediction horizon the system will have oscillations in the response, for the further change in the input.

R. Shridhar et al. [6] explains the concept of tuning the SISO DMC parameters for unconstraint SISO DMC for the 1st order plus delay time (FOPDT) system of the process dynamics. Here FOPDT model approximation is used for the tuning rules such as Cohen-Coon, Integral time absolute error (ITAE), and integral absolute error (IAE) for PID implementations. MIMO system has been simulated by R. Galindo et al. [7] with uncertainty is explained by Wolfgang Ponweiser et al. [8] and F. Abdollahi et al. [9] develop a new technique based on the worst case minimization.

Andrea Richter et al. [10] explained the tuning parameter of different controllers that are used together in multi-loop control system by optimizing the different single objective functions e.g. ISE, ITSE and ISTSE. The concept of the gain scheduling control strategy for the multivariable MPC is demonstrated by V.R.Ravi et al. [11]. The tuning of the multiple linear MPC for the Two Conical Tank Interacting Level System is done using real coded genetic algorithm (GA). One of the linear MPC controller output is selected as gain scheduling adaptive controller's output based on the current value of the measured process variable. A robust MPC controller design over infinite horizon for the online optimization has been formulated by V. Ghaffari et al [12], by posing it as worst case optimization problem using LMI.

MPC is used for the proper tracking of the reference signal; optimization of the performance indices is solved using the gradient. Based on this gradient, a second order approximation of the economic function is obtained and used in the MPC optimization problem resulting in a convex optimization problem. Recursive feasibility and convergence to the optimal equilibrium point is ensured by D. Limon et al. [13]. In this paper multi-objective genetic algorithm (MOGA) tuned model predictive controller (MPC) is considered for the robust control and proper tracking of top and bottom composition of distillation column of Wood and Berry distillation column. To assure robustness and tracking of the system, the controller design problem is formulated as $\left(\| S(jv) \| \right)_{\infty}$ as first objective and as the second objective of the system.

Mathemetical Modeling of Wood and Berry System: Wood and Berry [14] in 1973 performed a test to find out the mathematical model of distillation column having a diameter of 9 inches and 8 tray column with a condenser and a basket type reboiler. The output composition (Top composition and bottom composition) are controlled by regulating the inputs (Reflex and Steam).

Mass balance equation of the distillation process is given below.

$$MassRate_{in} - MassRate_{out} = MassAccumulated$$

Various components of the distillation column are given below. Condenser and Reflux Drum.

$$\frac{dM_D}{dt} = V_{NT} - (R + D_L + D_V) \tag{1}$$

$$\frac{dM_D X_D}{dt} = V_{NT} Y_{NT} - (R + D_L) X_D - D_V Y_D \tag{2}$$

Top Tray

$$\frac{dM_{NT}}{dt} = R + V_{NT-1} - L_{NT} - V_{NT} \tag{3}$$

$$\frac{dM_{NT} X_{NT}}{dt} = X_D R + V_{NT-1} Y_{NT-1} - X_{NT} L_{NT} - V_{NT} Y_{NT} \tag{4}$$

n^{th} tray

$$\frac{dM_n}{dt} = L_{n+1} - L_n + V_{n-1} - V_n \tag{5}$$

$$\frac{dM_n X_n}{dt} = L_{n+1} X_{n+1} - X_n L_n - V_{n-1} Y_{n-1} - V_n Y_n \tag{6}$$

Feed Tray

$$\frac{dM_{NF}}{dt} = L_{NF+1} - L_{NF} + V_{NF-1} - V_{NF} + F_L \tag{7}$$

$$\frac{dM_{NF} X_{NF}}{dt} = L_{NF+1} X_{NF+1} - X_{NF} L_{NF} - V_{NF-1} Y_{NF-1} - V_{NF} Y_{NF} + F_L Z_L \tag{8}$$

Bottom Tray

$$\frac{dM_1}{dt} = L_2 - L_1 + V_B - V_1 \tag{9}$$

$$\frac{dM_1 X_1}{dt} = L_2 X_2 - L_1 X_1 + V_B Y_B - V_1 Y_1 \tag{10}$$

Reboiler

$$\frac{dM_B}{dt} = L_1 - V_B - B \tag{11}$$

$$\frac{dM_B X_B}{dt} = L_1 X_1 - V_B Y_B - BX_B \tag{12}$$

Condensation Tank

$$\rho A \frac{d(H_T)}{dt} = LT - (L+D) \tag{13}$$

Reboiler Tank

$$\sigma A \frac{d(H_B)}{dt} = L_1 - B \tag{14}$$

Heat Balance equation is given by

$$HeatRate_{in} - HeatRate_{out} = HeatAccumulated$$

Energy balance on n^{th} tray.

$$\frac{M_n C_n d(h_n)}{dt} = H_{n+1}^L L_{n+1} - H_n^L L_n - H_{n-1}^V L_{n-1} - H_n^V L_n \tag{15}$$

Energy balance on reboiler

$$\frac{M_{NT} C_{NT} d(T_{NT})}{dt} = L_{NT} C_{NT} V_{NT-1}(T_{NT-1} - T_{NT}) - H_{NT-1}^V V_{NT-1} - QC \tag{16}$$

All the nomenclature used in wood and berry distillation column with units are specified in Table 1.

Figure 1: Wood & Berry distillation column.
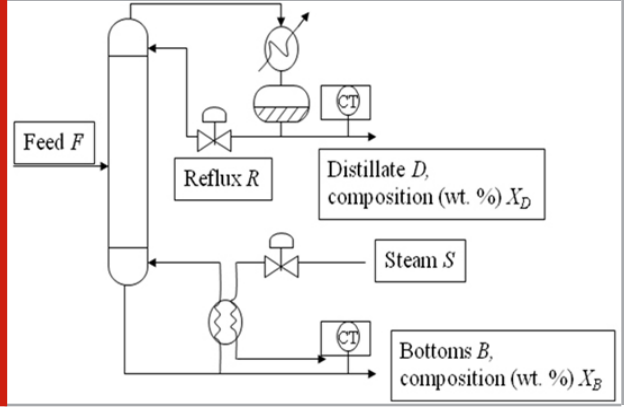
$$\begin{bmatrix} y_1(s) \\ y_2(s) \end{bmatrix} = \begin{bmatrix} \dfrac{12.8e^{-s}}{16.7s+1} & \dfrac{-18.9e^{-3s}}{21s+1} \\ \dfrac{6.6e^{-7s}}{10.9s+1} & \dfrac{-19.4e^{-3s}}{14.4s+1} \end{bmatrix} \begin{bmatrix} u_1(s) \\ u_2(s) \end{bmatrix} \tag{17}$$

where:
y1 = XD = Distillation Composition (%MeOH)
y2 = XB = Bottom Composition (%MeOH)
u1 = R = Reflux flow rate, lb/min.
u2 = S = Reflux flow rate, lb/min.

MPC Formulation: Consider the system has n states, p inputs and q outputs. It is arduous to control each output individually, with no difference in the actual output and desired output in steady state, if number of inputs is less than number of outputs in system. Here design uses the predicted process output (y), which optimizes objective function, J. Measurement noise v(k) is considered in the mathematical formulation of the problem.

$$x_p(k+1) = A_p x_p(k) + B_p u(k) \tag{18}$$

$$y(k) = C_p x_p(k) + v(k) \tag{19}$$

Table 1. Nomenclature and Units		
Symbol	**Name**	**Unit**
R	Rate of the Reflux Flow	Kg per hr
D	Rate of the top product Flow	Kg per hr
V_{NT}	Rate of the vapor Flow	Kg per hr
M	Value of Liquid Holdup	Kg
L_{NT}	Rate of Liquid Flow	Kg per hr
X,Y	Liquid and Vapor weight fraction	-
n	No. of trays	-
F	Rate of Feed Flow	Kg per hr
Z_L	Concentration of Feed Flow Rate	-
B	Rate of Bottom Feed Flow	Kg per hr
P	Liquid Density	Kg per m3
A	Storage tank area	-
H_n	Enthalpy of Liquid on the Tray	Kg per hr
H_n^L	$C_n T_n$	
H_n^V	Enthalpy of Vapor on the Tray	Kg per hr
C_n	Heat Capacity of nth Tray	Kg/hr °C
T_n	Temperature Capacity n^{th} of Tray	°C
QR	Heat Supply to Reboiler	KJ per hr
C_1	Heat Capacity of residual bottom column	KJ/hr °C
QC	Amount of Heat reduced in condensation	KJ per hr
NT	Heat capacity of distilled condensation	Kg/hr °C

Below mentioned depicts the transfer function of the wood and berry distillation column [14].

Figure 2: Flowchart representation of Multiobjectve Genetic Algorithm.
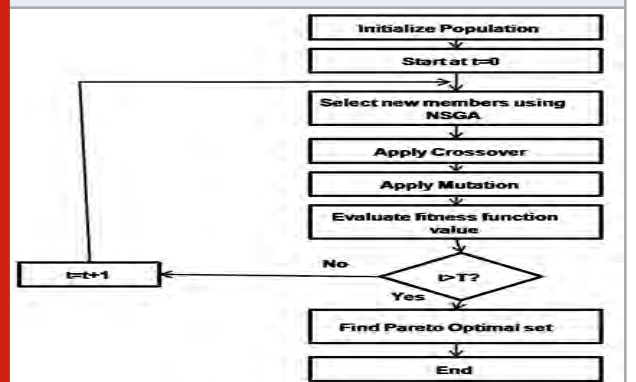
where $x_p(k)$ is the state variable. $v(k)$ is the measurement noise, which is random in nature. where A_p, B_p and C_p are the matrices corresponding to Equation 18 and 19. The tracking cost function which penalizes the increment in the change in control action (Δu) and error (e), which is represented by J.

$$J = \sum_{j=0}^{j=N_p} \| y(k+j|k) - r(k+j|k) \|^2_{Q(j)} + \sum_{i=0}^{i=N_c-1} \| \Delta u(k+i|k) \|^2_{R(i)} \qquad (20)$$

Where

$$e(k+j|k) = r(k+j|k) - y(k+j|k) \qquad (21)$$

$$Y(k) = \begin{bmatrix} y(k) \\ y(k+1|k) \\ . \\ . \\ . \\ y(k+N_p|k) \end{bmatrix}; \quad T(k) = \begin{bmatrix} r(k) \\ r(k+1|k) \\ . \\ . \\ . \\ r(k+N_p|k) \end{bmatrix}; \quad \Delta U(k) = \begin{bmatrix} \Delta u(k|k) \\ \Delta u(k+1|k) \\ . \\ . \\ . \\ \Delta u(k+N_{c-1}|k) \end{bmatrix};$$

$$Q = \begin{bmatrix} Q(0) & 0 & . & . & 0 \\ 0 & Q(1) & . & . & 0 \\ . & . & . & . & . \\ . & . & . & . & . \\ . & . & . & . & . \\ 0 & 0 & . & . & Q(N_p) \end{bmatrix}; \quad R = \begin{bmatrix} R(0) & 0 & . & . & 0 \\ 0 & R(1) & . & . & 0 \\ . & . & . & . & . \\ . & . & . & . & . \\ . & . & . & . & . \\ 0 & 0 & . & . & R(N_c-1) \end{bmatrix};$$

$$Y(k) = \Psi x(k) + \Upsilon u(k-1) + \Theta \Delta U(k) \qquad (22)$$

For the stable matrices Υ, Ψ and Θ. Define

$$\varepsilon(k) = Y(k) - \Psi x(k) - \Upsilon u(k-1) \qquad (23)$$

$$\Psi = \begin{bmatrix} A \\ . \\ . \\ . \\ A^{N_p} \end{bmatrix}; \quad \Theta = \begin{bmatrix} B & . & . & O \\ AB+B & . & . & O \\ . & . & . & . \\ \sum_{i=0}^{N_c-1} A^i B & . & . & B \\ \sum_{i=0}^{N_c} A^i B & . & . & AB+B \\ \sum_{i=0}^{N_p-1} A^i B & . & . & \sum_{i=0}^{N_p-N_c} A^i B \end{bmatrix};$$

$$\Upsilon = \begin{bmatrix} B \\ . \\ . \\ \sum_{i=0}^{N_p-1} A^i B \end{bmatrix}; \quad \Xi = \begin{bmatrix} B_d & O & . & . & O \\ AB_d & B_d & . & . & O \\ . & . & . & . & . \\ A^{N_p-1} B_d & A^{N_p-2} B_d & . & . & B_d \end{bmatrix};$$

Robust Design Criteria: Robust design criteria for a wood and berry system is formulated with the maximum singular value of $\|S(j\omega)\|$ and to achieve the tracking performance of the system maximum singular value of is $\|T(j\omega)\|$ taken as the second objective function that is to be optimized simultaneously.

$$J_S = \| S(jw) \|_\infty$$

$$J_T = | T(jw) |_\infty$$

$$\qquad (24)$$

Optimization of the JS is done to make the system robust from external noise and disturbances and JT is optimized to achieve the desired tracking performance.

Multiobjective Genetic Algorithm: Real world applications are multi-objective in nature and these objectives are conflicting. In single objective and weighted multi-objective optimization, there exists a single solution, whereas in multi-objective, there exist a set of solutions exists. These optimal solutions are the best solution in the search space where no other solution exist that can give better results in the search space with all the objectives are taken into consideration. GA is an efficient optimization technique which is capable to handle multiple objectives simultaneously.

GA is a computational method inspired by evolution. It's based on the Darwin's theory of "survival of the fittest". At first Rechenberg introduces GA. GA is direct method to find the global best solution in the search space during optimization. The main process of GA consists of natural evolution: reproduction, selection and miscellany of the generation. Initially GA selects a set possible solution or individuals or chromosome which is used to create population. The fitness function value of each chromosome from new generation is calculated to identify if it is better than former generation chromosome or not. Process is performed until a global best solution is obtained. Below flowchart depicts the step by step process of GA [15]:

Tuning of MPC using MOGA: Design objectives represented above in equation 24 are optimized using MOGA to find the optimal values of the MPC parameter [Q, R, NC, NP]. Where Q & R are the weights and NC & NP are the control and the prediction horizon respectively. Bounds of the MPC parameters are Upper Bound (UB): [1, 1, 6, 13] and Lower Bound (LB): [0.001, 0,001, 1, 7] respectively. This range is found by evaluating the optimization function number of times. It is clear from the results obtained that optimum value of the MPC parameters lies within lower and the uppers bounds stated above. Determining the range of the controller parameters makes it easier to identify the best solution in minimal time.

Table 2. Parameters of GA	
Description/Parameters	**Value**
Size of the Population	75
Migration Fraction value	0.2
Size of Tournament	2
Value of Crossover	0.8
Number of Generation	800

Best controller parameters obtained from POS using MOGA are [Q, R, Nc, Np] = [0.7365, 0.0648, 4, 17] and best values of the objective function obtained is $\|S(j\omega)\|_\infty = 1$, and $\|T(j\omega)\|_\infty = 1$. Where $\|S(j\omega)\|_\infty$ gives maximum singular value of sensitivity function

and $||T(j\omega)||\infty$ gives maximum singular value of complementary sensitivity function. Maximum singular value of sensitivity function is equal 1, which depicts

robustness of the system, maximum singular value of is equal to 1, which shows proper tracking of the system with no overshoot.

Table 3. Optimum Parameter and Objective Functions obtained for Wood and Berry Distillation Column							
Optimization	Norm	Q	R	Nc	Np	$||S(j\omega)||\infty$	$||T(j\omega)||\infty$
MOGA	1, 2 & ∞-Norm	0.0114	1.6606	3	14	1	1

Table 4. Time Domain Performances for Wood and Berry Distillation Column						
Performances	Input	RT	ST	OS	$||S(j\omega)||\infty$	$||T(j\omega)||\infty$
MOGA (1, 2 & ∞-Norm)	1st	23.12	40.81	0.22	1	1
	2nd	21.45	37.33	0.32	1	1
Q Wang et al. (2000)[16]	1st	3.964	72.24	38.24	2.395	2.45
	2nd	9.48	55.3	23.86	2.174	1.464
Q Wang et al. (1997)[17]	1st	5.192	65.82	26.1	1.909	1.835
	2nd	6.336	61.035	23.99	1.835	1.627
Vu and Lee, 2010 (PI-IMC)[18]	1st	1.48	20.48	15.12	1.666	1.23
	2nd	7.54	24.51	0.53	1.605	1

Table 3 depicts the ideal controller parameters and objective functions obtained by 1, 2 & ∞-Norm of LD, while designing the parameters of the MPC using MOGA. As stated in Table 4, the valves of infinity norm of sensitivity function for 1st & 2nd input of Wood and Berry Distillation Column System designed by MOGA tuned MPC are 1 & 1 respectively, on the other hand $||S(j\omega)||\infty$ value obtained by Q Wang et al. (2000)[16], Q Wang et al. (1997)[17] and Vu and Lee, 2010 (PI-IMC) [18] are 2.395 & 2.174; 1.909 & 1.835; and 1.666 & 1.605 respectively, which shows the value of $||S(j\omega)||\infty$ greater than 1 makes the system less robust in nature. It can be seen form Table 4 that the value of $||S(j\omega)||\infty$ for 1st & 2nd input is improved by 58.25% & 54%, 47.62% & 45.5% and 39.98% & 37.7% in comparison to Q Wang et al. (2000)[16], Q Wang et al. (1997)[17], and Vu and Lee, 2010 (PI-IMC)[18] respectively.

The value of $||T(j\omega)||\infty$ for 1st & 2nd input is 1 & 1 respectively. On the other hand, $||T(j\omega)||\infty$ values for both the inputs obtained by Q Wang et al. (2000)[16], Q Wang et al. (1997)[17] and Vu and Lee, 2010 (PI-IMC)[18] are 2.45 & 1.464; 1.835 & 1.627; and 1.23 & 1 respectively, which shows the value of $||T(j\omega)||\infty$ is greater than 1 that makes the system more vulnerable to noise in comparison to the tuning methods adopted by researcher as it can be seen in the Table 3, that values of the complementary sensitivity function for 1st and 2nd

input are 1 and 1 respectively, which makes the system less vulnerable to noise. It can be seen form Table 4 that the complementary sensitivity for 1st and 2nd input is improved by 59.18% & 31.69%, 45.5% & 38.54% and 18.7% & 0% in comparison to Q Wang et al. (2000)[16], Q Wang et al. (1997)[17], and Vu and Lee, 2010 (PI-IMC) [18] respectively.

So, it can be state that method proposed by researcher for tuning the MPC parameters by MOGA gives the robust stability and better tracking performance with less overshoot in comparison to all other methods. Pareto front of the objective function and controller parameters obtained using MOGA tuned MPC is shown in Fig. 3 and Fig. 4. Fig. 5 & 6 depicts step response and control effort of the closed loop system with MPC parameters obtained in POS using MOGA. Fig. 7 shows the singular value plot of S(jω) and T(jω) for MPC parameters obtained in POS using MOGA.

In this chapter, 1-norm, 2-norm and ∞-norm have been considered for the estimation of the optimal values of the model predictive controller parameters. Level Diagrams for the objective function is shown in Fig. 8, Fig. 10 & Fig. 12 for MOGA tuned MPC using 1-Norm, 2-Norm & ∞-Norm respectively. Level Diagrams for the controller parameters is shown in Fig. 9, Fig. 11 & Fig. 13 for MOGA tuned MPC using 1-Norm, 2-Norm

& ∞-Norm respectively. The best design parameters are chosen by selecting the point with a minimum value of the Y- axis parameter (which is shown by the green square on the level diagrams). As the best MPC parameters obtained using different struct of LD gave

the same model predictive controller parameters. Fig. 14 and Fig. 15 show the step response and control effort of the close loop system with the best MPC parameters obtained using LD technique. Fig. 16 shows the singular value plots of $||S(j\omega)||$ and $||T(j\omega)||$ obtained using best MPC parameters form POS using MOGA.

Figure 3: Pareto front obtained using MOGA tuned MPC.

Figure 4: Controller parameters obtained using MOGA tuned MPC.

Figure 5: Step response of close loop system with MPC parameter obtained in POS using MOGA
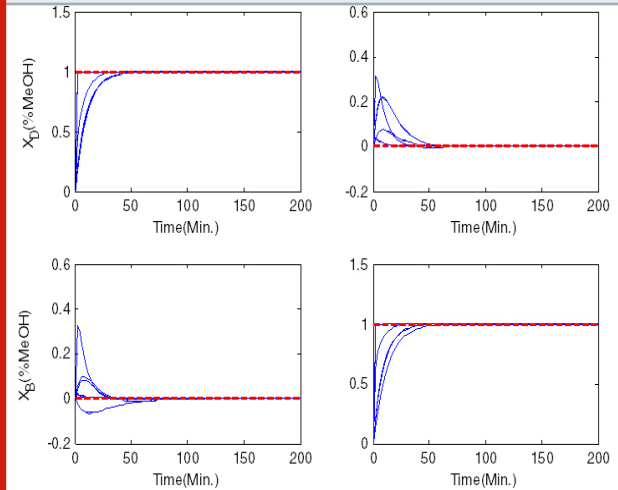
Figure 7: Singular value plot of the $S(j\omega)$ and $T(j\omega)$ for all the MPC parameter obtained in POS using MOGA.

Figure 6: Control Effort of close loop system with all MPC parameter obtained in POS using MOGA.
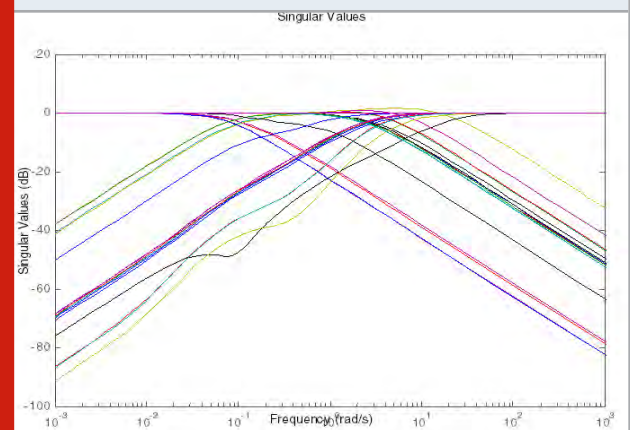
Figure 8: Design objectives obtained for MOGA tuned MPC using the 1-Norm of LD.

65
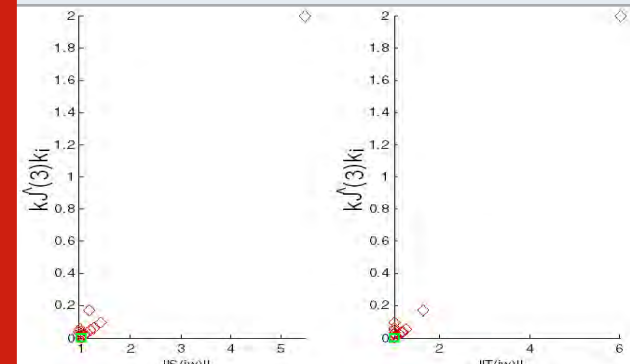
Figure 9: Controller parameters obtained for MOGA tuned MPC using 1-norm of LD.
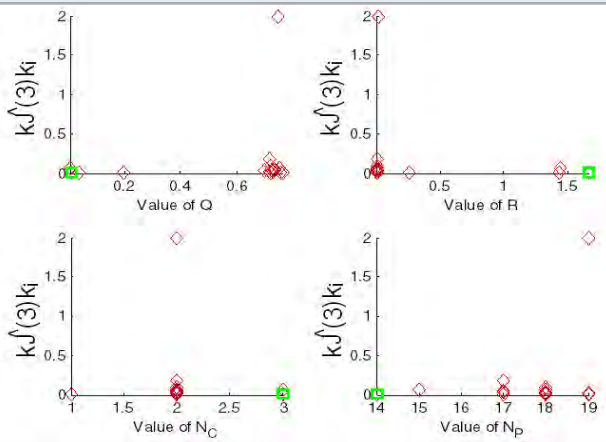
Figure 10: Design objectives obtained for MOGA tuned MPC using the 2-Norm of LD.
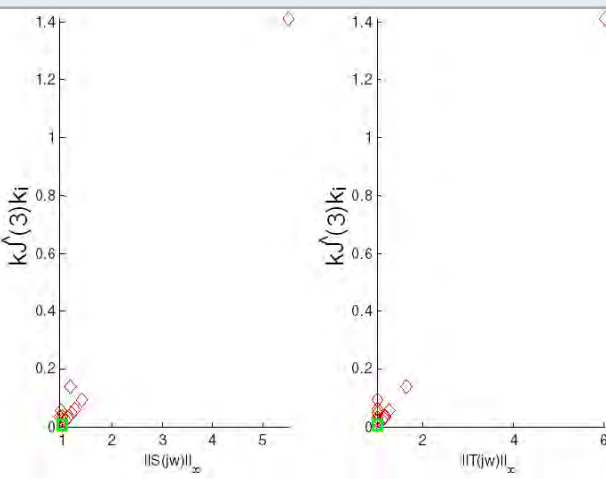
Figure 11: Controller parameters obtained for MOGA tuned MPC using 2-norm of LD.
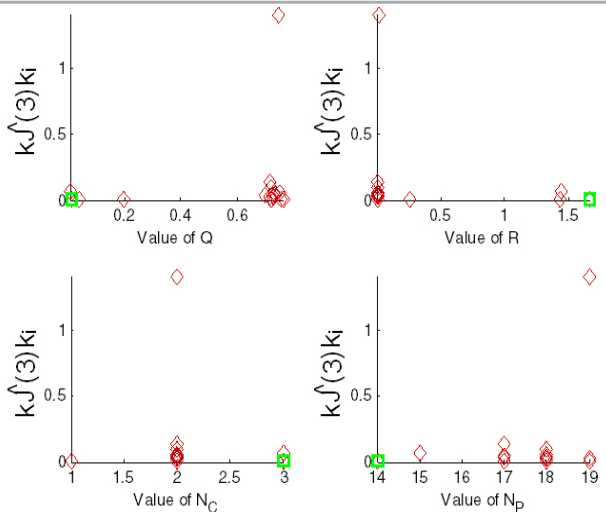
Figure 12: Design objectives obtained for MOGA tuned MPC using the ∞-Norm of LD.
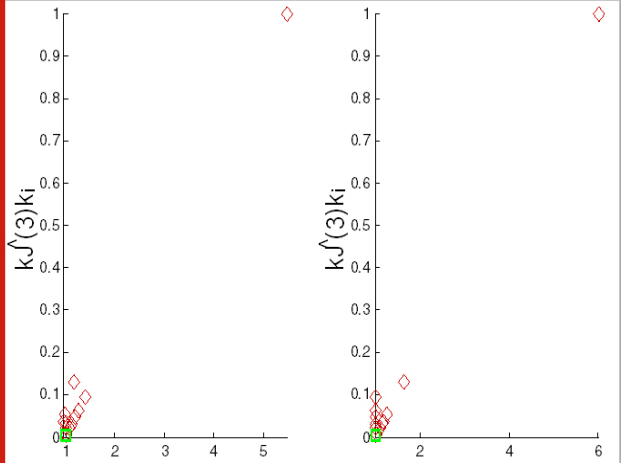
Figure 13: Controller parameters obtained for MOGA tuned MPC using ∞-norm of LD.
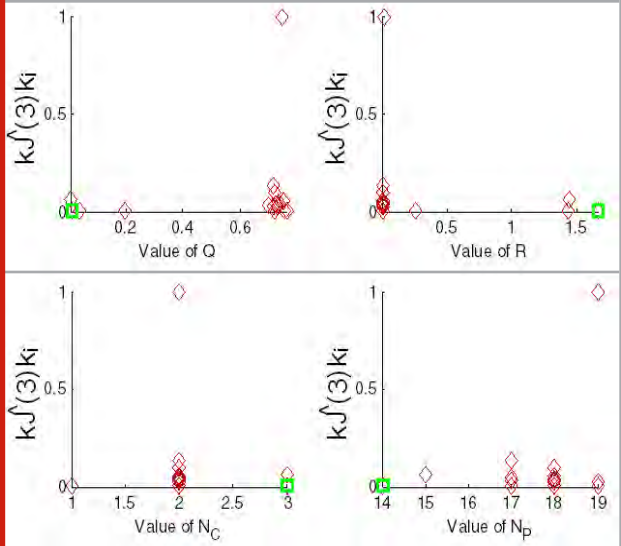
Figure 14: Step response of close loop system with best controller parameter obtained using MOGA.
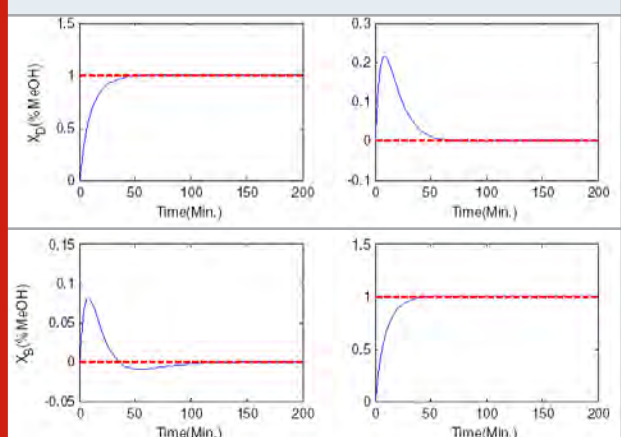
Figure 15: Control Effort of close loop system with best controller parameter obtained using MOGA.
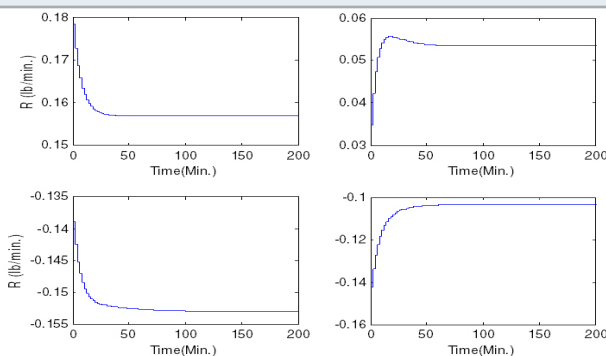
Figure 16: Singular value plot of the S(jω) and T(jω) for best controller parameter obtained in POS using MOGA.
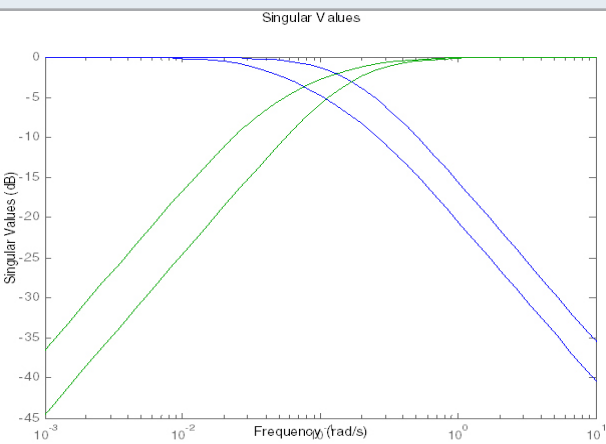
Simulation Results: Paper delineates the optimum tuning of MPC parameters using MOGA for robust wood and berry system. Fig. 14 and Fig. 15 depict best step response and control effort of the system with MOGA tuned MPC. Table 4 states all the solution obtained from MOGA tuned MPC for wood and berry distillation column is robust in nature and give better transient response in terms of overshoot in comparison to other researcher. Figure 3 and 4 shows the pareto set and pareto front obtained using level diagram analysis, where 1, 2 & ∞-norm of the controller parameters and objective functions are used to get the optimum solution from the set of solution obtained using MOGA tuned MPC for wood and berry distillation column.

CONCLUSION

Almost all the engineering problem are multi-objectives in nature. In the real world applications noise and disturbances make the system strenuous to achieve the required design requirements. So it is required to make sure that the system is robust in nature. This paper explores the optimal tuning of the MPC parameters using MOGA to make wood and berry distillation column robust as well as it satisfy the desired tracking performances. Here the optimization problem is formulated as minimization of maximum singular value of $||S(j\omega)||$ and maximum singular value of $||T(j\omega)||$ for achieving the desired robustness and tracking performances of the top and bottom composition of wood and berry distillation column. From the results obtained in this paper, wood and berry distillation column offers robustness with proper tracking and better transient response in comparison to existing work on the same system. This makes sure the product quality and safety of the process.

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Description of Nature in Bana's Kadambari

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ABSTRACT

Bana's Kadambari is a fantastic fairytale where the great storyteller Bana creates vibrant characters. He is the writer who reveals his own mind through his characters. He expresses his opinions and convictions through them which is not common among all the Sanskrit writers. He had an amazingly modern, humane, and sensitive mind especially which is special for the seventh century India in which he lived. Like modern writers he uses the dramatic techniques of irony, his characters use the words whose real significance is not observed by the speaker themselves. Kadambari as known to all of us is a romantic thriller played out in the magical regions between this world and the other in which the divine and the earthly blend in idyllic splendor. But Kadambari is not just that. There are multiple aspects in which Kadambari can be studied. It has a wonderful description of Nature, flora, and fauna of that era. Leaving apart the storyline in Kadambari, this article mainly focuses on description of nature in Bana's Kadambari. Bana has a great skill in describing the natural phenomena like sunrise and sunset, forests and rivers, mountains and oceans etc. This article focuses on the descriptions of Vindhya forest, maharishi Agastya's Ashrama, Pampa Sarovara, Shalmali tree, Ujjayini city, Kailasa foothills, Acchoda Lake, the lonely Shrine of Shulapani and the wonderful land of Hemakuta, finally summarizing and concluding the specialty of Bana's style of writing and his unique way of describing nature.

KEY WORDS: KADAMBARI, FOCUSES, SHRINE OF SHULAPANI.

INTRODUCTION

Subandhu, Bana and Dandi are the three important classical prose writers in classical Sanskrit. All the three have written almost the same kind of prose which are ornate and complicated in different degrees. Banabhatta has written Kadambari and Harshacharita. Banabhatta passed away before completing his work Kadambari. His son Bhushanabhatta completed the Utttarardha of it. He compares himself to a farmer's son who merely gathers fruits of his father's work. Bana's Kadambari is near perfect from all the aspects and it has no comparison. There is a famous saying.

Kaadambari rasaagnyanam aaharopi na rochate: It explains the effect of reading Bana's Kadambari. People do not enjoy any food while they are involved in reading Bana's Kadambari. The word Kadambari has two meanings. One, an alcoholic beverage and the other the piece of literary work written by Bana. This is the specialty of Bana. Throughout his work Bana has used the unique literary style of pun. Sanskrit words usually have more than one meaning which makes it highly suitable for this unique literary style of pun. King Shudraka received the parrot named "Vaishampayana" as a gift from a Chandala Women. That bird raised its right leg in salute and recited a verse in the praise of him. The bird could speak so well with pure, distinct, and grammatically chaste turns of phrases so elegantly put together.

It conducted itself like a refined human being with the knowledge of court etiquette. Surprised by this, the king

wanted to know where and how the parrot Vaishampayana was born, details regarding its parents, how it got the name and how it acquired Vedic knowledge, and how chandalas put it in the cage and ended up in his palace. The parrot Vaishampayana replied that it is long story and explains it.

Objective: They main objective of this article is to describe the description of nature in Bana's Kadambari. Bana has beautifully described the special species of flora and fauna in Vindhya forest, Agastyashrama, foothills of Kailasa, Acchoda lake and many other regions around in his special work Kadambari. Description is so marvelous that when people start reading Bana's Kadambari, they even forget about food and hunger.

Description of Vindhya forest: Bana in his Kadambari has used his picturesque unique style and through Vaishampayana described the timberland of Vindhya, Sage Agastya's hermitage, Shalmali or Silk cotton tree, description of forest by Shabara army, the lake Pampa and so on. Bana describes Vindhya forest as the girdle of the earth. He describes that trees in the forest would have grown tall mainly because of the streaming rut fluid of the wild Elephants which roam around in the forest. He describes the forests with its khadgas, the restless rhinos and the Rakta Chandana trees is like Katyayani, the sandalwood paste smeared goddess wielding her sword or khadga. (Banabhatta:107, 1982g) Vaishampayana mentions that the forest with rikshas, the bears and deers mimics the moon and the moon too carries the mark of the deer and the rikshas, the stars surrounded by it. (Banabhatta:107, 1982f).

The author compares forest with the Lanka of Ravana. He explains that, similar to the tall shala trees teaming with monkeys in Lanka, Vindhya parvata also has the long shala trees, tall mansions over run by the monkeys of Rama' s army. Sanskrit language has many words which has more than one meaning which makes it highly suitable for pun. In the above examples comparisons are made on the strength of certain keywords with more than one meaning. For example, the word "khadgas" means 'rhinoceros' as well as 'sword'. Similarly, "riksha" means bear as well as star and "shala" is the name of a tree as well as means 'mansion'.

The author describes that, the forest appears delirious with the palm trees or the "tala" the sound of rustling violent wind "vayuvega" which appears like wild sorrow filled hand clapping or "tala" of a widow filled with grief and wild behavior losing control of her feelings, vayuvega (unmada vega). In other place it seems to be in mourning, where Palm trees have lost all their fronds, the talapatras in the strong wind vayuvega, seems like widow shorn of her ear ornaments, the talapatras. (Banabhatta: 109, 1982e). Here Bana has compared the palm trees which has lost its leaves due to rustling wind, with sorrow filled wild hand clapping of a widow who has lost control of her feelings due to her intolerable sorrow and shorn off her ear rings.

Description of Agastyashrama: Sage Agastya lived in the Dandaka forest on these Vindhya ranges and his hermitage was famed as "the birthplace of dharma" throughout the world. Sage Agastya once drank up the waters of all the oceans based on Indra's request. He is the only one who could control the erring Vindhya Mountain which was spreading across the sky obstructing the movement of Sun's Chariot. Agastya was so powerful that, he digested the demon Vatapi by the fire in his stomach. The author gives a wonderful description of the Sage Agastya's hermitage. He explains that, Agastya's hermitage was beautiful with trees planted and nurtured by his wife Lopamudra, as her own children. All round the edges of hermitage their used to be dark and shady parrot green plantain groves.

The river Godavari would round the hermitage in a thin single stream. The author compares the river Godavari to a widow in mourning (with all her hair woven into a single plait) with an intent only on reaching her dead husband to the ocean whose waters have already been swallowed by the sage Agastya.(Banabhatta:113, 1982a) The author describes that, long time ago Rama lived happily with his wife Sita in the hut put up by Lakshmana in a place called Panchavati to serve the sage Agastya. He describes that Panchavati now remains deserted. Even though ascetics of the ancient times have gone away, the rows of white pigeons sitting quietly amidst dark branches creates an illusion that the trees are columns of smoke coming up from sacrificial altars.(Banabhatta:113, 1982a) He compares the glossy red young leaves of the creeper with soft red palms of Sita while she was gathering flowers for the rituals.(Banabhatta:114, 1982a) He wonders if the blood of rakshasas killed by Rama since soaked deep in the roots have even now stained the fresh grown leaves.(Banabhatta:114, 1982a).

Like this Bana has given wonderful examples to describe Agastyashrama. If we look at the above given examples in two of the examples Bana has compared palm tree without leaves to a widow with no ear ornament and again Godavari river which is flowing around the Agastyashrama to widow's circularly tied hairdo. The question which comes to our mind is why he considered widow for describing these. This also gives us a hint of social and cultural state of widows during that period.

Description of Pampa Sarovara: The author describes that, near Agastya's hermitage there is an astonishingly long Lake called Pampa. Prajapati and Varuna were angry with the Sage Agastya for drinking away all the waters of the ocean, for which Prajapati and Varuna were the overlord. Hence they created Pampa Sarovara. The author questions if they created this ocean like huge lake because of anger on Sage Agastya, that too very close to the hermitage, just to taunt him?.

He comments that the Pampa Lake is never placid, but because of Shabara women who bounce their well-rounded breasts while plunging into the lake it gets disturbed. The countless creatures and myriad diving birds agitate the waters and the sound of the ripples

is heard constantly and the windy rain tosses up the waves and creates cold spays. Blue and white lilies and lotuses grow in the lake as forest. The author describes that blooming lotuses covered with the droplets of honey resembles the eyes in the peacock feathers. (Banabhatta: 117, 1982d).

The humming bees shadows the blooming lotuses. Female Swans turn coquettish and make merry by drinking the nectar in the lotuses. Watersport loving nymphs descend in the lake for bathing. Flowers in the trees add their fragrance to water. We can hear the sound of ascetics filling water to their Kamandalus. White Swans swim in the midst of recently opened white lilies whose sound could be inferred only through their cackle. Pollen dust of Ketaki flowers cover the sandy shores of the lake towards the edges of the beach. The author further describes the hermits standing and doing penance in water, soft fresh grass around the water which remains moist by the water sprayed by leaping fishes and wings of the water birds, the peacocks dancing in their bowers, flowering bushes which fill the air with their fragrance as though goddess of nature is scenting the air with her own breaths, forest elephants come ceaselessly to drink the water from Pampa as though masses of clouds come down to drink water from the lake in the illusion that it is ocean. He finally mentions that beauty of the pampa lake is unfathomable, seemingly unbounded and certainly incomparable.

Description of Shalmali tree: Bana describes a huge ancient Shalmali tree or Silk Cotton tree (Bombax Ceiba) on the western shores of Pampa lake close to the rows of grayish white palms which Rama had pierced through with a single charging arrow. That Shalmali tree had a great old python wound to its roots permanently as it if it was a bank to hold the water permanently. The tree had high branches spread far and wide in the sky as if seeking to measure the extent of horizon. The Author has compared it with the Shiva's flying hair when he performs his cosmic dance with his thousand hands all stretched out. He describes that the tall tree was merely clinging to the shoulders of Vayu with its outstretched branches in the fear of losing balance, the creepers twined like old age tendons, thorns like old age spots, the rain clouds wetted the new green leaves, but the clouds had never seen the top of the tree as it was tall and peek reached Indra's fabled garden. Its top branches were filled with bunches of silk cotton, which looked like foam collected in the mouths of sun's horses exhausted by the trek pulling their lords chariots.(Banabhatta:123, 1982c).

The Shalmali tree stood proudly on the banks of Pampa as a friend of Vindhyas, lord of Dhandaka forests and a prince among trees. There were countless nests in the edges and junctions of the branches, inside the hollows of ancient bark and amidst the foliage. Innumerous families of parrots and other birds coming from different regions stayed here securely with freedom from all the fear of danger because of its great height from the ground. While the birds stayed in their own nests during the night

as soon as the sun shines, they started flying away in various formations in search of food forming dark streaks across the sky as though Balarama had scarred up the dark waters of many streamed Yamuna with the tip of his ploughshare. Like how the blooming dark lilies in Ganga were plucked and cast down by Indra's Elephant, flying birds would look like moving emerald floor with series of mass patches in the sky lake.

The birds would fly back to their nests in this Shalmali tree in the evening to feed the young ones left behind. Brimming with overwhelming love they would take the young ones protectively under their wings and spend the three yamas of the night. It was in the old hollow of this Shalmali tree the parrot Vyshampayana, who is telling his birth story to King Shudraka was born.

Description of Ujjayini City in the kingdom of Avanti: The author describes that the City named Ujjayini had a surpassing beauty and was more splendid than the city of the gods and was like an ornament to all the three worlds. Lord Mahadeva is the presiding deity of Ujjayini. He created this city as yet another earth for his very special abode. Hence the oceans surrounded the city in the form of a deep moat believing it to be the second earth. The whitewashed ramparts that ring Ujjayini looked like Mount Kailasa. The Market streets of Ujjayini were wealth of merchandise-counches, pearls, emeralds and corals. Fine sand looked like gold dust everywhere. There were many art galleries in the city decorated with paintings of devas, asuras, siddhas, Gandharvas and Vidhyadharas.

The author questions if these were really picture gallaries or they were aerial vehicles which had come down from divinities to watch the lovely women gathered at the never ceasing festivities of the city. Magnificent temples in the city Squares looked like Mandara ranges splashed with the milk of the milky oceans while being churned. The golden dooms and the white flying flags looked like the streams of the celestial Ganga. The city had shady green woods with the wells with whitewashed platforms to water the trees. Flying pollens from the Ketaki bushes made the country side appear dusty. The worship of Kama, the god of love goes on in this city as one hears auspicious ringing of the bells. Every house hoisted a flag with fish emblem, the love god's flag with a pole made of wood of the Bakula tree. The innumerable fountains in Ujjayini rumbled like deep sounds of muted Mrudangam.

Water sprays refract the rays of the sun and form rainbows. Peacocks open up their features in an arc and dance in abandon in the rainy atmosphere. There are countless lakes in the city with abundance of lilies, the blue ones in periphery and the white ones in the center so beautiful the one could gaze them forever. River Shipra flows around Ujjayini rising her huge waves possibly in a bid to wash the skies above as though knitting her wave eyebrows in violent jealousy of Ganga seated on the crown of Shiva. The city is the home of men of brilliance and sophistication whose fame is known to

all the three worlds. Even though people are wealthy, they never flaunt their wealth and unbiased in all their dealings and are like living Smritis. They conduct Sabhas where the learned people meet and discuss the affairs of the city. They make gardens, build temples, bridges and water fountains. It was in this remarkable city of Ujjayini, there ruled the king Tarapida who is the father of Vyshampayana, the parrot who tells its previous story to the king Shudraka.

Description of foothills of Kailasa: The king Tarapida's son the king Chandrapida has once came out for the hunt and missed his troop while following the Kinnara pair. He had almost reached the foothills of the Kailasa. Bana describes the magnificent beauty of foothills of Kailasa. The author describes that it was densely wooded with Sarala, Sala and Sallakki trees which were so tall that one had to look up to see their tops which were circular like Umbrella and were of highly medicinal value. Ground was covered with Yellowish Shingles, grass and creepers were sparse due to rocky terrain Red arsenic dust was in the air making everything tawny. The scattered blossoms of the pashanabhangini had made curved tattoo like designs on the rocky surfaces. The rocks had become sticky because of the gums oozing from the gum trees.

Stones had become slippery because of the bitumen leaking from the peak. The chisel hoops of the horses had pounded yellow orpiment which is a mineral consisting of arsenic trisulfide formerly used as dye and artists pigments. There was also gold dust due to gold having been dug out of the ground by rats. Foot hills of Kailasa had pungent Sulphur smell and was dense with cane and Bamboo groves. There were other thick groves of trees to the north east of the Kailasa peak. Cool moist breeze bearing the sweet smell of pollen wafted out of these groves and embraced Chandrapida like shower of Sandalwood water. The distant calls of the swans excited with nectar of lotus attracted Chandrapida to enter the grove in the middle of which was the most beautiful Acchoda lake which he had ever seen.

Description of Acchoda Lake: Bana excellently describes the scenic beauty of Acchoda Lake. He describes that, the lake was like gem mirror of the goddess Lakshmi or the crystal floor chamber of the goddess of the earth. It was as though the skies themselves came down into the pristine waters of this lake. The author questions if the Kailasa had melted or the Himalayas themselves? Or all the white clouds of autumn come together to form the water of this lake? Or could it be the mirror mansion of the god Varuna? Or had the moonlight taken this watery form? Or it must be the clear mind of the ascetics or their chaste qualities of the virtuous that had transformed into water or else how could the water be so pure?.

The water was so transparent that one could see right down to the bottom so clearly that they would get doubt if there was any water or not. It was as though Indra was wielding thousand bows to protect everything around the lake. The lake was very deep and the reflection of tamala forest was clearly visible in water. It was as though the

gates of the patala, the nether world was right deep down the lake.

Bana describes that the great Mahadeva himself must have come down from the neighboring Kailasa hundreds of times to bathe in the lake, as he plunged into waters repeatedly, the crescent moon on his head would have oozed nectar competing with the lustre that flowed from the water washed cheeks of Parvathi and the left side of Mahadeva and mixed with the waters of the lake. Brahma might have filled his Kamandalus by the water of this lake and hence purified the water in the process. The Balakilyas would come in group to this lake to perform their, morning, noon and afternoon worship. Many times the seven sages have bathed here which has sanctified the water, as did the women of the siddha clad in the bark of the Parijata tree.

At the sight of this beautiful lake, Chandrapida's tiredness went away and he thought his failure to capture the horse faced Kinnara pair is compensated by the sight of this beautiful lake and his eyes attained their highest reward in their quest for beauty as he has seen ultimate manifestation of beauty. Brahma seems to have created amrita again after creating this late. Umapati will not leave Kailasa mainly because of the splendor of this lake and it is surprising that Lord Vishnu still seek to satisfy his craving for water by lying in the middle of the salty ocean disregarding this lake. The author finally describes that water delights all the senses like Amrita, it gladden the eye by its clarity, coolness comforts the sense of touch, the fragrance of lotuses gratifies the sense of smell, the sweetness of the waters satisfies the sense of taste, the calling of swans thrills the ears and thus this place satisfies all the sense organs.

Description of the lonely Shrine of Shulapani: After enjoying the breeze of Acchoda lake Chandrapida rode towards the western side of the lake that shone with a sort of white lusture like rays of the moon. The place was suitably named Chandraprabha. On the western shores of the lake he saw a lonely Shrine of Shulapani. It was a 'siddhayatna', a shrine where one could attain the fulfilment of one's desire through penance. The spot was surrounded on all the sides with greenery. The charmingly melodious call of Harita bird resonated everywhere. Cuckoos lived there happily by eating tender shoots of mango tree as much as needed Honey bees buzzed around the opening buds of the mango trees. Bhringaraja birds were crushing the full grown hardened buds with their claws.

Chakora birds pecked at the fresh pepper with the tip of their beaks. The Chataka birds drenched in the yellow pollen dust of the Champaka were pecking fruits of the pippala trees. The sparrows had hatched their young ones in their nests built on pomegranate bushes. The beating of wings of the young pigeons were creating a shower of flowers. The sarikas smeared with pollen dust were on the top of the trees. The ground was full of fruit bits minced by beaks and claws of thousands of parrots. The plantain leaves waved gently in air, the coconut trees

were bent as they were laden with coconuts. There were arecanut trees with slender fronds and many Karpura and agaru trees. As soon as Chandrapida entered the shrine, wind blew and he was completely covered with pollen dust of Ketaki as though someone smeared Vibuthi on him before letting him enter the presence of Mahadeva. Inside he saw the four faced idol of Triambaka, the lord of all creation worshipped in all the three worlds fashioned out of white marble. It was where he saw a strangely beautiful women Mahashveta sitting in the yogic posture towards the southern side of the idol.

Description of palace of Gandharva King on Hemakuta:
Chandrapida moves through Hemakuta parvata along with Mahashveta to meet Kadambari as per Mahasveta's request. The author takes this opportunity to describe the beauty of Hemakuta, especially the palace of Ghandarva king where Kadambari lived. While walking towards Kadambari's apartment Chandrapida observes gardens on both the sides of the path. He describes that the path was sandy due to the pollen dust falling from the blooms in the garden. Koels would peck the mango fruits which seemed like mango juice rain on the path. The path is compared to an island of gold with the blooms of the champak flowers on the path. Bees hovering over the flowers made the path appear like dense forest of dark Ashoka trees.

CONCLUSION

Description of Vindhya forest, Agastyashrama, Shalmali tree, Pampa Sarovara, Acchoda lake, city of Ujjayini, and the lonely Shrine of Shulapani are just samples of description of nature in Bana's Kadambari. Like this we can find various descriptions of nature throughout Kadambari in multiple circumstances. We can get a good glimpse of rich flora and fauna of that era. Many of those species are rarely found or almost extinct these days. Blue Jambu fruit juice, pomegranate juice, myrobalans (Amratakri phala), tender leaves of Tamala trees, Ketaki and Karira plants, Kesara trees, arecanut trees, betel leaf creepers, cardamom creepers, Bilva and asvatha trees, Durva grasss, Shala trees, chira and Kusha grass, fibrous roots, Kusha grass, parrot green plantain trees, lotus like Kumuda, Kuvalaya , Kalhara, Saugandhika, tala trees, Shalmali trees, Kalpavruksha, Karpura and agaru trees,

Kutaja,, Knda and Sinduvara flowers are examples of rich flora and founa of that era. Most of the plants and trees described above were highly of medicinal values. It shows the richness in flora and fauna during that era. Bana's special literary style of Pun makes Kadambari even more interesting. The examples used by Bana in comparison of nature are so interesting that there is no other reason for not to accept "Kaadambari rasaagnyanam aaharopi na rochate".

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DIC: Dataset on Indian Cows for Animal Classification and Detection

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ABSTRACT

In this article we present a new dataset on Indian Cows. As per our knowledge, No such dataset is available for general use. The primary motivation for this work is to enable development of novel artificial intelligence algorithms to solve some of the important research problems for Indian animals, such as cows. We present the dataset of 815 images of cows of Indian breed. The dataset is built by collecting images which are freely available over the internet. We hope this dataset will help researchers to build novel deep learning algorithms such as detecting and classifying Indian cows.

KEY WORDS: INDIAN COWS, FARM ANIMALS, DATASET, CLASSIFICATION, OBJECT DETECTION.

INTRODUCTION

In recent years Convolutional Neural Networks (CNN) have become the state of art in image classification and object detection [13]. In this particular approach the training of neural network is done on a large dataset of images to solve several different research problems such as object detection and classification [2]. The dataset has an important role to develop the CNN model for object classification. It is used to feed the information about the specific object into the model. With this process the model can predict the category of the object. The data is generally divided into different groups called classes.

The process of feeding information about the objects into the model is called training the model. Training a model on such large datasets makes it capable to identify different patterns present in the images and learn different categories of objects. In general, there are three major categories of datasets, Image Datasets [14], Audio Dataset [7] and Natural Language Processing dataset [18]. For training a CNN model for object classification, we need image dataset in which large number of images are collected for different object categories. These images are grouped together as per respective classes; i.e. particular class have the images of objects belonging to only that particular class.

There are datasets available today for object detection and classification like, MNIST, CIFAR-10, CIFAR-100, PASCAL VOC, ImageNet, MS COCO, etc. For animal classification there are several datasets available with different animal classes including wild and farm sector animals. For the farm sector animals like cow, there are various datasets available, however, these datasets primarily have images of foreign cow breeds. These datasets, in general, are not much helpful for analyzing Indian cows. One may train

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a model to identify Indian cows using these datasets, however, the accuracy of such model will be very poor as Indian cows are quite different in physical appearance as per Fig 1. So the primary motivation for preparing a dataset of Indian cows is to have a dataset which can enable training of CNN models to detect Indian cows with good accuracy. With this dataset researchers will be able to develop novel techniques using CNNs for the analysis of Indian cows. The overall article has arranged as follows. In next section we review relevant literature, in Section 3 we provide details of proposed dataset and finally, in Section 4 we conclude the article.

Related Work: In this topic we review recent literatures of object detection and classification using typical deep learning datasets. CNN models are trained on large collection of image datasets. The model is required to learn meaningful features from these training images. Once the model is trained it can make a use of these features to recognize objects in the given image and can also perform several additional tasks such as object segmentation. MNIST [11], PASCAL VOC [14], ImageNet, MS COCO are some of the standard image datasets which are freely available to use. MNIST is the dataset of 70,000 handwritten digits from 0-9 forming 10 classes. The training and testing set of this dataset has 60,000 and 10,000 images respectively. These images have been used for developing handwritten character recognition [3].

In the year 2012, the PASCAL VOC dataset was proposed with total 11,530 images included with 27,450 objects annotation and total 6,929 objects are segmented. This dataset comprises 20 classes of different objects, like person, bird, cat, cow etc [10]. In ImageNet dataset objects are categorized as per the WordNet hierarchy. Each term in WordNet is specified by many words or phrases, called as synset. ImageNet combines 21,841 synsets of WordNet. The ImageNet dataset built using of 14,197,122 annotated images structured by the semantic hierarchical structure of WordNet [16]. The MS COCO dataset has 91 common object classes. 5,000 plus objects are labeled in 82 classes out of 91 classes, as a whole the dataset comprises 2,500,000 labeled objects from 328,000 images [19].

In the previous years, some work has been done on wild animal classification using CNN [15, 4]. Along with wild animal classification, the deep learning techniques have also been applied on farm sector animals like cow on re-identification problem [12]. The datasets like PASCAL VOC, ImageNet, MS COCO, etc. have multiple classes of animals including class for cow which has multiple images of the cow breed. In Fig. 2 we show sample cow images from these datasets. One may note that these animals are significantly different than Indian cows in physical appearance.

Most of the images in these datasets for this particular class are of the foreign breeds which are not suitable for analyzing Indian cows. The trained model using these datasets will have poor accuracy for classifying Indian cows as both Indian and foreign cows are different in

physical shape and size. Hence in this article we introduce novel dataset which consists of cows from only Indian breed, which will help improve the accuracy of CNN models to detect and classify Indian Cows.

Figure 1: The figure above shows cows from different breeds in India and foreign regions. The left image of the figure we show cows from different breeds found in other countries. The right part we show cows from different breeds from India. From this figure one can notice that Indian cows are significantly different in physical appearance than cows from foreign breed.

Figure 2: Figure above show few sample images corresponding to class cow from PASCAL VOC dataset. It should be noted that cows from India breeds are not present in many of the popular image datasets such as this one.

Figure 3: We show sample images found over the internet for preparing the dataset. The images appear in different shape, size and resolution which requires further processing.

Proposed Dataset: In this part of the article we provide details of the proposed dataset. In order to prepare our dataset on Indian cows, we resorted to the Internet as our primary source for data collection. We collected several images from the Internet. In general, these images vary in resolution and external body pattern (shape and size)

of the animal shown in the image. We show in Fig. 3 typical raw images collected from the internet. We crop the images when there are other objects present in the image so that the primary animal in the image is the cow. We further resize all the images to 600x600 pixel resolution. The final version of the dataset contains 815 images of Indian cows and calves. Our dataset contains total of 1,114 animals annotated in 815 images. We show in Fig. 4 some of the processed images showing diversity in the proposed dataset.

Figure 4: We show few sample images from our dataset after processing. We crop these images and resize them to 600x600 pixel resolution.

Figure 5: Figure above shows sample images of cows and calves with different colors.
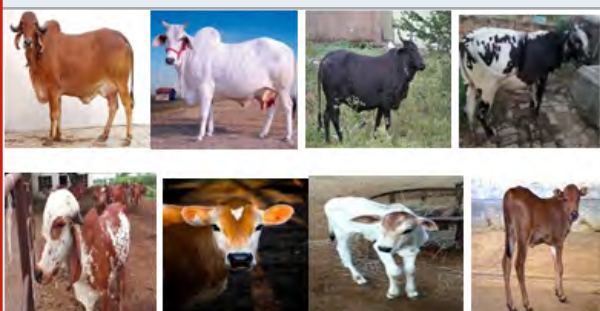
While preparing the dataset we make sure that our dataset has animal diversity. The animals in the dataset have different physical characteristics which makes this dataset truly versatile. In the present work following cow breeds have used to make the dataset: Gir, Red Sindhi, Rathi, Tharparkar, Hariana, Kankrej, Red Kandhari, Nimari, Malvi, Khillari cattle, Amritmahal, Hallikar, Kangayam, Baraguru, Kenkatha, Bachaur, Siri, Kherigarh. The cows in the dataset have different colors like, some cows have single color on complete body like, white, black, brown, red, some cows have different color patches like chocolate-brown, white with dark red, while some animals are pale red, reddish dun, grey-white, dark-grey in color, some of them are having different color marking like, brown color with red marking, black color with white marking etc.

Fig. 5 shows these color differences. Further, the animals also have different sizes and shapes of the horns such as backward curving, lyre shaped, some are peculiarly curved which gives appearance to the horn like half-

moon. Fig. 6 shows sample images of cows having different types of horns. The position of the animals in the images are different like front facing, side facing, few images have only the face of the animal and while few have full animal visible in the image. The bifurcation is given in the Table 1. The sample images of animals' position are shown in Fig. 7 and Fig. 8. We use the format of PASCAL VOC dataset for annotation while preparing this dataset. The format of PASCAL VOC utilizes XML file of each image to store the information of all the object annotated in the image. In Fig 9 we show typical XML code generated from image.

Figure 6: Above Sample images show cows with different shapes and sizes of horns.
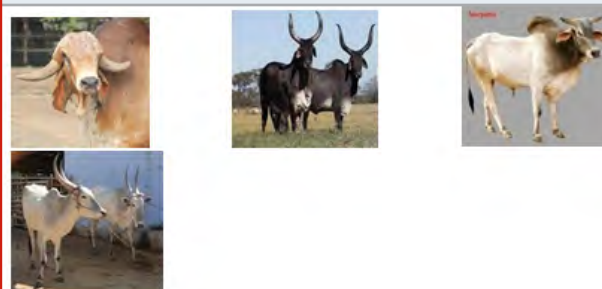
Table 1. Table shows animals' Position bifurcation in the dataset.

Animals' position bifurcation in the dataset				
Animal	Only face	Front facing	Side facing	Full body	Total
Cow	184	138	253	217	792
Calf	68	73	83	98	322
					1114

Figure 7: Sample images of cows with different positions used in the dataset.
Image (a) - Front facing cow image
Image (b) - Front facing cow image
Image (c) - Side facing cow image
Image (d) - Full body cow image

(a)   (b)   (c)   (d)
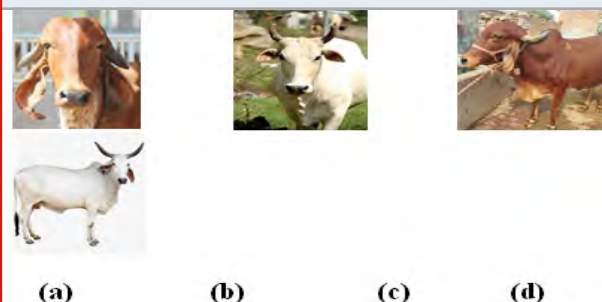
Figure 8: Sample images of calves with different positions used in the dataset.
Image (a) - Front facing calf image
Image (b) - Front facing calf image
Image (c) - Side facing calf image
Image (d) - Full body calf image

(a)   (b)   (c)   (d)

Figure 9: The figure shows typical XML code generated from LableImg tool.

We have used LabelImg tool for annotating an object in the image and generating XML code for images. The LabelImg, graphical image annotation tool, coded in Python which uses a popular C++ framework named Qt for writing GUI applications for graphical interface. It is very simple to use and saves the annotation in XML file of PASCAL VOC format. This tool allows us to draw bounding boxes around objects. The coordinates of bounding box are stored in the corresponding XML file. The XML file also contains information related to image file like, path of the image, class or label for each visual box etc. Fig. 10 shows user interface of LabelImg tool.

General Training Guidelines: In general, training state of the art model in deep learning requires huge amount of training data in the form of large dataset. When number of images available for training are limited the model may overfit the training data and will fail to generalize well on test data. This is a popular problem and studied quite well in the literatures [5]. Since the size of our dataset is not that big in comparison to many popular datasets, a powerful model like VGG [9], InceptionNet [8] and ResNet [6] may overfit the training data. However,

one can mitigate this issue with the help of techniques of transfer learning [17].The model learns how the meaningful features can be extracted from the image by training the model with existing datasets. After the successful training, the model can be fine-tuned on the proposed dataset. This particular approach has been known to avoid overfitting issues and help improve the accuracy for the test data when training dataset size is small. Further, one can increase the effective dataset size using data augmentation techniques which will further improve the model robustness [1].

Figure 10: The figure above show user interface for LabelImg tool.

CONCLUSION AND FUTURE WORK

This article proposes, the novel dataset on Indian cows. We expect that our work will enable the researchers to develop novel deep learning algorithms to analyze Indian cow breeds. The proposed dataset used PASCAL VOC format and contains 815 images with total of 1,114 annotations in total. We have made this dataset freely available for everyone to use. As our dataset is smaller in comparison to many of the existing datasets used for training CNN models, we discussed some of the issues associated with using this dataset such as overfitting. We also discuss recommended practices researchers use when utilizing such smaller datasets for training the models in state of the art deep learning techniques.

In future we will add more images to this dataset to improve the diversity of the dataset which will mitigate some of the issues that we have discussed. Further, there are many cow breeds available in India with each breed being significantly different than the other, for example, Gir, Malvi, Hallikar, Khillari etc, shown in the right part of Fig. 1. In future, we will also provide annotations corresponding to these sub-classes which will allow fine grained analysis of the animal.

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Hygiene and Safety: A Review of the Hotel Industry in the Era of COVID-19 Pandemic

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ABSTRACT

The entire world is affected by the Corona pandemic. Hotel industry is one of the industry which is getting the most affected by this pandemic. It is said that safety comes first therefore, unless the hotel doesn't provide a safe and secure environment to their guest, it will become difficult to get business. As soon as this lockdown ends the hotel industry needs to take up a wide variety of precautions for their guests as well as for their employees. This COVID 19 pandemic has raised the issues related to redesigning of safety measures and hygiene standards. The hotel industry needs to modify the operating systems to reduce the risk of spreading contagious diseases like corona. This study aims to review the initiatives taken by the various hotels during the pandemic and to look into the hospitality industry in a new normal. A total of thirty interviews were conducted with medical professionals and the hotel managers to know their opinion. Based on the study researchers suggested a new preferred techniques and standard for making a safe and secure hotel environment for the guests as well as for the employees. It also, suggested how artificial intelligence can be used in the hotel industry to give more safe and quick service to the customers. Critical analysis was done on the steps taken and new procedures adopted by various hotel groups during the COVID19.

KEY WORDS: SAFETY AND HYGIENE, HOTEL INDUSTRY, COVID19, ARTIFICIAL INTELLIGENCE.

INTRODUCTION

(National Clinical Management protocol COVID-19, 2020) The coronavirus disease (COVID-19) is caused by Corona viruses which spreads illness in animals and humans. This contagious disease is believed to spread from China, Seafood market in Wuhan city in Hubel Province in mid-December, 2019. This outbreak has now been transmitted around 214 countries worldwide. World

Health Organization declared it as Covid-19 Pandemic on 11th, March, 2020. (Djeebet, 2020) Corona virus has governed the status of a pandemic which leads to a worldwide crisis and the most hard-hit is the hospitality industry which is much more affected than those of 9/11, SARS, or the financial crises worldwide in the year 2008. Most of the business of the world got constrained but the severest effect is on the Travel and Tourism Industry.

As per OAG Aviation Worldwide, the restrictions imposed on International Flights caused a high loss of around $ 880 billion. (McKinsey & Company, 2020) Hotels adopted a new cleaning process, procedures and touch less or contactless arrangements for the customers which include contactless checkouts via email and hotel Apps. Food and Beverage is being delivered by Robots including pre-packaged meal as well. The consumption of food and beverage is suggested to be consumed in the Guest's

Room itself and avoiding visit to Restaurant or Bar area. The total shutdown of facilities is strictly followed such as Gyms, Spa's, and Laundry facilities.

To provide a safe and hygienic experience to the travelers, tourist and visitors in hotels, many standard procedures and process have been adopted to kick start the business with a New Normal approach and try to stand again. (UNWTO World Tourism Organization, 2020) Against all the challenges the Travel and Tourism sector is facing, this is the toughest throughout the world, UNWTO calls for various support in the form of political and financial recovery measures. Proper coordination is held between international development and donor organization to provide an incentive for Travel and Tourism sector to recover. Tourism support channel is being implemented for wider recovery plans and actions for affected economies. For the upcoming couple of months it would be difficult to get International Tourist. Therefore, the industry is targeting the domestic tourists or local market.

This is a new area of research as it did not exist before 2019 hence, only the latest reviews were available. This paper examined the various steps taken by the hotels, analyzed recently written articles by various authors. Moreover, the current study analyzes the opinions and suggestions of medical and hotel professionals. The next section of the paper presents the initiatives taken by the various hotels during this pandemic and the results of structured interviews are presented. Lastly, research suggests a few recommendations which can be adopted by hotels post COVID19.

Literature review: This section provides the current scenario of the hotel industry during this pandemic and initiatives taken by various hotels and other health organizations:

(Covid 19 updates Oberoi hotels and Resorts, 2020) At Oberoi Hotels& Resorts every step is being taken to maintain cleanness, hygiene and health safety. The standards adopted are completely transparent to ensure that the guests feel safe and confident. The hotel has implemented 360 degree approach in all the aspects of safety and cleanliness standards in all the important vulnerable areas where there is maximum guest close contact points such as Bell desk , Front desk, Cash counter , Boutique ,Security, Housekeeping, Food and Beverage , Laundry, Material Receiving. Every area has a specific standard operating procedure and practices such as at the bell desk and the Doorman, the guest is welcomed by folding hands and greeting "Namaste'' by maintaining physical distance, checking the luggage and sanitizing it with sanitizer, the car gets sanitized by the fogging machine before entering the main porch, Cleaning and sanitizing the Reservation Desk using appropriate chemical in every two hours.

In fitness Centre maximum possibilities for outdoor exercise options has been observed. Tray for guests' personal items is sanitized. The important aspects of

housekeeping services is checked and sanitized such as External areas, Main porch, Lobby, Cloak room, Restaurants, Swimming pool, Guest room. After every use the Restaurant tables and chairs is being cleaned and disinfected. At every 30 minutes the guest elevator touch points is being disinfected by the housekeeping staff.Guests are encouraged to view the menu on their own electronic device with the help of the QR code placed on the table. Fresh printed menu is made available on request. The adjacent table is kept vacant without any layout.

In the Kitchen various important procedures is being observed such as in every two hours Cleanliness of production and service areas with Suma Multi D2.3L and sanitizing them with Suma San D10.1 solution. The team members use hair covering nets and hand gloves .Every team member has been trained by the representatives from FSSAI .The laundry cleanliness and Hygienic practices are thoroughly maintained in the areas such as Laundry Checklist, Marking, Sorting and Washing, Linen and Uniform Room. Material receiving areas such as Purchase and Receiving and all the couriers are well sanitized. Always fresh vegetables, fruits and eggs are used and well sanitized by using 50 ppm chlorine solution.

(Hotel operations standard operating procedure Covid 19 and beyond) The Orchid hotel has made a very effective standard operating procedure to maintain and implement safe environment and hygienic practices for its valued guest and its employees. It has made provisions of all the minute and specific detailing of the steps to be followed in the various areas of the hotel operations such as Guest transportation, Entrance, Reception, Guest Rooms, Restaurants, Pool, Gym and Spa, Business Centre, Meetings and Check out points. Temperature check, hand wash and sanitizing various touch points, wearing of face masks and hand gloves, thorough cleaning of guest room, provision of alternate rooms for the guest and keeping a safe distance between guests in restaurant by keeping the adjacent table without layout is done. Strict adherence to WHO and FSSAI guidelines have been maintained like social distancing ,hygiene and cleanliness measures in the hotel to provide the best environment. The safety, cleanliness procedures has not only provided a safe and clean place to stay but also has boosted the confidence of the valued guest.

(ITC Hotels Responsible Luxury, 2020)ITC group of hotels stated that they are providing training to their associates with hygiene protocol, health and safety measures relevant to the current situation. All hotels of ITC are paying attention to maximum contact points, surfaces, and fixtures by increasing the frequency of cleaning with special sanitizing and disinfecting protocols. (Robots and safety certificates: foreign hotel business adapts to the new reality, 2020) in Tokyo, hotels are going to adopt a new robot staff service to keep the hotel clean and to take care of their guest. They want to create the most safe and pleasant environment for their guests. Therefore, they are using robotics services. They have appointed the

robots for high risk zone areas like lobby for cleaning to minimize the risk of its employees.

A manager of hotel New York Rudy Tauscher said that they will check the body temperature of the visitors and will provide them with sanitizer and stickers stating that they are checked and healthy. Stickers are given every day after checking the temperature of the guest. Further, he mentioned that it is new for both the guests and the hotel staff so they tried to make them understand and adapt with work until the situation changes. (Coronavirus (COVID-19) Update - Extended Cancellation Policy, 2020) Radisson Hotels India disclosed that they are following the guidelines released by the WHO and the Centre for Disease Control Prevention. The facilities like fitness center and pool may be non-operational for few days. Fitness centers and pools are a few major facilities which hotel offers to the guest.

(Scandice, 2020) Stated that importance should be given to the hotel staff and the guest by making the area secure and safe through implementing intense safety health standards of cleaning and strictly maintaining physical distancing among staff members and guests during the delivery of food, beverage, room service, and other products. (Chaturvedi, 2020) An international hotel chain Marriott came up with a project named "we care" in India. More than 200 touch points were identified where the new health and safety standard needs to be implemented to meet the challenges. They started usage of protection shield at the front desk, stopped operating buffet service. Mandatory mobile check-in ,check out, reduced banqueting by 50 % and focusing on to clinically clean from aesthetically clean was implemented. Here, there is a need of adopting hospital-grade disinfectant to make sure cleanliness at the highest standards.

(Pandey,2020)The hotel and restaurant post-COVID-19 would have a new normal and that would be the new trend in hospitality Industry. The standard operating procedure which is applied may not continue in future but definitely will teach a lesson to cope up with the need of the hour and guide the industry to strictly adhere the rules and guidelines of cleanliness, hygiene standards and to get well equipped to face any other pandemic in future. The researcher also provided with guidelines for the operation of kitchen in restaurant and hotel by following three important steps such as to make the staff and vendors free from Covid-19 by regular health check-ups. Secondly, he pointed out the strict course and norms for Food and Beverage Control from receiving, storing, and food preparation at the end and lastly he emphasized on Social Distancing.

(Huang, 2020).The researcher discussed the quarantine process and procedures and managing any suspected individual of Covid- 19 in the hotel. He suggested to work on full proof standard operating procedure and implement it to the staff through training. Lastly, he suggested to follow the various guidelines of the Local government body to deal with pandemic Covid-19. Apart from the secondary data primary data were also collected from medical and hotel professionals through structured Interview to know their opinion regarding hotel industry during COVID 19 and post COVID 19.

Results of interview: This section of the paper discusses various responses of medical profession and Hotel managers through Telephonic Interview. Two different questionnaires were made for interviewing with medical and hotel professionals. The first structured interview was conducted with 15 medicals professionals. Findings from the interview are asfollows: Medical professionals were asked about why to follow clinically clean, Hygiene, and Safety practices for its guests and employees Post Covid-19 Pandemic? Most of the respondents referred that the Cleanliness and hygienic practices should be followed strictly to safeguard their valued guest and the employees from the life-threatening Covid-19 Pandemic. The respondent emphasized that as the hotel deals with a large number of guests, their stay in the hotel it should follow the hygiene and safety procedures to stop cross-contamination as well as the spread of the corona. Safety of guest and employees are on the top priority of any hotel Therefore, there is a strong need of switching to the clinically clean procedure and providing a safe and secure environment to the guest as well as staff.

When it was asked for the suggestions regarding safe environment most of them responded to adhere the guidelines released by the Government bodies, Local Health Authority and various procedures, practices related to Hygiene, Cleanliness, and Safety. The respondents suggested various points such as before entering the hotel the guest's body temperature should be measured and entry should be allowed only with the face masks. Regular sanitization of the high touch point areas such as lobby, Guest common Toilet, and to provide clean air through a system of air filtration. To instruct and train the staff about the various principles of Hygiene and cleanliness practices that needs to be followed regularly and religiously. To immediately take action by informing the Government health and Hospital authority in case of symptoms found of Covid-19.

The second set of structured interview was conducted with 15 managerial level Hotel employees of mostly high rated hotels. The questions were asked regarding the redesigning of the Standard Operation Procedure of hotels which would help to provide a Safe and Healthy environment to its Staff and Guest. The most of the respondent agreed with the redesigning approach and were ready to provide an additional measure of hygiene. Suggestions were given to boost guest's confidence and appreciated the Government Authority's steps laid on the Standard Operating Procedures and emphasized that hotel from their end would implement the safety standards rigorously and by following these steps and procedures , the employees would also be more confident about their wellbeing and health.

Based on the question asked on Micro and Macro changes of the redesigning of the Standard Operating Procedure, the respondents remarked regarding breaking the tasks

into micro task by introducing new disinfectant products and procedures. Also emphasized on the all-round changes in the Standards throughout the guest course such as basic information being provided to the guest at the time of reservation, sanitization of guest's luggage during the welcome along with temperature checks, compulsion of wearing the mask for all the employees as well the guest at most of the time, at various important touch points installation and provision of sanitizer dispensers, cancellation of Banquet functions and events to avoid gathering and creating zero contact environment and place. Also disclosed the possibilities of use of artificial intelligence in the industry. How technology and robots could be used during this pandemic as well as in new normal.

Based on the question asked regarding the increase of confidence level among the staff members and guest by redesigning the Standard Operating Procedure, most of the respondent agreed as well as emphasized that the psychological aspect is the most important and crucial at this time when most of the people in the world are panicked and afraid in the on-going circumstances. The redesigning of the Standard Operating Procedure is welcomed by the guest who makes them feel more confident about the hotel and would thereby feel secure, happy.

Based on the question asked regarding any constraints faced by the hotel management during implementing the Redesigning of Standard Operating procedure, the respondents agreed to adapt to the new normal, during the initial phase of implementing the Standard Operating Procedure there might be fewer constraints but as these are lifesaving procedures, the staff will get habituated by the new normal and there is less or no constraints faced during implementation of the Standard procedures.

Based on the question asked whether the redesigning of the Standard Operating Procedure of the Hotel would bring the lost business in track, most of the respondents agreed with and hoped that the change and redesigning of Standard Operating Procedure in the hotel would boost confidence and trust among guest and employees unless and until the world gets freed from this COVID 19 by the invention of Vaccine.

Findings: Most of the hotels in India are following the guidelines issued by the FASSI and WHO strictly for the entire major areas of the hotel.Hotels have introduced new chemicals to clean and maintain various areas of the hotels .There is ambit of applying artificial intelligence in the hotel industry to provide safer, contactless, and quick service to the customer. Hotels have switched from aesthetically clean to clinically clean procedure. Hotels are training their employees about the principles of safe handling procedures of the various services which are provided to the guest such as food, accommodation. All the high touch points identified by the hotels be cleaned and sanitized properly. Hotels are expecting the industry to bounce back soon and targeting the domestic tourism.

CONCLUSION

It can be concluded that in the COVID19 pandemic standard operating process which are being used by the hotel industry may not remain for the future, however, educate for adaptation with the need of the hour and guides the industry to observe as well as stick to the cleanliness and hygiene requirements for maintaining a safe and secure environment for guests and staff. In a new normal artificial intelligence may replace many task which humans do in the hotel industry. By using the AI hotel industry can provide more safe, contactless, and quick service to the customers. Post-COVID 19 would have a new normal and that might be a new way of hotel industry.

Suggestions: The hotel needs to provide a clinically clean safe environment to the guest as well as its staff to build confidence among the staff and guests. The Standard Operating procedure of hygiene and cleanliness practices must be implemented strictly without any second thought as this will sail the cleanliness norms and practices intact. The new approach needs to be carried out clearly to reassure everyone that the hotel is doing all to maintain a safe and hygienic environment. The staff must be updated with the knowledge and principles of safe handling procedures of the various services, products rendered to the guest such as food and accommodation through proper training, In-room dining services can be given priority over services in restaurant or Banquets. Disinfection tunnel system can be fixed at the entry of the hotel to sanitize the guest before entering in the hotel. Mist spray machines can be used by the hotel to make the area disinfected and for purifying the air.

Artificial intelligence would play a very significant role in coming days within the Hotel industry. AI equipment is regularly making its way into the industry. Holographic ordering for the restaurants in which guests can see the 3D Menu via a mini holographic projector on the table can be used. Holographic can also be used inside the elevator to avoid contact with buttons. It is kind of digital button in the air. Keyless entry might also take place where hotels can use technology like QR code or face recognition machines. Flippy Kitchen the world's first autonomous robotic kitchen which can learn from its surroundings and acquire new skills over time can be used to make food items like burgers and pizza. Sally is the first world's first salad robot which can put together more than 100 types of salads on one press of button and the customer gets his favorite salad. It maintains more hygiene and provides fresh food. Ginger robotic waiter by Nepal, serves food to customers and even crack jokes, such kind of technology can be adopted by hotels all around the world. Talking tech may be used to address queries on the front desk and can be placed in hotel rooms. All the suggestions are the need of the hour to be safe and make the word the safest place to live.

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English Language Teaching in the 21st Century: A Paradigm Shift Towards E-Learning

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ABSTRACT

There is an increasing body of research finding advocating the use of blended learning in the teaching-learning process. On similar lines, scholars have explored the use of this methodology in language teaching as an alternative to the traditional method that was, mainly, based on direct instruction. It is therefore critical to understand what blended learning is and how it can be applied for learning English in the classroom. This paper highlights the possibilities offered by blended learning to language teaching and language acquisition. In this respect, this paper should help teachers in understanding what exactly to expect from blended learning if they use it as their method of instruction in language learning.

KEY WORDS: BLENDED LEARNING, FLIPPED, E-LEARNING.

INTRODUCTION

English is the most widely spoken language across the world in the 21st century. A quarter of the world's population, roughly around 1.75 billion people speak English at a useful level (Howson, 2013). Therefore, it would not be wrong to say that the English language, today, has acquired the status of a 'global language'. It has also emerged as a 'utilitarian' language with software and operating systems being developed in this language. With the greatest literary and non-literary resources being available in the English language, it has also gained the status of a 'library' language.

The ascent of the English language in India has its roots in a quote by Lord Macaulay, who, whilst establishing his aim for introducing English as a medium of instruction in schools, famously stated that it was in fact "to form a class of persons, Indian in blood and colour, but English in taste, in opinions, in morals, and in intellect" (Banerjee, 2016). The aim of the British was to colonise the minds and affect culture through language. For Indians, the language served as 'a window to the world'. Although it occupies the position of associate official language in India, it is widely used for inter-state communication, thereby, becoming a 'link' language (Sharma, 2018). The growth of the English language in India today is reflective of the need of its people to be able to fully participate in national and international life (Amritavalli, 2006).

In the present context, there are many opportunities and some challenges to English Language Teaching (ELT), particularly, motivating students to communicate and express themselves fluently in a language that may not be their mother-tongue. This is known as the mother tongue interference phenomenon, wherein a learner tends to transfer the acquired skills in his native or indigenous language (L1) to his second language (L2). Additionally, second language learners encounter phonetic difficulties while using the English language as they find it difficult to pronounce certain English words whose sounds are absent from their native languages (Rachana, 2017). Consequently, English language pedagogy must focus on the achievement of a basic proficiency such as acquired in native language learning (Amritavalli, 2006).

21st Century has transformed the traditional modes of communication in the wake of science and technological revolution and truly globalised the human learning experience. The increased accessibility to the vast knowledge across the world and the new avenues of information have started indicating an inevitable shift from the traditional teaching learning methods to the new approaches. This shift can be seen partly as a response to the changing teaching-learning environment and partly as a consequence of the globalised world, potentially fading the logic of the North-South divide, at least in the educational field.

Over the last few decades, there has been an incremental use of technology in the classroom. The NPE (1986) had laid special emphasis on the use of computers for improving quality of education (Shivam & Singh, 2015). One of the approaches for technological integration in the classroom is via blended learning. This pedagogical method has gained immense popularity, with different scholars investigating the implementation of this teaching methodology and one of its models, the flipped classroom, in various institutions (Eppard & Rochdi, 2017). Aimed as a preliminary initiative towards understanding the implementation of blended learning in classrooms, this paper presents current ideas, research results, and practices of blended learning to reveal its nature, types, benefits and success factors for implementation. The present paper seeks to propose the emergence of e-learning as a new educational paradigm.

Rabindranath Tagore once stated, "Don't limit a child to your own learning, for he was born in another time." Taking forward this thought, education today, no longer stands by the old "jug and mug theory" of learning, wherein the teacher was the full mug, pouring knowledge into the empty mugs, represented by students. Traditional teaching was teacher centred. The problem with traditional lectures was, mainly, a matter of pacing. For some students, the information presented in class may be known to them; other students may have trouble taking in information so rapidly, or they may lack the prior knowledge needed for understanding the concepts presented (Alsowat, 2016). English language teachers must, therefore, move away from the traditional approach and adopt a more communicative approach.

Aim of the Study: There is an increasing body of research finding advocating the use of blended learning in the teaching-learning process. On similar lines, scholars have explored the use of this methodology in language teaching as an alternative to the traditional method that was, mainly, based on direct instruction. It is therefore critical to understand what blended learning is and how it can be applied for learning English in the classroom. This paper highlights the possibilities offered by blended learning to language teaching and language acquisition. In this respect, this paper should help teachers in understanding what exactly to expect from blended learning if they use it as their method of instruction in language learning.

Research Questions: The main research questions are:
1. What are the definitions of e-learning and the related concepts (mainly blended learning and the flipped classroom)?
2. What is the educational philosophy of blended learning and the flipped classroom?
3. What is the educational framework for implementing e-learning in the English language learning classroom?
4. What changes would blended learning bring to the educational environment and English language learning experience?

Significance of the Paper: Language teachers are in the best position to benefit from this paper as they will manage to understand the best approach or strategies to employ while enhancing the skills of language learners. It can also serve as a guiding tool for planning of blended learning or flipped learning practices to enhance language acquisition.

Research Method: The paper relies on secondary sources and is primarily based on qualitative method of analysis. The paper is based on existing research and literature. In addition, the paper analysed theoretical groundings for the application of these new models of e-learning from previous studies. For this, the descriptive method of research has been employed. The paper proposes e-learning as a new paradigm in the field of education and, specifically, English language learning.

What is Blended Learning?: After realizing the nature of the challenges associated with English language teaching, blended learning has evolved as an alternative for meeting those challenges (Tawil, 2018). Blended learning, which is now a part of the academic vernacular, is essentially based on e-learning. In order to understand the nature of blended learning, it is important to first begin by grasping the meaning of e-learning.

E-learning has often been associated with various terms, such as computer-based learning, technology-aided interaction, and computer-based training. It has been defined in various ways as well. One such definition was given by Horton (2006), who defined e-learning as "the use of information and computer technologies to create learning experiences" (Rice & Gregor, 2016), while according to Abbad et al (2009), "E-learning is any learning that is enabled electronically". For Wentling et al (2000), the term e-learning refers to the attainment and use of knowledge that are predominantly facilitated and distributed by electronic means (Arkorful & Abaidoo, 2014). Koohang & Harman (2005) state that "E-learning is the delivery of education (all activities relevant to instructing, teaching, and learning) through various electronic media" (Koohang, Riley, Smith, & Schreurs, 2011).

Another definition states, "E-learning is the use of technology to deliver learning and training programs" (E-learning portal, 2009). These definitions focus on different aspects of e-learning. Some of these definitions

focus on the use of the web for delivery of educational experiences while others focus on the use of information and communications technology in learning. Despite these differences, all of them indicate that e-learning makes it possible for learners to broaden their knowledge base through the use of computer-aided technologies.

The definition referred to in this paper defines e-learning as a set of practices that uses technology-aided interaction to create, provide and enhance learning (Rice & Gregor, 2016). While e-learning continues to remain popular, it has also faced opposition on a few counts, such as the charge of depriving students of "real" experiences, leading to isolating students, failing to motivate students and resulting in increased dropout rates. To meet these challenges, teachers and universities are working on courses that provide both fully online and face-to-face instruction. Blended learning as an approach was invented with the intention to add to the already existing strengths of e-learning. Thus, it seeks to optimize elements of e-learning rather than replacing them (Parlingdundan, 2013).

Like many advances in educational practice, blended learning is defined and implemented in multiple ways. As more and more educators and institutions use it, many different meanings have evolved. According to Bonk and Graham (2006), "Blended learning systems combine face-to-face instruction with computer-mediated instruction (Parlingdundan, 2013). In line with this, for Stacey and Gerbic, blended learning involves "some combination of virtual and physical environments" (Bryan & Volchenkova, 2016). The Australian National Training Authority (ANTA) (2003) describes blended learning as the integrated combination of traditional learning with web-based online approaches (Shivam & Singh, 2015). Another definition by Welker & Berardino (2006) emphasizes that blended learning is an integration of e-learning tools such as virtual learning environment with face-to-face learning (Aji, 2017).

Thus, it is used to refer to any combination of face-to-face teaching with computer technology (online and offline activities/materials)' (Hockly, 2018). All these definitions reflect that blended learning is a combination of different methods of learning, different learning environments and different learning styles. The "right" blend can offer a richer and "optimal" learning environment. Using a few effective tools shall prove to be an efficient way to achieve a deeper approach to learning, foster autonomy and maximise social interaction in the classroom (King, 2016).

Models of Blended Learning: Staker and Horn (2012) categorized blended learning into four models: rotation, flexible, self-blend and enriched-virtual (see figure below) (Bryan & Volchenkova, 2016). The following section describes each model.

This typology was reduced to four from the original six models. The six original models were the face-to-face driven model, the rotation model, the flex model,

the online lab model, the self-blend model and the enriched virtual model. The face-to-face driven model was eliminated, and the online-lab model and the self-blend model were merged. In the face-to-face driven model, the introduction of online instruction is decided on a case-by-case basis, meaning only certain students in a given class will participate in any form of blended learning. In the rotation model, the instructor decides the fixed schedule according to which the students shall rotate between different learning modalities, which may include working online, individual face-to-face interaction, group projects or small group activities. One of the modalities is online learning. The Rotation model includes four sub-models: Station Rotation, Lab Rotation, Flipped Classroom, and Individual Rotation (Parlingdundan, 2013).
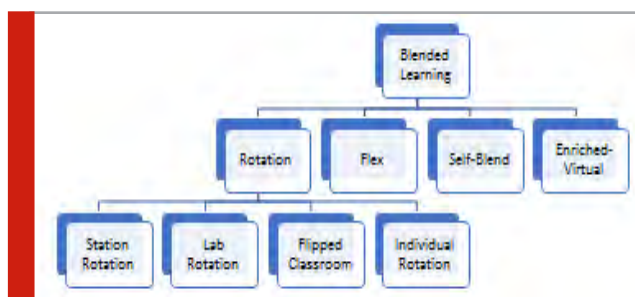
For the flex model, students cover most of the learning material online according to an individually tailored schedule, and the required face-to-face support is provided by the teacher, whilst in the online lab model, students add to their regular coursework by taking an online course on-campus. The self-blend model of blended learning offers students the opportunity to take additional classes, beyond the ones already offered at their school and in the enriched-virtual model, the study is, predominantly, online with occasional visits to the physical learning environment for face-to-face interaction (Bryan & Volchenkova, 2016).

As mentioned, there are different variants of the rotation model. The most interesting variant of the rotation model is the 'flipped classroom'. Flipped instruction is a form of blended learning in the way that it connects face-to-face teaching with online learning. Here, the student studies the preliminary or introductory content online (at a location of their own choosing), and activities, that support meaningful learning, are conducted in the classroom. Thus, the order of the traditional teaching-learning process is reversed (Szparagowski, 2014).

The Flipped Classroom as A Mode of Blended Learning: Flipped Classroom is not a recent concept. It is a mode of blended learning that involves a different process than that employed in a traditional classroom. The researchers often credited with first mentioning this inverted model of learning, Lage, Platt and Treglia, published the paper "Inverting the Classroom: A Gateway to Creating an Inclusive Learning Environment" in 2000. According to them, flipped learning occurs when events that have traditionally taken place inside the classroom, now take

place outside the classroom and vice versa" (Eppard & Rochdi, 2017). The concept of a flipped class, according to Jonathan Bergmann and Aaron Sams is "that which is traditionally done in class is now done at home, and that which is traditionally done as homework is now completed in class" (Bergmann & Sams, Flip your Classroom: Reach every student in class every day, 2012).

The Flipped Learning Network defines it as "a pedagogical approach in which direct instruction moves from the group learning space to the individual learning space, and the resulting group space is transformed into a dynamic, interactive learning environment where the educator guides students as they apply concepts and engage creatively in the subject matter" (Piehler, 2014 as cited in (Ouda & Ahmed , 2016)).

Estes et al proposed a 3-stage model of the flipped classroom consisting of preclass, inclass, and postclass learning activities. Preclass activities can include readings, short recorded video or audio lectures, or some other form of computer-based instruction. Preclass work is mainly to introduce the information that needs to be learned. Students should be given information regarding what they are expected to do or know beforehand, rather than simply directing them to read a specific chapter or watch a video. The pre-class work acts as a base for the in-class activities, which may include quizzes given at the beginning of class, group learning activities, problem solving, case discussions, or other active-learning methods that apply to different learning types. Postclass learning activities in flipped classroom formats usually involve learning assessments, in the form of presentations, and further application of skills or knowledge (Rotellar & Cain, 2016).

Flipped learning encourages students to take responsibility of pre-learning at home (Jarvis, Halvorson, Sadeque, & Johnston, 2014). It also permits students to stop a video to take notes or go back and listen again to something that they have not understood. Additionally, it provides support to absentee students to be on par with the rest of the class (Kitano, 2015). Blended learning is a teaching methodology which combines the traditional classroom with on-line activities. It finds its best application in the Flipped classroom. In this pedagogical model, the role of the teacher has changed from knowledge-giver to that of a guide or facilitator as the responsibility of learning has, somehow, transferred to students who have direct access to the contents of the lesson before going to school (Capone, Caterina, & Mazza, 2017).

Theoretical Foundations
Bloom's Taxonomy: Bloom's taxonomy is an instructional framework that is often used to determine the outcomes of teaching and learning. This framework, which is depicted as a pyramid, classifies thinking skills into six hierarchically arranged sections that range from lower-level cognitive skills to higher-order thinking skills. This pyramid was revised in the 1990s. The revised six levels in Bloom's taxonomy are: remembering, understating,

applying, analysing, evaluating and creating (Stanny, 2016). This revised version of Bloom's Taxonomy is relevant to flipped learning as the task of learning can be performed as homework, through a video or any other appropriate resource, thereby, building upon the lower tier of Bloom's Taxonomy, remembering and understanding. During class time, students can be asked to demonstrate their new knowledge and focus on Bloom's higher tier, applying, analysis, evaluation, and creating. Thus, the assimilation of information, which demands complex thinking skills, occurs during class, under the guidance of an instructor or mentor. With the feedback from the instructor or the classmates, as well as viewing and learning from the work of others, the class transforms into a community of learners (Mehring & Leis, 2018).

In the words of Albert Einstein, "Education is not the learning of facts, but the training of the mind to think". In the flipped classroom, students practice remembering and understanding at home, by watching instructional videos, visiting course-related websites, listening to audios or at least reading the lesson. In class, teachers utilise that freed-up time by engaging students in activities that generate critical thinking (Bergmann & Sams, 2013/2014). Higher-order thinking skills train students for real-world application (Conklin, 2012). Language is an instrument for development of abstract thought and knowledge-acquisition. In English language classrooms, language should serve as a means of developing higher-order thinking skills (Burns & Richards, 2012) as higher-order thinking skills increase students' motivation as well as achievement (Brookhart, 2010).

Constructivism: On the basis of our earlier understanding, flipping a classroom implies a reversal of the traditional class wherein transmission of information takes place outside the classroom and assimilation takes place in the classroom (Eppard & Rochdi, 2017). The flipped classroom incorporates the constructivist learning theory as students "construct" their own knowledge (Mehring & Leis, 2018).

The foundation of social constructivist theory is based on Lev Vygotsky's theory of social constructivism. This theory contends that cognitive development of children takes place in the context of socialization. Vygotsky defines the "Zone of Proximal Development" (ZPD) as "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem-solving under adult guidance, or in collaboration with more capable peers" (Vygotsky, 1978, p. 86 as cited in (Ozer, 2004)). Thus, the zone of proximal development indicates the difference between what a learner can do without guidance and what he or she can achieve with support and encouragement from a peer.

Accordingly, whenever a student is at the zone of proximal development for a specific task, scaffolding (or providing supporting to the student) will give the student the confidence to accomplish the task. With the

support of the mentor (guide/instructor/teacher/peer), the student will gain the confidence to accomplish the task independently (McLeod, 2012). Essentially, if flipped classrooms include collaborative learning activities and problem-solving tasks, then constructivism can be seen as providing a theoretical underpinning to this mode of blended learning (Jarvis, Halvorson, Sadeque, & Johnston, 2014). Basically, in a Vygotskian classroom, students are exposed to discussions, research collaborations, electronic information resources, and project groups that work on problem analysis (Ozer, 2004). Thus, students learn as a result of social interaction and collaboration with others. Blended learning and the flipped classroom provide multiple opportunities for collaboration and social interaction and hence, prove to be beneficial for language learning.

**The Pedagogical Framework Of E-Learning For Elt
The Structure of The Elt Flipped Teaching Classroom
Model:** Engaging the learners while teaching is very important as passive learners will not be able to practice all the language skills in the classroom

Hamad Alsowat (2016) has developed an 'EFL Flipped Classroom Teaching Model (EFL-FCTM). This model directs EFL (English as a Foreign Language) instructors to the practical procedures that can be implemented step by step in EFL classrooms. The suggested model (EFL-FCTM) has four phases beginning from outside the classroom activities and ending with assessment. Bergmann and Sams (2012 & 2015) have also provided various useful inputs and relevant guidance for flipping the classroom. McGrath et al. (McGrath, Groessler, Fink, Reidsema, & Kavanagh, 2017) have also compiled a list of seven steps in the 7C Model (Conceptualise, create, communicate, collaborate, consider, combine, consolidate) to demonstrate the stages involved in flipping the classroom. This paper presents different stages that include a combination of the procedures listed in the three mentioned works.

First: It is important to flip one's thinking and open one's mind to the endless possibilities of e-learning. The instructor chooses the lesson to be flipped. The instructor must conceptualise based on the students' access to technology, students' prior experiences, and the institution's technical support system. Also, the instructor has to assess the suitability of the lesson for flipped learning, as all lessons cannot be flipped. The instructor also needs to consider the learning objectives of the lesson. The learning objectives are planned keeping in mind Bloom's Taxonomy and are divided into lower-order thinking skills (LOTS) and higher-order thinking skills (HOTS). LOTS are stated to be achieved outside the classroom and HOTS should be achieved in class.

Second: The instructor creates or designs the learning content. For this, the instructor needs to set aside some time each week to explore the field of e-learning and to consider any technological barriers that may arise. As Bergman and Sams (2015), suggest, the best tool to use "is the one you can actually use". They also mention

that successful flipped classrooms usually make use of videos created by instructors themselves. Next, the instructor delivers the content through videos, audios, reading materials and/or by any means before the next class. For this, the instructor should, ideally, collaborate with e-learning designers, librarians and developers. This content should focus on LOTS. Students watch the videos, reads the materials, listen to the audios and the other materials assigned by the instructor outside the classroom. They focus on remembering the information provided and on understanding the main ideas.

Third: In the classroom, students are busy in developing critical thinking skills through active learning activities, discussions and collaborative learning. These methods encourage students' participation and engagement. The instructor acts as a facilitator and guides the students towards discovery and learning. Here, the instructor frequently communicates with the students to ensure reflection takes place. It is also important to utilise tools or plan activities that will enhance learning outcomes.

Fourth: For the closing activity, students have to do projects, presentations and assignments related to the lesson. The instructor evaluates these activities to ensure that the learning objectives have been achieved. While planning the assessment, the instructor can have various types and methods of evaluation. They can be done online or onsite, depending on the particular learning objectives. In the case of onsite assessment, the teacher may rely on regular tests, exams or performance observations. For online evaluation, the students may complete some assignments that they should submit online (Stein & Graham, 2014).

Fifth: At the end, the instructor evaluates every step of the model to generate a feedback for the whole lesson and depending on that evaluation, plan for the next lesson or unit.

Thus, while planning any of the blended learning models, the instructor needs to plan the content, learning resources, learning activities and assessment. The instructor also needs to provide some time to the students to become familiar with the blended learning platforms. It is important to note that the flipped classroom is adaptable to a teacher's style and circumstances. The teacher can personalize his/her version of flipped learning and play to their individual strengths as educators (Alsowat, 2016). The core idea of constructivism applied to learning is that the focus is on the learners. In this learner-centred environment, knowledge and understanding is socially constructed. From the above steps, we can surmise, that this teaching model adapts to the constructivist learning theory and constructivist learning environment as it is directed towards student-centred learning under the guidance of teachers (Xu & Shi, 2018).

Implementation in English Language Classrooms: It has been said that we cannot really teach language, we can only create conditions in which it will develop spontaneously in mind in its own way (Gomaa, 2010 as

cited in (Adas D. O., 2013)). The advantage of blended learning is that both face-to-face and technology teaching methods support each other and address the limitations of each by merging, so as to achieve the best results in language teaching. The four foundational skills of language learning are speaking, reading, listening and writing. While learning a language, it is necessary to master these skills to ensure proficiency in the use of the language. The relationship between the four language skills can be represented as (Ahumaraeze, 2015):

	Input	Output
Spoken	Listening	Speaking
Written	Reading	Writing

Blended learning enhances these foundational skills, which are all fundamental to increasing comprehension and enhancing the communication process.

Reading is an important skill to master while learning any language. The teacher must prime the students for the lesson. Approaches and methods need not be necessarily exclusive but maybe mutually supportive to develop fundamental competencies. Up to class eight, a teacher may conduct model reading for the first two or three lessons. Teachers can record themselves reading the lesson with correct intonation and pronunciation, and then share this through various platforms, online or on the school system, with the students. This resource can help students practice reading by giving them the opportunity to pause and rewind while listening to difficult words. It can also help develop their listening skills. During the next classroom session, the teacher could ask the students to read aloud in class. This also helps them gain confidence, as it builds when the student is encouraged to read and everyone else is quietly listening. Posing questions through google forms to check their comprehension will also help for further differentiated instruction and in-class activities.

Tech tools such as Curriculet, Actively Learn, StoryBots, Have Fun Teaching and Subtext can also be used for reading activities and for exposing students to different reading material, as these types of web-based programs allow teachers to freely use many works from the public domain. This also provides opportunities for 'Differentiated Learning'. Teachers can also insert, within the text, customizable questions, quizzes and notes to engage the students as they progress through the reading material. These technologies support teachers in customizing which extra material each student receives, personalized to his or her learning requirements (Bergmann & Sams, Flipped Learning for Elementary Instruction, 2015).

Listening: needs more than one instance in hearing because it is not only about hearing but also about understanding and interpreting the meaning of the conversation. Through blended learning, students can be exposed to varied learning aids such as recorded drills, conversation practice and various other media. Students can practice listening to vocabulary, sentence structures and dialogues in the English language (Aji, 2017). Training students to develop their listening skills by exposing them to different songs (age appropriate) would also prove to be a useful exercise. Exposure to well-known speeches could further develop their language proficiency and help them to structure their thoughts meaningfully.

The main aim of language learning is to be equipped with the target language skills that the learner can successfully apply in real-life situations (Aborisade, 2013). Public speaking is an effective way of sharing ideas and it is best cultivated in the face-to-face interaction in the classroom, as online learning exclusively does not harness this skill effectively. Regular practice is fundamental in all language learning and it is vital for students to interact in the target language and collaboration in the classroom setting provides opportunities for group interaction, communication and problem-solving skills (Tawil, 2018).

Writing is an intricate and complex task (Adas & Bakir, 2013). Developing the skill of creative writing is important as well. For this, a simple yet effective strategy is CODER – Collect ideas, organise in sentences, draft, edit it and rewrite. Students must be encouraged to use this strategy to develop their creative writing skills (Chandrasekharan, 2017).

The students could also be asked to write letters to other students through inter-school (offline or internet-based) programs. Letter-writing activities to government officials, especially to the Prime Minister of the country serve the dual purpose of sensitising students to relevant issues and enhancing language proficiency. To build their writing skills, students can also be given online access to a few works of a particular writer, with instructions to choose one to read before class and then ask students to write a book summary or review in class. Another writing activity is having students write an essay on the issue of defacing historical monuments through scribbling or other activities. As words are abstract whereas visuals are concrete, the teacher could share pictures with the students on a virtual platform to stimulate thinking.

An extension of this activity could be an in-class drama. After the drama, the students could share their thoughts on the subject and on essaying that particular character before the other students. This could culminate with students writing a letter on behalf of the historical monument, explaining how it has been affected on being damaged (Bergmann & Sams, Flipped Learning for Elementary Instruction, 2015). This encourages them to comprehend the issue and engage with the lesson in many different ways (intellectually, emotionally, creatively). This approach also complements many different learning styles and successfully moves learning from the concrete to the abstract, thereby, making learning more tangible.

Using images to prompt writing is an effective strategy to use with Elementary students of the English language. Pictures grasp and successfully retain attention. Edutopia, as a website, has excellent blended learning activity suggestions to use in English Language classrooms. One such activity is the Picture Word Inductive Model (PWIM), which helps elementary students develop their vocabulary and organise their writing. In this, students initially brainstorm words related to a picture shown on the screen and then categorize those words. They proceed to add new words to those categories and complete a "cloze" (or fill-in-the-blank) activity with sentences about the picture and again, categorize those sentences. They, then, convert those sentences into paragraphs, and, finally arrange the paragraphs into sentences. The PWIM uses an inductive process, which encourages students to seek patterns and use them to organise information.

Other strategies include use of "thought bubbles" for characters and picture dictation to stimulate thinking and generate ideas for story writing. For more advanced English-Language Learners, students can be asked to develop levelled questions about a photo. The teacher could provide "question starters". These questions serve as entry points for students to write longer pieces based on the image (Ferlazzo, 2012).

Spelling in any language usually helps cement the connection that is shared between sounds and letters. To improve this skill, Bergmann and Sams (2015) recommend an online, game-based learning site Vocabulary-SpellingCity, which also provides help in vocabulary, writing and overall language arts. Playing spelling games in class such as scrabble, crossword, word search races and jumbled words helps students to learn spellings while having fun at the same time. Students could be asked to illustrate word meanings through pictures and drawing. Picto-Spells helps retention and students enjoy the activity as well.

Teachers of English Language must move away from the traditional approach (grammar-translation and Direct Method) of teaching grammar. Adopting a more communicative approach shall help students understand how to use grammar meaningfully in context. Traditionally, teaching of grammar focused more on form i.e., the presentation of rules. The philosophy and practice of teaching grammar needs to focus on meaning and usage along with form (Garnder, 2008). Explaining the meaning becomes important because when students don't know the meaning, they don't use it in their daily lives. The meaning of the topic must always be explained with several examples, such as using story narration at the beginning of a topic. This could be done through the use of pictures or videos. Situational grammar teaching provides students with a context within which form, meaning and usage are foregrounded. In the classroom, learners should be encouraged to move away from the prescriptive approach and follow the method of guided discovery. It is important for a teacher to elicit meaning and rules from the students itself. This shall lead to lifelong learning.

Bergmann and Sams, in their book, 'Flipped learning for Elementary Instruction' (2015), have shared some commonly used resources to employ in the flipped classroom. One of these is www.noredink.com, an adaptive online resource that enables students to pace their grammar learning through exercises that provide immediate feedback and help with mistakes. Other suggested resources also included are EDpuzzle and eduCanon. Students can watch and take notes at home on a grammar video. These grammar videos are easily available on YouTube. While teaching idioms, students can watch songs and animations about idioms. The students can, then, carry their notes to the next day's class for discussion.

Integrating art into ELT helps to bring forth the creativity of the students. After a short discussion on idioms – for example, "a piece of cake" or "to feel under the weather" – each student can draw the literal and figurative meaning of different idioms, as images or visuals are the easiest things for the brain to remember. Once completed, the other students can guess the meaning of the idiom (Bergmann & Sams, Flipped Learning for Elementary Instruction, 2015). Lastly, teachers should make a mental note at the end of each class to assess what worked and what didn't work for them on that given day. This shall prove to be a useful exercise in developing oneself as a teacher.

Outcomes of Blended Learning In Language Teaching: Various scholars have investigated the merits of embedding blended learning in language teaching and learning (Adair-Hauck et al, 2010; Banados, 2006; Sari et al, 2018). Hong & Samimy (2010) confirm that this debate has gained prominence, based on the upsurge in the number of studies focusing on second language teaching since 2000 (Hong & Samimy, 2010). Most of these studies have concerned blended learning pedagogy and its implementation, while others have looked at the learning outcomes obtained after implementing blended learning. The following section therefore looks at a number of research findings regarding both the implementation and the outcomes of blended learning in language teaching.

Different scholars have outlined varied ways in which blended learning enhances language teaching based on the findings from their studies. According to Hanan Tawil (2018), blended learning in language teaching delivers a number of advantages, as use of technology aids in increasing the knowledge pool. Banitvilai (2016), in his study on enhancing students' language skills through blended learning, found that online practice is directly beneficial for enhancing the four language learning skills as well as autonomous learning and learner motivation. In the same context, through their research, Adas & Bakir (2013) concluded that students' writing abilities improved due to implementation of blended learning. Garrison & Vaughan (2008) claim that it is E and b-learning which makes the courses "more participative, interactive and student-centred" as students spend more time engaged in the English language which eventually leads to better

language proficiency (Garrison & Vaughan, 2008). Therefore, blended learning seems to be an instructional methodology that should be embraced in new language teaching, in order to engender the best language and knowledge acquisition.

CONCLUSION

The procedures that educators are implementing in their teaching-learning practices are revealing the changing landscape of the educational canvas. This new canvas differentiates instruction, modifies resources and reinforces dissimilar student learning styles in order to fulfil the needs of different learners (Ouda & Ahmed , 2016). The current generation of learners are digital natives, who have grown up with cyber-media technology. Blended learning combines face-to-face instruction with computer-mediated instruction. Since it caters to this generations' characteristics and learning preferences, it is likely that, in the future, our learning systems will provide a blend of face-to-face and computer mediated experiences.

E-learning, through blended and flipped learning, aims at achieving all levels of Bloom's Taxonomy, including higher-order thinking skills (Uzunboulu & Karagozlu, 2015). The new teaching-learning approaches focus on students taking greater responsibility and ownership of their learning, and thereby, building knowledge in a constructivist learning setting, with the teacher as a facilitator and supervisor. Future learning practices will be differentiated not based on whether they blend but rather by how they blend and whether they achieve the "right" blend. The question of how best to apply blended learning in the classroom is what we must focus on as we move into the future (Bryan & Volchenkova, 2016).

However, it should be noted that no one methodology or approach can address the complex nature of success or failure of current social inequalities and inequities (Harris & Alexander, 1998). Poor technology infrastructure and inadequate facilities exert great pressure on the most willing students and staff. Training requirements for academic and technical staff are issues that must be paid attention to when going in for blended learning. The much talked about digital divide is a reality. Peter Aborisade (2013) conducted a case study in Nigeria titled 'Blended learning in English for Academic Purposes Courses:

A Nigerian Case Study'. In the study, he has observed that in a developing country such as Nigeria, the obstacles to educational change are myriad. They include the generic issues of strategy, perceptions and e-readiness; human and contextual issues, and resources of time, cost and technology. These challenges remain true for many other developing countries, including India (Aborisade, 2013). The gap can be bridged by teachers and institutions who are willing to walk the talk. Change is possible and e-learning acts as a means of providing equal quality education to all students by bringing learning resources through the internet into the classrooms, thereby connecting the global North with the global South.

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Microplastics in Aquatic Environment: A Review on the Abundance, Biological Effects, Analysis and Bio-Degradation

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ABSTRACT

Microplastics were considered as serious pollutants in the aquatic and terrestrial environment, the distribution and abundance of Microplastics in the aquatic environment such as ponds, lakes, rivers and oceans were increased due to the undeliberate release of these plastics into the environment. The microplastics in the aquatic environment possess serious threat to the organisms in the water since these plastics when consumed by the organisms will get accumulated in the digestive tract by means of which it will enter the circulatory system. Ingestion of microplastics causes serious effects on the human beings. The microplastics enter into the body of organism by means of ingestion and show their impact from planktonic organisms to higher mammals. The current review deals with sources and abundance of microplastics, the impact of microplastics on the living organisms and the biodegradation of plastics using biological sources. The fate of microplastics in the environment is not clear still due to the limited knowledge on the biomagnifications of microplastics and the isolation and identification of microplastics. The degradation of macro plastics also contributes the formation of micro and nano plastics resulting in the magnification of the impact of plastic pollution. It is essential to evaluate the fate of these microplastics and novel compounds that could aid in the transformation of non-toxic monomers that can be utilized for the normal growth of the organism.

KEY WORDS: MICROPLASTICS, BIODEGRADATION, TOXICITY, POLLUTANT, ENVIRONMENT.

INTRODUCTION

Plastics are high molecular weight synthetic polymers (Tokiwa et al., 2009), which are light and chemical-resistant and can be used under wide range of temperatures. About 335million tones of plastics were produced per year (Plastic facts, 2017). Besides their useful benefits, the property that makes it resistant to degradation has made it a major pollutant in the environment (Barnes et al., 2009;

Jambeck et al., 2015). The presence of plastic debris in the marine environment was reported by Carpenter and Smith (1972). The plastic litter ranges in size from metres to micrometres (Barnes et al., 2009). The marine plastics are diverse in nature. They were classified based on the source such as fisheries, industrial plastics, sewage wastes, fishing vessels, commercial shipping, liners and all other litter formed by activities in oceans (Ryan, 2015; Sadri and Thompson, 2014; Rech et al., 2014). Approximately 4.8 to 12.7 million metric tons of plastic wastes are being released into the marine environment every year (Jambeck et al., 2015).

Microplastics: The term microplastic has been introduced for the first time in literature by Thompson et al., (2004) to describe the smallest form of plastics of <5mm and lesser. Plastic particles are classified into meso, micro and nanoplastics (Andrady, 2011). Plastics with the diameter of 0.06 to 0.5mm or less than 1.0mm are considered

as small microplastics and with 1-5mm diameter are termed as larger microplastics. These microplastics are insoluble in water and are non-degradable in nature with different physicochemical properties (Zhang et al., 2018). Microplastics are heterogeneous in nature (Roy et al., 2011). Microplastics were classified into spheres (beads, pellets, and granules), fibers (filaments, lines), films, fragments and foams, based on their morphology (Free et al., 2014).

Since the microplastics are too small to be seen through naked eye the risk of pollution is very high (Law and Thompson, 2014). The accumulation of microplastics in the environment by means of various sources such as residential wastes (Browne et al., 2011) personal care products (Castaneda et al., 2014) waste water treatment plants (Mc Cormick et al., 2014), plastic moulds in agriculture fields (Yan et al., 2016), green house habitat (Song et al., 2017) pharmaceutical industry and footwear industries. Most of the microplastics were dumped into oceans, which becomes the largest sink for dumping of plastics resulting in the plastic pollution in future (Song et al., 2017). The release of microplastics into the environment by different activities results in the interference of microplastics in the normal biota of terrestrial and aquatic organisms and it further disturbs the ecological balance.

Primary Microplastics: Primary microplastics are those that are produced intentionally at the micro size of 5mm and lesser to be used as abrasives or precursors such as plastic pellets (Cole et al., 2011; Costa et al., 2010). The primary microplastics were commonly used in the production of cosmetics, hand cleansers, shower gels, facial, body scrubs, insect repellents, sunscreens, and synthetic clothing (Zitko and Hanlon, 1991; Gregory, 1996). Primary microplastics can be originated from the abrasion of macro plastics during the processing. The erosion of tyres and graze of synthetic textiles also results in the formation of microplastics. About 48% of microplastics released from various means were released into the ocean.

However, the remaining is deposited in the soil and sludge (Boucher and Friot, 2017). Primary microplastics also include those that are used as water softeners and fruit coating materials (Essel et al., 2015). USA and Canada banned the use of micro beads in cosmetic industry (Al-Thawadi, 2020). Primary microplastics are also used as scrubbers in air blasting technology to remove rust and paint contaminated by heavy metals and these could affect the environment in which they are disposed, especially in water systems.

Secondary Microplastics: The secondary microplastics are those that result from fragmentation of existing plastics (Cole et al., 2011). The microplastics found in the oceans were mostly of secondary type, were originated by the breakdown of plastic objects such as plastic bags and fishing nets (Tanaka and Takada, 2016). About 61-89% of microplastics found in the ocean were of secondary microplastics. Further the fragmentation and

weathering of such as textiles, tyres and paints during their applications results in the formation of secondary microplastics. (GESAMP, 2015) Apart from being physically degraded into smaller fragments forming microplastics (Galgani et al., 2015), like other organic materials plastics degrade, but at a much slower rate (Andrady, 2015). The plastic litter found floating in the oceans was subjected to photo degradation and oxidation (Scott, 1972). The plastics floating in water and the debris of the beaches undergo serious weathering by which the plastic develops cracks results in the fragmentation of those plastics and formation of secondary microplastics was evident (Cooper and Corcoran, 2010).

Abundance and Distribution of Microplastics: Abiotic factors such as wind, climate, ocean currents, industrial and urban wastes, fishing grounds and seasonal change in river flow causes the distribution of plastics in marine. Polyethylene and polypropylene are found floating in seawater due to their low density and sometimes undergo leaching or bio fouling and sinks to the bottom of the sea floor. Microplastics are ubiquitous and found in any type of environment like atmosphere (Allen et al., 2019), soil (Horton et al., 2017; Guo et al., 2020), marine and freshwater ecosystems. Microplastics are found ubiquitously in sea surface, water column, sea ice, deep-seafloor (Barnes et al., 2009; Claessens et al., 2011). Presence of synthetic polymers in sea water and sediments of Asian marine environment reported in Singapore (Ng and Obbard, 2006). About 10% of terrestrial plastic waste ends up in oceans (Thompson, 2007).

Exposure of UV irradiation is high and the ratio of conversion of macroplastics to microplastics is more in countries tropical countries like India. Tourism and fishing industry release the terrestrial microplastics into the sea through river mouth (Karthik et al., 2018). Abundance of microplastics through plastic fishing gears (Dowarah and Devipriya 2019) sewage (Sathish et al., 2019). Presence of microplastics in the ecosystem and commercial fishes of South Eastern Arabian sea (James et al., 2020) and Southeast coast of Bay of Bengal (Karuppasamy et al., 2020). Polyethylene terephthalate was more abundant in the sediments of river Ganges (Sarkar et al., 2019).

Effects of Microplastics on Aquatic Organisms: Marine habitats, which are rich in biodiversity, are being threatened by major pollutants, including microplastics (Johnston and Roberts, 2009). The plastic litter in marine causes mortality mainly by the entanglement and intestinal blockage (Oberbeckmann et al., 2016). The threat is higher in case of microplastics because of the smaller size, which could be ingested by larger number of animals and how longer it remains in the animal. The cultured mussels had more microplastics ingested than wild mussels (Mathalon and Hill 2014). Seabirds are the most affected organisms by the ingestion of microplastics (Ryan, 2015). The mortality of sea turtles was raised due to ingestion of plastic bags (Balazs, 1985). Microplastics were found in commercial bivalves (Cho et al., 2019),

mussels (Sparks, 2020), European sardine, horse mackerel, anchovy, chub mackerel, Atlantic mackerel, and bogue (Lopes et al., 2020).

Filter-feeding organisms (Leslie et al., 2017; Ward and Shumway, 2004) from *Daphnia magna* (Canniff and Hoang, 2018) higher Cetacean species like baleen whales (Simmonds, 2012). Fishes are mostly affected by micro beads which are a type of primary microplastics used in cosmetics and personal care products such as facial cleansers. These micro beads escape even through wastewater treatment plants (Law and Thompson, 2014; Tanaka and Takada, 2016). The microplastics of different chemical composition cause intestinal damage in *C. elegans* and *Danio rerio* (Lei et al., 2018). There is even a much higher risk, when these microplastics are exposed to the environmental breakdown into nano-plastics (Li et al., 2018). Microfibers entangled in the gills and fins of freshwater fishes (Kusmierek and Popiolek, 2020). Ingestion of microplastics by fishes could cause stress, physical damage, cyto-toxicity and change in behaviour and accumulation of pathogens and heavy metals (Rochman et al., 2013; Jovanovic, 2017; Lyu et al., 2020). Microplastics can lead to the introduction of invasive species into an environment which could be harmful to the native species (Barnes, 2002).

The marine organisms are mainly affected by the food web transfer of microplastics from one tropic level to another (Setala et al., 2014). Decreased growth rate and photosynthesis of marine microalgae (*Skeletonema costatum*) (Zhang et al., 2017); C. neogracile showed hetero-aggregation with polystyrene microplastics (Long et al., 2017); reproductive damage in *C. elegans* (Lei et al., 2018); granulocytomas followed by lysosomal instability in *Mytilus edulis* (Von Moos et al., 2012). The smaller size microplastics showed larger toxic effects (Li et al., 2020). Microplastics were found to transfer POPs (persistent organic pollutants) into the food web (Cole et al., 2011; Ivar do Sul and Costa, 2014). The microplastics were transferred through food web from *Artemia nauplii* to the zebra fish (*Danio rerio*) (Batel et al., 2016).

Microplastics affiliated with polycyclic aromatic hydrocarbons were found to disrupt the endocrine system (Honda and Suzuki, 2020). Ingestion of virgin polyethylene spheres or along with pyrene, showed decreased acetyl cholinesterase activity in the juveniles of common goby *Pomato schistusmicrops* (Guzzetti et al., 2018). The microplastics could be a source of transfer for various industrial toxins, bio films with pathogens and phycotoxins through food webs affecting the ecosystem from pelagic to benthic regions (O'Leary et al., 2013; Setala et al., 2014). These harmful toxins and pathogens could be transferred to the successive members of the food chain and cause harmful effects (De-La-Torre, 2019; De Tender, 2015). Microplastics are found to adsorb metals such as lead, cadmium and copper (bivalents), especially the ones that have rough surface (Zou et al., 2020). The toxic effects include developmental abnormalities, reduced reproduction rate and increased mortality (Pacheco et al., 2018).

Ingestion of microplastics lead to the formation of ROS (Reactive Oxygen Species), which causes reproductive failure (Jeong and Choi, 2019), these microplastics could be sites for adsorption and desorption of hydrophobic Endocrine Disrupting Chemicals (EDCs) which could cause feminization in fishes (Lu et al., 2020). Through commercial sea foods, microplastics could enter the digestive system of humans and affect public health (Neves et al., 2015). Humans are affected by microplastics that enter their body through inhalation of synthetic textiles, skin contact through wounds or hair follicles and by ingestion of contaminated seafood and other food and water (De-La-Torre, 2019). The toxicity is high when the adsorbed substances are released into the organism after ingestion (Al-Thawadi, 2020). Abundance of microplastics varies with the inhabitant population of the region (Lyu et al., 2020). The plastic debris generated by human inhabited regions of the coast is estimated to reach the ocean gyre within months and deposit there for decades (Zettler et al., 2013). Guven et al., (2017) observed that the amount of microplastics present in the fishes also depends on the region inhabited.

Techniques to Identify and Isolate Microplastics:
Microplastics are isolated mostly using planktonic nets. However, the much smaller ones escape from these nets (Law and Thompson, 2014). Generally, the mesh size of nets used for sampling of microplastics is 330μm (Li et al., 2018). In order to study the microplastics in living organisms, isolation is performed using acids, bases or enzymes. Microplastics can be separated using high density salt solutions of NaCl, ZnCl2, NaI and CaCl2 of which NaCl and CaCl2were commonly used to separate microplastics from soil due their economically viable and pollution free nature (Claessens et al., 2013). Separation of organic matter from microplastics can be carried out using acid and alkali agents (Scheurer and Bigalke 2018). The microplastics are visually viewed using light, polarised or electron microscopy. Scanning electron microscopy is used to observe the microplastics in highly magnified images and energy-dispersive X-ray spectroscopy is used to observe the elements present in the polymers. The quantity of then microplastics can be observed using semi-automated methods like Zoo Scan, flowcytometry, cell sorters and coulter counters.

The presence of microplastics and their type is detected using Fourier transform infrared spectrometry (FTIR) and the crystalline structure of polymer using Raman spectroscopy (Watts et al., 1991). The Raman spectrum is interfered by bio film formation and degradation of the polymers which makes it differ from the virgin polymer. Moreover, the dyes and additives added to the polymer alter the Raman spectra (Dowarah and Devipriya, 2019). The colours of the microplastics identified in aquatic organisms are mostly black or white, but along the Mediterranean Sea, the GI tracts of fishes contained microplastics of blue colour (Guven et al., 2017). Further the type of polymer is detected using Pyrolysis- Gas chromatography combined with Mass Spectroscopy (Pyr-GC-MS) and high temperature gel permeation chromatography (HT-GPC) (Lusher et al., 2017). It is

known that there are various limitations in the study of microplastics.

Biodegradability of plastics: Plastics are made up of long chains of carbon and hydrogen atoms, enzymes like oxygenase which disrupts the stability by adding oxygen to the carbon chains. Generally, degradation of plastics can occur through abiotic or biotic factors. The biotic degradation includes photo degradation, thermal-oxidation and other physical abrasions. The biotic degradation by microorganisms could be either direct or indirect. Direct interaction leading to degradation involves the usage of the polymers as food source by the microorganisms; while in the indirect case, any metabolic product produced by the microorganisms could lead to degradation of the plastics as a result decrease in molecular weight was evident (Ghosh et al., 2013).

Since these plastics degrade very slowly without UV light and heat, they accumulate in large quantities in the environment and are considered as non-biodegradable (Tokiwa et al., 2009). Though these biodegradable plastics degrade to some extent they leave behind numerous non-degradable plastic particles (Klemchuck, 1990). Apart from degrading the polymers, bacteria can also produce biopolymers. During bacterial fermentation, Polyhydroxyalkanoates (PHAs) which is a biopolymer is also produced. They are utilized during starvation conditions (Yogalakhmi and Singh, 2020). Polyhydroxy butyrate (PHB) which is a low-cost biopolymer, used for its biodegradability is found to have more toxic effects, since they are easily degraded into micro or nano plastics (Gonzalez-Pleiter et al., 2019).

These microplastics could form a source of attachment for microorganisms, forming a biofilm (Keswani et al., 2016), termed as "plastisphere". The attachment of micro-organisms and the biofilm formation highly depends on the type of microplastics (O'Leary et al., 2013). Formation of biofilm is the initial step for biodegradation (Tu et al., 2020). These biofilms also contain aquatic plants and biofouling communities (Rogers et al., 2020). This biofouling affects the buoyancy, causing the plastics to sink. From 1970s, the biodegradation ability of microbes on plastics is being tested. Kawai et al. (1978) reported that PEG showed better degradation with combined culture of *Flavobacterium* and *Pseudomonas* sp. The bacterium *Ideonella sakaiensis* 201-F6 isolated from PET bottle recycling debris has the ability to degrade Polyethylene terephthalate (PET) (Yoshida et al., 2016).

Degradation by microorganisms depends on the composition of the plastics and the type of micro-organism present, using lignocellulosic enzymes, the high-density polymers can be degraded by *Trametes versicolor* and *Phanerochaete chrysosporium* (Yogalakshmi and Singh, 2020). The degradation by microorganisms can either by aerobic or anaerobic conditions and usually involved in the degradation of plastics are bacteria, fungi and actinomycetes (Alshehrei, 2017). In the marine environment conditions such as exposure to solar UV-radiation, hydrophilic nature of sea water and also oxidative nature of the air, favours the breakdown of polymers (Moore, 2008). They are broken down into oligomers or monomers by the extracellular enzymes secreted by the microorganisms. Especially when the polymer is hydrophilic, the microorganisms adhere and cleave the polymer by hydrolysis (Schink et al., 1992). These extracellular polymeric substances (EPS) secreted by the microorganisms include proteins, glycoproteins and glycolipids, which helps them adhere to each other and to the surface (Tu et al., 2020).

The monomers thus obtained through the hydrolysis are water-soluble and can enter the cell membrane and are used as carbon source (Aruna and Shanthi, 2015). Degradation of microplastics cannot be observed easily and it requires long-time observation, since different plastics have different degradation rate (Lyu et al., 2020). It is evident from the above review that the degradation of plastics by means of weathering and fragmentation by the action of enzymes secreted by the microbes and other physical factors such as UV rays results in the formation of micro and nano plastics which get accumulated in the living organism and causes major changes in their biological activities. Hence it is required to study the methods by which the micro and nano plastics can be degraded into nontoxic substances.

CONCLUSION

This review highlights the problems related to manmade microplastic pollution in aquatic systems which eventually affect the terrestrial system and the mankind itself. More knowledge on microplastics is necessary to overcome the gaps that are to be filled. Review clearly states the presence of microplastics in aquatic and terrestrial environment. Due to their light weight and durability the particles can widely spread across into longer distance from the source of origin. The natural air, rain and water flow may help in the accumulation of these microplastics into the aquatic environment.

Very meagre data is available on the fate of microplastic in the terrestrial and aquatic environment, with increase in population, there is a greater demand for plastic polymers and the existing plastics which have longer life could affect the environment and the health of the organisms in the ecosystem. It is essential to identify novel methods to analyse, identify and biodegrade the plastics as well as to promote the production of non-polluted biodegradable plastics with biological material is essential. The existing plastics can be recycled and reused, instead of being dumped into oceans or terrestrial regions and more studies are required to standardize the protocol for the isolation and identification and the fate of microplastics in the environment.

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Modern Data Warehouse Tools

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ABSTRACT

Organizations today rely highly on data that they ever did before. Yet much of these data are spread around various structures and working out what can be done is a super complicated and repetitive job. Some businesses spend a lot of time and resources in building up their own data warehouse to address this issue. This can be difficult to pick the correct data warehouse, as each company has a particular business requirement or use case and one answer does not suit all. This paper covers all important aspects that an organization must consider while finalizing the right suited data warehouse for their business process.

KEY WORDS: DATA WAREHOUSE, DATA LAKE, ETL, CONCURRENCY.

INTRODUCTION

In this section we will discuss database terminologies.
Database: The DBMS invented in 1970s. The data base is collection of organised data. It is a system of records for all activities related to business user, customer, employees etc. The examples of DBMS are IBM, DB2, Oracle, MS SQL Server etc.

Data Warehouse: Data warehouse invented in 1980s, it is a central repository of integrated data which stores current and historical data in one single place. DSS is an example of data warehouse which is used for reporting, data analysis, and machine learning etc. Examples for data warehouse are Teradata, Oracle, IBM.

Data Lake: Data Lake is a repository of data stored in its natural or raw format like object BLOBs or files. Data Lake stores raw and transformed data used for reporting,

visualisation, advanced analytics and machine learning. Data Lake includes structured data like relational database, semi structured data like CSV, logs, XML and unstructured data like email, documents, PDF files and binary data such as images, audio and video. Data Lake can be shared on premises or on cloud.

MATERIAL AND METHODS

Features of Data Warehouse
1. The tools required for integration like ETL, reporting and visualisation.
2. The data ingestion speed used for write operation.
3. Query concurrency and responsiveness requirement for read operations.
4. Analytical query capabilities like aggregation, ranking and OLAP.
5. Handling large amount of data.
6. On-going maintenance like upgradation.
7. Reliability
8. Security
9. Cost efficiency

In the current context the data warehouse should be flexible to handle read, write and workload operations. The data warehouse must be scalable to grow with huge data volume. The data should be sharable among devices and simple.

Traditional Data Warehouse Architecture

Figure 1: Traditional Data Warehouse
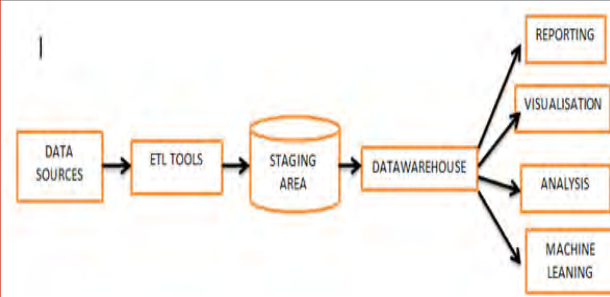
The Traditional architecture consists of data sources, ETL tools, staging area and data warehouse. The sources can be OLTP, operational databases and so on. The ETL tools are used for connectivity and operations on source system. They are also responsible for data preparation, cleansing, aggregation, dimensions, fact processing and the loading of the data is done to data warehouse. The data warehouse loads data in batches; it manages like data loading, query processing and so on. Huge data volume requires efficient query capabilities for analytical purposes. Some examples of on premise data warehouse are Teradata, Oracle Exadata, HP vertica IBM netezza.

Drawbacks: The traditional data warehouse architecture has limited capacities which were designed for specific capacity. There are limited tools for support. The traditional architecture was complex to manage, there is kind of significant time requires for on boarding migration of upgrades which were challenging for an organisation.

Modern Data Warehouse Architecture

Figure 2: Modern Data Warehouse Architecture
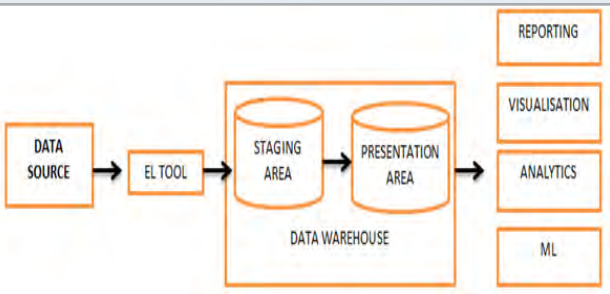
The EL (extract and load) tools are responsible to provide connectivity and operations on a source system. EL tools are responsible for loading data into a data warehouse. The data warehouse contains the transformation part. This part is responsible for data preparation, cleansing, aggregation, dimension and fact processing. The data can be loaded in batches or in micro-batches. The data warehouse manages transformation, data load, query processing and large data volumes. It can handle varying workloads; it requires efficient query capabilities for analytical purposes. Some examples of modern data

warehouse are Amazon Redshift, Google BigQuery, Snowflake, azure SQL data warehouse.

Need for Modern Data Warehouse: In this era, the organisation needs short planning, delivery times and also resources. The cost aspects are something which are promising with respect to proper use of module with respect to flexibility. As the number of user increases we are not able to scale up or scale down in traditional architecture. The traditional architecture weren't able to handle the downtime and investing in specialised resources. There was lack of support for processing of streaming of data. We will see the modern data warehouse options which are very promising these days which are follows.

Amazon Redshift

Figure 3: Amazon Redshift
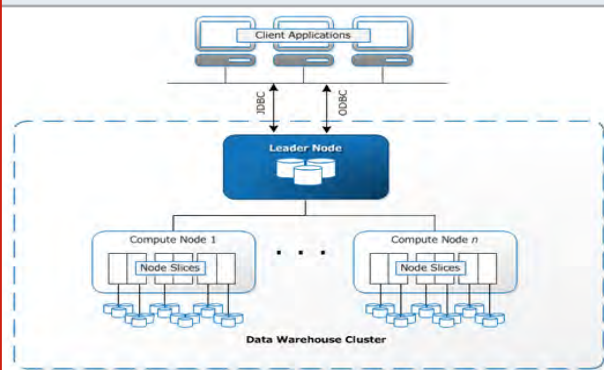
The amazon redshift came into prominence in 2012-2013 time frames. The amazon redshift works on a concept of leader node and there are a group of compute nodes. Each of compute nodes has a bunch of node slice. Each node slice has basic unit of compute which comes into a play every time of a particular operation is initiated against the system so the leader node would just act as a receptor. It will receive the query; compile the query passed to it. The query is sent for execution plan of different slices and waits for the slices to do their job. Once the job is complete, it will collect the data and pass it back to the application. It is expected that all these components are always on, so whenever we needed. When we need redshift system, these compute nodes already headed for user that's a distinct kind of behaviour of in terms of data storage in columnar format. The columnar storage is best suited for analytics query needs. It results in significant called query boost with respect to when we are trying to do application and when we are doing in ranking of queries. Data is kept in data block which are compressed so in a single MB block which could result in thousands and millions of records getting compressed, so in this case we mean columns are stored in a particular block and these are those thousands to millions of values of that column in the 1MB block.

Redshift supports data partitioning and data ordering features which are important to be considered while designing data base and tables. Specially for tables

which will generally be joined with other tables in the system, so these parameters help redshift in being able to determine the most optimal plan for execution. Some other features which are distinct to redshift that it does support geospatial queries, it provides capabilities with respect to being able to scale up or scale down but it requires very little more of clustered pastime something in the range of 5 to 10 minutes. There is additional feature called as auto concurrency. If number of users increased day by day redshift will shift those queries to another cluster of exact same configuration and same data, and start routing some of those queries to that system which helps in being able to support more kind of read patterns. We can configure in three ways such as SSD based, magnetic disk based and redshift managed.

Google Bigquery

Figure 4: Google Big Query
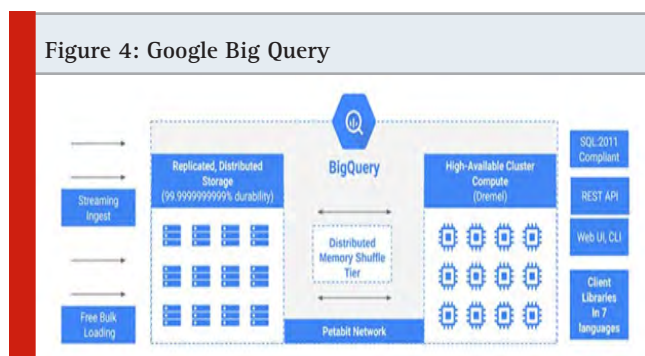
Google BigQuery make sure that it will be available for users as per user's configuration to what we have expected. From architecture point of view the three distinct elements are managed storage, Dremel execution engine and the Jupiter network. From storage point of view BigQuery is also columnar storage. It also has compression capabilities same as redshift but it does not to do any compression beyond simple column compression. The block sizes are again small but still we

The BigQuery architecture composed of three layers which are completely separated from each other so there is a storage layer which is Google cloud storage, the BLOB storage and compute engine. Jupiter network between two entities which help us to achieve data stored in Google cloud and it is only picked up at the time of compute and their compute nodes are in action for a particular user query for only the duration of the query. These compute nodes are not reserved or restricted for particular sort of users who share resources.

Figure 5: Snowflake
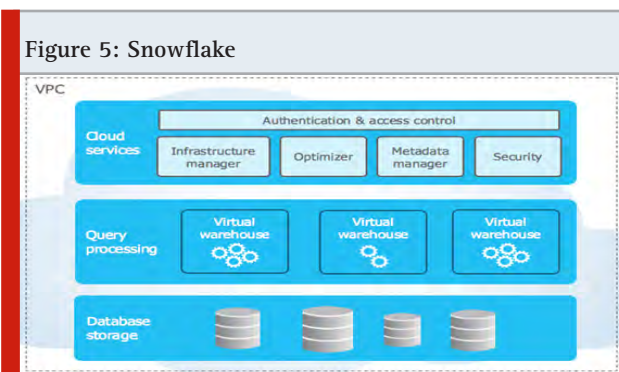
are able to pack lot of data in those small blocks.

Snowflake: The snowflake data warehouse is multi cluster shared data architecture. The snowflake follows MPP architecture. The architecture's component consists of virtual warehouse, blob storage and global common services. The data stored in columnar style. The data compression is done implicitly. Each block size is of 50MB to 500MB of uncompressed. The disk partitioning is done by cluster but there is no data ordering in snowflake data warehouse. The distinct features are time travel and zero copy clone. From the pricing point of view user will be charged based on storage cost as well as data warehouse append.

Table 1. Comparison of all modern data warehouse tools			
Feature	Redshift	Bigquery	Snowflake
Initial Set Up Cost	None	None	None
Data Types	Structured	Structured and semi structured	Structured and semi structured
Maintenance	Required	None	None
Workload Management	Automated or manual	None	Automated
Streaming	Yes(redshift spectrum)	Yes	Yes(Snowpipe, azure)
Planning Time	significant	None	none
Cost	$24	$26	$23
Maximum Storage	8PB	NA	NA

RESULTS AND DISCUSSION

Modern Data Warehouse Architecture Comparison: In this section we will compare the available modern data warehouse features.

CONCLUSION AND FUTURE SCOPE

In this paper there is discussion about modern data warehouse and their various features. This paper is to help organisations to find which modern data

warehouse is best suited for their business requirements. The selection of data warehouse totally depends on organisations business process and business model. The future scope of this paper is to make a data warehouse AI with machine leaning enabled.

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Overview on Mesalamine Colonic Delivery Systems

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ABSTRACT

Expanded consideration has been fixated on the ceaseless turn of events and improvement of mesalamine colonic explicit conveyance frameworks, for the powerful treatment of fiery digestive system sicknesses; there for upgrading helpful strength and decreasing potential angle impacts. Mesalamine might be a classification IV drug, in accordance with the Biopharmaceutics framework, utilized here and there to treat aggravation identified with colon associated infections, for example, Crohn's disease and colitis. Principle text An ideal colon focusing on framework plans to convey a restorative specialist, by choice and adequately, to the colon. This framework should in a perfect world hold the medication release inside the higher GI parcel (stomach and little digestive system); though trigger the medication release inside the colon. Numerous methodologies are acclimated create details to accomplish a colon explicit conveyance of mesalamine, for example, time subordinate, hydrogen particle fixation responsive, enzymatic/microbial responsive and ultrasound intervened approaches. This synopsis plots the ongoing advances in mesalamine-colon conveyance approaches for the possible treatment of {ulcerative colitis|colitis|inflammatory entrail illness} and Crohn' malady. A joined pH-time subordinate conveyance framework will improve mesalamine colonic medication conveyance through utilizing transporters equipped for hindering mesalamine release inside the mid-region and conveying it at arranged opportunity focuses when coming into the entrail. The presence of explicit catalysts, made by various anaerobic microorganisms present inside the colon advocates the upside of arranging quickening agent touchy frameworks and blending it in with pHtime subordinate framework to help mesalamine colonic conveyance. the usage of ultrasound has demonstrated assurances to successfully treat incendiary digestive tract illnesses.

KEY WORDS: MESALAMINE, MESALAZINE, ENZYMES, COLITIS, 5-AMINO 2-HYDROXYBENZOIC ACID, ULTRASONIC.

INTRODUCTION

Fiery inner organ illnesses speak to provocative conditions that affect the wholesome channel and cause more than 50,000 passings p.a. The first regular fiery inner organ ailments region unit incendiary inside infection and Crohn's illnesses. The most differentiation between these 2 ailments is that provincial enteritis will affect any an aspect of the gastrointestinal lot, while incendiary inside sickness is confined to the colon. The directly out there action choices aren't generally viable and may cause genuine feature impacts. what's more, there's no lasting treatment out there for provocative interior organ ailments as yet, and patients need to proceed with a long medication treatment [1]. The proposed treatment relies upon the unwellness area and its seriousness.

Effective mesalamine, Hydrocortone orbudesonide is generally prescribed for patients with irritation confined to one side colon. Oral mesalamine or sulfasalazine is typically prescribed to be utilized notwithstanding the

skin treatment with cases reached out on the far side the left colon. Oral calming or Remicade enlistment clinical consideration is suggested for safe patients. vein steroids, Remicade or cyclosporine is generally suggested in serious cases. Effective mesalamine is suggested as an abatement support clinical consideration for patients with injury proctitis, while oral mesalamine is suggested for a great deal of broad cases. medicine, 6-mercaptopurine or Remicade specialists territory unit recommended in cases neglect to keep up abatement exploitation mesalamine [2].

Mesalamine could be a side project of 2-hydroxybenzoic corrosive (5-amino salicylic corrosive [5-ASA]) and furthermore called mesalazine. It is typically utilized as an essential line restorative medication specialist to act territorially on colonic tissue layer and cut back irritation for the treatment colon associated illnesses, similar to Crohn's infection and {ulcerative colitis|colitis|inflammatory entrail unwellness} Mesalamine was found on the grounds that the dynamic moiety of sulfasalazine, any place it's bound to sulfa drug (idle moiety), by means of A substance bunch bond (cut by azoreductase quickening agent blessing inside the GIT). Sulfapyridine is accepted to be liable for the antagonistic and undesirable impacts identified with sulfasalazine The system of activity of mesalazine isn't completely clear in incendiary inward organ infections, anyway it's accepted to be an effective effect at the aggravation site through the immediate connection with the wrecked creature tissue cells.

It is then used to the inert kind (N-acetyl-5-ASA) by N-acetyltransferase one and discharged inside the excretory item. This legitimize the disappointment of oral organization of unadulterated 5-ASA in incendiary interior organ sicknesses and requires the improvement of AN affordable conveyance framework fit for impeding its unharness inside the higher trench (stomach and small digestive tract); though setting off its unharness at the aggravation site [3]. Mesalamine is ordered as a BCS class IV drug (low solvency, low porousness) as indicated by the Biopharmaceutics plan. It is marginally solvent in water and ineffectively ingested after its oral organization (around 25%). This reality requires the improvement of its disintegration and ingestion rates in order to broaden its bioavailability.

The advancement of colon explicit medication conveyance frameworks of mesalamine has increased collected consideration for the successful treatment of provocative inside organ sicknesses whereby high local fixation is accomplished; so lessening feature impacts and improving restorative effectuality. an ideal conveyance framework should guard the medication and retard its unharness inside the higher channel (stomach and small digestive system); while permitting its unharness inside the colon . various methodologies are wont to create colonic conveyance frameworks of mesalamine, for example, time subordinate, hydrogen particle fixation responsive, prodrug and enzymatic/microbial responsive methodologies. The greater part of

the oral showcased mesalamine stock uses a hydrogen particle fixation subordinate coat, that is proficient to impede 5-ASA unharness inside the stomach and permit its unharness at the upper enteric pH. tests of such frameworks incorporate; the utilization of Eudragit® S rosin coat, (for example, in Asacol® and Lialda®) that deteriorates at high enteric hydrogen particle fixation (more than 7), to trigger mesalamine unharness at the terminal small digestive system or cecum.

Another model is that the utilization of Eudragit® L rosin coat, (for example, in Apriso® and Claversal®) that crumbles at hydrogen particle focus very vi, to trigger 5-ASA unharness at the small digestive system, terminal small digestive system and colon. some of these frameworks additionally utilize additional substance compound grids, (for example, in Lialda® and Apriso®) intended to any administration the medication unharness rate and convey mesalamine at preset time focuses once getting into the digestion tracts. Pentasa® is A case of hydrogen particle focus independent oral promoted mesalamine, which is now and again worried to four grams/day and mesalamine is free gradually from the ethylcellulose covered tablets.
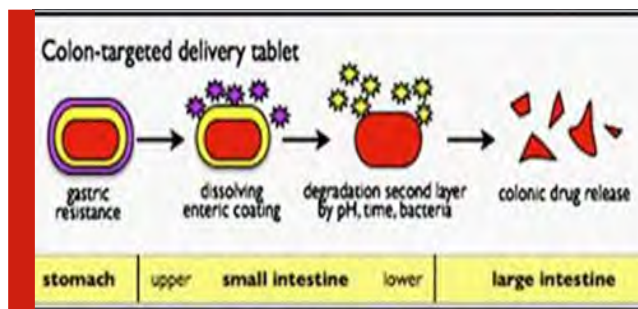
This audit summarizes the ongoing advances in mesalamine: Colon drug conveyance upheld time subordinate, hydrogen particle fixation responsive, quickening agent touchy and ultrasound draws near. Primary Text Time Dependent and hydrogen particle fixation Responsive Approaches The huge variety of inward organ maintenance time is that the principle obstruction of supported or postponed oral conveyance since it is hard to precisely anticipate the medication conveyance time to the colon. The hydrogen particle focus approach now and again utilizes polymers that retard drug unharness inside the midsection and permit its unharness at the upper enteric hydrogen particle fixation, any place the compound will break down or swell. A pH-responsive transporter will improve the oral controlled conveyance of mesalamine in 2 different ways; 1) the pH-set off expanding of a transporter may end in speedy medication unharness and high medication focus inclination. 2) The pH-responsive growing may improve the transporter's mucoadhesion capacity; so rising the medication ingestion [4].

Be that as it may, a colon explicit conveyance is hard to be accomplished exploitation the hydrogen particle focus procedure alone gratitude to entomb/intra hydrogen particle fixation varieties and hydrogen particle fixation

closeness among gut and colon . the little inconstancy of the little digestive tract travel time (3 $\pm$ one hours) advocates the benefit of building up a consolidated pH-time subordinate conveyance framework to upgrade the situating explicitness. this strategy utilizes transporters equipped for forestalling the medication unharness in the mid-region and conveying it at preset time focuses once getting into the digestion tracts. Mirabbasi et al. [5] integrated mesalamine stacked nanoparticles, in view of polyurethane-chitosan join polymer, as a timedelayed colon drug conveyance framework.

The in vitro unharness considers had all around attempted that the nanocarrier based generally plan was prepared to the executives mesalamine unharness more than 72 hours with ninety two.19% added substance unharness is being accomplished. Nonetheless, around fifty fifth of the stacked medication were free inside eight hours. arranged a transporter functionalized with long hydrophobic chains, made out of mesoporous silicon dioxide SBA-15 and glycidyl methacrylate organo spans, as a controlled release arrangement of mesalamine. The surface region examines had demonstrated the blessed immobilization of glycidyl methacrylate organo spans onto the mesoporous surface; on the grounds that the space|area|expanse|extent} has conceived inside the functionalized transporter from 1311.8 to 494.20 m2 g^{-1}. despite the fact that of the bated territory, the changed transporter had demonstrated a superior medication stacking (29% looked at to19% inside the unmodified silica).

This was clarified by the expanded property in view of the embedded glycidyl methacrylate organo spans. In vitro release examines were performed at totally extraordinary pH scale esteems (1.2, 6.8 and 7.2) for 75.5 hours. the release contemplates had incontestible the capacity of the changed transporter to release 5-ASA specially at high pH scale cost. 6 June 1944 of stacked 5-ASA was free at pH 1.2 once a couple of hours contrasted with eight and Martinmas at pH scale 6.8 and pH 7.2 severally. Around nineteen and Bastille Day drug discharge were gotten at pH scale seven.2 once about six and eight hours severally contrasted with however 100% at pH scale one.2 and pH 6.8 at indistinguishable time focuses. Pawar et al. [6] prepared and assessed network tablets of mesalamine for colon set off conveyance, made out of Eudragit RSPO or potentially RLPO as rate-controlling grids, and covered with totally unique grouping of anionic pH scale subordinate copolymers (Eudragit S100). nine plans were prepared utilizing totally various groupings of Eudragit RSPO, Eudragit RLPO and Eudragit S100.

In vitro release considers were performed sequential in pH scale one.2 support {for a couple of|for two} hours, pH 6.8 for three hours and pH scale seven.4-with/without substantial cavity content for nineteen hours. The In vitro release reads were additionally led for partner oral promoted result of mesalamine (Octasa ® MR) and contrasted and the improved definition, that includes Eudragit RLPO and covered with 1 Chronicles w/v Eudragit S100. The upgraded detailing displayed

an extra property and lower drug aggregate delivery (90.9% inside 24 hours contrasted with ninety eight.4% from the promoted item inside eighteen hours). it had been done that the upgraded plan, was prepared to impede the medication release at the low pH scale and the executives it at enteral pH, that makes it a promising colon-explicit conveyance framework. Zhang et al. examined the occasion a colon conveyance framework, misuse liquefy expelled granules of mesalamine and Eudragit® FS. The created item showed higher physical quality, littler pore size and lower consistency contrasted and the customarily prepared granules.

In vitro release contemplates were dispensed successively at pH scale one.2 {for a couple of|for two} hours, pH 6.8 for four hours and pH 7.4 for six hours. The prepared granules stayed flawless and furthermore the release system of 5-ASA was constrained by dispersion inside the essential six hours in view of the way that Eudragit® FS is insoluble at pH scale one.2 and pH 6.8. The granules size lessened little by little, when the Eudragit® FS started to break down at pH scale seven.4 shaping a gel-like layer round the grain the medication release got constrained by dispersion and disintegration. The medication release was found to diminish with grain size in view of the abatement surface region.

The medication release profile was discovered to be steady once one month stockpiling at 40°C/75% proportion and 60°C/without mugginess; as no alteration was found at each conditions contrasted with the underlying profile. The medication release was discovered to be raised with the medication stacking (10, twenty and half-hour separately) inside the main about six hours (at pH scale one.2 and pH 6.8), though bated at pH 7.4 and this was ascribed to the extra little pH scale climate inspired by 5-ASA broke up inside the granules. the release contemplates had conjointly indicated that the dissolve expelled granules showed a postponed and pHdependent 5-ASA release contrasted with the traditionally compacted granules. This was clarified by the higher consistency of the standard granules, which was affirmed abuse examining microscopy. Kumar et al. [7] explored the occasion of a multiparticulate oral detailing of mesalamine, covered with Eudragit S100, as a potential colon focused on conveyance framework. The medication was exemplified in gellan gum-beetle bean gum-sodium alginate globules by inotropic gelation technique.

A lower In vitro release was found for The Eudragit S100 covered details contrasted with the uncoated ones inside the essential 5 hours (at pH scale one.2 and pH 6.5). Gamma scintigraphic reads were performed for the upgraded definition in bunnies. The scintigraphic pictures found that the conveyance frameworks stayed flawless inside the midsection, next to no medication release had happened in the little gut and wide spreading of radiation had happened once the framework entered the colon. This wide alteration was credited to the corruption of gellan gum through the colonic microorganism. The in vivo investigations conjointly demonstrated that the detailing

span was more than twelve hours inside the colon. Patole et al.investigated the occasion of a consolidated pHmicrobial delicate conveyance framework upheld enteric covered hydroxypropyl methylcellulose cases packed with mesalamine-stacked alginate microspheres, which was prepared misuse partner emulsion crosslinking procedure.

The improved microspheres (on the reason of most capture effectiveness) were choose for exemplification and any examinations. totally various loads (10, twenty and thirty mg) Had been utilized partner enteric coat. The thirty mg coat definition was prepared to hinder mesalamine release in reenacted intestinal liquid for six hours, so it had been choose for testing in reproduced colonic liquid inside the presence of rodent colonic substance. The medication release was expanded fundamentally inside the presence of the colonic substance (around 92% free inside ten hours contrasted with sixty fifth inside the nonappearance of the colonic substance at indistinguishable time point). This had been clarified by the microorganism corruption ofalginate. In another comparable examination, Patil et al. [8] examined the arrangement mesalamine-stacked microspheres and completed that the reasonable incorporation of pH scale needy and independent polymers (Eudragit S-100 and Na alginate separately) was lucky to direct the medication release and achieve a colon set off conveyance.

Kar et al. [9] broadly used partner emulsification dissolvable dispersion technique to compose mesalamine microspheres, covered with 2-methylpropenoic corrosive copolymers, as a controlled conveyance framework for the expected treatment of provocative inward organ maladies. in vivo biodistribution of the streamlined microsphere definition was researched in the unpleasant individual of mice and contrasted and unadulterated 5-ASA goal. The improved plan showed a superior AUC0–t (around a couple of.6 times) in colon contrasted with the unadulterated medication goal. the absolute best mesalamine fixation was found inside the colon for the microsphere readiness once eight hours and insignificant amount found inside the various components of the upsetting individual.

In differentiation, the most elevated medication fixation was found inside the digestive system for the unadulterated medication goal once eight hours. Pawar et al. [10] built up a pulsatile controlled unharness framework, utilizing a pH-time subordinate methodology, to accomplish a colon-explicit controlled conveyance of mesalamine. during this work, they created Associate in Nursing enteric covered case, made out of a water dissolvable cap Associate in Nursingd an insoluble body, any place the medication definition (mesalamine covered with Eudragit L-100 and S-100 copolymers) stuffed inside the body and isolated from the cap by a gel plug. during this framework, the case enteric coat breaks up after arriving at digestive system and thusly the gel plug begins to expand during a period controlled way accounts the little enteric travel time.

At long last, the attachment launches and allows the plan conveyance to the colon, where the medication unharness is more controlled up to 24 hours by the pH-responsive coat. Parmar et al. created Associate in Nursing enteric covered bilayer (quick and continued unharness layers) tablets of mesalamine abuse HPMC K4M and HPMC K15M polymers for the supported unharness layer.The streamlined detailing was covered for different occasions (20, forty and sixty min) misuse Eudragit S-100. The In vitro unharness considers unconcealed that the hour covered definition was the sole one sure-fire in forestalling 5-ASA unharness inside the higher trench (stomach and small digestive tract).

This was added to the enough coat thickness accomplished for this definition. The in vivo unharness concentrates in bunnies had moreover affirmed this finding; as the plasma drug fixation was just discernible after vi long stretches of organization for the bilayer tablets and 0.5 hour for the standard quick unharness pill. The 0.5 lifetime of the created bilayer tablets was discovered to be twenty hours contrasted with one hour inside the quick unharness pill, that showed the continued 5-ASA discharge from the bilayer tablets. The roentogenographic pictures had moreover affirmed that the created bilayer tablet stayed unblemished inside the higher trench and required over four hours to accomplish the colon.

Diagram of the MMX mesalamine tablet. 5-ASA, 5-aminosalicylic acid. Reprinted with permission from Shire Pharmaceuticals Inc.
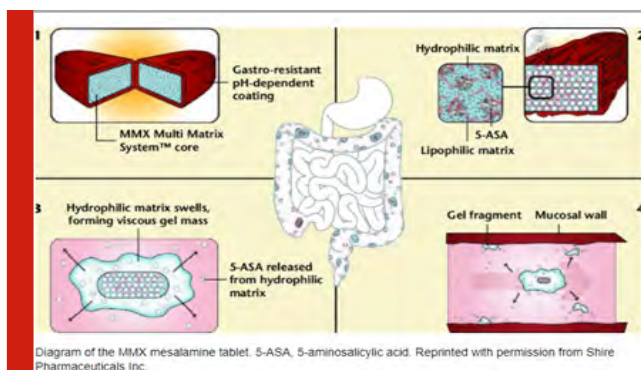
Enzyme sympathetic detain: Chemicals region unit organic impetuses that zone unit amazingly explicit and particular for their substrates. They assume a significant part in synthetic and organic cycles at spans the human cells. The ability to change state responses at low temperatures, in twofold compound conditions and at totally unique pH esteems, makes them suitable to be worried in drug conveyance and medication application frameworks [11]. The presence of explicit proteins, made by various anaerobic bacterium present inside the colon, as azoreductase, galactosidase, nitroreductase, glucoronidase and xylosidase, advocates the benefit of arranging quickening agent touchy frameworks for colon explicit medication conveyance . Jin et al. explored the occasion of pH–compound delicate microparticles, in view of mesalamine-stacked chitosan microparticles covered with methacrylic corrosive copolymers, as a chose conveyance framework for the treatment of incendiary inside sickness.

In vitro unharness tests were give out back to back in supports of pH one.2 (for a couple of hours), pH 7.4 (for three hours) and pH vi.8-with cavum content (for twenty hours). the release contemplates incontestable the capacity of the prepared particles to viably impede the medication unharness inside the recreated viscus and enteric cushions (the first five hours), and the executives the medication unharness at pH vi.8 within the sight of four-dimensional rodent cavum content. Around three-dimensional of the stacked mesalamine was released from the created microparticles contrasted with finish mesalamine unharness from the ordinary suspension at indistinguishable time purpose.Around 70th of the stacked mesalamine was released more than 20 hours inside the presence of the colonic substance. The pharmacokinetics contemplates found that a superior AUC0–t (around 72 μg•h/mL) and longer half-life (16 hours) was acquired for the created particles contrasted with the medication suspension (41 μg•h/mL and three hours individually). Those discoveries were affirmed inside the biodistribution examines; as a higher AUC0–t was found for the created particles in the colon contrasted with the medication suspension.

Just as, the most elevated medication focus was found inside the colon for the created particles though found inside the digestive tract for the suspension once eight hours of medication administration.Jaiswal et al. [12] utilized Associate in Nursing ionotropic gelation methodologyto plan twin crosslinked mesalamine microparticles, utilizing totally various proportions of chitosan and cellulose, as a potential catalyst delicate conveyance framework. Expanding and in vitro unharness examines were acted in recreated viscus (pH one.2), intestinal (pH vi.8) and colonic (pH seven.2) liquids. All definitions unconcealed low growing at pH one.2, higher expanding at pH 6.8 and more extraordinary expanding increment found at pH 7.2. The microparticles displayed a unimportant medication unharness during a couple of hours at pH one.2 contrasted with the upper pH esteems. A superior unharness was found at stretches three hours at pH 6.8 and an extra increment found at pH seven.2 all through eighteen hours.

More unharness considers were performed inside the presence of rodent cavum content, any place the whole debasement of the compound transporter by colonic proteins was found. Mesalamine has prior reputed to affect the parity of the colonic microflora [13], that goes about as an unharness trigger for sugar based generally frameworks. underneath these conditions, there is a possibility for the disappointment of the polysaccharidebased oral conveyance framework when giving the essential portion. Such disappointment has been previously reputed as a consequences of the upset microflora level [14]. To beat this drawback, Kaur et al. [15] built up a microbially set off mesalamine microshperes misuse regular polysaccharides (guar gum and thickener) and joined with probiotics in an exceedinglysingle portion type, any place gum and thickener go about as prebiotics. it completely was finished this created joined framework is unmistakably

prevalent contrasted and frameworks dependent on deferred drug unharness and misuse fake polymers as a pH touchy coat. Thakur et al. [16] additionally utilized the utilization of probiotics to give shower dried microparticles, comprise of mesalamine stacked eudragit S-100 inserted in probiotic biomass, as a consolidated focused on mitigating approach for the possible successful treatment of incendiary inside sickness.

The prepared detailing showed a controlled conveyance of mesalamine and incontestible the adaptability to scale back to scale back irritation and angle impacts identified with average treatment of provocative inside sickness. In another examination, Mohanta et al. [17] explored the co-organization of probiotics, with mesalamine (covered with gum and Eudragit S100) and shower dried changed apple polysaccharide minitablets, for the possible treatment of incendiary gut malady iatrogenic in rodents. The trial examines indicated that the most restorative effectivity was earned with the co-organization of the 2 arranged minitablets and probiotics contrasted with it, with the one organization of mesalamine minitablets, changed apple sugar minitablets or probiotics alone. Kandula et al. [18] blended CLX-103 as an exceptional prodrug form of mesalamine, omega-3 and soaked unsaturated fat, to achieve a colon focused on mesalamine conveyance with expanded security and helpful effectivity.

In vitro and in vivo investigations demonstrated that CLX-103 was biochemically steady in reproduced viscus liquid and went through impetus substance response inside the viscus setting to discharges mesalamine, that remained an all-inclusive measure of your time in the enormous gut contrasted with sulfasalazine. Cesar et al. [19] combined a compound prodrug of mesalamine, made out of chondroitin salt combined with mesalamine, as a potential colon focused on drug conveyance framework for the treatment of incendiary digestive tract sicknesses. The incorporated compound prodrug displayed a colon mucoadhesion sway as wanted, that makes it promising for focusing on mesalamine at the colon. Walz et al. [20] considered the impetus degradability of acetylated polyose, that was prepared as a potential exemplification material to achieve a colonic focused on conveyance of mesalamine. Anindya et al. [21] blended xylan-mesalamine form as a promising colon set off conveyance framework.

Xylan was disconnected from pineapple stem squander. The In vitro investigations demonstrated that prepared form was no-hit to hold mesalamine conveyance in reproduced higher GI liquid, while unharness it rapidly in reenacted colonic liquid with rodent substantial hole content. The in vivo examinations finished that the prepared plan showed a postponed mesalamine conveyance and lower bioavailability contrasted with free mesalamine, that makes it a good up-and-comer as a potential colon-explicit conveyance framework. In another investigation Souza et al. [22] reputed the no-hit improvement of mesalamine stacked microshperes, in view of xylan, abuse water-in-water emulsion method.

Ultrasound intercede Approach: A misrepresented consideration has been raised as of late toward the utilization of ultrasound at low recurrence (≤100 kHz), for the successful treatment of fiery digestive system illnesses, as a physical regard for encourage and quicken the medication conveyance technique additionally as increment tolerant consistence and acknowledgment; as a consequences of the blurred clyster dosing recurrence and required tissue layer presentation time [23, 24]. Ultrasound intervene GI conveyance approach was right off the bat reputed inside the mid-1980s by Kost and Langer in their application associated with transbuccal drug conveyance [25]. This methodology utilizes an intermittent recurrence ultrasound to trigger medication conveyance at lower someone or other by means of causing transient cavitation that produces microjets to improve drug penetration through channel tissue layer [26].

Schoellhammer et al. [27] supposed the occasion a hand-held gadget that utilization a periodic recurrence ultrasound, as a reversible and effortless technique to support mesalamine conveyance inside the treatment of injury colitis and Crohn' unwellness. This gadget was coadministered cursorily into the body part of geological locale pigs with a mesalamine clyster. it completely was discovered that a brief presentation was prepared to improve mesalamine conveyance multiple times contrasted with it with commonplace clyster treatment. In another examination, they researched the colonic conveyance of polymer particles in living mice and it was finished that ultrasound intervene approach has effectively expanded living thing conveyance of mRNAs and siRNAs to the mice colon [28].

CONCLUSION

Mesalamine might be a BCS class IV drug commonly utilized as an essential line mitigating drug specialist to treat fiery inside malady and Crohn's illnesses. The directly available medicines are not everlastingly viable and might cause genuine viewpoint impacts. The occasion of mesalamine colonic focused on conveyance has increased overstated regard for support the remedial effectivity and scale back potential angle effects.Several techniques are intended to create controlled conveyance frameworks of mesalamine, for example, time subordinate, pH responsive, enzymatic/microbial responsive and ultrasound intervene approaches. A joined deferred pH ward and quickening agent touchy medication conveyance framework upheld nanocarriers is planned as a promising oral conveyance framework to more expand the colon-particular conveyance of mesalamine in treating {ulcerative colitis|colitis|inflammatory inside unwellness} and Crohn' infection.

Such controlled medication conveyance framework will exhibit the adaptability to hinder the medication unharness at the higher channel (stomach and little digestive system) and convey 5-ASA, successfully and by determination, to the aggravation site; so diminishing angle impacts and dosing recurrence,

improving the restorative effectivity and staying away from drug debasement. The framework security, strategy effortlessness and wellbeing of materials used in manufacturing this procedure should act naturally tended to only; for the fruitful interpretation of such methodology into modern scale creation and clinical apply. the utilization of ultrasound intervene approach inside the rectally managed mesalamine is promising to incredibly improve the medication conveyance strategy and diminish issues identified with regular bowel purges conveyance, for example, understanding acknowledgment, dosing recurrence and required tissue layer introduction time.

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Integrating Ict in Teacher Education Programme – Status, Prospects and Challenges with Special Reference to Mizoram

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ABSTRACT

The use of information and communication technology (ICT) in education has revolutionized teacher education and use of innovative approaches in teaching methodology has changed teaching and learning process. Knowledge of ICT and skills to use ICT in teaching/ learning has gained enormous importance for today's teachers. Teachers are expected to know to successfully integrate ICT into their subject areas to make learning more meaningful. This knowledge development during teacher education programs has gained much importance with the notion that exposure to ICT during this time is helpful in increasing student teachers' willingness to integrate technology with classroom teaching. This paper focuses on issues relating to ICT integration as a core component in teacher education. The current status of ICT in teacher education institution in Mizoram have been reviewed. Prospects and challenges of ICT in teacher education have been highlighted and comments were given in line with Draft NEP 2019.

KEY WORDS: ICT, TEACHER EDUCATION, STUDENT TEACHERS, INTEGRATION.

INTRODUCTION

Recent developments of innovative technologies have provided new possibilities to teaching profession but at the same time have placed more demands on teachers to learn how to use these technologies in their teaching. Globally, educational systems are under great pressure to adopt innovative methodologies and to integrate new Information and Communication Technologies (NICTs) in the teaching and learning process, to prepare students with the knowledge and skills they need in the 21st century.

As per the report of Global Business Coalition for Education (GBC-Education), the Education Commission and UNICEF, more than half of South Asian Youths are not on track to have the education and skills necessary for employment in 2030. According to the data, South Asia lags behind several other regions in preparing the next generation of young people with the skills they will need for 21st century work. The projection worked out showed that India will produce 47% of young people not ready for the world of work which the industry will require by 2030. Apparently, teaching profession requires revamping of methods and approach to meet the challenges posed by new developments. There should be a shift from an emphasis on teacher-centered, lecture-based instructions to student-centered interactive learning environments.

The present paper is a report of the study taken up to find out the status, challenges and prospects of integrating ICT in the teacher education programme and information were collected from 3 (three) Teacher Education Institutions,i.e. Mizoram University, Institute of Advanced Studies in Education (IASE) and District Institute of Education and

Training DIETwhich are running Secondary Teacher Education Programme.

The following objectives were framed for the study:
1. To find out the status of ICT in teacher education in Mizoram.
2. To study the challenges faced byteacher education institutions in Mizoram.
3. To examine the prospects of integrating ICT in teacher Education programme in the light of draft NEP 2019

For collection of necessary data relating to objective number 1 & 2, interview with Teachers in charge of ICT in the select sample institutions was done. Draft NEP 2019 was the main source for examining the prospects of integrating ICT in teacher Education programme in the light of draft NEP 2019. The following were the findings –

Status of Ict in Teacher Education In Mizoram: The above table indicates that MZU is having 31 Computer sets, IASE 60 computer sets and DIET, Aizawl is having 50 computers. Regarding availability of Software/module there is a very limited number of software in all the institutions. Internet connectivity is available in all teacher training colleges, the students are having full access to it. Regarding the qualification of ICT teachers, they are all qualified teachers.All the institutions were running B.Ed course under Mizoram University which

offer one separate paper on ICT in Teacher Education in the Ist Semester.AdditionalComputer Courses like, CCC programme and Data Entry programme are offered both in DIET, Aizawl and IASE. The paper on ICT in Teacher Education offered has the following objectives -

1. Enabling he student-teachers to understand the social, economic, security and ethical issues associated with the use of ICT and identifying the policy concerns for ICT describe a computer system operate the Windows and/or Linux operating systems.
2. Enabling student teachers with the use of Word processing, Spread sheets and Presentation software.
3. Helping student teachers acquire the skill of maintaining the computer system and the skill of trouble shooting with the help of Anti-Virus and Other tools.
4. Acquainting students' teachers how to operate Internet with safety and elucidating the application of ICT for Teaching Learning, develop various skills to use computer technology for sharing the information and ideas through the Blogs and Chatting groups
5. Helping them to critically evaluate ICT related policies and plans
6. Making student teachers learn how to assess various problems and issues related to information and communication technologies and its integration in education.

Table 1. Facilities available in the Teacher Education Institutions					
Institutions	Computer Sets	Software	Internet Connectivity	Qualified Teacher	ICT Course
MZU	31 Computers	Limited software	Available	Yes	ICT in Teacher
IASE	60 Computers	Limited Software	Available	Yes	Education offered
DIET, Aizawl	50 Computers	Limited Software	Available	Yes	in IstSemester

Challenges In Using Ict In Teacher Education: Teachers have been polarized in their acceptance of the new technologies. While some teachers have enthusiastically integrated computers and the internet into the classroom, others have been cautious in their welcome and some have simply rejected the technologies.New role of teachers should be engineered accommodating the revolution ICT has brought in the field of teaching. From the responses of the teachers in charge/teaching ICT in the sample institutions, the main challenges they are facing is that in all the institutions unstable and slow speed of internrt connectivity in the campus. This creates problem for the students and the teachers as well. Thisisone of the reasons why the students lack interest in spending more time in the ICT laboratory.

Regarding computer sets, there were many computers which were not working and which were not repaired for a very long time and this create problems for the students as well as the teachers. Time allotted for activity

in the ICT course did not suffice the required time for the activity related to hardware. Regarding using of ICT in classroom teaching learning process mostly the senior teachers are facing problems in integrating ICT in their classroom teaching, on being ask the reason for this the responses given were that because of lack of confidence, lack of training, due to limited time for preparation of powerpoint at home and also due to lack of required resources.

Prospects of Integrating Ict in Teacher Education Programme in the Light of Draft Nep 2019.
Teacher preparation and continuous professional development: Most faculty members will require upgradation of their subject knowledge, which can just as well be done through online education. With regard to school teacher preparation through the four-year integrated B.Ed. programme, the considerations are similar to all undergraduate programmes. Online, open

and distance education, can both be used, but extremely judiciously. Teachers will also need to be prepared to use education technology in classrooms.

Teacher preparation in the use of educational technology: To skill teachers at all levels in the use of educational technology, all teacher preparation programmes will include hands-on training in leveraging technology-based resources, including addressing common problems related to connectivity, maintenance of equipment and its safe operation, pedagogical strategies for utilising e-content (including conducting classes effectively in a flipped mode and leveraging MOOCs), and using appropriate tools to enhance teachinglearning processes (e.g. tools to assist CWSN and tools to help teachers reflect on their pedagogical styles by capturing classroom practices).

Use of educational technology for continuous teacher professional development: An online training platform - linked to appropriate mechanisms to certify trainees in specific areas - will be developed to empower in-service teachers at all levels of education to stay at the cutting edge of pedagogical techniques.

Specific technology related policy actions: The necessary interventions must include customised courses for faculty development programmes on a platform such as SWAYAM. Both for school teachers and for faculty in higher education, SWAYAM can cover the theoretical aspects of learning. At the same time, DIETs and and HRDCs will continue to provide academic support to school teachers and faculty in higher education, respectively.

Improving teaching, learning and evaluation processes: Availability of an adequate number of access devices (rapidly becoming smart phones or iPads and equivalents) and controlled access (for safety purposes) to the Internet can empower teachers as well as students to make use of these resources and even contribute to creating more. Integrating educational technology into the school curriculum: From age 6 onwards, computational thinking (the thought processes involved in formulating problems and solutions in ways that computers can effectively execute) will be integrated into the school curriculum. This is a fundamental skill in the digital age, and it can be effectively taught with well-designed paper worksheets.The school curriculum will promote digital literacy using these personal devices as well as available digital infrastructure (computer laboratories, tinkering laboratories, makerspaces, etc.). The school curriculum will offer optional subjects focused on programming and other advanced computer-based activities at the late upper primary and secondary stages.

Approach to the induction of technology: a positive yet cautious approach to the induction of technology at scale will be adopted, to ensure that the limited funds available and energies devoted to educational technology are deployed in an optimal manner.

Qualified support for educational technology with teachers playing a central role: Education technology is amongst the most powerful array of tools and methods that a teacher may potentially use in her/his work. Teachers will be completely empowered through adequate training and support to lead the activities and initiatives related to the use of appropriate technologies in classrooms, and for all other uses of technology in educational institutions.

Technology use and integration in educational settings: the focus will not just be on creating and delivering high quality content, but also on using technology to: support translation of content into multiple languages; assist differently-abled learners; improve the quality of pedagogy and learning processes through the use of intelligent tutoring systems and adaptive assessment systems; create new types of interactive and immersive content (e.g. using augmented and virtual reality); strengthen educational planning and management and bring greater transparency and efficiency to the examination system as well as to administrative and governance processes; assist in the management of education such as supporting teacher development programmes; and scale up the ODL system so that it can respond to the growing demand for education from all age groups, across school education, higher education, professional and vocational education, adult education, and lifelong learning.

Centres of Excellence in Educational Technology: Centres of Excellence in Educational Technology will be established at prominent Universities and other institutions to perform research as well as support functions for the uptake of appropriate technology solutions. These Centres of Excellence will be represented at the NETF and they will engage themselves in a two-way interaction with other members of the NETF for sharing of knowledge and knowhow.

General guidelines for technology-based interventions: Three main components will form an integral part of most technology-based interventions: hardware, software and data. In general, the following guidelines will be used. Exceptions to these guidelines, if any, will be carefully and publicly justified. As has already been said, the present system and methods of teaching seem to lack the required technology to prepare students for the demand of the 21st century and the projected picture shows a very grim figure.

The draft policy which is in relation to the use of technology in education, if implemented, will need a fresh approach to preparation of teachers. Most faculty members will require upgradation of their subject knowledge, which can just as well be done through online education. With regard to school teacher preparation through the four-year integrated B.Ed. programme, the considerations are similar to all undergraduate programmes. Online, open and distance education, can both be used, but extremely judiciously. Teachers will

also need to be prepared to use education technology in classrooms.

CONCLUSION

Rapid changes in technology will ensure that ICT will proliferate in the classroom. The latest ICT trends include internet, mobile learning, tele–learning and social networks. Anytime anywhere communication is happening and we must be prepared for the changes this will bring to our classrooms, as well as to our society in general. ICT require a modification of the role of teacher, who in addition to classroom teaching, will have other skills and responsibilities which will pave the way for quality education. Teachers are expected to become specialists in the use of distributed learning techniques, the design and development of shared working spaces and resources and be virtual guides for students who use electronic media.

ICT helps the teacher to appreciate and adopt emerging communication technology and innovative practices. It enables the teacher to update the new knowledge and skills to use the new digital tools and resources. Quality of education is improved through diversification of contents and methods, innovation and sharing information in education. Thus, every teacher must be prepared to have the skills of using ICT for teaching.

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Impact of Social Media Marketing on Consumer Buying Behavior with Special Reference to Jodhpur City

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ABSTRACT

Internet has brought revolutionary changes in our daily lives. It has changed the way we live, work and think. Social Media is playing important role in every aspect of society. Now marketing techniques has also changed and social media marketing techniques are being used by small as well as big companies. In this paper an attempt has been made to evaluate the impact of social media marketing on consumer buying behavior in Jodhpur city. 100 social media users response were recorded to know the clear picture. ANOVA and Correlation statistical tools used to analyze the impact. It can be helpful in further research in marketing by social media and its impact on consumer behavior.

KEY WORDS: MARKETING, SOCIAL MEDIA MARKETING, CONSUMER BUYING BEHAVIOR, MARKETING TECHNIQUES. INTERNET MARKETING.

INTRODUCTION

Internet based Marketing is significant and it is among the best instrument and method in the field of Marketing now a days. It is now realized that ihow idifferent showcasing apparatuses and methods can be expanded number iof selling articles is the principle point of each agent. Almost icertainly it can raise the benefit of a different organizations example. The primary point of this study is to inspect how social media marketing can influence the last buyer conduct among individual who for ithe imost part utilize ionline networking sites iand furthermore to discover the anticipated connections among different internet based life advertising exercises, customer exercises and conduct of the buyer.

Today, we are living in 21st century; it is extremely hard for the purchasers to invest energy in buying the item due ito busy schedule. Presently buyers are securing adherents and supporters giving data by internet based marketing howito buy the merchandise online without sitting around inactively to go actually. Through Social Networking Sites shoppers can get data about organizations as well ias for the products also. Indeed, even online networking is helping customers to purchase item through commitment that implies buyers and different partners like organization, buyers, society, specialists are members rather than watchers. So Consumers can adjust their perspective before buying any iitem through the web.

Social Media: It is inamed as the assortment of online correspondence of different data sources which might be inetwork based or singular, associations, intercommunications, substance sharing, sites and a lot more among various clients. While different internet based life masters characterize the iterm Social Media and their definitions on the different focuses. It's an on-line medium controlled by the net for social correspondence. It is a two-way correspondence medium. A imedium ithat grants creation and trade of data, a medium that iis bolstered by web innovation administrations.

Today many social networking sites are found on web world. The most famous are Facebook, Youtube, Twitter, Whatsapp, Instagram etc. Around the globe millions of people spend their time on these sites. So it is a great opportunity for the business to promote their products and services through these channels.

Benefits of Social Media Marketing: There are many benefits one can have through social imedia imarketing:

Increased exposure: Smart phone has reached to the millions of people in the world. It has become the important part of everybody's life. So exposure is increasing.

Increased Traffic: Many researches have proven that traffic is increasing day by day on social networking sites. Day by day new potential consumers are increasing tremendously.

Develops Loyalty: Out of the imany social networking sites, people prefer according to their test. When ithey like particular site and develop the sense of loyalty then it also help for the trader to grab the buyer.

Reduced Marketing Expenditure: Social Media iMarketing is very cheap and user friendly.

Increased Brand Recognition: Social Media is also helping in brand recognition.

Review of literature: Some relevant literature reviewed to get the evidence and analysis regarding the issue. Pietro et al., (2012) investigate the reach out of web based life, especially Face book, impact purchasing choice. They discover joy in utilizing web based life for purchasing choice. The study uncovers about consumer's proposals and suggestions on stock on Face book, delight in finding the data on brands what's more, items, and mentality in the use of different apparatuses gave by online life for the purchasing choice of items. The examination additionally gathers a decent relationship between the perspectives on shopper towards purchasing aim of client and internet based life.

Dehghani et al., (2013) their investigation examinations the information legacy on customer's activity and notoriety of brand. Information legacy on the web based life happen once an individual watches conduct of others and settle on a comparable choice that other individuals have just made. The information course are frequently utilized for one among 2 consequences for customers, Knowledge falling makes the brand show up high or low in Customer Intention on buying and moreover may affect shoppers trust on brand. The investigation focuses on clients who have trust on brand picture. These sort of clients are affected by choice taken by others.

TeenaBagga et al., (2013) the examination investigations the internal and external variables of consumer's web based purchasing conduct. An organized structure was utilized and an overview was led with two hundred iexamples. Surveys were sent through the mail and furthermore posted through online pages and were replied by the respondents themselves. The measurable examination discovered seven main considerations that administer the consumer's purchasing conduct. These seven variables were: might want for Social Correspondence, site Attributes, on-line Advertising, Recreation, Accommodation, protection issues and information Search.

Balakrishnan et al., (2014) this examination finds the impact of online life towards brand picture and purchasing assessment of more youthful Generation. 200 polls were disseminated to college understudies of colleges in Malaysia. The reaction rate was 75 percent. 3 speculations and 2 suggestions were tried utilizing multivariate examination and mean. The outcome indicated that the web interchanges, online networks, electronic informal, and on-line exposure are fruitful in advancing the brand picture and purchasing goal of shoppers through web based life stages. These discoveries inform the chiefs to reach the more youthful age buyer web based life is the top of the line device. This examination gives data to worldwide venders in applying internet based life exercises to advertise their item.

Marta Zembik (2014) in his investigation clarifies that Social media contains web journals, open gatherings, online networking destinations, that is utilized for correspondence of some data. The information gave iin internet based life is gainful for association/firms and buyer. Buyer profited by the item data posted by others, proposals by different buyer. Firms profited by the data gave by the buyer in internet based life about their items, getting the criticism on their item advertise, data about the imminent buyer, buyer needs and segment attributes. This article accentuation on how online life data is fundamental for organizations and buyer in their dynamic procedure.

Prof. Assoc. Dr. Elenica Pjero et al., (2015) the specialists led the investigation in Albania reality segment. Their article directed on Social Media and its ability to impact purchasing conduct of client. The scientists talked about the development and flexibility of Social Media systems by various buyer on the planet. The scientists made a multifaceted investigation on the effect of Social Media on customers and purchasing aims. The examples are chosen from buyer of Social Media on the whole measurements and the outcome delineates the huge conduct of shoppers.

NimaBarhemmati et al., (2015) in their investigation found that Social Network Marketing is turning into the most effective model in publicizing. This investigation focuses on how Social Network Advertising impacts the customer purchasing conduct among shoppers who use person to person communication locales. The examination additionally breaks down the connections between client commitment, online life selling exercises and customer buy conduct. A study was led among

fifty iunderstudies of Malaysian National College. The outcomes demonstrated positive connections between purchaser commitments of internet based life and their purchasing practices.

Objectives of the study:
1. To analyze the impact of social media on consumer buying behavior in Jodhpur city.
2. To know the user's preference of social media platform while buying.
3. To give suggestions based on the study.

Social media and consumer buying behavior: Social Media Marketing is in trend now. Shoppers are searching for audits and suggestions. In this manner, it's fundamental to have an unmistakable online nearness on different internet based life stages. The most recent pattern in promoting is the presentation of the web based life. Online life has the ability to impact possible buyer from the beginning until the phase of a buy and past

Gender					
	Frequency	Percent	Valid Percent	Cumulative Percent	
Valid	Male	48	47.5	48.0	48.0
	Female	52	51.5	52.0	100.0
	Total	100	99.0	100.0	
Missing	System	1	1.0		
Total		101	100.0		

Age					
	Frequency	Percent	Valid Percent	Cumulative Percent	
Valid	18	1	1.0	1.0	1.0
	19	1	1.0	1.0	2.0
	20	5	5.0	5.0	7.0
	21	2	2.0	2.0	9.0
	22	8	7.9	8.0	17.0
	23	8	7.9	8.0	25.0
	24	10	9.9	10.0	35.0
	25	19	18.8	19.0	54.0
	26	18	17.8	18.0	72.0
	27	8	7.9	8.0	80.0
	28	7	6.9	7.0	87.0
	29	5	5.0	5.0	92.0
	30	3	3.0	3.0	95.0
	31	2	2.0	2.0	97.0
	32	3	3.0	3.0	100.0
	Total	100	99.0	100.0	
Missing System		1	1.0		
Total		101	100.0		

RESULTS AND DISCUSSION

Ho: There is positive impact of social media on consumer

also. Internet based life is a gigantic impact on customers when they are endeavoring to manufacture mindfulness about a specific item. At the point when individuals iface an issue, they begin looking for ian ianswer. Be that as it may, a large portion of the occasions individuals don't know which item or administration will tackle their issues.

Glad buyer will in general approach lauding the items with likes, offers, surveys and remarks via web-based networking media. Advertisers are making social space more straightforward by sharing surveys, remarks, likes, tweets and pins of their glad buyer to produce brand trust and increment transformation rate.

RESEARCH METHODOLOGY

100 samples of the people who use social media, took from across the Jodhpur city. Correlation and ANOVA statistical tools used to analyze the collected data.

Limitations
- Limited irespondents
- Just ione icity ihas ibeen itaken ifor ithe istudy

Scope of the Study: Social Media is playing important role in our lives. Now a days user base are increasing at all platforms. It's a great tool for marketing, so ithere is a big scope for further research to know more about the relationship of social media and consumer buying behavior.

Usages in one week (In hours)					
	Frequency	Percent	Valid Percent	Cumulative Percent	
Valid	3.50	3	3.0	3.0	3.0
	7.00	17	16.8	17.0	20.0
	10.50	2	2.0	2.0	22.0
	14.00	18	17.8	18.0	40.0
	17.50	7	6.9	7.0	47.0
	21.00	18	17.8	18.0	65.0
	24.50	7	6.9	7.0	72.0
	28.00	9	8.9	9.0	81.0
	31.50	2	2.0	2.0	83.0
	35.00	6	5.9	6.0	89.0
	38.50	3	3.0	3.0	92.0
	42.00	5	5.0	5.0	97.0
	45.50	1	1.0	1.0	98.0
	49.00	2	2.0	2.0	100.0
	Total	100	99.0	100.0	
Missing System		1	1.0		
Total	101	100.0			

buying behavior
H1: There is no positive impact of social media on consumer buying behavior.

We get the correlation value. 408 at 95% confidence level which states that there is a relation exists between

people who use social media and their buying behavior. Therefore we failed to reject the null hypothesis H0.

Ho: All social media types are equally preferred by consumers for buying decisions

H1: All social media types are not equally preferred by consumers for buying decisions.

		Descriptive Statistics				
			Bootstrap[a]		95% Confidence Interval	
		Statistic	Bias	Std. Error	Lower	Upper
Socialmediausage	Mean	20.6850	-.0098	1.1694	18.3750	22.9250
	Std. Deviation	11.30135	-.06258	.73829	9.79933	12.60868
	N	100	0	0	100	100
bought anything in last 6 imonth	Mean	1.0600	.0069	.1335	.8003	1.3200
	Std. Deviation	1.34705	-.00327	.13365	1.06298	1.58908
	N	100	0	0	100	100

a. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples

Correlations

			Socialmediausage	bought anything in last 6 month
socialmediausage	Pearson Correlation		1	.408[**]
	Sig. (2-tailed)			.000
	N		100	100
	Bootstrap[c] Bias		0	.002
	Std. Error		0	.088
	95% Confidence Interval	Lower	1	.224
		Upper	1	.569
bought anything in last 6 month	Pearson Correlation		.408[**]	1
	Sig. (2-tailed)		.000	
	N		100	100
	Bootstrap[c] Bias		.002	0
	Std. Error		.088	0
	95% Confidence Interval	Lower	.224	1
		Upper	.569	1

In above Analysis of Variance, when we compare the different means. We get the F Value 1.431 which is less than the if table value(1.431) at 5% level iof isignificance, hence again failed to reject the null hypothesis. It means that all social media types are equally preferred by consumers for buying decisions.

	ANOVA				
social media	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	43.556	2	21.778	1.431	.310
Within Groups	91.333	6	15.222		
Total	134.889	8			

Findings and suggestions
- After analysis of data it has been found that there is a irelation between the users who use social media and their buying behavior in Jodhpur City.
- It has been noted that people from the Jodhpur who took part in the survey, also prefer the social media sites like Facebook, Instagram, and Whatsapp equally.
- Based on the study it can be suggested that there is relationship between the social media uses and consumer buying behavior, so social media marketing can be helpful in grabbing the new customers.
- Many top social media sites like facebook, whatsapp and instagram etc. are equally popular among the users, so any site can be used by the sellers but with the effective marketing techniques.

CONCLUSION

Social media, which includes the content, visuals, promotions, discounts and influencers, has the ability to influence the buying behavior of consumers. The effects of social media on consumer behavior cannot be ignored by brands and businesses. The study revealed that consumers who are influenced by social media are more likely to spend more on purchases. Moreover, the influence can be so high in some cases that more than

29% of consumers more likely to make a purchase on the same day of using social media.

Policy Implications: This study can be a roadmap for the new research in Jodhpur or another city in the field of marketing by social media and its impact on consumer behavior.

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Trends in Agricultural Exports of India

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ABSTRACT

The production of agricultural sector has been increasing after green revolution, hence, the agriculture sector made India as the seventh largest agriculture product exporter. Basmathi Rice and Non-Basmathi Rice, Meat, Goundnut, Milk, Sugar Cane and Wheat are the major crops yielding and are the highest outputs and India's exports. The agricultural sector has been playing a key role in the composition of Indian exports but, unfortunately the share of Indian agriculture exports have been slowly declining in recent years. The changing scenario of Global agricultural trade in the post liberalization era is as much challenging for India. Thus India could not gain much from trade liberalization even though the increasing rate of economic integration of the Indian economy with global processes. With this background, the present paper is confined to study the trends in Agriculture-Export of India in terms of export quantity, export growth rate, export per cent in GDP and the impact of exports on the growth of GDP after the post liberalization period (1990-91 to 2019-20) i.e., thirty years in three sub decades in a comparative analysis.

KEY WORDS: AGRICULTURE EXPORTS, POST-LIBERALIZATION, MAJOR CROPS, GROWTH RATE, PER CENT IN GDP, IMPACT ON GDP.

INTRODUCTION

Agriculture sector plays a significant role in the Indian economy. This sector made India as self-sufficient in grain production. It has a major contribution in geographical area and occupation. And it is the largest contributor of India's GDP even after a decline in the agriculture share in India. Agriculture is the primary source of livelihood for about 58 per cent of India's population. The Indian food industry is poised for huge growth; it is increasing its contribution to the world food trade every year. The Indian food and grocery market is the world's sixth largest market with retail contributing 70 per cent of the sales, the Indian food processing industry accounts for 32 per cent of the country's total food market, one of the largest industries in India and is ranked fifth in terms of production, consumption, export and expected growth. The some of the milestones of Indian Agriculture sector are: during 2017-18* crop year, food grain production is estimated at record 284.83 million tonnes.

In 2018-19, Government of India is targeting food grain production of 285.2 million tonnes. Milk production was estimated at 165.4 million tonnes during FY17, while meat production was 7.4 million tonnes. India is the second largest fruit producer in the world. Production of horticulture crops is estimated at record 314.7 million tonnes (mt) in 2018-19 as per third advance estimates. Total agricultural exports from India grew at a CAGR of 16.45 per cent over FY10-18 to reach US$ 38.21 billion in FY18. In FY2019 agriculture exports were US$ 38.54 billion. India is also the largest producer, consumer and exporter of spices and spice products. Spice exports from India reached US$ 3.1 billion in 2017-18. Tea exports from India reached a 36 year high of 240.68 million kgs in CY 2017 while coffee exports reached record 395,000 tonnes in 2017-18. Food & Grocery retail market in India was worth US$ 380 billion in 2017.

Government of India Initiatives for the development of Agriculture sector: Some of the recent major government initiatives in the sector are the Prime Minister of India, launched the Pradhan Mantri Kisan Samman Nidhi Yojana (PM-Kisan on February 24, 2019 and the Transport and Marketing Assistance (TMA) scheme to provide financial assistance for transport and marketing of agriculture products in order to boost agriculture exports. The Agriculture Export Policy, 2018 was approved by Government of India in December 2018.

This new policy aims to increase India's agricultural exports to US$ 60 billion by 2022 and US$ 100 billion in the next few years with a stable trade policy regime. The Government is planning to triple the capacity of food processing sector in India from the current 10 per cent of agriculture produce and has also committed Rs 6,000 crore (US$ 936.38 billion) as investments for mega food parks in the country, as a part of the Scheme for Agro-Marine Processing and Development of Agro-Processing Clusters (SAMPADA). And the Government has also allowed 100 per cent FDI in marketing of food products and in food product e-commerce under the automatic route.

Objectives and Methodology of the Study: The main objectives of the present study are to analyse the trends in India's agriculture exports in the post-liberalization period through the estimation of growth rates and to observe the impact of agriculture exports on the GDP of India. The objectives are as follows:

Product	Major Market	Product	Major Market	Product	Major Market
Floriculture	USA, Japan, UK, Netherlands & Germany	Mango Pulp	Saudi Arabia, Netherlands , UAE, Yemen, Arab Republic & Kuwait	Guar Gum	USA, China, Germany, Italy & Netherlands
Fruits & Vegetable Seeds	Pakistan, Bangladesh, USA, Japan & Netherlands	Pickles & Chutneys	Russia, USA, Belgium, Netherlands & France	Jaggery & Confectionery	Portugal, USA, Bangladesh, Pakistan & Nepal
Fresh Onions	Bangladesh, Malaysia, Sri Lanka, UAE, Pakistan & Nepal	Other Processed Fruits	USA, Netherlands, UK, UAE & Saudi Arabia	Cocoa Products	Nepal, Netherlands, Malaysia, Yemen Arab Republic & UAE
Other Fresh Vegetables	UAE, Bangladesh, Pakistan, Nepal &Sri Lanka	Buffalo Meat	Malaysia, Philippines, Saudi Arabia, Jordan & Angola	Cereal Preparations	USA, UK, Nepal, Sri Lanka & UAE
Walnuts	Spain, Egypt, Germany, UK & Netherlands	Sheep / Goat Meat	Saudi Arabia, UAE, Qatar, Oman & Kuwait	Alcoholic Beverages	Jamaica, Thailand, UAE, Angola & Bhutan
Fresh Mangoes	UAE, Bangladesh, UK, Saudi Arabia & Nepal	Poultry Products	UAE, Kuwait, Oman, Germany & Japan	Miscellaneous Preparations	UAE, Iran, USA, UK & Indonesia
Fresh Grapes	Netherlands, UK, UAE, Bangladesh, Belgium	Dairy Products	Bangladesh, Algeria, UAE, Yemen, Arab Republic & Egypt	Milled Products	USA, UK, Indonesia, Maldives & UAE
Other Fresh Fruits	Bangladesh, UAE, Netherlands, Nepal, Saudi Arabia	Animal Casings	Germany, Portugal, France, Spain & Italy	Basmati Rice	Saudi Arabia, Kuwait, UK,UAE & Yemen Arab Rep.
Dried & Preserved Vegetables	Russia, France, USA, Germany & Spain	Processed Meat	Seychelles, UAE, Hong Kong, Germany & USA	Non Basmati Rice	Nigeria, Bangladesh, South Africa, UAE & Ivory Coast

1. To study the trends in India's agriculture exports in terms of quantity and volume.
2. To ascertain the per cent of share of agriculture exports in GDP.
3. To examine the impact of agriculture exports on the GDP of India.

To see the trends in agriculture exports period in terms of quantity and volume in three sub decades of in the post-liberalization period, the annual growth rate, average annual growth rate and compounded annual growth rates are calculated. In order to calculate the growth rates of exports quantity the following formulas are applied:

- Growth rate = (Ending Value - Beginning Value) / Beginning Value]
- AAGR = (Growth Rate in Period A + Growth Rate in Period B + Growth Rate in Period C + ...Growth Rate in Period X) / Number of Periods
- CAGR = (End Value/Start Value)^(1/Years)-1.

And to calculate the impact of agriculture exports on the GDP of India the following simple linear regression equation is adopted.

- Regression: Y=a+bX

Research Hypothesis:
1. Ho1: There is no positive and significant growth in agriculture export quantity during the three sub decades of the post liberalization period.
2. Ho2: Exports of agriculture sector has no positive impact on the GDP of India in three sub decades of the post liberalization period.

Research Design: The present research study adopts the analytical research design technique which uses empirical evidence to examine the variation and relationship within and between the variables.

Sources of Data: The data examined were national aggregates that were collected from secondary sources. The major sources include agriculture and processed food products export development authority (APEDA) exports statistics, Ministry of statistics, National bureau of statistics, the CEIC data and other online information.

Method of data Analysis: The method of analysis of the study was used the Microsoft excel to find out the growth rates and econometric software eviews10 to estimate regression analysis.

Model Specification: The impact of Agriculture exports on the domestic economy was examined by the following simple linear regression equation:

$$Y=a+bX$$

Where Y = Dependent variable (GDP of India)
a = Intercept
b = Slope
X = Explanatory variable

In the above said equation the parameters give the information furnished below.

Coefficient of determination (R2): It determines the proportion of variation in the dependent variable as a result of the variation in the independent variable.

T – Statistic: This is the ratio of the departure of an estimated parameter from its national value and its standard error. It is used for hypothesis testing.

F – Statistic: It is applied to test the overall significance of the regression equation.

Exporting Commodities: The entire data of the study was based on the following agriculture commodity exports of India to all countries in the world in three annual decades. These commodities are: Basmati Rice, Buffalo Meat, Fresh Onions, Guargum, Processed Vegetables, Alcoholic Beverages, Fresh, Mangoes, Sheep/Goat Meat, Wheat, Mango Pulp, Groundnuts, Jaggery & Confectionery, Cereal Preparations, Pulses, Walnuts, Non Basmati Rice, Processed Fruits, Juices & Nuts, Other Fresh Fruits, Fresh Grapes ,Fruits &, Vegetables Seeds, Floriculture, Animal Casings, Other Fresh Vegetables, Miscellaneous Preparations, Cocoa, Products, Other Cereals, Dairy Products, Poultry Products, Processed Meat, Milled Products, Natural Honey, Cucumber and Gherkins(Prepd. & Presvd).

Trends in Agriculture Exports of India after the post–liberalization period: The present study analyses the agriculture sector exports in terms of quantity, volume, its per cent and the impact on the GDP of India after the post liberalization period in three comparative decades i.e., three phase periods 1) Phase I (1990-91 to 1999-2000) 2) Phase II (2001-02 to 2009-10) and 3) Phase III (2010-11 to 2019-20 (E).

Table: 3.1

Time Period	Average Exports Quantity (Billion Tones)	Average Growth Rate(%)
Phase I (1990-91 to 1999-2000)	62411.13	0.76
Phase II (2001-02 to 2009-10)	10840.63	0.15
Phase III (2010-11 to 2019-20)	22489.51	0.08

Figure: 3.1
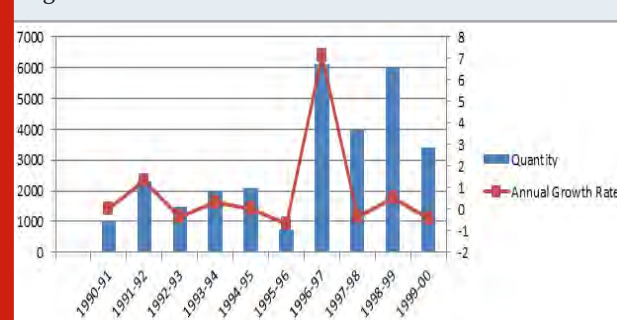
Table 3.1 shows the quantity of agriculture exports and their annual growth rates of three decades after post liberalization period. The quantity of exports is fluctuated in every sub decade. It is observed that the quantity of exports is declined first in the year 1992-93 after post liberalization period (Figure: 3.1), it showed that

the annual growth rate is in a negative value as -0.35. Thereafter it had declined in the years 1995-96, 1997-98 and 1999-2000. The stable growth in the agriculture production during the years 1990-91 and 1992-93 as 9,045 million tonnes in 1990-91 and 9736 million tonnes in 1992-93 may cause of the negative value of the exports in the year 1992-93.

As usual it had happened in the years 1995-96., 1997-98 and 1999-2000. In the next sub decade during 2000-01 to 2009-10 the export quantities are negative in the year 2005-06 and declined continuously in two years 2008-09 and 2009-10 (Figure: 3.2). In this phase the growth in the exports are very slow because the increase in the production is very constant in nature as 14,705 (mt) in 2000-01, 14,628 (mt) in 2001-02, 15,405 (mt) in 2004-05 and recorded continuously year after year 15575 (mt), 16095(mt), 14707 (mt), 14334 (mt) up to 2009-10 – 16,221(mt) are calculated.

In the last decade 2010-11 to 2019-20 (E) (Figure: 3.3) the agriculture sector showed a very low growth rate rate with a declining export quantities since 2013-14 to 2015-16 continuously because there was no record growth rate in the production of agriculture sector as it has accounted as 216378 (mt) in 2010-11, 16363 (mt) in 2011-12, 15735 (mt) in 2012-13 and 16092 million tonnes in the year 2013-14 and 2019-20 (E). Hence, the hypothesis (HO1) is partially rejected.
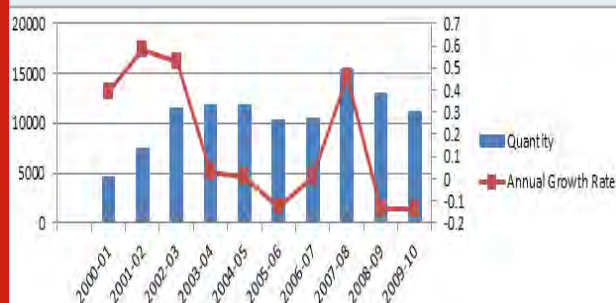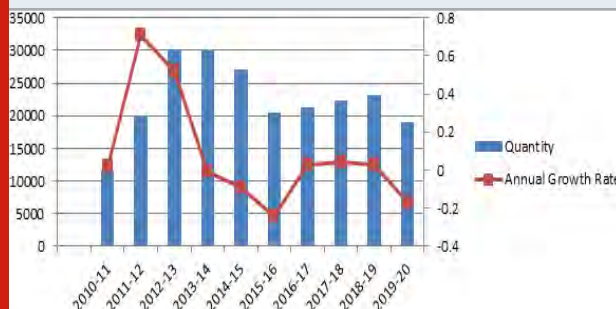
Table: 3.2

PERIOD	AAGR (%)	CAGR (%)
Phase I (1990-91 to 1999-2000)	0.12	0.13
Phase II (2001-02 to 2009-10)	0.08	0.09
Phase III (2010-11 to 2019-20)	0.05	0.05

Growth Rates of Agriculture Export

The above table reveals the information about the AAGR and CAGR of the three phases. In the first phase the AAGR is recorded as 0.12 and it has declined in the next phase to 0.08 and 0.05 in the last phase. The CAGR has also shown the same information of the declining rate of the growth of export quantity from first decade to last decade as it is decreased from 0.13 to 0.09 and to 0.05.

Figure: 3.2

Figure: 3.3

Table: 3.3

Descriptive Statistics	Export Quantity (US$ Bn) 1990-91 to 1999-2000	Export Quantity (US$ Bn) 2001-02 to 20009-2010	Export Quantity (US$ Bn) 2010-11 to t2019-2020
Mean	62411.13	10840.63	22489.51
Median	2190.555	11394.29	21787.04
Minimum	601019.0	15428.40	30172.96
Maximum	189254.2	2946.870	5588.542
Std. Dev.	2.66312	-0.700536	-0.264299
Skewness	8.11004	3.256531	2.730149
Kurtosis	22.72875	0.845337	0.146764
Jarque – Bera	0.000012	0.655296	0.929246
Probability	624111.3	108406.3	224895.1
Sum	3.22E+11	78156396	2.81E+08
Sum Sq. Dev.	10	10	10
Observations			

Table: 4.1

TTIME	Average Export Volume (US$ Bn)	Average Per Cent in GDP
Phase I (1990-91 to 1999-2000)	1.40	0.358
Phase II (2001-02 to 2009-10)	4.48	0.449
Phase III (2010-11 to 2019-20)	16.53	0.624

Descriptive Statistics:

The descriptive statistics of three decades is explained in the above table (Table: 3.3), it is observed that the mean of the agriculture exports in the first decade was 62411.13 billion tonnes (bt), in the second decade it was 10840.63 (bt) and in last decade it is 22489.51 (bt). It gives the information as the agriculture export quantities are much higher in the first decade but declined in the next decade but shown the slight increase in the last decade. The standard deviation of the variable in the first decade is 1892.2, in the second decade 2946.870 and in the last decade 5588.542.

Figure: 4.2
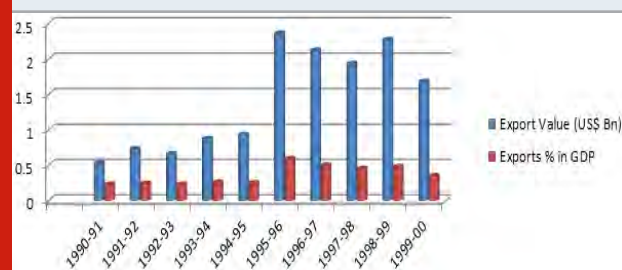
Figure: 4.1
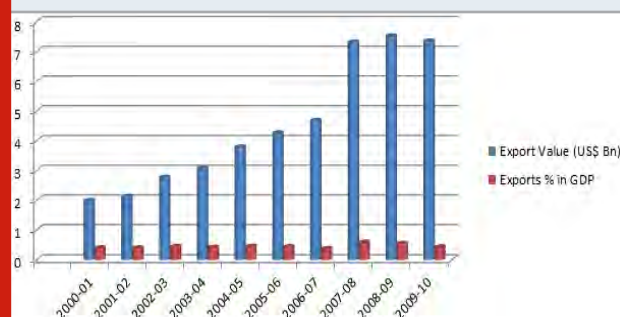
Figure: 4.3
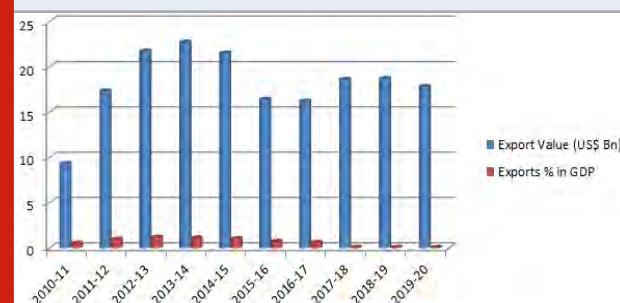
Table: 5.1

Variable		Phase: I (1990-91 to 1999-2000)	Phase: II (2000-01 to 2009-2010)	Phase: III (2010-11 to -2019-20)
C	Coefficient	248.6632	192.1864	2242.630
	Std. Error	28.65523	117.4504	877.2397
	t-Statistic	8.677760	1.63619	2.556462
	Prob.	0.0000	0.1404	0.0338
Export Value (US$ Bn) (Independent Variable)	Coefficient	89.52188	172.8486	6.165572
	Std. Error	18.25677	23.77628	47.70796
	t-Statistic	4.903489	7.269792	0.129236
	Prob.	0.0012	0.0001	0.9004
R^2		0.750345	0.868529	0.002083
Adjusted R^2		0.719138	0.852095	-0.122656
S.E of regression		40.04339	155.3415	546.0179
F-Statistic		24.04420	52.84988	0.016702
Prob (F-Statistic)		0.001189	0.000086	0.900361
D-W Stat.		1.340830	2.181753	0.154

Agriculture Export Volume and Per Cent share in GDP:

The above table reveals the information about the volume of agriculture exports in US$ Billion and its per cent in GDP of India in three sub decades. In phase I the average export volume is 1.40 US$ Billion. It has increased in the next decade as to 4.48 US$ Billion and continuously recorded as 16.53 US$ Billion in the last phase of the decade. It had also shown the per cent of agriculture export to GDP in three phases as 0.358, 0.449 and 0.624 continuously at increasing scenario. The three figures (4.1,4.2,4.3) given below indicate that the per

cent share of agriculture export in the GDP of India. It is observed that it has increased in the first decade, showed a constant increase in the second decade the decreasing nature in the third decade.

The impact of Agriculture Exports on the GDP of India:

Table: 5.1
Dependent variable: GDP (US$ Bn)
Method Least Squares
Observations: 10 in each phase.

The agriculture exports of India are showing a positive and significant impact on the GDP of India in three decades after post liberalization period. The regression analysis of least squares is showing the impact with results. It is observed that the result of the regression analysis reject the null hypothesis HO2 in the first two phases i.e., the P- value is low (<0.05) (Table: 4.2) but in the last phase is was accepted the null hypothesis as the impact of agriculture exports have no significance as the P- values is > 0.05. It is indicated that the change in agriculture exports lead to change in the GDP of India in the first two phases but not lead much change in the last decade.

It is also proved with the value of coefficient, the coefficient of determination (R2) indicate that if there is a 1 per cent change in the agriculture exports lead to change 89 per cent increase in the GDP. It is evident that the 1 US$ agriculture export value lead to increase 89 US$ change in GDP in phase I. It is continued as in the second phase the impact had led to increase as to 172 US$. But in the last phase the impact is deceased in drastic value to 6 US$ in GDP. The F- Statistic value is explaining about THE overall significance of regression equation as the impact of the agriculture exports on the growth of the GDP is 24.04420 in the first phase, 52.84988 in the second phase and 0.016702 in the last stage. Hence, the hypothesis (HO2)is partially rejected.

CONCLUSION

The agriculture sector of India had been playing a pivotal role in the Indian economy. The agriculture sector exports have shown different accounts after the post liberalization period. The entire study has focused on the entire changing scenario of agriculture exports during the post reforms era in three sub decades, in the view of export quantities and growth rates, per cent share in GDP and the impact on the growth of GDP. The statistical results of all study variables have proved the different changes relations in three decades. First of all the average quantity of exports have fluctuated drastically in three sub decades, but when looking in the growth rates the first decade has shown the high growth rate in the quantity of exports, but declined in the next decade in a large per cent and stated to increase in the last decade.

It observed that the volume of the export has shown continues increase in three sub decades and it per cent share in the GDP of India has also increased in study phases. It may cause by the volume of Rupee to Dollar exchange rate. At last the impact of agriculture exports on the GDP of India is different in three sub decades as it is high in the first decade, decreased in the second decade but negative in the third decade. Anyhow the entire study has given information about the role of agriculture exports in Indian economy after the post reforms period. However the agriculture sector given the most priory in the economy the agriculture export sector facing many hurdles as weakness in export infrastructure like storage, port handling facilities lack of technology, fluctuations in domestic and international prices, currency exchange rates etc.,

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The Development of Language Policy and its Implementations: the Case of Ethiopia Since 1991

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ABSTRACT

Ethiopia is a country in the north-eastern part of Africa and is exceedingly ethnically and semantically various, with more than 80 different languages spoken in its region. Over the span of its long history, Ethiopia has treated distinctive social and cultural issues inside the region. One of the essential issues that worry Ethiopia today is the subject of language. Amharic has kept up the predominance in governmental issues, business and social communication in the historical backdrop of language arrangement in the country. Ethiopia, in the distinctive routines, all the more explicitly until Ethiopian People's Revolutionary Democratic Front (EPRDF), had been predominantly Unitarian that favored Amharic as a national language. Amharic had been viewed as a language of national image and solidarity: primary education, common administrations and social orders, exchange and business and so on all utilized Amharic as a medium of instruction, cooperation, exchange and communication. For intellectual quest of inquiry to discover how human language and power, right are interrelated, it is palatable to raise assorted sociolinguistic aspects that may help people explain such relationship in a flamboyant way. In the midst of the propositions which have got a remarkable attention, nowadays, is language policy, language planning and the practical implementations. The paper is a comprehensive attempt to unpack language policy of the Democratic Republic of Ethiopia (EPRDF) since Post Mengistu Haile-Mariam's Regime. The paper thus focuses on the advancement of language policy and its implementations in Ethiopia 1991 until the present day.

KEY WORDS: ETHIOPIA, LANGUAGES, LANGUAGE POLICY, AMHARIC.

INTRODUCTION

Ethiopia is one of the countries which are different from the rest of African nations in that it was ruled and colonized by any external power with the exception of a multiyear attack from 1936 to 1941 by Italy and with the fable of the Queen of Sheba. According to Wagaw (1979), Ethiopia "may have had its root in the early time of Sabean movement to Africa". This movement had made the country unique in its features. Not only these, Negash (1996) added, Ethiopia is one of only a handful couple of nations in the world having amazing history and with its claim contents sofar effectively being used. Alemu D. S and Tekleselassie, A. A. (2006) states that the nation's present instructive status, in any case, is remarkably frustrating Africa in regular base.

Ethiopia has also been named having a long history of 3000 years and then some. At different occasions, its ruling classes had assumed their jobs in molding the geological, social, authentic, and religious and so on - all parts of the nation. Thus the vast majority of the norm today is, as it were, the inheritance of our previous history. Our stresses and difficulties are what to do with the pervious.

Ethiopia has treated differing social and social cases in its domain. One of the basic issues that stress Ethiopia today is the theme of language. Being a multilingual and multicultural country, Ethiopia shares the issue of language use and language decision for different purposes. There are more than eighty tongues in Ethiopia that can be incorporated under various language families (like Omotic, Nilotic, Semittic, and Cushittic). All these isolated dialects are taken as resources for the speakers of that language. Each language is utilized as a method for relationship for the framework that dialogs it. Close to the use of these dialects for correspondence purposes, they can be utilized in guidance, various leveled association and the esteem course of action of the nation.

What do we mean by a language policy?: The idea of language policy is fundamentally identified with choices standards, guidelines and rules, areas as well as domains of dialect which is the privileges of that language speakers' inquiry. According to Calvet (1998), they will regard language approach as the cognizant decision made in the space of connection among language and public activity all in all. There is moreover a dynamically express the case in a predominant significance. This particular concept lights up language approach and its dialects as:

I. The government is expected to acting out, to decide in legal ground, formal action, official activities or different intends as to:

1. identify in what ways are language utilized in open settings
2. develop language aptitudes expected to national needs, or
3. set up the privileges of people or gatherings to look after dialects.

II. Ruler guideline of the dialect incorporate ventures as to encourage comprehensible correspondence, enlist work force, ensure fair treatment, cultivate political cooperation, and give access to open administrations, procedures and archives.

The clarifications gave so far obviously call attention to that language strategy is the duty of the legislature. Researchers declare state that there is a requirement for the ownership of specialist in the definition of language policy (Columas,1994 and Calvet, 1998). Another concept illuminated by the space of usage of dialectic approaches and is stressed over choosing tongues which recommends as vernaculars must be utilized by languages of the nation, and increasingly broad correspondence, and others are picked by officials systematically. Language approaches are stressed over spaces use, and areas of vernaculars furthermore recommend what language should be used in preparing, instruction, association, etc, and to what degree and where should be settled by language courses of action.

Policies of language and its kinds: Arrangements of language change from spot to put and once in a while according to the political presentation of governments and the possibility of the overall population that exists. A few governments have open as well as unequivocal dialect methodologies, named as plain approaches, having made help in definitive files, for instance, and the constitution. Another one need to disguise to their language policy, and thus, don't express their language strategies in composed authoritative reports or others. Such approaches are alluded to as secretive language strategies. Undercover language approaches are otherwise called accepted, customary law or conventional, and for the most part it is the semantic the norm that is taken as the true or regular low.

According to Getachew & Derib (2006), language policies are likewise delegated either promotive or resilience (tolerant) contingent upon the help and consolation in a given legislature, utilization and advancement of the dialects. By spaces of utilization, it implies if (a) language (s) ought to be utilized in decision making places, learning centers or/and in the organization, and so on. Resilience approaches, then again, permit the utilization of a specific or a few dialects however without consolation of utilization and advancement by giving budgetary or faculty support. Another qualification is among language approaches is among equalitarian and confined approaches. Few language approaches treat 'regardless of whether a little minority' as in every case absolutely equivalents to any language and spot all dialects on equivalent footings. In any case, confined strategies as they infer, are not as open as equivalent for all languages.

According to Sengupta (2009), he first focused on the four modalities of language strategy, in light of the use of language (s) in that specific network. They are disconnection or separation: the types keeps up which ought to be no formally perceived language (s). The second one is official multilingualism: it ought to be a similar acknowledgment for the different dialects consumed in the network. The third is language defense: that is a special open language by restricting or precluding acknowledgment from claiming different dialects in specific circles of language utilization. And the last is language support: that intends to do the whole dialects similarly fruitful in the utilization. The above mentioned distinctive kinds of language policies, as expressed prior, are the indications the administration's philosophies in a certain nation for the discourse network in regards to on the language (s) use.

Language Policy of Ethiopian People Revolutionary Democratic Front (EPRDF): The new constitution of the Federal Democratic Republic of Ethiopia allowed every single ethnic gathering the privilege to build up their languages and to set up mother tongue primary education frameworks. This is a stamped change to the language strategies of past governments in Ethiopia. Properly, Ethiopia (1991), the Transitional Period contract in its second article has started the momentous ideological move by expressing the accompanying: Nations, Nationalities and people groups reserve the

option to self-assurance. As needs be every country, nationality and individuals has the option to safeguard and watch its personality, build up its way of life. The ensuing geopolitical reorganization, that presented the government arrangement of organization and the confirmation of the 1994 constitution, has likewise continued changing the historical backdrop of the nation with respect to language approach by representing the accompanying explanations in the constitution's Article 5:

a.   Every single Ethiopian language will appreciate equivalent condition of acknowledgment.
b.   In the federal, official language will be Amharic
c.   Individuals from the representative may decide on specific dialects.

In such manner the present government has advanced the decentralized utilization of neighborhood languages for official, managerial, legal executive and instructive purposes. The present government has clarified that it progresses in the direction of the improvement of the whole Ethiopian languages for different aims. The social arrangement of Ethiopia as expressed in the reality in the accompanying manner that get equivalent acknowledgment, regard and opportunity to improvement, providing a conducive environment in order to conduct findings of the languages in scientific manners, and providing the essential expert help to the different countries, nationalities and people groups while settling on their decision of language (Ministr of Youth, Sports and Culture, 2003). The selection of languages so as to utilize in different places is by all accounts settled, yet there is a need to pick languages for mode of guidance, organization and equity at different dimensions in various pieces of the nation.

Language Use in Education: Maybe, the most grounded appearance of the strategies is found teaching learning processes of the nation other than in different areas. The Education and Training Policy (2002) peruses: "Conscious of the academic favorable position of the child in learning in first language and the privileges of nationalities to advance the utilization of their languages, primary education will be given in nationality languages". The legislature firmly contends that individuals ought to attend in their mother tongue in light of the fact that,

1.   Language is the reason for personality
2.   Academically it is increasingly favorable
3.   It gives individuals mental fulfillment and causes them create positive confidence.

Because of this arrangement, there are 21 languages, barring Amharic, which are at present utilized as medium of instruction in primary cycle. Some of them are Konta, Nuer, Dawro, SidamuAfo, Gedeo, Wolayta, Xahmta, Afan Oromo, Gamonso, Goffa, Kambata, Silti, Kafinoono, Tigrinya Hadiyyisa. Every one of these languages is additionally given as independent subjects in the essential training. Notwithstanding the first cycle

level, Tigrinya, Oromefa, and Amhargna have been educated as subjects up to graduate and postgraduate level. A few languages including SidamuAfo, Gamo, Tigrinya, Wolayta, Kafinoono, Afan Oromo, Hdiyyisa and so on, are utilized to prepare elementary school teachers (Getachew & Derib, 2006).

Reasonable of Language Use in Education: Education is a basic reason for improvement. In spite of the fact that there are people who can think in a L2 the vast majority think in the language of their mother language. Along these lines, child must be instructed in their own first language if the learning and encouraging procedure is to be intelligent and productive. Access for education can likewise be evenhandedly conceivable if citizens are educated in their very own native languages. A native language implies the language one uses legitimately. This is due to the degree conceivable, all individuals should be educated in their native language at the grade school level, and even past, are as per the following:

i.   Language isn't just a mechanism of guidance for the general population, yet additionally a seal of personality;
ii.   Learning in a first language empowers the students' to comprehend exercises effectively, and dodges issues related with language hindrances;
iii. Using a language for guidance empowers;
iv.   Using native language fortifies character and empowers its clients to be glad for their way of life and character.

They become fearless and pleased residents. Such self-assurance combined with the securing of information and ability through tutoring makes produce fit and profitable residents conceivable (MoE, 2002). In any case, because of restrictions of asset and lacking earlier arrangement, youngsters in certain regions need to learn in the language of the greater part as opposed to their very own first language. The strategy pinpoints the issues by accommodating the utilization of native languages or mother tongue in elementary schools and it clarifies this plainly in the archive of (MoE, 2002) Article 3.5.1 and 3.5.2. as pursues:

Insightful of the academic favorable position of the youngster in learning in native language and the privileges of nationalities to advance the utilization of their languages, primary education will be given in nationality languages. Making the essential readiness, countries and nationalities can either learn in their very own language or can look over among those chose based on national and countrywide circulation. According to MoE (2002), recently addressed educational programs wound up operational, more than 20 languages have been utilized as modes of guidance for up to grade 4, 6, or 8 relying upon the genuine conditions in every area. The explanations behind the variety in the highest dimension of the evaluations in which first languages are instructed rely upon the overall improvement of the language. In locales where:

Tthe language is generally very much created and has adequate number of teachers that they prepared in that language, training in the native language is offered up to grade 8. This is clear reality in Amhara, Tigrai, and Oromia Regional States. Districts that utilization first language up to grade 6 resort to the utilization of English as medium of instruction from grade 7 up wards. In any case, it would be exhorted if guidance in English were to start in grade 9 rather than in grade 7 Minister of Education (2002). This is on the grounds that the English language capability of students at the levels of grades 7 and 8 isn't adequate for the learning and instructing process.

In addition, as the vast majority of the individuals who complete Grade 8 won't proceed with optional instruction later on, yet rather take momentary preparing of different sorts and join the work compel learning in native language places understudies will be in a favorable position. A simple two-year time of English would not empower one to get a handle on ideas and prepare for the set preparing program. Additionally, a two-year English language study won't be adequate to make students capable in the language. It is greatly improved for districts, which have the ability to do as such, to encourage students in their separate first languages instead of in English in Grades 7 and 8.

Some Facts about Using Languages as Medium of Instruction across Regions: To the extent the utilization of languages as mode of guidance is concerned, it is conceivable to take note of how they are being utilized at present across regions and city administrations.
a) Oromia-Afaan Oromo, Amharic
b) Harari - Aderigna (Harari language), Afaan Oromo, Somaligna, Amharic
c) Benishangul-Gumuze-Amharic
d) S/N/N/P-SidamuAfo, Wolaytigna, Hadiyyisa, Kembatisa, Gediogna, Dawro, Kafinoono, Siltie, Amharic, Kebena, Korotie, and so on (in Non-formal and lower classes).
e) Tigray-Tigrigna
f) Gambela-Agnuwak, Nu'eir, Mezenger
g) A remote place - Afar, Amharic
h) Amhara - Amharic, Awigna, Hamtagna, Afaan Oromo (in Oromia Zone)
i) Somali-Somaligna

Challenges of the Current Language Policy
Educational challenges: In spite of the fact that the present routine's language strategy has such a large number of notable angles towards education, it is additionally in this segment different disadvantages have come to occur. Subsequently we may take note of the accompanying significant downsides of the arrangement in the instruction part:
a. Despite the fact that utilizing nearby languages in lower grade level is ensured by the constitution, it is getting to be fanciful to address the multilingual urban areas – state Addis Ababa. Here the medium of instruction is Amharic however there is high potential outcomes for child whose primary language isn't Amharic, to live in the city.
b. The present language strategy is decentralized at any rate in local states level – there exists irregularity in execution of language as medium of instruction in primary level across regional states.
c. Creating instructive materials, and creating orthographies and contents for different minority languages in SNNPR state in which over 70% of the Ethiopian languages is among the observational difficulties.
d. Absence of prepared labor is a challenge which obstructs utilizing of neighborhood languages in primary level of education.
e. Absence of mastery and network support over the span of language arranging and utilizing minor political choices towards language use are causing clashes.

Administrational challenges: Usually different minority ethnic gatherings in huge numbers may live in a district other than their very own in which one noteworthy language has completely utilized for authority reason. For example Oromos, Awi, Waghimura in Amhara zone; Kunamas and Irbo in Tigray are instances of Ethnic gatherings which are living in different states and left their unique areas for financial or different reasons. Since the language predominantly utilized in such locales are not the same as their very own they will discover hard to completely utilize their own language in various managerial dimensions for correspondence. In addition some local states like: SNNPR, Benshangual Gumuz, Gambella, and Harari: are confronting an issue of choosing significant authority language in the provincial dimension.

This is on the grounds that from the different languages none of them are spoken broadly. Thus they upheld to utilize Amharic as the language for authority correspondence in the territorial dimension. The urban areas which are regulated Federal government: Addis Ababa and Dire Dawa are additionally confronting a few issues with current language approach since these urban communities are home to various ethnic gatherings. Here Amharic is the official language of the organizations by supporting the useful difficulty of perceiving every one of the dialects verbally expressed by the inhabitants in these urban communities. Along these lines in such situation the phonetic, social and ethnic personality of the occupants is likely under inquiry.

CONCLUSION

As can be seen above on how Ethiopia is politically advancing "pseudo populism" and "visionary" native language approach, which has should give route for the improvement of the vernacularism, there are as yet unsolved inquiries and difficulties of the strategy

and related language arranging. As an assumptive parallelism, "minority" societies, values and ethno-anti-extremism might be advanced, allowed and endured. Thought on the paper be up on rest, on opposite side, a non-resumeable decay of generally shared societies, values, frameworks, structures, practices, occasions and correspondence medium are broadly exacerbated from tip-to-tip round the "map" of Ethiopia. Subsequently the aggregate impact of this system will without a doubt unfavorably break down Ethiopia. In like manner, it quickens monetary disappointment and social and social character chaos of the different ethnic gatherings of the biggest constituents in the nation. This thusly won't realize national solidarity and improvement.

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Shareholder wealth Creation and Economic Value Added Using M & A – A Miniature of Indian Pharmaceutical Industry

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ABSTRACT

Aim of the study: This study attempts to analyse whether the sample companies have been able to enhance shareholders wealth post-recession considering their M&A. The study attempts to explain how traditional measures of financial performance are influenced by M&A and their relation to EVA. Methodology: The researcher has used ANOVA and Regression as analysis tools for the study. Findings: It was found that there is a significant difference between the means of EVACE, ROCE, ROE and EPS. ROCE and ROE are significantly correlated to EVACE. Moreover, there is an insignificant bearing of ROE, ROCE and EPS on EVACE. Managerial Implications, and Scope for future work / Limitations: It can be concluded that M&A's are a better way of creating shareholder wealth as compared to inorganic growth strategies. But due diligence process must be carried in accordance with the plan of strategic motives. The pharmaceutical companies need to enhance their financial performance to generate shareholder wealth; otherwise, it will lead to investor dissatisfaction. The same method of analysis can be used for different study period and on bigger sample size.

KEY WORDS: CORPORATE STRATEGIES, EVA, SHAREHOLDER WEALTH CREATION, FINANCIAL RATIOS.

INTRODUCTION

The corporate restructuring embracing merger and acquisition is the prevalent mode of business blends. These blends played an indispensable role in the growth of numerous top companies over the world. In the United States, the first merger wave arose between 1890 and 1904, and the end of World War I lead to the second wave which sustained over the 1920s. The third wave inaugurated in the latter part of World War II and continued (Arthur, 1963).

Around two-thirds of the huge public corporations in the USA have merger or amalgamation in their antiquity. In India, nearby 1180 proposals for amalgamation of corporate bodies entailing approximately 2400 companies were filed with High Courts throughout 1976-86. These formed 6% of the $40,600 corporations at the commencement of 1976. In the year 2003-04, 834 mergers and acquisitions worth Rs 35,890 crore were recorded. In 2008, the M&A deals were US$19.8 billion. The Indian Corporations sensed that western countries

are captivating Indian market this led to the numerous mega-mergers and takeover(Bhattacharyya, 1988).

Mergers And Acquisition In India: Economic reforms and deregulation of the Indian economy post-liberalisation economy have fetched in additional transnational players in Indian Industries. The entry of international players amplified competitive coercion resulting in structural changes in Indian Industries. To survive in the market restructuring strategy was adopted by Indian industries through M&A. Researchers believe that mergers and acquisitions followed specific patterns according to the economic conditions. These patterns were identified considering the nature and behaviour of M&A (horizontal, vertical, and conglomerate) and were grouped in waves. The waves of M&A are caused by the combination of three major things economic, regulatory and technological changes which can be termed as "shocks".

The first wave (1890 -1905) of M&A occurred when United States corporations tried to create monopolies in various industries. The second wave (1926-1929) saw the creation of oligopolies and vertical integration between the companies. The main factor that led to this wave was the large availability of a capital investment in the market caused by the post-world war economic boom. The third wave (1965-1969) of M&A has been pigeonholed by tending towards diversification between companies. The economic boom once again swamped the market with economical money and gave rise to conglomerate M&As. The fourth wave (1981-1989) was characterized by a large number of Hostile takeovers and became a common alternative for enterprise growth through acquisitions.

The Fifth wave (1992-2000) was driven by the globalisation, boom in the stock market with market deregulation on its peak. The burst in the bubble of stock market led to the end of the fifth wave in 2000. In the sixth wave (2001-2008) the target companies were overestimated due to massive conjectures and dearth of seeming risks. This whole scenario was the root cause of the Subprime catastrophe in year 2007 because it dehydrated the credit and the world was embarked into recession, and the end of the sixth wave of transactions. Every wave follows a specific trend and is related to the economic conditions as well as regulations set by the government (Martinson, 2012; Cordeiro, 2014; Anastasia, 2016).

The data presented in the below Table No 1 for the period 2008 to 2109, reveals that considerable development in the M&A activities in India after the recession. The absolute number of M&A deals in 2018 was estimated at 836, which is 25 per cent advanced than the total number of transactions in the preceding year. However, there is a significant upsurge in the number of deals in the year 2015, which is 67 per cent compared to the earlier year 2014. The worth of deals has publicized variation; after rising to 69,313 INR crores in 2016 compared to 22,203

INR crore in 2015. The highest M&A deals value was 72,815 INR crores in 2018.

Table 1. M&A in India (2008–2019)		
Year	Number	Amount (Rs Crore)
2019	604	50,059
2018	836	72,815
2017	666	54,254
2016	691	69,313
2015	609	22,203
2014	364	16,318
2013	286	4,167
2012	284	11,669
2011	302	7,517
2010	337	9,451
2009	327	4,418
2008	373	7,987

Source: Bloomberg, 2019

Figure : Graphical representation of . M&A in India (2008–2019)
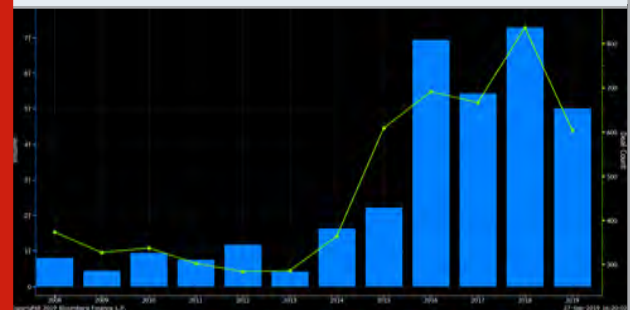
Source: Bloomberg, 2019

For an acquiring firm, a merger will make sense economically if it is beneficiary to the shareholders. The real owners of the company are the equity shareholders. They invest their money in equity shares of the business with the goal of accomplishing better capital appreciation along with stable and regular returns. When the combined present value of the merged firms is greater than the sum of their present individual values as separate entities, then the merger or acquisition will be termed as an economic advantage. As an example, firm a and firm b have an individual worth of VA and VB respectively, and worth of Vab in combination. If they merge, then the economic advantage will be realized if:

$$Vab > (Va+Vb)$$

The objectives are purely based on the financial stability and profitability of the business. The investment decisions are irrevocable and have long term effect on the business, so investors, consider the several factors like returns of

investments & market value of the firm which have an impact on the financial performance of the company. Shareholders wealth maximization is equivalent to maximizing the utility of their consumption over time in terms of returns. When seen from the perspective of the shareholder, the wealth generated by the actions of the company should be considered in the market value of the company. So, the wealth of shareholders is measured in terms of returns they receive and on their investments. These returns can be in the form of capital appreciation or dividends, or both (Pandey, 2010).

There are specific measures that investors consider, like accounting profitability measures, which include ROI, ROE, EPS, ROCE, and DPS, etc., and shareholder value measure includes EVA and MVA. The corporate strategies like mergers and acquisitions have a specific impact on financial performance and shareholder value. The fundamental question of whether mergers and acquisitions create value and enhance the financial performance, as well as shareholder value of the acquiring firms, has been of continuous interest to academicians and practitioners for many years. The capability to generate value through M&A respites on the principle that a firm can enhance or match its fundamental resources and skills via value-creating or synergistic blends with other corporations.

This study employs financial ratios and famous new value-based performance metrics; namely, economic value-added to measure the financial performance of acquirers. The objective is to assess financial success/failure in terms of shareholder value creation. Economic Value Added: this concept was defined and popularized by the US-based Stewart & Company (1991). It is considered the most accurate measure of the economic performance of the company. EVA is an approximation of actual economic profit. The amount by which earnings exceed or fall short of the required minimum rate of return investors could get by investing in other securities of comparable risk. The corporate segment in India progressively recognizes the significance of EVA as a consequence some Indian corporates viz., Samtel India Ltd, Ranbaxy Laboratories, etc., have commenced to calculate EVA. The first Indian company Infosys Technologies Ltd, reported EVA in annual report. EVA tries to gauge real economic profit as it contrasts the actual rate of return as against the required rate of return (Bhasin, 2013).

Calculation of EVA: When we are estimating EVA, the capital employed at the beginning of the year depicts the capital invested. The reason behind for considering beginning capital for calculation of EVA is that; a company will be able earn a return on its investment, after a minimum of one year. It should be noted that estimation of EVA entails some crucial issues., Therefore its each element has been discussed individually. EVA needs three different inputs for its calculation (Pandey, 2010). They enumerated below:

Where,

- NOPAT (Net Operating Profit after Tax)
- Weighted Average Cost of Capital (WACC).
- Capital Employed

Calculation of Weighted Average Cost of Capital (WACC):
The cost of capital is the expected return to equity owners (or shareholders) and to debtholders; so, WACC tells us the return that both stakeholders can expect. WACC represents the investor's opportunity cost of taking on the risk of putting money into a company.

- WACC = (Ke * We) + (Kd * Wd)
- Ke = Cost of equity, Kd = Cost of debt

Cost of equity by the CAPM (Capital Asset Pricing Model)
- Ke = Rf + β(Rm -Rf)
- Rf =Risk free rate, β= Volatility of the stock with respect to the market, Rm = Market return

Calculation of Cost of Debt
- Cost of Debt = (Total Interest Expense / Beginning Total Borrowings) × (1−t) × 100

Pharmaceutical Industry and its importance: Several factors influence the pharmaceutical industry. Among them, the major ones include the role of pharmacies, the growth of pharmacy benefit managers, and health maintenance organizations. There are many initiatives in regulating health schemes in several countries including India. All these factors strategically influence pharmaceutical companies, and in order to deal with these environmental changes' companies respond through mergers and acquisitions. The Indian Pharmaceutical sector being the huge and most progressive amid developing nations. The Indian pharma sector is 3rd largest in the world in consideration of volume and thirteen largest in value consideration. The sector is expected to expand with grow rate at CAGR of 12.89% over 2015-20 to seize USD 55 billion.

The Indian pharmaceutical sector claims 2.4% of the global pharma industry in value and 10% in volume. As the largest exporter of the generic medicine, India has exported worth USD 16.4 billion pharma products in 2016, and is inclined to achieve USD 20 billion by 2020. Many pharma firms have turned into mini giants of the Indian market; most of them are now dependent on exports. Corporations like Dr. Reddy's Laboratories, Cipla, Kopran, Cadila Healthcare and Sun Pharma have all gained US-FDA approvals; the primary standard to enter the US market. Utmost all the companies pursue the global tie-ups, in order to spread across new products, research, and have a debut pad for international market entry. In this industry, the market is influenced by doctors and pharmacists, who are the customers of the companies. They influence the choice of consumers, i.e., patients by prescribing medicines.

The customers (doctors) are, in turn, influenced by the medical representatives and market strategies of producers. Merger and Acquisition by Indian companies

are aimed at gaining new markets and new technologies. Enhancing the market size and thereby gaining higher economies of scale could be considered as the two critical motivations behind M&A in the pharmaceutical sector. According to KPMG report "The Indian Pharmaceutical Industry", (2006), it could be mentioned that domestic drug manufacturers in India are aiming foreign acquisition with the following goals in focus:

- Move up to the value chain.
- Enhance global competitiveness.
- Enhance respective production portfolio.
- Developing new markets.
- Increasing market share and revenues.
- Compensate the sluggishness they face in the domestic market.
- Acquire new assets, including research and contract manufacturing firms, in order to boost their outsourcing capabilities.
- Acquiring new products.

Research Objective: To analyze whether the sample companies have been able to generate value for its shareholders using both the measures of financial performance "EVA as well as accounting ratios. Furthermore, to analyse the result of EVA with traditional performance measures ROCE, ROE and EPS for evaluating the impact of ratios on EVA financial performance.

Literature Review: Firth (1980), examined the merger and takeover activity in the U.K by using a sample of U.K. takeovers. He analysed the impact of M&A's on shareholder returns and management and found evidence that was unswerving with the hubris hypothesis. The research indicated that it was only the acquiring company's shareholders, who suffered losses. The mergers and acquisitions were beneficial for the target company's shareholders and the acquiring firms' managers. Thus, we can say that, M&A's are more driven by the optimization of management utility reasons than by the optimization of shareholder wealth. A study carried out to investigate effect on wealth due to merger and acquisitions found that; mergers are value increasing dealings for target firms but value decreasing dealings for acquiring firms and concluded that takeovers are motivated by the agency (Malatesta, 1983). Thus, strategic motives have an effect on the financial accomplishment of the company.

Activity of merger and acquisition can mainly be explained by the factors, motivating a firm's growth and expansion. This is considered a faster and an efficient way of developing firm's asset base and productive capacity. (Vyas & Narayana, 2015). The merger and acquisition activity is condensed in definite time periods. The waves of M&A are caused by the combination of three major factors- economic, regulatory and technological changes (Harford 2005; and Zhou 2006).

Key intentions from the purchaser's perspective undertaking M&A deals are primarily identified with the choice rapidly to develop (rather than natural development through their own assets) and to get the admittance to elusive resources, specifically, human resources, auxiliary capital and client capital. Other extra intentions incorporate the accomplishment of collaborations, acclimation to changes, underestimated resources, botched issues, and tax savings, etc. From the merchant perspective, the key thought processes to sell the business incorporates the choice to transform equity into money, development augmentation, and top in valuation, proprietor's retirement, absence of admittance to capital (Tamosiuniene and Duksaite 2009). Key thought processes are gains from fortified market positions following the M&As (Coeurdacier et al., 2009).

As indicated by Gaphin (2010), at first, that is in the past decades, mergers and acquisitions were just money related exchanges meaning to control undervalued resources, and the objective was an industry or business totally different from the acquirer's centre business. Cash flow adequate only for debt repayment was the essential objective. Mergers and acquisitions lately are altogether different. Today, a typical merger or acquisition is very vital and operational in nature. This suggests that today, managers are not just purchasing underestimated resources as well as what they are purchasing are introduced client bases, better conveyance channels, more noteworthy topographical limits, hierarchical skills and an assortment of new talent.

All of these obtained factors in turn, offer more strategic opportunities to associations so they can increase an edge over their rivals' items products and services. Such associations are effective in consolidating business units trying to expand revenues and share prices. Singh and Mogla (2010) said that surveying the performance of mergers and procurement (M&A) can be done from bookkeeping information and market information. Market performance is the administration capacity to create the market estimation of the organization and is related to the market value in the stock exchange.

Sinha and Gupta (2011) found that the merger activity affects profitability positively while as deteriorated the liquidity pointing to the fact, that companies may have been able to leverage the synergies rising out of the transaction. Beholding to the findings of Krishnakumar and Sethi (2012) and Zollo and Meier (2008), it was suggested that both market measurement and accounting techniques must be used simultaneously to evaluate the performance after M&A in a more comprehensive way. Furthermore, according to Krishnakumar and Sethi (2012), event study is typically used in developed nations, whereas it may not work appropriately in developing nations such as India due to difference in the efficiency of the market. This echoes the scenarios of the corporations according to the shareholders' expectation and perception (Gunawan & Surakartha, 2013).

Sharma (2013), measured the post-merger performance of BSE listed companies and suggested that there was a marginal but not significant enhancement in the solvency and liquidity ratios whereas profitability ratios showed

significant deterioration post-merger. Haas and Hodgson (2013) stated that the result of full synergy logically can be seen in the financial performance of the fourth year after M&A because the synergy would be distributed amid all departments wholly by the end of the third year after M&A had been executed. Ahmed and Ahmed (2014), examined the post-merger financial routine of the acquiring banks in Pakistan and concluded that the financial performance of merging banks improved in the post-merger period but marginally.

Verma and Sharma (2014), studied the influence of mergers and acquisitions on the operation of Indian Telecom industry by reviewing pre- and post-merger financial and operating parameters. The research found that, companies have been able to leverage the synergies ascending out of the merger or acquisition, but couldn't upsurge the operating and financial execution. The adoptions of M&A's might have been mixed with the ambition of market integration, acquiring bigger size, empire building which led to worsening performance. Bertrand and Zitouna (2008) investigated the impact of horizontal acquisitions on the execution of the objective firms and inferred that both cross-border and homegrown merger and acquisitions have similar aftermaths.

Furthermore, they proposed that cross-border acquisitions have extra adequacy gains; it might be because of advanced innovation they are obtaining from abroad. In any case, profits are not heightened but increment in productivity shows the redeployment of efficiency gains at the creation stage. All things considered, recent investigations recommended that mergers and acquisitions create incentive for acquirers (Martynova and Rennebog, 2008). The value creation to any acquirer company depends on the kind of deal and qualities befuddled in the arrangement (Dutta and Jog, 2009). Saboo and Gopi (2009) compared the post-merger execution of firms associated with the homegrown and international acquisitions. They noticed that noteworthy contrasts exist in the monetary ratios of the firm post-merger relying upon whether it obtained a homegrown firm or a foreign firm.

Accounting proportions, for example, profit after tax, debt-equity ratios and profit for capital were studied and discovered that a large portion of the measures improved in one to two years post-merger in case of homegrown firms. While, similar proportions were negative for firms gaining foreign firms. Consequently, the result of the key accounting proportions of the procured firms represents that the effect of the merger was different for homegrown acquisition and cross-border acquisitions. The type of acquisition appears to play a pivotal part in the performance of the organizations.

For instance, Bertrand and Bestchinger (2011) claim that there are unpropitious effects accompanying acquisitions. Furthermore, firms that operate in developing markets have little leverage worth (capability of borrowing funds) due to truncated M&A experience and proficiencies, specifically for transnational acquisitions. The pharmaceutical concerns have restricted profits due to boundaries in product pricing, therefore, have to ponder other strategies of expansion and value creation. Merger and acquisitions enhance value of the firms by growing corporate control in the marketplace (Meena, 2014).

Objectives of the Study:
- To analyze whether the sample companies have been able to generate value for its shareholders.
- To analyse the both the measures of financial performance EVA as well as ratios.
- To analyse the result of EVA with traditional performance measures ROCE, ROE and EPS for evaluating the impact of ratios on EVA financial performance.
- Hypothesis Development:
- Hypothesis1

- HO_1: There is no significant difference between mean values of EVACE, ROCE, ROE and EPS.
- HA_1: There is a significant difference between mean values of EVACE, ROCE, ROE and EPS.
- Hypothesis 2.

- HO_2: There is no significant impact of ROCE, ROE and EPS on EVACE.
- HA_2: There is a significant impact of ROCE, ROE and EPS on EVACE.

RESEARCH METHODOLOGY

Sources of Data: This study is based on secondary data. To achieve our set objectives, required financial data of sample companies were collected from "Bloomberg Database". A database developed by Bloomberg L.P. The Bloomberg Terminal brings together real-time data on every market, breaking news, n-depth research, powerful analytics, communications tools and world-class execution capabilities in one fully integrated solution.

Sample Design: Some of the top Indian companies as per net sales are given in the money control with 38 acquisitions were selected as the sample for the study.

Figure 2: Net sales

Source: moneycontrol

The sample of 38 acquisitions was selected by considering the availability of financial data for computation of EVA,

ROCE, ROE, EPS for the study period from 2009 to 2018 (post-recession period).

Data Analysis and Interpretation: Table No. 2 given below explains the number of mergers and acquisitions undertaken by the top Indian Pharmaceutical companies after the recession, including the recession year also. It is quite evident from the figures given in the table that the year 2015 has witnessed the highest number of M&As.

Principally, the concept of EVA respites on two principal proclamations: first, corporate is not really profitable lest it grosses return on invested capital that surpasses the opportunity cost of capital; and second, that wealth is formed when a firm's managers take positive NPV investment pronouncements for the shareholders (Grant, 2003).

The above table 3 illustrates the Economic Value-Added performance of sample companies for the post-recession years from 2009 to 2018. The table evidently discloses that there have been ups and downs in the EVA over the study period. A careful study of the results of Coefficient of Variation shows that Dr. Reddy has been able to add shareholder value consistently among all the with 6.44% variation followed by Cipla with 14.90% variation as obvious from their least estimates. It shows the two firms' capability to generate EVA steadily which means earning economic profits excess of their cost of capital.

Table 2. M&As of four Indian Pharmaceutical Companies after recession

Year	Aurobindo Pharma Ltd	Cipla Dr. Ltd	Reddy's Laboratories Ltd	Lupin Ltd	Total
2009	1	0	0	3	4
2010	0	3	1	0	4
2011	0	0	0	1	1
2012	0	1	1	0	2
2013	1	2	0	0	3
2014	2	1	1	2	6
2015	0	3	2	4	9
2016	0	0	2	0	2
2017	2	1	1	1	5
2018	1	1	0	0	2
Total	7	12	8	11	38

Source: Created from the information given in the Bloomberg, 2019

Table 3. EVA Calculations in millions (INR) computed from data available in Bloomberg.

Year	Aurobindo	Cipla	Dr. Reddy	Lupin
FY 2009	60.8009	3400.79	431.639	2651.66
FY 2010	1168.34	4033.73	-3611.7	3431.54
FY 2011	271.011	1743.99	1403	3762.82
FY 2012	-2352.4	2480.54	4646.57	3426.06
FY 2013	-210.77	4842.67	5616.07	8004.72
FY 2014	6871.51	1268.03	5260.61	10663.8
FY 2015	7136.67	-1335.5	5601.68	13325.5
FY 2016	3573.48	-4208.5	1435.5	5089.15
FY 2017	10274.4	-5417.5	-6623.4	1093.03
FY 2018	7992.52	-681.35	-8944.1	-13862
Average	3428.15	515.344	339.585	2154.86
Sd	4299.61	3458.40	5276.67	7288.05
COV	79.73	14.90	6.44	29.57

Source: Bloomberg, 2019

The upsurge in EVA escalates shareholders' wealth, Stewart (1994) has specified four mechanisms on which corporate business strategies ought to depend. Firstly, efficient utilisation of existing resources to magnify the operating performance, that will help in attaining higher interest rate on prevailing capital. Secondly, devoting additional capital in projects where earnings are higher than the capital cost. Thirdly, withdrawal (or shrinking) of capital from the non-paying projects that yield negative NPV. Lastly, to utilise an optimal capital structure for driving down the cost of capital.

Fundamentally, Economic Value Added on Capital Employed (EVACE) strives for signifying the association between 'EVA' and 'average' capital employed by company. Below Table 4 defines the performance of the sample companies grounded on EVACE during the study period. A vigilant investigation of the table discloses that the business concerns have been able to add value to their shareholders wealth post-recession with less variations. Lupin tops the list followed by and Cipla with variations 28.58% and 28.70% respectively. While the highest variation 36.14% was posted by Aurobindo.

We have selected three financial ratios ROCE ROE and EPS. These ratios measure the returns on invested capital in different products and projects; efficiency of using assets to generate profit and the last measure is relevant to the shareholders as it simply states how much earning each share has received.

the ratio; the more efficiency of capital utilisation". The above table demonstrates the ROCE of the companies for the selected study period. It shows the intense ups and downs in the ROCE during these years. Yet, the mean ROCE throughout the study period marked at 20.77 by Lupin, followed by 14.29 by Aurobindo. On the other hand, the inflated variability in ROCE was specifically observed in the event of two companies, viz., Dr. Reddy and Lupin. The range of variation was observed to be minimum in the case of Cipla (25.62).

Table 4. EVACE Calculations in millions (INR) computed from data available in Bloomberg.

Company Name	Aurobindo	Cipla	Dr. Reddy	Lupin
FY 2009	0.268585	7.52349	1.156837	18.72933
FY 2010	4.71274	6.636839	-9.52812	16.37652
FY 2011	1.092917	2.874729	3.364185	14.42007
FY 2012	-9.24035	3.549473	10.61903	11.22947
FY 2013	-0.69308	5.813624	10.57461	19.40308
FY 2014	17.59339	1.944696	6.524057	17.71296
FY 2015	14.74795	-1.96413	5.995975	18.24727
FY 2016	6.224404	-5.4458	1.431049	6.166077
FY 2017	15.695	-6.43016	-7.42613	1.07593
FY 2018	10.35271	-0.69524	-9.96828	-13.5124
Average	26.85849	752.349	115.6837	1872.933
SD	9.780249	215.9335	33.63765	535.3566
COV	36.414	28.70125	29.07727	28.58386

Table 6. Return on Equity

Years	Aurobindo	Cipla	Dr. Reddy	Lupin
2009-10	32.50	21.07	15.14	33.23
2010-11	26.49	15.33	14.97	28.50
2011-12	-1.68	15.87	14.33	23.36
2012-13	18.26	18.36	17.45	29.38
2013-14	33.72	14.64	22.59	39.31
2014-15	32.36	11.15	16.83	29.95
2015-16	26.61	12.67	12.10	27.04
2016-17	22.31	7.87	11.69	23.54
2017-18	19.68	10.91	4.84	8.80
2018-19	14.34	12.63	10.43	9.35
MEAN	22.46	14.05	14.04	25.25
SD	10.71	3.85	4.73	9.68
COV	47.70	27.42	33.71	38.36

Source: Bloomberg, 2019

Table 5. Return on Capital employed

Years	Aurobindo	Cipla	Dr. Reddy	Lupin
2009-10	12.80	17.17	11.51	22.84
2010-11	13.79	13.22	11.38	20.71
2011-12	6.86	13.45	12.05	17.74
2012-13	12.25	15.01	13.45	23.56
2013-14	20.55	11.82	17.86	31.27
2014-15	19.52	9.68	11.90	26.97
2015-16	17.45	10.70	7.90	24.98
2016-17	14.87	7.12	6.09	22.07
2017-18	14.31	9.52	3.09	8.03
2018-19	10.49	9.65	7.90	9.55
MEAN	14.29	11.73	10.31	20.77
SD	4.12	3.00	4.17	7.28
COV	28.87	25.62	40.45	35.07

Source: Bloomberg, 2019

Table 7. Earnings Per Share

Years	Aurobindo	Cipla	Dr. Reddy	Lupin
2009-10	9.709	13.69	50.15	15.08
2010-11	10.315	11.96	52.82	18.18
2011-12	-0.73	14	53.83	18.02
2012-13	8.52	18.77	74.54	28.19
2013-14	20.12	17.29	113.67	51.88
2014-15	26.005	14.71	98.6	53.41
2015-16	27.85	18.21	80.59	62.92
2016-17	29.16	12.13	83.05	69.63
2017-18	30.94	18.25	34.19	29.76
2018-19	26.11	23.45	76.98	34.03
MEAN	18.80	16.25	71.84	38.11
SD	10.98	3.60	24.21	19.86
COV	58.42	22.14	33.70	52.10

Source: Bloomberg, 2019

ROCE is quite common and relatively a useful performance measure. It pursues to associate the profits of the company with the entire capital employed by the company. It offers adequate understanding how proficiently the company is utilising the long-term funds. The rule of thumb for this ratio is "the higher

Table 8. Results of ANOVA – EVACE, ROCE, ROE and EPS							
Sources of Variation	ANOVA Sum of Squares	df	Mean Square	F	Sig.	F–Critical Value	
EVACE	Between Groups	639.341	3	213.114	3.179	.036*	2.87
	Within Groups	2413.063	36	67.030			
	Total	3052.404	39				
ROCE	Between Groups	1046.331	3	348.777	7.637	.000*	2.87
	Within Groups	1644.127	36	45.670			
	Total	2690.458	39				
ROE	Between Groups	1210.123	3	403.374	7.098	.001*	2.87
	Within Groups	2045.884	36	56.830			
	Total	3256.007	39				
EPS	Between Groups	19749.161	3	6583.054	23.636	.000*	2.87
	Within Groups	10026.523	36	278.515			
	Total	29775.684	39				

Notes: SS = sum of squares; DF = degree of freedom; MS = mean square; *Significant at 5% significance level.

Table 9. Karl Pearson's Correlation matrix (EVACE, ROCE, ROE and EPS)

	Aurobindo			
	EVACE	ROCE	ROE	EPS
EVACE	1			
ROCE	.391	1		
ROE	.744*	.365	1	
EPS	.734*	.480	.347	1
	Cipla			
	EVACE	ROCE	ROE	EPS
EVACE	1			
ROCE	.903**	1		
ROE	.922**	.795**	1	
EPS	-.262	-.189	-.545	1
	Dr. Reddy			
	EVACE	ROCE	ROE	EPS
EVACE	1			
ROCE	.739*	1		
ROE	.629	.714*	1	.
EPS	.611	.663*	.433	1
	Lupin			
	EVACE	ROCE	ROE	EPS
EVACE	1			
ROCE	.927**	1		
ROE	.889**	.795**	1	
EPS	.039	.129	.132	1

**. Correlation is significant at the 0.01 level (2-tailed) *. Correlation is significant at 0.05 level (2-tailed)

The ratios return on equity measures the capability of the corporation in engendering profit per rupee of equity

shareholders' funds. Going by pragmatism "the inflated the ratio of ROE, more significant is the efficiency of management and fund utilization. The above Table 6 provides the insights of the returns received by the corporations on the equity invested during the study period. The analysis of the ROE values reveals a non-fluctuating trend among two companies throughout the study period. The highest average ROE was reported by Lupin (25.25), trailed by Aurobindo (22.46).

Furthermore, Cipla and Dr. Reddy are at the same level in terms of ROE. This has divided the companies into the two groups, which reflects that Lupin and Aurobindo had capability to provide better returns to the equity investors in comparison to the other two companies in the sample. Though the latter group had not been able to provide returns but exhibited steady presentation in ROE as apparent from the least coefficient of variation of 27.24% (Cipla) and 33.71% (Dr. Reddy). Unfortunately, Aurobindo has the highest variation (47.790%).

Earnings per share are the profitability measure that indicates the profitability of the business on per equity share basis. There is no rule of thumb for interpretation of EPS. Generally, the elevated the EPS figure, the healthier it is for the firm. Earnings per share determine the lofty earnings and indestructible financial orientation; hence, a unswerving company to invest. Table no 7 provides a snapshot of the EPS of the selected companies for the study period. It is quite evident from the table that Cipla (16.25) has the lowest average EPS reported in the given period of study followed by the Aurobindo (18.80). At the same time, Cipla has the highest consistency in EPS (22.14%) among all the companies in the sample, followed by Dr. Reddy. The highest variation was reported by Aurobindo (58.42%).

The empirical outcome of ANOVA is recapitulated in Table 8. It is palpable from the below table that premediated values of 'F' are 3.179, 7.637, 7.098 and 23.636 for EVACE, ROCE, ROE and EPS, respectively. Meanwhile, the premediated value is soaring than the critical value at 5% significance level, the null hypothesis (H01) is rejected against the alternate hypothesis (HA1). Hence, it can be culminated that EVACE, ROE, ROCE and EPS of companies fluctuate significantly.

Table 10. Regression results of Aurobindo – EVACE as Independent Variable

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df 1	df 2	Sig. F Change	Durbin-Watson
1	.918a	.843	.717	4.551014010000000	.843	6.711	3	4	.030	3.029

a. Predictors: (Constant), ROCE, ROE, EPS
b. Dependent Variable: EVACE

Coefficients

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	-11.081	4.690		-2.363	.065
	ROCE	2.580	3.030	2.599	.851	.434
	ROE	.754	.380	.981	1.984	.104
	EPS	2.086	1.850	2.676	1.127	.311

a. Dependent Variable: EVACE

One of the purposes of the present study is "to glean the affiliation that subsists among EVACE and traditional means of corporate achievement". Hinging on the data, Table 9 reports the consequences of Karl Pearson's correlation. It is apparent that in the case of Aurobindo Pharma ROE and EPS are 'highly' allied with EVACE at 5 per cent significance level. The values of ROE and EVACE were 'exceptionally' correlated at 1 per cent significance level in instance of Cipla and Lupin. There is no significant rapport amid EVACE and traditional performance measure EPS in case of Cipla, Dr. Reddy and Lupin. On the contrary, EPS is significant but negatively correlated with EVACE when looking at results of Aurobindo. The outcomes of Cipla and Lupin displays significant relation amongst ROCE and EVACE, and ROE and EVACE at 5 per cent and 1 per cent significance level, correspondingly.
\
Moreover, in the case of Cipla & Lupin, ROCE and ROE are highly correlated with EVACE (5% level). Consequently, it can be approximately clinched: "ROE and ROCE changes in tandem with EVACE at an advanced degree". As a part of this study, ROE, ROCE and EPS are assumed as 'independent' variables while as EVACE is assumed as 'dependent' variable. The result of regression analysis of Aurobindo Ltd is reported in Table 10. The p-values for

all the ratios are higher than the significant value 0.05 which confirms acceptance of null hypothesis. Further, the value R-Square is .843 which means the variance of dependent variable is explained 84.3% so regression equation is best fitted.

The regression results of Cipla Ltd are reported in Table 11. The p-value for ROE is lower than 0.05, while as p-values of other two ratios is more than 0.05 which authorizes "the acceptance of null hypothesis at 5% level of significance". Further, there is significant effect of ROE on EVACE. Furthermore, to gauge the accomplishment of the regression analysis in forecasting the values of the dependant variables within the sample, R-squared is calculated. The value of R-square 0.960 illustrates that the regression equation is fitted best.

The outcome of the regression analysis of Dr. Reddy Labs is summarized in Table 12. EVACE is identified as dependent variable and ROCE, ROE and EPS as independent variables. The p-values for autonomous variables are more than 0.05, therefore null hypothesis is rejected at 5% level of significance. The R-squared estimates 0.662 discloses that the 66.2% of the variance of the dependent variable is enlightened by the independent variables.

Table 11. Regression results of Cipla Ltd – EVACE as dependent variable

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df 1	df 2	Sig. F Change	Durbin-Watson
1	.980ª	.960	.928	1.308780493000000	.960	30.184	3	4	.001	2.342

a. Predictors: (Constant), ROCE, ROE, EPS.
b. Dependent Variable: EVACE

Coefficients

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	T	Sig.
1	(Constant)	-24.120	3.924		-6.146	.002
	ROCE	.744	.720	.554	1.032	.349
	ROE	.981	.238	.828	4.122	.009
	EPS	.366	.189	.269	1.939	.110

a. Dependent Variable: EVACE

Table 12. Regression results of Dr. Reddy – EVACE as dependent variable

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df 1	df 2	Sig. F Change	Durbin-Watson
1	.813ª	.662	.391	6.083200701000000	.662	2.445	3	4	.177	2.287

a. Predictors: (Constant), ROCE, ROE, EPS
b. Dependent Variable: EVACE

Coefficients

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	T	Sig.
1	(Constant)	-10.470	12.529		-.836	.441
	ROCE	5.920	5.334	3.257	1.110	.318
	ROE	-.116	.800	-.070	-.145	.890
	EPS	.019	.126	.060	.153	.885

a. Dependent Variable: EVACE

Table 13. Regression results of Lupin – EVACE as dependent variable

Model Summary										
						Change Statistics				Durbin-Watson
Model 1	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df 1	df 2	Sig. F Change	
1	.965 a	.931	.877	3.686432247000000	.931	16.986	3	4	.004	3.082

a. Predictors: (Constant), ROCE, ROE, EPS
b. Dependent Variable: EVACE

Coefficients						
		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	-20.248	5.587		-3.624	.015
	ROCE	.608	.569	.507	1.068	.334
	ROE	.533	.268	.407	1.985	.104
	EPS	-.088	.180	-.166	-.487	.647

a. Dependent Variable: EVACE

Table 13 represents the result of regression analysis of Lupin. EVACE being dependent variable while ROE, ROCE and EPS are assumed as autonomous variables. The p-values for autonomous variables are inflated than 0.05, hence the acceptance of null hypothesis of a zero coefficient at 5% level of significance. Furthermore, the R-squared estimate of 0.931 demonstrations fitness of the model.

Findings: The present study examined the shareholder wealth creation using inorganic strategies. In this regard, traditional measures of financial performance (ROCE, ROE and EPS) and EVA was analysed by using ANOVA and Regression analysis. According to the analysis of the data, Cipla has the highest number of M&A among all the companies, shows highest consistency among the sample companies in analysis of all financial ratios. At the same time, EVA is the lowest among all the companies because with the increase in the number of M&A cash outflow also increases and leads to a drop in EVA sharply after M&A. Lupin has the second-highest number of M&A and is more consistent in shareholder value addition revealed by the analysis of EVACE followed by Dr. Reddy Laboratories.

However, there could also be other reasons responsible for the drop of EVA like the operating efficiency as well as the changes in the cost of capital. Aurobindo with least M&A in number has neither added value to shareholders nor improved financial performance. It is quite evident form the analysis of financial ratios and potrays the highest variation, which means accounting profit is suffering. The variation in these ratios depicts that company has unutilised funds or idle capital available; because these measurements show the efficiency of capital utilisation.

The Empirical results of our study claim that M&A's have bearing on financial routine. The analysis of results revealed that higher variability in absolute figures of EVA, relative figures of EVACE and financial ratios was seen in Aurobindo Pharma. Aurobindo Pharma has lowest number of M&A in the sample companies. It is understood that uniformity in EVACE was marked by Lupin while in financial ratios Cipla recorded highest consistency. M&A is one of the better ways for shareholder wealth creation. It is evident from the outcomes of ANOVA that EPS, ROCE, ROE, and EVACE, and of the sample firms vary significantly. Further, the regression analysis depicted that traditional measures (financial ratios) do not impact EVACE significantly and EPS is negatively correlated to the EVACE.

CONCLUSION

The main motives of mergers and acquisitions is to create synergy and shareholder wealth. One of the significant financial goals of every company is to improve shareholder wealth. The investors are also looking for companies which could provide long-term yields on their investment. The financial ratios are the performance measures that help us to determine the returns of investments, but these measures don not theoretically correlate with shareholder value creation. To overcome the drawback, value-based measures are used to determine the wealth created by the companies like EVA. Economic Value Added is considered as the base on which company takes decisions associated with the choice of strategy, divesting, capital allotment or mergers and acquisitions. EVA is used to measure shareholder wealth creation.

The Indian economy is market-driven; therefore, several firms create wealth using M&A, whereas the most of

them destroy it. The pharmaceutical companies need to enhance their financial performance to generate shareholder wealth; otherwise, it will lead to investor dissatisfaction (Reddy et al., 2011). EVA governs the efficiency of earnings engendered by a firm to offset the cost of capital, i.e., whether the business concern is value creator or destroyer. The investor's wealth silently being tainted in insolvent plans which results in shareholders' treasure demolition (Sakthivel, 2010). It can be concluded that M&A 's are better ways of creating create shareholder value as well as destroying it.

Chen and Dodd (2001), recommended that "there are innumerable aspects interrelated to employees, clienteles, artefact quality, research & development novelties and community satisfaction, that distresses the firms' market value excluding financial aspects". The strategic decisions are irrevocable and have long term impact on the company's financial stability and success in terms of growth and expansion.

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Simulation of Hi-Technology Mask to Detect Various Diseases

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ABSTRACT

People all over the world are prone to many diseases that are known and unknown. However, suitable methods for detecting the diseases in early stage are limited. In todays world we need to figure the disease in early stage in-order to prevent the complications. This implementation of sensors in daily wearable things like mask helps the person to find the changes happening in the body due to different parameters like breathing, temperature and pulse rate. The abnormality in the human body can be detected using sensors. The features which are used for the assessment of diseases are researched and collected from various websites. The sensors which are listed to detect the changes in the body are quite accurate and some calculations are made in-order to achieve the accuracy. By placing the sensors in mask detection of temperature, heart rate becomes easier and the data can be acquired in mobile phone.

KEY WORDS: IOT, MASK, BIOMEDICAL DEVICE, PROTEUS, MICRO CONTROLLER.

INTRODUCTION

This assessment is a fundamental principle of the tools and programs to contribute to the welfare of human health. The diseases causing germs are identified by the symptoms. These symptoms are different for each disease. According to these symptoms, the types of disease and corresponding medications are prescribed. But some of the symptoms are identified only after the disease becomes severe. In-order to identify the symptoms in early stage these sensors are highly helpful. Covid-19 which is the most dreadful disease in current situation shows symptoms such as fever, drop in sp02

level and abnormality in breathing, which is a sign of severity in disease. In this case the use of temperature sensor, heart rate sensor will provide the change in body temperature and pulse. Through this the abnormality can be detected in early stage. Unlike covid-19, diseases like asthma, heart diseases which involves the variation in pulse, hypothermia etc. can be determined earlier. Implementation of these sensors together in mask, would help us detect and analyse the abnormalities in human body. This system would be body alarming device to give us the details about our body condition. This can be used in hospitals to test the patients just by wearing it, instead of using separate devices to check different parameters. This device would detect all the essential parameters for identifying the disease.

METHODOLOGY

The diseases are identified according to the symptoms. In-case of covid-19, the raise in temperature above 100F and drop in sp02 below 90 is a major sign. According to this criteria temperature sensor and heart rate sensor will detect these symptoms stage of asthma and other

respiratory problems. Normal breath rate of a person above the age of 12 is 12 to 16 per minute. If the breath rate exceeds that or is above 40 per min then it is the symptom of Pneumonia, bronchitis, asthma etc. The normal pulse rate of healthy person is between 60 to 100 BPM. When the heart beat rate falls below or above, it becomes the indication of heart disease. Unlike the person is involved in heavy physical activity. Placing the heart beat sensor in different parts of the body will give us fluctuating pulse rate.

Placing it by the side of ears will give us quite accurate result. pulse rate is obtained from carotid artery part of face, which is near the side of ear lobe. These results can be acquired by using these sensors separately, but it would be a lengthy process, expensive and time consuming. When we implement these in a single product, it would be of great advantage. By placing these in mask with high protection will acquire us promising multiple results. This wearable mask with these sensors would give the information about heart rate, temperature which are the two main essential parameters necessary for identifying the diseases. These data can be displayed in the app. This mask would not only prevent from spread of infection, but also detect the changes in the person's body who is wearing it.

Table 1. Data Sheet Of Diseases And Their Symptoms				
s.no	disease	symptoms	Normal body specifications	parameter
1.	Covid-19	Raise in temp above 100F Drop in SpO2 value below 90%	Body temp: 97.8F–99F SpO2: >90 (greater than 90) Normal heart beat rate: 60 to 100 BPM	Temperature, heart rate
2.	hypothermia	Drop of body temp below 95F	Body temp: 97.8F–99F	temperature
3.	hyperpyrexia	Raise in temperature Body temp: 106F(41.1C)	Body temp: 97.8F–99F	temperature breathing
4.	Pneumonia, bronchitis	Breathing rate above 40/min	Normal breath rate: Birth to 1yr - 30 to 60 1 to 3 yr - 24 to 40 3 to 6 yr - 22 to 34 6 to 12 yr - 18 to 30 12 to 18 yr – 12 to 16	
5.	TTN transient tachypnea	Breathing rate above 60/min		breathing
6.	Asthma	1. Pulse 100 to 125 per min (children older than 5) 2. Pulse rate <140 (2 to 5) 3. Respiratory rate of 20 to 30 /min (older than 5 yrs)	Normal heart beat rate: 60 to 100 BPM	Breathing, heart rate
7.	Heart diseases	less than 60BPM more than 100 to 200 BPM	Normal heart beat rate: 60 to 100 BPM	Breathing, heart rate

Figure 1: Process flow using sensors and components
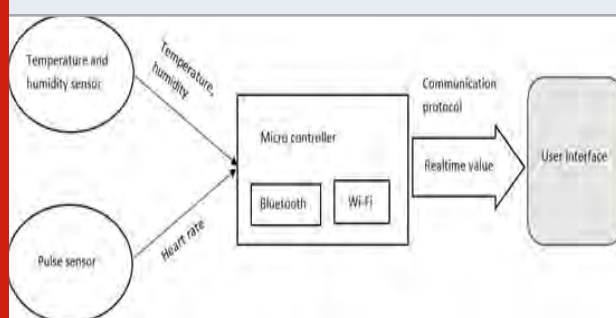
These signals can be sent to phone and can have a tract of the changes daily. The person can have the tract in history of changes of his body. By placing the heart rate sensor on the internal carotid artery, the pulse rate can be obtained. These data are collected from web sources and are listed in TABLE 1. By simulating using these sensors and below mentioned data the type of disease can be detected. The process flow is mentioned in Fig 1 and Fig 8. The temperature sensor not only detects the change in temperature (Liang et. al. 2011), but also the humidity and by using these parameters breath rate can also be detected. The count of breath rate can detect the primary.

Process flow of the Hi Tech Mask: The values or parameters like body temperature and pulse rate are detected through the temperature and humidity sensor, pulse rate sensor respectively. These signals are then passed to the microcontroller. The microcontroller converts these signals to actual values. The actual range for detection is fed in the microcontroller in the source code. By comparing the values obtained by internet data shown in TABLE 1 and calculated values (1) the symptoms can be predicted. These information are then passed to the user interface wirelessly. The micro-controller with Bluetooth and wi-fi can be used to transmit the information wirelessly. The suggestion for type of sensors and micro-controller is listed in TABLE 2.

Table 2. Data Sheet Of Sensors Used		
S.no	Name of the sensor	specifications
1.	Temperature, Humidity,	BME280: pressure sensor BME280 Pressure: 300...1100 hPa Temperature: -40...85°C Average current: 1.8 µA to 2.8 µA Humidity sensor: Response time (τ63%): 1 s Accuracy tolerance: ± 3 % relative humidity Hysteresis: ≤ 2 % relative humidity Pressure sensor: Sensitivity Error: ± 0.25 % Temperature coefficient offset: ±1.5 Pa/K (equiv. to ±12.6 cm at 1°C temperature change)
2.	Heart rate sensor MAX30102	MAX30102: Heart Rate Monitor and Pulse Oximeter Biosensor has Low-Power Heart-Rate Monitor (< 1mW) Ultra-Low Shutdown Current (0.7µA) Fast Data Output Capability
3.	Microcontroller ESP32	ESP32-WROOM-32: 32-bit LX6 microprocessors 448 KB ROM for booting and core functions 520 KB on-chip SRAM Wi-Fi: 802.11n up to 150 Mbps Bluetooth v4.2 BR/EDR and BLE Wi-Fi mode Operating temperature -40 + 85C Operating voltage: 2.2-3.6V Consumption: 80 mA type

Mask structure: These figures are designed using solid works software (Jiang et. al. 2007). The structure is designed in such a way that it consists of vent for placing the controllers and sensors. The material of mask is listed below. Three types of material are suggested and will consist of three layers of protection. The vent is shown in Fig 2. In Fig 2 the place for keeping pulse rate sensor is shown(a). Since the pulse rate is obtained from carotid artery part of face (near ear), the place of pulse rate sensor is designed in strap. The complete view of the mask is shown in Fig 2, Fig 3, Fig 4 and Fig 5. The 3D image was designed in order to get better illustration of the device (Swennen et. al. 2020; White & Shakeel et. al. 2017). The position of temperature sensor is shown in Fig 1 (b).

MATERIAL AND METHODS

Polyester: Polyester is preferred as second layer in the mask. Polyester has excellent shape characteristics. Polyester fabrics can be used for a long period after being washed several times. It lasts for longer period, flexible, non-deformable, anti-corrosion, insulating and is less maintenance (Baowu et. al. 2001). Polyester is suggested as second layer because of the following advantages.

Polyester material advantages
- good flexibility.
- The modulus of elasticity of polyester is 22 to 141 cN/dtex, and is 3 times greater than nylon.
- Synthetic fibre has good heat resistance and thermo-

plasticity.
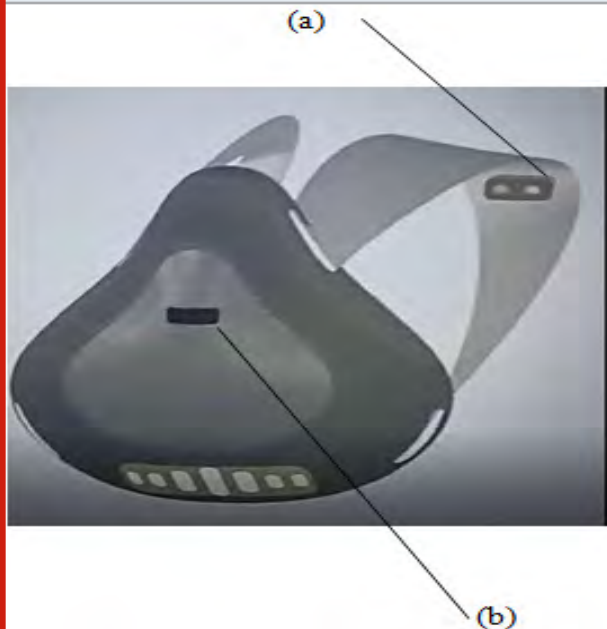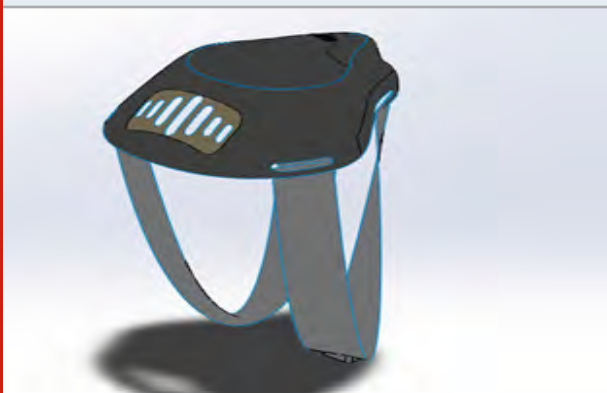- Good chemical resistance

Figure 2: Front view

Figure 3: Side view

Cotton: Cotton is preferred for inner most layer of the mask. Cotton will keep you cool when the temperature is hot and provide insulation when the temperature is cool. Dermatologists prefer cotton as it rarely causes irritations or any allergic reactions. Cotton is breathable, soft, and super comfortable (Konda, & Guha et. al. 2020). It causes negligible irritation to skin and thus it is preferred as inner most layer.

Polypropylene fibre: Polypropylene fibre is preferred for the outer layer. This fibre is thermoplastic, resilient, light weight and resistant to mildew and many different chemicals (Demir et. al. 2015).
PP has the following properties:

- low heat resistance
- excellent chemical resistance

Figure 4: Top view

- low price
- light weight
- strong
- flexible
- has low thermal conductivity – 6.0
- has excellent electric insulation
- moisture absorption is 0 to 0.05%

Figure 6: N-95 FILTER

Filter: The N-95 filter, restricts 95% of the airborne particles. This filter is considered equivalent to respiratory regulators. It is a fine mesh of synthetic polymer fibre. This can be used for continuously more than 8 hrs. some are available in polypropylene fibre (Bałazy et. al. 2006). It consists of no-oil based particles. It is specially designed for industrial workers and medical professionals (Grinshpun et. al. 2009).

Figure 7: simulation result

Figure 7: simulation result

Figure 8: flow chart of simulation process

Figure 8: flow chart of simulation process
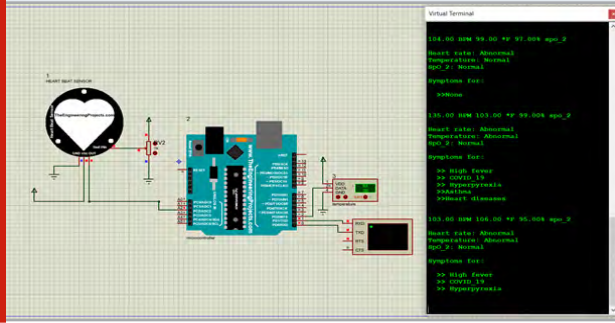
RESULTS AND DISSCUSSION

The simulation is done in Proteus 8 Professional (Xiao-dong, X. U. 2009). In this software, the desired components such as Heart Beat Sensor, microcontroller, Temperature sensor are used for the simulation as shown in Fig 7. The components used for simulation are already available via software. These components can also be replaced by other sensors like in TABLE 2. The simulation results are listed in TABLE 3.

The desired sensors and microcontroller are selected and placed in the schematic working area. Each sensor is selected and connected to the microcontroller. The actual values are provided and limitations are specified in the source code. Finally, the results are obtained by running the simulation. Some calculations are made in order to find the SpO2 value (1).

$$SpO_2 = 100 \times \frac{C[HbO_2]}{C[HbO_2] + C[RHb]} \qquad (1)$$

C[HbO$_2$] is the concentration of HbO$_2$ oxyhemoglobin in arterial blood and C[RHb] is the concentration of RHb. The arterial blood oxygen saturation level in human are 95-100%. If the level is below 90 then it is called hypoxemia. Covid-19 is determined when the SpO$_2$ value is below 90. Peripheral oxygen saturation (SpO$_2$) is an estimation of oxygen saturation level.

Flow chart of simulation: The process begins with fetching values from the sensors using microcontroller. These values are then processed with their respective modules to get accurate values. The calculated values are then displayed in the virtual terminal. The values are then checked if they are normal for an individual. If they are abnormal then control flows to the decision function. There the parameters, symptoms for possible diseases are compared and calculated, then it's passed to main program. These information and contents on the terminal are displayed in the mobile application through BLYNK service system (Todica, M. 2016). This entire process repeats itself with some interval. The flow chart of simulation is given in below Fig 8.
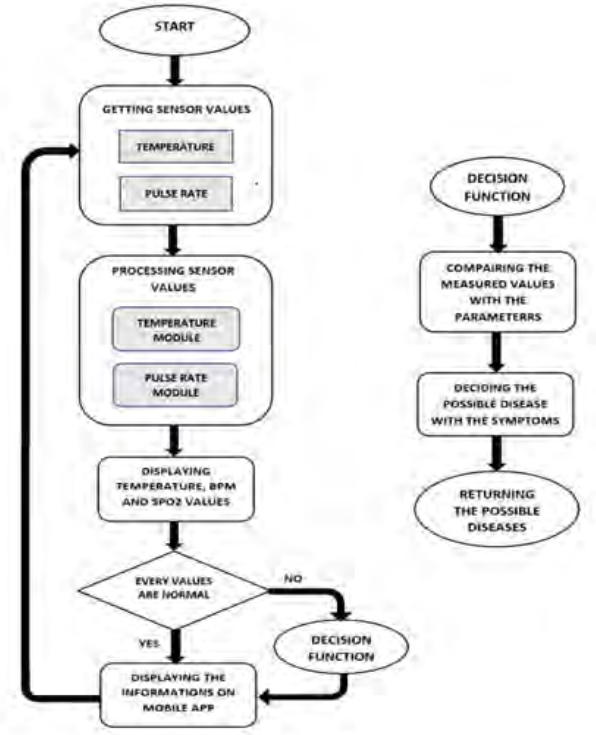
The simulation is done for three cases, in which different types of diseases are found related to the victim symptoms. It is displayed using virtual terminal. For the first case, there is increase in heart rate(104 BPM), normal body temperature (99F)and spo2 level is above 90 which is normal(97%). According to this symptom, there are no possibilities of getting affected by diseases, thus the victim is safe. Similarly, for the second case there is increase in heart rate (135 BPM), slight raise in body temperature (103F) and spo2 level is normal (95%). Thus in this case the victim is likely to get high fever, COVID_19, hyperpyrexia, asthma and heart diseases. In the third case, the spo2 level is normal (95%), increase in body temperature (106F) and heart rate (103 BPM), which is abnormal. According to this, the victim might suffer from COVID_19, hyperpyrexia and high fever. These simulated results are verified to be quite accurate. These are diplayed in Fig 9.

Mobile app features: For recruiting the results in mobile app, BLYNK service is used here (Doshi et. al. 2017). BLYNK is a platform, which allows to quickly build interfaces for controlling and monitoring devices from IOS and android devices. It helps to control Arduino, raspberry pi and other microcontrollers too. The values which are calculated and processed on the microcontroller is sent to mobile app through cloud service or through LAN. The terminal where the live values and other information are displayed can also be viewed in the app. The values on the app is refreshed every pre-set number of seconds. This app is helpful in tracking the health condition of the person. They can have a record of it. This will be useful in analysing the body condition of the respective person.

s.no	case	Symptoms	result	Prone diseases	Normal body specification
			Table 3. The Results Of Simulation For Three Different Cases		
1.	Victim 1	Heart rate: 104 BPM Body temperature: 99F SpO2: 97%	Heart rate: abnormal Body temperature: normal SpO2: normal	NONE	Heart rate: 60 to 100 BPM Body temperature: 97.8F-99F SpO2: >90 (greater than 90)
2.	Victim 2	Heart rate: 135 BPM Body temperature: 103F SpO2: 99%	Heart rate: abnormal Body temperature: abnormal SpO2: normal	1) High fever 2) COVID_19 3) Hyperpyrexia 4) Asthma 5) Heart diseases	Heart rate: 60 to 100 BPM Body temperature: 97.8 F-99F SpO2: >90 (greater than 90)
3.	Victim 3	Heart rate: 103 BPM Body temperature: 106F SpO2: 95%	Heart rate: abnormal Body temperature: abnormal SpO2: normal	1) High fever 2) COVID_19 3) Hyperpyrexia	Heart rate: 60 to 100 BPM Body temperature: 97.8F-99F SpO2: >90 (greater than 90)

Figure 9: display of symptoms in virtual terminal
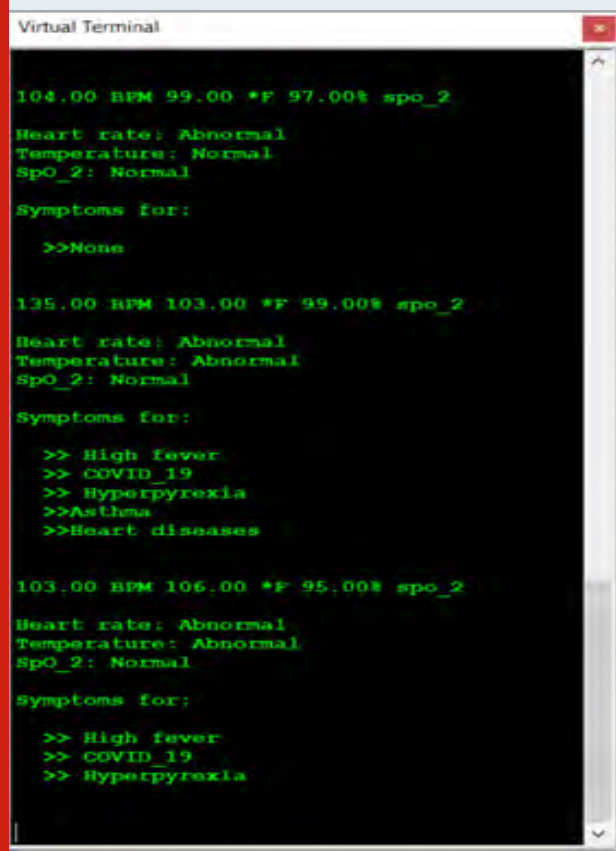
Future Work: In future this can be implemented to connect all the masks of the same type under a network like a mesh network and the data of the abnormal individual can be detected and shared to other users under the same network. This will alert the users on the locality over a certain distance and thereby eliminating the spread of diseases and infections. This might also help the people in the locality to be aware and to seek the doctor for help. This can also be used to integrate the app with contact tracking application, such that the information reaches out the concerned person. This application can also be improved on design and algorithms to improve the accuracy of the parameters and to get more information on the app.

Figure 10: Display of symptoms and diseases

DISCUSSION

In this paper we have summarized the detection of various diseases in the early stage using the sensors present in the mask. The mask is suggested to have three different materials in three different areas. These materials are suggested on the bases of human body condition and sensors effectiveness. Polyester is proposed as second layer, cotton as inner most layer and polypropylene fibre

as outer layer. The simulation is done for three different cases and the results are shown. By Using this mask, the symptoms can be received in phone and the person can have a record of his health condition. This can also be used to sense the other person health condition by using the Bluetooth features available in the micro-controlled used. This is possible only if the second person wears this same mask.

CONCLUSION

A low-cost, daily wearable, efficient detector in mask is illustrated. It is based on the change in temperature, heart rate and breath rate the diseases are detected. This is a portable three- layer mask with suitable fibre material. A sensitive flexible sensor is used to sense the changes in human body and effective microcontroller system is used to extract information from the signal and the data is acquired in mobile phone. This will be portable and more efficient in acquiring the changes in human body. This will be a multi-purpose device which sense the major parameters responsible for diseases. This is mainly devised based on the current pandemic (covid-19). This will sense the infection quicker and will help in diagnosing it. The information of the victim health can be recorded by using the mobile app. The person can have a track of his health data.

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Study on Price Discovery of Selected Indian Agriculture Commodity with Special Orientation to Ncdex

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ABSTRACT

Commodity Future market has major economic implications by performing several economic functions. It includes price discovery function, hedging functions, price stabilization function, Liquidity function and finance function An efficient commodity futures market attracts number of investors in the futures market. The special feature of the futures market is price discovery and risk minimisation and there are many complications related to price signals, volatility spillovers, price discovery in spot and futures of Indian commodity market. This study empirically analyses both the market to understand which reacts first in India by assessing the relationship between spot & future prices of selected agricultural commodities such as Chana and Castor Seeds traded in NCDEX for 2016- 2018.

KEY WORDS: COMMODITY FUTURE MARKET: PRICE DISCOVERY.

INTRODUCTION

India Being an agricultural economy faces price risk. With the advent of derivative trading in commodities which provides producers and consumer not only with correct price signals but also with tools for managing price risk. Commodities have attracted quite a considerable interest as an investment avenue in recent years. Indian commodity derivative market has a very long history. However, the first organized commodity future trading was started in cotton in 1875 by Bombay Cotton Trade Association. The policies with regard to commodity future trading have taken several turns over the years where there were several years that witnessed a ban on trading. Commodity future market in india has been

restructured in 2003 and futures contracts trading has seen improvement in terms of volume and value flow with very rapid growth during that period. It elevated itself to compete in the international market with worldwide giants, such as NYMEX,CBOT, LME, etc.

Chana: The chickpea or chick pea (Cicer arietinum) is an annual legume of the family Fabaceae, subfamily Faboideae. Its different types are variously known as gram or Bengal gram, garbanzo or garbanzo bean, Egyptian pea. Chickpea seeds are high in protein. It is one of the earliest cultivated legumes, and 7500-year-old remains have been found in the Middle East.

In the list of food pulses chana takes third position thoughout the world which comprises 25% proteins, which is the maximum provided by any pulse and 60% carbohydrates. Chana is used throughout the world as an edible seed and is also used for making flour.in 2018, world production of chickpeas increased over 2017 levels by 16%, rising to a total of 17.2 million tonnes..India led production with 66% of the global total, while Australia, United States, and Turkey were secondary producers.

Chickpea is grown in September to November (Rabi Season) month in India. The maturity period of desi type chickpea is 95-105 days and of kabuli type chickpea is 100-110 days.. In India, it is harvested in February, March and April

Castor Seed: Castor is a plant that produces seeds (beans). Castor oil is produced from ripe seeds that have had their outer covering (hull) removed. Castor oil has been used as a medicine for centuries.Castor oil is used for constipation and bowel preparation prior to colonoscopy, childbirth, and many other conditions, but there is no good scientific evidence to support these uses. The hull of the castor seed contains a deadly poison called ricin. This is why the hull must be removed before use. Ricin has been tested as a chemical warfare agent. Weapons-grade ricin is purified and produced in particles that are so small they can be breathed in.

Castor plant is cultivated in 30 different countries. India, China, Brazil, Russia, Thailand, Ethiopia and Philippines are major castor seed growing countries which accounts about 88% of the world's production. In India it is a kharif crop, sowing in July-August and arrivals from December onwards till March. The chief producing state in india is Gujarat having a share of 86% of domestic production, followed by Andhra Pradesh and Rajasthan.

Review of Literature: Review of literature is the collection and presentation of earlier research works for the determination of precisely knowing important information relating to the present research and research methodology. Well structured review of literature is arranged orderly along with references with the specific format of referencing, apt use of terminologies and concepts and complete details of previous research works in relation with research problem under consideration for the present study. Most importantly, it is carried out for the drive of locating gaps in research, constructing research framework and procedures.

Reviews on Earlier Studies: Lokare (2007) studied performance of the selected Agricultural commodity future trading in India. The monthly future and spot prices of potato, caster seed, pepper, mustard and gur for the period from 1990-2005 and Cointegration and ADF were used to analyze data. The findings showed that there is a positive co-integration between the cash and future prices of pepper, mustard and gur.

Nath and Lingareddy (2008) investigated the impact of the invention of futures trading on spot prices of pulses for the period of January 2001 to August 2007. Simple percentages, correlations, regression analysis and Granger causality were used for analyzing the causal relationship. Results revealed that Futures trading had a positive and significant causal effect on volatilities in spot prices of urad while the same cannot be established for gram and there was a volatility spill over from urad to food grains. Sahadevan (2008) assessed which market influence the mentha oil futures on spot prices and daily spot market price for mentha oil futures traded on MCX

and NCDEX, in the year 2007. Johnson Cointegration and granger causality tests were applied and results showed that both prices were cointegrated. Price is discovered in future market and it is influencing the spot market prices.

Hernandez and Torero (2010) observed dynamic relationship between spot & future prices of agricultural commodities. The spot data for weekly (Friday) prices obtained from the Food and Agriculture Organization of the United Nations (FAO). International Commodity Prices Database were in U.S. dollars per metric ton (US$/MT) for the period of from January 1994 to June 2009 for corn and soybeans and from January 1998 to June 2009 for the two varieties of wheat were taken for the study. Granger causality test was used. The results showed that Price changes in futures markets led price changes in spot markets more often than the reverse, especially when examining returns and the causal link appeared to be stronger and more persistent.

Kumar and Pandey (2011) investigated the cross market associations of Indian commodity futures for nine commodities with international futures markets outside India for Soybean, and Corn, three metals: Aluminum, Copper and Zinc, two precious metals: Gold and Silver, and two energy commodities: Crude oil and Natural gas. futures contracts traded on MCX were used and data were collected from 2004 to 2008. Cointegration and vector error correction model were used. The results of long run cointegration between Indian futures prices and their world counterparts indicated that for all the nine commodities studied, the Indian markets were co-integrated with the world markets. The Granger Causality test results and variance decomposition of forecast error of VECM model indicated that there existed one-way causality from world markets to Indian market in utmost of the commodities. The impact of CBOT on Indian agricultural futures market is unidirectional and approximately 30% - 40% variations in returns of Indian commodity futures were explained by CBOT futures prices.

Bhanumurthy et al (2012) examined casual relationship with spot and futures agricultural commodity prices. The daily prices from June 2005 to December 2011 were collected for the study and co-integration, granger causality and error correction models were used. Results indicated that there was increasing integration of spot and futures market prices. Future prices Granger caused spot prices while the shock in futures prices appeared to have impact on the spot prices at least for five month period with a maximum impact at a lag of one month. Changes in rainfall affected both futures and spot prices with different lags. The results from the bivariate causality between the variables of interest, particularly with rainfall, supported the theoretical relationship between these two markets, which was clearly different from the conclusions of the AbhijitSen Committee. The results from the variance decompositions and impulse responses only support the direction as well as the extent of impact future prices have on the spot prices.

Efe-Omojevw (2013) studied the efficiencies of maize and wheat futures markets in India. The study used data obtained from the database of the Indian National Commodity Derivative Exchange (NCDEX) on the futures trading of the commodities for the period of January 2006 to June 2011. The daily price data was converted into monthly price data. Stationarity of the data was determined with a unit root test using the Augmented-Dickey Fuller (ADF) method. Augmented Engle-Granger (AEG) co-integration test of unit root was applied on the obtained residuals of the long-term equilibrium regression. The existence of co-integration means the price relationship between futures and spot can be adequately represented by an error correction model (ECM).

The presence of co-integration was an indication of interdependency between the price series and it supported the findings of unbiased-ness of the futures price in estimating the future spot prices. Consequently, the futures market was an optimal forecaster of future spot rates and was able to play the major role of price discovery. The convergence of the futures and spot prices was reinforced by the negative error correction terms that helped to minimise losses and gains in futures contract payments as contract maturity draws close. The futures markets were found to be weakly inefficient as they contained additional information that traders could use to make additional gains.

Chhajed and Mehta (2013) studied price discovery and behaviour of commodity markets in Indian Agriculture Commodity Markets. Nine agriculture commodities viz., wheat, chana, soybean oil, jute, mentha oil ,rubber, potato, crude palm oil and cardamom were considered for the study. average monthly spot and future prices trading on MCX and NCDEX during 2009-2010 were considered for the study. Granger causality test was used to test the causality effect of future market on spot market and vice-versa. The market behaviour was studied with the help of backwardation and contango. The result indicate that most of the commodities showed bi-directional causality between spot and future prices. The contango and backwardation helped in identifying the hedging opportunities in the market.

Aggarwal et al (2014) investigated price discovery and hedging effectiveness of commodity futures. The data used for the study was obtained from MCX, NCDEX, and NMCE for the period between 2003-2014. The daily closing price data on both the spot and the futures prices of pepper, soya oil, sugar, wheat and rubber were taken for analysis. Cross-correlations, co-integration and Granger causality were use and results indicated that future market influenced the price discovery for all the commodities and risk reduction was not effective there was a relationship between spot and futures prices and they were co-integrated for all agricultural commodities.

Haq and Rao (2014) examined effectiveness in the long-run for four different agricultural commodity futures

markets and also to determine short run and long run cointegrationand whether there is any pricing biases existed in these markets. For Channa, Chilli, Guar Gum, Guar Seeds, Jeera , Refined Soy Oil, Soy Bean and pepper the data set used was from March 2006 to Dec 2011, Barley from Mach 2007 to Dec 2011 and for turmeric the data used was from March 2009 to Dec 2011. ADF, Cointegration test and Vector Auto Regression (VAR) were used to analyze data and the results indicated that spot and future prices of agricultural commodities were cointegrated in long run and the markets for all commodities were efficient in long run. However, short run inadequacies and pricing prejudices existed.

Nirmala et al (2015) analyzed price discovery process in respect to cardamom, whether Cardamom future market serves as a price discovery mechanism for spot market prices and vice versa.The analysis involved use of econometric tools like Augmented DickeyFuller (ADF) test, Granger Causality test and Cointegration technique. The daily closingdata from 2012 to 2013 had been taken for the study.for analysis. findings suggested that, cardamom futures price movement could be used as price discovery vehicle for spot market transactions.

Ahmad (2015) studied the Malaysian crude palm oil futures before and after Shari'ah-compliance and there price duiscovery function. The data of crude palm oil futures and crude palm oil prices for the January 2007 until December 2011 period was collected and tested using ADF and PP Test. The results of the Augmented Dickey Fuller (ADF) and Philips Perrons (PP) unit root tests suggested that the CPO and FCPO series were stationery at first difference. Johansen's co-integration test indicates that FCPO and its underlying spot market for both periods were co-integrated, implying that there was a causal relation between the two markets. In period I, the estimated results of Vector Error Correction model (VECM) indicated a one-way causality direction from the CPO market to the FCPO market in the long run.

Research Gap

(i) The numbers of quality research in the field of commodity markets are limited..

(ii) There is a need to study the causal relationship between spot markets & future markets on various sectors of agricultural commodities

(iii) There is a need to study Price Forecasting

Objectives

1. To check Stationarity of Commodity Prices
2. To Estimate cointegration between future and Spot Prices markets
3. To Check the Cause and Effect relationship between spot & future prices markets

METHODOLOGY

Data Collection: Data is collected from National Commodity and Derivative Exchange(NCDEX) of daily closing prices from 2016 to 2018.

Period of Study: The study uses the sample period of 2 years from2016 to 2018.

Scope of the study: This study observes the relationship between spot & future prices of agricultural commodities such as Turmeric and Chilly from 2016 to 2018 traded in NCDEX,
Hypotheses–

H_0: Time series data is non Stationery
H_0: There is no significant long-run and short run association between commodity futures and spot prices
H_0: Spot price does not granger cause future
H_0: Future does not granger cause spot

Statistical Tools for Analysis
a) Augmented Dickey Fuller Test.
b) Johansen's co-integration model and VECM Model.
c) Ganger Casaulity Test

Stationary of Commodity Spot and Futures Prices
H_0: Time series data is non Stationery
H_a: Time series data is Stationery

Since the probability value id greater than 0.05null hypothesis is accepted. The above table shows the results of stationarity test on the n values of prices of series of spot and futures of Chana and castor seeds respectively. The result of the ADF test confirm that the data series of spot and futures prices is non- stationary at level form (p>0.05) and the data series of spot and futures is stationary at level form (p<0.05).Hence Johansen Test of cointegration is used to check long run equilibrium relationship between spot and future prices of sample commodities .As a result of cointegration is sensitive to lag length.

Long run Association between Commodities Futures and Spot Prices

			Level – Trend		Level-Trend and Intercept		Level None	
			t-Statistic	Prob.*	t-Statistic	Prob.*	t-Statistic	Prob.*
Chana Spot	Augmented Dickey-Fuller test statistic		-0.499435	0.9864	-0.889334	0.9544	1.359399	0.9564
	Test critical values:	1% level	-3.457515		-3.996754		-2.574633	
		5% level	-2.873390		-3.428660		-1.942153	
		10% level	-2.573160		-3.137757		-1.615818	
Chana Future	Augmented Dickey-Fuller test statistic		-1.808582	0.3758	-2.200914	0.4865	0.299631	0.7717
	Test critical values:	1% level	-3.457515		-3.996754		-2.574633	
		5% level	-2.873390		-3.428660		-1.942153	
		10% level	-2.573160		-3.137757		-1.615818	
Castor Seeds Spot	Augmented Dickey-Fuller test statistic		-1.877313	0.3427	-1.918973	0.6415	0.094257	0.6502
	Test critical values:	1% level	-3.457630		-3.996918		-2.574674	
		5% level	-2.873440		-3.428739		-1.942159	
		10% level	-2.573187		-3.137804		-1.615814	
Castor Seeds Future	Augmented Dickey-Fuller test statistic		-1.715507	0.4222	-1.647683	0.7711	0.226372	0.7512
	Test critical values:	1% level	-3.457515		-3.996754		-2.574633	
		5% level	-2.873390		-3.428660		-1.942153	
		10% level	-2.573160		-3.137757		-1.615818	

H_0: There is no significant long-run association between commodity futures and spot prices

H_a: There is a significant long-run association between commodity futures and spot prices

The table shows the result of Johnsen test of cointegration ,The result reveals that there is a presence of one cointegration equation between spot and future prices of Chana and Castor Seeds and this signifies the long run association .The trace results points out the number of cointegrating equations equation are less than or equal to one; whereas Maximum Eigen Value test results confirm the presence of one integration equation examine the lead lag relationship or the long run and short run speed adjustment or convergence towards equilibrium between spot and future prices.

long-run and short-run adjustments (causality) between spot and futures prices

H_0: There is no long-run and short-run adjustments (causality) between spot and futures prices

H_0: There is a long-run and short-run adjustments (causality) between spot and futures prices.

Table 4.4							
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**	Max–Eigen Statistic	0.05 Critical Value	Prob.**
None	0.043261	10.84271	15.49471	0.2213	10.43707	14.26460	0.1848
At most 1	0.001717	0.405632	3.841466	0.5242	0.405632	3.841466	0.5242

Trace test indicates no cointegration at the 0.05 level
*Denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values
Max-eigenvalue test indicates no cointegration at the 0.05 level

Table							
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**	Max–Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.064672	19.33639	15.49471	0.0125	15.77859	14.26460	0.0286
most 1	0.014962	3.557806	3.841466	0.0593	3.557806	3.841466	0.0593

At
Trace test indicates no cointegration at the 0.05 level
*Denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Estimation of long-run and short-run adjustments (causality) between spot & futures prices Estimation of long run and short run adjustments between spot & futures

The t-statistics are given in [] brackets while the error term are given in () brackets .The coefficients of Chana future returns and castor seeds future returns are positive and statistically insignificant respectively, the results reveal that the relationship between Chana future returns and spot returns and castor seeds future returns and spot returns are positive. The sign of the error correction coefficient in determination of Chana spot returns is positive (0.01521),the t value is [0.91192]and f statistics is 2.354423 and castor seeds returns is positive 0.041934 ,the t value is [0.73464].And f statistics is 5.474049 This indicates that Chana and castor seeds spot returns do not respond significantly to re-establish the equilibrium relationship once deviation occurs.

Presence of Short run Causality between futures and spot prices

H_0: There is no presence of short run causality between futures and spot prices.

H_a: There is presence of short run causality between futures and spot prices.

Since the probability value is more than 0.05, null hypothesis is accepted hence alternative hypothesis is rejected. The table reveals that results of Wald chi-square test that the joint value of all the coefficient of future prices of Chana and castor seeds at select lag length are not equal to zero ,which indicates the presence of the

short run causality between the spot and future market of commodities under study.

Direction of Causality–Granger Causality

H_0: There is no significant impact of commodity futures prices to spot prices

H_0: There is a significant impact of commodity futures prices to spot prices

Estimation of Direction of Causality-Granger Causality Estimation of Direction of Causality –Granger Causality

Table		
Panel A : Normalized Co- integration Co-efficient		
CHANNA(-1)	CHANNA1(-1)	CONSTANT
1.000000	-1.438321	1920.791
	(0.19532)	
	[-7.36378]	
Panel B : Coefficient of Error Correction Term		
Error Correction:	D(CHANNA)	D(CHANNA1)
CointEq1	0.015214	0.096657
	(0.01668)	(0.02511)
	[0.91192]	[3.84893]
F-statistic	2.354423	3.919548
Standard errors in ( ) & t-statistics in [ ]		

Table		
Panel A : Normalized Co- integration Co-efficient		
CASTOR(-1)	CASTOR1(-1)	CONSTANT
1.000000	-0.895942	-376.5728
	(0.04209)	
	[-21.2865]	
Panel B : Coefficient of Error Correction Term		
Error Correction:	D(CASTOR)	D(CASTOR1)
CointEq1	0.041934	0.221188
	(0.05708)	(0.06194)
	[0.73464]	[3.57107]
F-statistic	5.474049	12.55270

The cointegration result indicates that causality exists between the cointegrated variables but it fails to show us the direction of the causal relationship .The pair wise Granger causality test is performed between all possible pairs of variables to determine the direction of causality .The results show that there are bidirectional causality exists only between castor future returns and castor spot returns.

Wald Test:
Equation: Untitled

Test Statistic	Value	Df	Probability
F-statistic	1.723210	(2, 234)	0.1807
Chi-square	3.446421	2	0.1785
Null Hypothesis: C(3)=C(4)=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)	Value	Std. Err.	
C(3)	-0.082809	0.045552	
C(4)	0.079584	0.045157	
Restrictions are linear in coefficients.			

Wald Test:
Equation: Untitled

Test Statistic	Value	Df	Probability
F-statistic	0.058046	(2, 234)	0.9436
Chi-square	0.116093	2	0.9436
Null Hypothesis: C(3)=C(4)=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)	Value	Std. Err.	
C(3)	0.022544	0.076318	
C(4)	-0.009034	0.071519	
Restrictions are linear in coefficients.			

Note: p values denote significance level at the 5% level of significance.

Null Hypothesis:	Obs	F-Statistic	Prob.	DECISION
D(CHANNA1) does not Granger Cause D(CHANNA)	238	2.72990	0.0673	Accept
D(CHANNA) does not Granger Cause D(CHANNA1)	1.24487	0.2899	Accept	

Findings

1. The Johansen's co integration test reveals that there is a long run association that is equilibrium between spot and future prices of Chana and castor seeds.
2. The VECM results reveal that the co efficient of error correction term (coefficient of cointEq1) is positive in sign and is not significant. This implies that there

is a long run causality running from future prices to dependent spot prices which enable the spot market to adjust to the short run deviation from long run equilibrium path nearly 2.01% and 3.30% speed of adjustments in sample commodities ,that is ,Chana and castor seeds respectively .The speed of correction in the future market of Chana is 3.43%against spot market ,which indicates a highly informative future market .At the same time ,insignificant ECT of in future prices of castor seeds indicates futures market efficiency towards maintaining stable long run equilibrium.

3. Wald chi-square revels that the joint value of all the coefficient of future prices of Chana and castor seeds at select lag lengths are not equal to zero ,which indicates the presence of short run causality between the spot and future market of commodities under study ($p<0.05$).

4. Granger Causality tests disclosure that there is only a unidirectional causality from future returns to spot returns of commodities Chana and castor seeds ($p<0.05$).

Null Hypothesis:	Obs	F-Statistic	Prob.	DECISION
D(CASTOR1) does not Granger Cause D(CASTOR)	238	1.84703	0.1600	Accept
D(CASTOR) does not Granger Cause D(CASTOR1)		22.3142	1.E-09	Reject

CONCLUSION

The study was undertaken by the researcher to find out the efficiency of Commodity future in price discovery of agricultural commodities in India .It is Concluded that there is a long run association that is, equilibrium between Commodity spot and future prices of sample commodities. This indicates that There is no scope for long run arbitrage opportunity .The result of co integration In addition, VECM and granger causality test highlight that future market contributes largely to the price Discovery, suggesting that future market influence spot market in price discovery of Chana & castor seeds y .It is observed that the commodity futures are more effective in hedging in the case of Chana and Castor seeds .So it is revealed that the near month future contracts are suitable For hedging.

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The Role of Statistical Analysis on Nanofluid Flow and Heat Transfer over Cylinder with Porous Medium

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ABSTRACT

Nanofluids are fluid materials that consist of solid nanoparticles or nanofibers suspended in liquid. A porous medium is a material consist of solid matrix, and void space or pore space that can be filled with one or more fluids. This study was conducted to investigate the mathematical model on flow and heat transfer of nanofluid in cylindrical surface with porous medium. Using Buongiorno nanofluid model, governing boundary layer equation obtained which consider the effects of Brownian motion and thermophoresis. Using similarity transformation, the partial differential equations from governing equation are transformed into a set of ordinary differential equations. Then it will be solved numerically by using shooting method. The influences of the governing parameters, porosity K are presented graphically. In the outcomes, velocity profiles, temperature profiles and nanoparticle concentration profiles using different values of porosity K are shown. When value of K increases, it makes the velocity temperature as well as nanoparticle concentration profiles increase. Using startistical resedual analysis, the correlation between porosity and heat transfer carcteristics.

KEY WORDS: NANOFLUIDS, POROUS MEDIUM, BOUNDARY LAYER FLOW, HEAT TRANSFER, BUONGIORNO MODEL

INTRODUCTION

Nanofluids are fluid composite materials comprising of material called nanoparticles or nanofibers that have the size of 1-100 nm suspended in fluid. Nanofluid usually been used in engineering application and become important in industry that involve heat transfer [1], [2],

[3], [4]. Application using nanofluid and porous medium have been getting attention in engineering industry [5], [6]. Porous medium said to increase contact surface area between fluids thus increase the heat transfer rate. Because of that, by integrating the usage of nanofluid and porous medium, the heat transfer rate can be maximized for further purposes [7], [8], [9]. With the ongoing upgrades of research in nanotechnology, there is clear way of displaying heat transfer convection in nanofluids.

The concept was pursued by Buongiorno [10] who considered slip instruments which created a relative speed between the base fluid and nanoparticles. With all the slip instruments considered, Brownian motion as well as thermophoresis are imperative to remodel the

convective transport in nanofluids. Investigation of fluid flow and heat transfer around cylinders surface has been a popular subject because of its significance in variety of applications such as heat exchangers, power generators, nuclear plants and thermal apparatus.

Mass suction is important to sustain the flow within the boundary layer [11]. The applications of flow near to a stretching sheet are widely used in manufacturing such as rubber sheet and glass fibre for thermal insulation. Little particles suspended in a nonisothermal gas get a mean velocity with respect to the gas toward the path inverse to the temperature gradient. This is called thermophoresis. Brownian motion is the movement of particles in a fluid in random as they will always collide with other molecules [12], [13], [14].

To predict and forecast the effects of an independent variable on the average heat and mass transfer, many researchers have considered the applications of regression analysis. [15] examined the laminar fluid flow from the stretching of a flat surface in a nanofluid and presented the linear regression for Nusselt and Sherwood number in their research. The influence of Brownian motion, thermophoretic and buoyancy ratio parameter on local Nusselt number has been forecasted by [16] using linear and quadratic regression models. The linear regression model for local Nusselt and Sherwood number was further presented by [17] who studied the nanofluid's natural convective flow. Further, [18] performed a quadratic multiple regression analysis on skin friction coefficient and Nusselt number of mixed convection stagnation point flow towards a stretching surface. Moreover, [19] explained the heat transfer including regression analysis over a stretching/shrinking sheet in nanofluid. Hence in this article new mathemahical model using porous effect in cylindrical surfaces is proposed. In addition, regression coeeficient is also considered to determine the relationship of proposed parameter with the heat transfer characteristics.

Figure 1: Physical model of porous medium over cylindrical surface
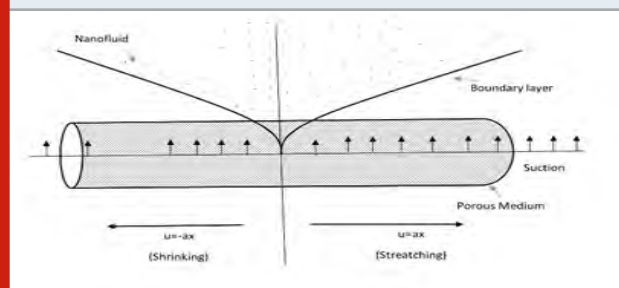
MATERIAL AND METHODS

Governing Boundary Layer Equation: The theory of continuum mechanics describes the mathematical modelling of the flows. Conservation equations and constitutive equations are included in the governing equations obtained from Buongiorno Model. The conservation equations are obtained based on the principle of conservation of mass. The equation also takes the basis of the principle of balance of energy and the principle of linear momentum. Referring to the governing equations from [19], the new boundary layer of partial differential equations with cylindrical and porosity are written in equations (1), (2), (3) and (4). Whereas the schematic diagram of the proposed model is state in Figure 1.

$$\frac{\partial}{\partial x}(ru) + \frac{\partial}{\partial r}(rv) = 0 \tag{1}$$

$$u\frac{\partial u}{\partial x} + v\frac{\partial u}{\partial r} = v\left(\frac{\partial^2 u}{\partial r^2} + \frac{1}{r}\frac{\partial u}{\partial r}\right) - \frac{v}{k}u \tag{2}$$

$$u\frac{\partial T}{\partial x} + v\frac{\partial T}{\partial r} = \alpha\left(\frac{\partial^2 T}{\partial r^2} + \frac{1}{r}\frac{\partial T}{\partial r}\right) + \tau\left[D_B\frac{\partial C}{\partial r}\frac{\partial T}{\partial r} + \frac{D_T}{T_\infty}\left(\frac{\partial T}{\partial r}\right)^2\right] \tag{3}$$

$$u\frac{\partial C}{\partial x} + v\frac{\partial C}{\partial r} = D_B\left(\frac{\partial^2 C}{\partial r^2} + \frac{1}{r}\frac{\partial C}{\partial r}\right) + \frac{D_T}{T_\infty}\left(\frac{\partial^2 T}{\partial r^2} + \frac{1}{r}\frac{\partial T}{\partial r}\right) \tag{4}$$

Using similarity transformation, the partial differential equations from governing equation are transformed into a set of ordinary differential equations. Then it will be solved numerically by using shooting method. Brownian motion as well as thermophoresis are considered in the model of nanofluid. The governing parameters considered are porosity K, curvature parameter γ, mass suction parameter S, Brownian motion parameter Nb and thermophoresis parameter Nt on the heat, flow and mass transfers properties are presented in this research. Similarity transformations is method that reduce the number of independent variables of a system of partial differential equations to obtain the similarity solution.

The equation must be one less than from the original equation of partial differential equation. Similarity solutions is the solutions that come from using the similarity transformations. In term of mathematics, similarity solutions of partial differential equations are obtained when the number of independent variables decrease by one less of original equation by transforming the variables. Shooting methods is a way to transform a boundary value problem into initial value problem. There must be alternatives to solve boundary value problems (BVPs), specifically if the equations are in nonlinear form. To solve the similarity solutions of governing boundary layer equation with the subject to boundary conditions by using method of similarity transformations:

$$\eta = \frac{r^2 - R^2}{2R}\left(\frac{c}{vL}\right)^{\frac{1}{2}}, \psi = \left(\frac{vc}{L}\right)^{\frac{1}{2}} x R f(\eta), \theta(\eta) = \frac{T - T_\infty}{T_f - T_\infty}, \phi(\eta) = \frac{C - C_\infty}{C_w - C_\infty} \tag{5}$$

where, η is the similarity variable, and ψ is the stream function. ψ are defined as u = r −1 ∂ψ/∂y and v = r − 1 ∂ψ /∂x which similarly satisfies continuity equation by using η in this form, the boundary conditions at r = R decrease to the boundary conditions at η = 0. Substituting the

similarity transformations into momentum equation and energy equation, we obtain the following nonlinear ordinary differential equations:

$$(1-2\eta\gamma)f''' + 2\gamma f'' + f f'' - f'^2 - K' = 0 \qquad (6)$$

$$\frac{1}{Pr}\left[(1+2\eta\gamma)\theta'' + 2\gamma\theta'\right] + f\theta' + (1+2\eta\gamma)Nb\theta'\phi' + (1+2\eta\gamma)Nt\theta'^2 = 0 \qquad (7)$$

$$(1+2\eta\gamma)\phi'' + Le f\phi' + 2\gamma\phi' + (1+2\eta\gamma)\frac{Nt}{Nb}\theta'' + 2\gamma\frac{Nt}{Nb}\theta' = 0 \qquad (8)$$

boundary conditions as stated which become,

$$f(0)=S,\ f'(0)=\varepsilon+\sigma f''(0),\ \theta'(0)=Bi(\theta-1),\ \phi(0)=1 \qquad (9)$$

$$f'(\eta)\to 0,\ \theta(\eta)\to 0,\ \phi(\eta)\to 0\ as\ \eta\to\infty \qquad (10)$$

With

$$S = -\frac{v_w r}{R(vc/L)^{1/2}} = \frac{v_0}{(vc/L)^{1/2}} \qquad (9)$$

where $v_w = v_0 R/r$, v_0 is the constant mass flux velocity. Besides that, $S > 0$ $(v_w < 0)$ where it is referred to mass suction meanwhile $S < 0 (v_w < 0)$ referred to mass injection. From this, we identify ε where it represented the parameter of stretching/shrinking. When $\varepsilon > 0$ is related to stretching sheet while $\varepsilon < 0$ is related to shrinking sheet [8].

RESULTS AND DISCUSSION

By using the numerical method, the nonlinear transformed boundary layer that are subjected to the boundary conditions are solved. There are few parameters that are independent and dimensionless used namely porosity K, curvature parameter γ, mass suction parameter S, Brownian motion parameter Nb and thermophoresis parameter Nt. In this research, will be explained the finding results in graphical display of preceding parameters for nanoparticle, temperature and velocity concentration profiles. The results then are discussed and analyzed. Figure 1 demonstrates the velocity profiles, Figure 2 elucidates the temperature profiles, whereas Figure 3 illustrates the nanoparticle concentration profile for shrinking cylinder case with the effect of the porosity K = 0, 0.05, and 0.1, respectively.

From these figures, it is noticeable that there exist multiple solutions in the profiles, however, the momentum boundary layer thickness for second solutions is thicker than first solutions. Also, we can see that the solutions

converged asymptotically. It can be noticed that the velocity boundary layer thickness increases with the increase of K which made the momentum boundary layer becomes thinner. From research before, we knew that the presence of porous medium will provide restriction to the fluid that caused the fluid velocity decrease. In other graph, raising the K value would increase temperature profile as well as nanoparticle concentration profile. This will lead to the thermal and nanoparticle concentration boundary layer becoming thinner. The boundary layer thicknesses decrease in the case of cylinder surface when we compared with flat plate. Besides that, nanoparticle, temperature and velocity concentration gradient increase when the value of K increased. This will cause the values of skin friction coefficient increase which lead to the heat transfer rate and mass transfer rate to also increase when we increase the value K.

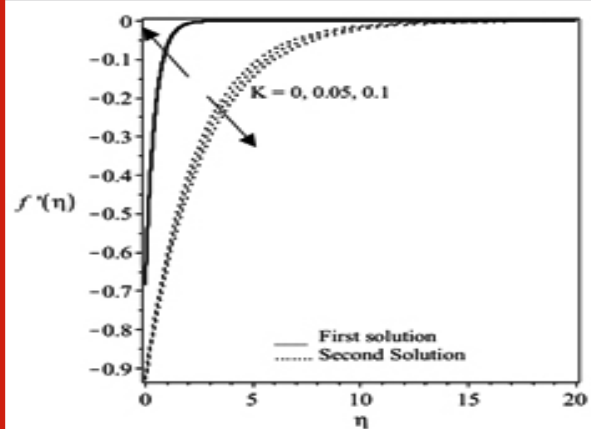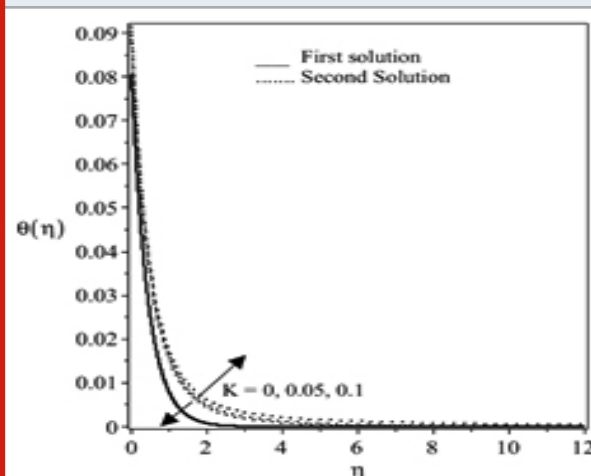Figure 2: Velocity profile with the effect of the porosity, K

Figure 3: Temperature profile with the effect of the porosity, K

Statistical Analysis: Regression analysis is done to estimate the value of the first solution, which incorporates the variation of skin friction coefficient, local Nusselt number and local Sherwood number for parameter K =

0.005. The estimated form of the regression analysis as in (12):

$$\hat{h} = \hat{\beta}_0 + \hat{\beta}_1 x_i + e_i, \quad i = 1, 2, \ldots, n, \tag{12}$$

where β_i are the regression coefficients and $e_i = |h_i - \hat{h}_i|$ is the residual. To perform the regression analysis for the skin friction, local Nusselt and Sherwood number, the value of porosity parameter K are fixed at 0.05. Thus, using (9), the estimated liner regression analysis for skin friction coefficient, heat and mass transfer as below:

$$Cf_{est} = Cf + a_1\varepsilon \tag{13}$$
$$Nu_{est} = Nu + a_2\varepsilon \tag{14}$$
$$Sh_{est} = Sh + a_3\varepsilon \tag{15}$$

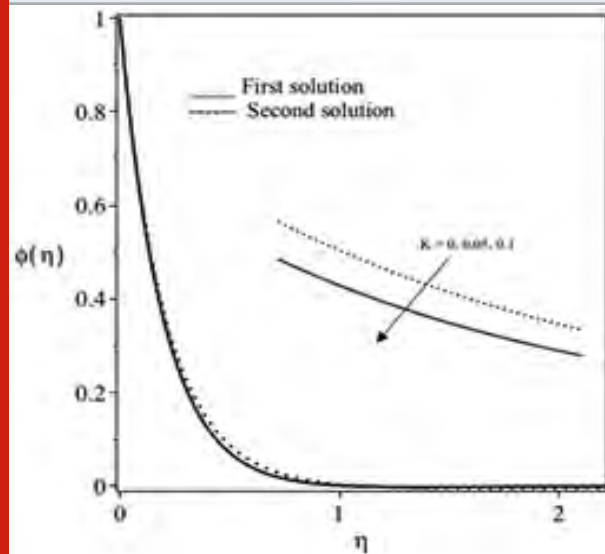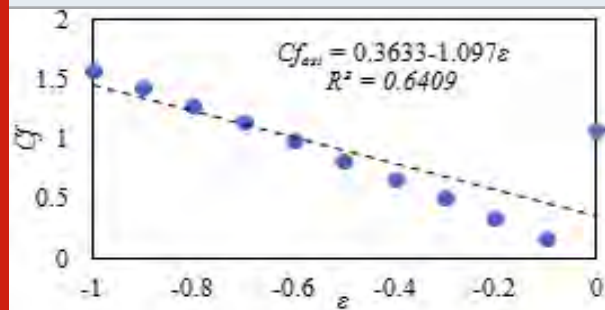Figure 4: Nanoparticle concentration profile with the effect of the porosity, K

Figure 5: Regression analysis for variation of skin friction coefficient versus shrinking sheet

where a_1, a_2 and a_3 represent the linear regression coefficient. Table 1, Table 2 and Table 3 shows the estimated regression analysis at different values of the shrinking sheet along with their residual. From the above formulation, the resulting regression equation

(13) means that the role of skin friction coefficient becomes least with an increase in ε. Further, to explore the impact Nusselt number on heat transfer rate, linear regression (14) is carried out for shrinking sheet, and it can be observed that the rate of heat transfer is increases proportionately as the value of ε is increased. Similarly, the role of the Sherwood number in mass transfer also rises with increment ε. These results agree with the graphical results presented in Figure 5-Figure 7.

Figure 6: Regression analysis for variation of local Nusselt number versus shrinking sheet
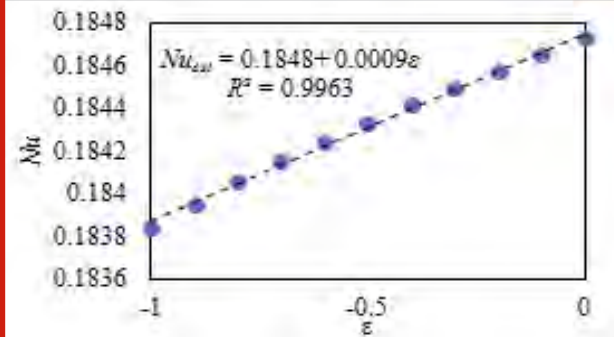

Figure 7: Regression analysis for variation of local Sherwood number versus shrinking sheet
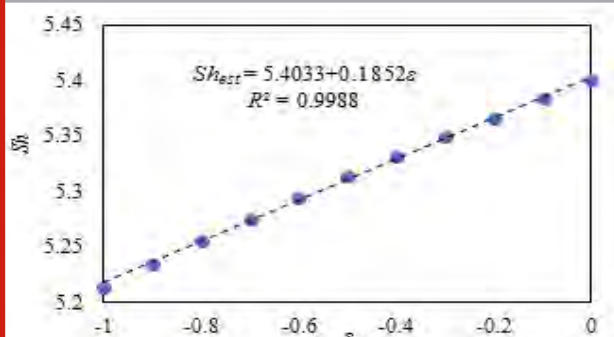

Table 1. Linear regression analysis and residual for the estimated $CfRe_x^{1/2}$

ε	Cfest	Cf	ei
-0.2	0.5827	0.33932	0.24338
-0.4	0.8021	0.66873	0.13337
-0.6	1.0215	0.98694	0.03456
-0.8	1.2409	1.29226	0.05136
-1	1.4603	1.58240	0.12210

The values of correlation coefficients are calculated for skin friction coefficient, local Nusselt and Sherwood number. Besides, the apparent error of these correlation coefficients are also estimated. The R2 > 0.7 defines a strong linear association between the parameter

variables. Moreover, the practice of probable error is important in order to evaluate the accuracy of the correlation coefficient. The values of r / P.E (r) are shown in Table 1. If the r / P.E (r) > 6, As seen in Table 1 above, it is noticeable that the estimated skin friction coefficient, Nusselt, and Sherwood number for flow, heat and mass transfer satisfy r / P.E (r), which confirms that the correlation coefficient is statistically significant.

Table 2. Regression analysis and residual for the estimated $Nu_x Re_x{}^{-1/2}$			
ε	Nuest	Nux	ei
-0.2	0.18462	0.18473	0.00007
-0.4	0.18444	0.18442	0.00002
-0.6	0.8426	0.18424	0.00002
-0.8	0.18498	0.18405	0.00003
-1	0.18390	0.18384	0.00006

Table 3. Regression analysis and residual for the estimated $Sh_x Re_x{}^{-1/2}$			
ε	Shest	Shx	ei
-0.2	5.36626	5.36634	0.00008
-0.4	5.32922	5.33121	0.00199
-0.6	5.29218	5.29440	0.00222
-0.8	5.25514	5.25558	0.00044
-1	5.21810	5.21438	0.00372

Table 4. Values of r / P.E(r).			
	r^2	P.E(r) [19]	r / P.E(r)
Cfest	0.6409	0.07303	10.96211
Nuest	0.9963	0.00075	1326.501
Shest	0.9988	0.00024	4095.174

CONCLUSION

In conclusion, this research show that the porous medium affects the boundary layer flow, heat and mass transfer. This research can be applied into heat transfer industry and industry such as energy production, automotive and chemical industry. Besides that, the research knowledge of porous medium can be benefited in material and product manufacturing. The nonlinear system of ordinary differential with boundary conditions is solved with the help of shooting method. The profiles show that the solutions converge asymptotically and exist dual solutions. However, the momentum boundary layer thickness for the second solutions are found thicker than first solutions. Also, the velocity boundary layer

thickness increases with the increase of K, and raising the value of K would increase temperature profile as well as nanoparticle concentration profile. Hence, it leads to the thermal and nanoparticle concentration boundary layer becoming thinner. A regression analysis is also performed which resulted that the correlation coefficient is statistically significant.

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Tools used for Distributed Agile Software Development

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ABSTRACT

The Agile software development is not just a framework for Scrum, Extreme Programming, or feature-driven development (FDD). The Agile software development is more than just practice, such as pairing Programming, Test-Driven Development, Standing, planning sessions, and sprints. The Agile software development is a general term for a set of frameworks and practices based on the values and principles expressed in the manifesto for agile software development and the 12 principles behind them. When you're dealing with software development in a particular way, it's usually good to base on these values and principles and use them to help figure out what to do right in a particular context. The communication barriers need to be overcome for creating an effective distributed agile team. Many distributed teams become unsuccessful as they work as if they are collocated and do not efficiently concentrate on the additional requirements they need to fulfill. In order to face the communication challenges, they need they make use of additional tools and practices and be committed for improving.

KEY WORDS: SOFTWARE, PROGRAMMING, STANDING, PLANNING SESSIONS.

INTRODUCTION

The Agile distributed software development methods uses the following practices to overcome the problems:

Improve Communication: A distributed team can only be successful if they find ways for bridging the communication gaps, Conference phone and projector can help for setting up a meeting across the locations. The complete team can interact easily using it, whether distributed or collocated. Video conferencing is much better option than voice conferencing. In order to work together remotely hands free headsets, web cams and application sharing software's can be used by the team members. For synchronous communication, instant messenger can be used. For asynchronous communication, e-mail can be an option. [1]

There has to be a change in the way the team members communicate. Usually the communication is informal (verbal) in collocated teams. The verbal communication has to be changed to formal (nonverbal) communication. The problem of non overlapping working hours can be solved by this approach. Communication can also be as an explicitly part of somebody else's duties on the team. By assigning a representative for a remote sub team to help to catch up with the missed hallway communication, this could be done. There needs to be a change in the meeting formats. As the issues which are related to the whole team only are discussed in the daily standup meetings, therefore these meetings may be overly long. The discussion of other issues may be after the meeting. In the meeting, only those team members must be present

who are involved in the project, the team members who are not involved can leave the room and get on to their work. [2].

Use Contact Visits: The Collocated project teams meeting for the first little iteration can do face-to-face communication. With the help of this, the team members know each other in a better way and build trusts and bonding. As many key decisions are taken at the beginning of the project, therefore face to face communication helps a lot. The Personnel bonds can be refreshed, when on periodic basis the whole team gets back together during the course of the project. The release and shipping of the final deliverable becomes much smoother by bringing the team together for the last couple of iterations.

Team Distribution: As the team is not available during the day due to significant time zone differences, it results in communication blackouts. In the time zone distribution, the workable hours shared by whole team is of three to four hours either in morning or afternoon hours for meetings, the best time used by the team is overlapping time. The team is distributed offshore and the time zone difference is large, in that case a team representative is hired who has worked with the distributed team and has a good understanding with them it will be represented as the core of the team and will be present at daily standup meetings. He will have vigorous discussions and meetings in the team room and will pass the results to the offshore team work can lead to exhaustion. [3]. Hubert Smiths has suggested in his article an alternative for coordinated office hours. Usage of nested scrum with multilevel reporting and multiple daily scrum meetings is suggested by him. The intention of all of these modifications is to assist teams regulate to new methods and projects and help reduce misunderstandings connecting different groups.

Focus on Team coaching: The challenges encountered by the distributed teams is more and they require more help to enable them to attach with the core practices engaged by agile teams. The key practices are discarded by many distributed teams as they seem to be too hard. One person from the team who can play the role of coach is very important in keeping the distributed team on the correct path. As it is important that a practice should be modified or replaced with something equivalent, thus many of the core Extreme Programming development practices serve to support each other. For example the pair programming may be amplified or replaced by code reviews and story cards might require whole information generally gained from conversations. To remind the team of the fundamental principles and assist them to adjust to the practices when the enticement might be to dispose of them is the role of the coach. [4]

Documentation: The distributed agile software development process can be improved if documentation of the complete project is done properly.For example if user stories are provided with use case diagrams in

worldwide reachable backlogs, it will help in reducing the misunderstandings and improve teamwork.

Background and Related Work

Use of tools: For formal/informal communication and project support, various tools have been suggested. If the whole team is not in the same room, then the agile teams cannot rely on sticky notes on a task board or a burn down chart on the wall for project tracking. The Likewise designs and diagrams need to be shared across multiple locations. The distributed team has to be provided with the tools it needs to maximize communication

The suggested tools categorized by their main function are given below:
Social networking tools
They facilitate group interactions which also include everything from email to video conferencing. [5]

- Communication tools: e-mails, instant messengers
- Software configuration management tools: repositories and description scheming tools.
- Bug and issue tracking databases: it gives information about the bugs found
- Knowledge centers: containing scientific references and frequently asked questions.
- Mutual development environments: Provide project workspaces and standardized work sets e.g. Essential solutions in distributed agile projects are project repositories and project management tools.
- Fowler says there are various ways to contain information, but among them wikis work well due to following reasons are given below.
- Simple to use
- Compatible with any browser
- Easy to set up.
- Its unstructured nature is its additional benefit
- As the project grows, own structures can be used by the team for keeping the information progress tracking during the iteration, some tools focus on documenting the outcomes of a planning meeting. The target of others is to support the actual planning meeting. This difference is unfortunately not highlighted in the relevant literature and marketing material.

In order to review the existing agile planning tools, first collection of candidate tools that are published online was done, which was mentioned by the interview participants (industrial agile developers) or described in the literature. Although reviewing of the tools showed some diversity, they could still be categorized by design goals, functionalities and supported platforms. The common features, advantages and limitations of existing agile planning tools are revealed by the categorization. [6] The Table 1 lists the basic categories and sample tools used in the study. Some tools are found sharing feature of more than one category.

Research Method: Out the tools available in the above table, I have focused on the Communication Tool used in Distributed projects by the different project managers

and their teams. I have taken information about it by personally meeting the CEO of an organization and gathering the desired information.

Table 1. Showing Category and sample tools	
Category	Sample Tools
Wiki	MASE, PM Wiki, JSP Wiki, Media Wiki
Web-form based application	Rally, Version One, Scrum Works, XP Planner, Mingle
Board-based application	Card Meeting, Glue wiki, Agile Planner, MASE, Mingle, Danube
Plugins for IDE	IBM Jazz, Jira +Green Hopper, Project Cards
Synchronous agile planning tool	DAP, Card Meeting
Tabletop-based agile planning tool	APDT
Communication Tool	Skype for Business & WebEx Meeting with rich functionality Like screen share, remote screen control and recording the communication for Future references
Sprint & Product Charter tacking	Jira, Project Management Server.

Figure 1: Showing Skype for business
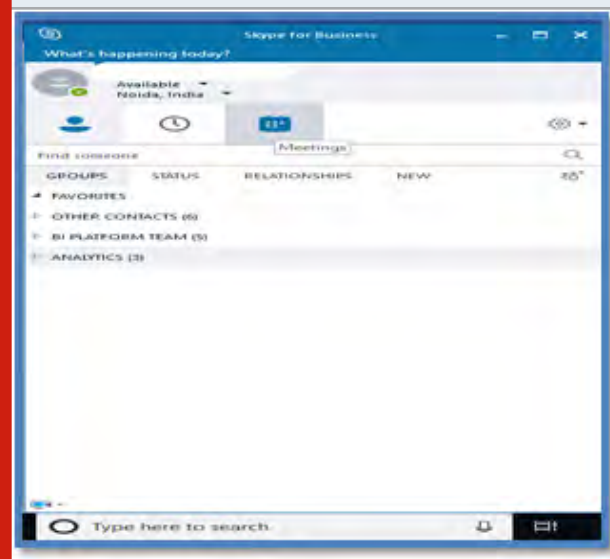
Communication Software Tool: Skype for Business

Sprint & Product Charter Tacking: The Jira web based tool is used in this product development for tracking

the sprint task and ongoing support on the released features of the product. All the Jira issues are segregated in different task group e. g. production support (Data Load issue, server issue etc), development based on sprint, ad- hock request and all these issue type having their own work flow.
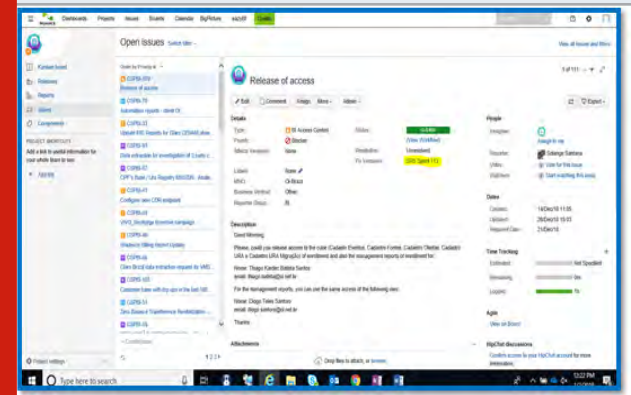
Figure 2: Showing Sprint and Product Charter Tracking
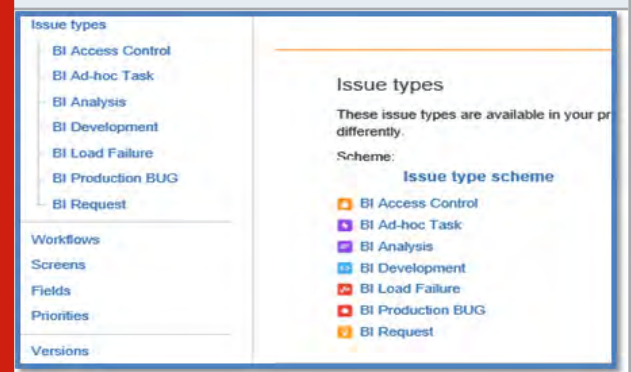

Figure 3: Showing Issue Type Scheme

Figure 3: Showing Work Flow of BI Development

Issue Type: In Jira we have grouped the issue type as flowing category and all issue type are having their own workflow.

Work Flow: In Jira workflow can be defined on issue type and any new issue type created/ updated in back ground works get triggered.

Case Study of Nuance Communication Azure Big Data BI Platform

Product Detail: The Azure Big Data BI Platform is a Cloud based centralized Analytic and reporting product which fulfills all the all requirement of the different products line e. g. Mobile Communication, Auto relative and health care for multiple locations like India, Bangladesh, China, Brazil, U.K. and USA. The team members of this product are in all the location and working in centralized Azure Cloud Platform.

Figure 4: Showing Project Charter

Figure 5: Showing Sprint and Tracking
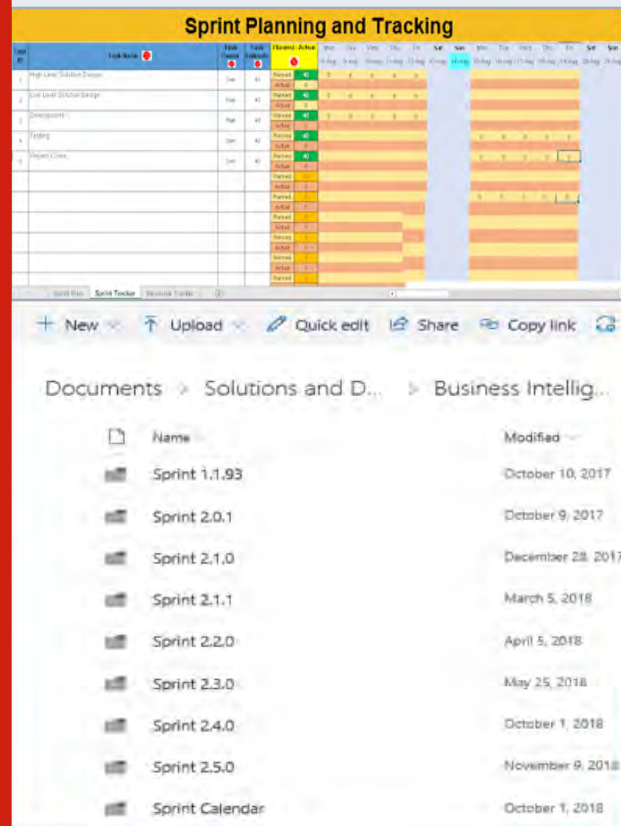
Figure 6: Showing Centralized Product Documentation
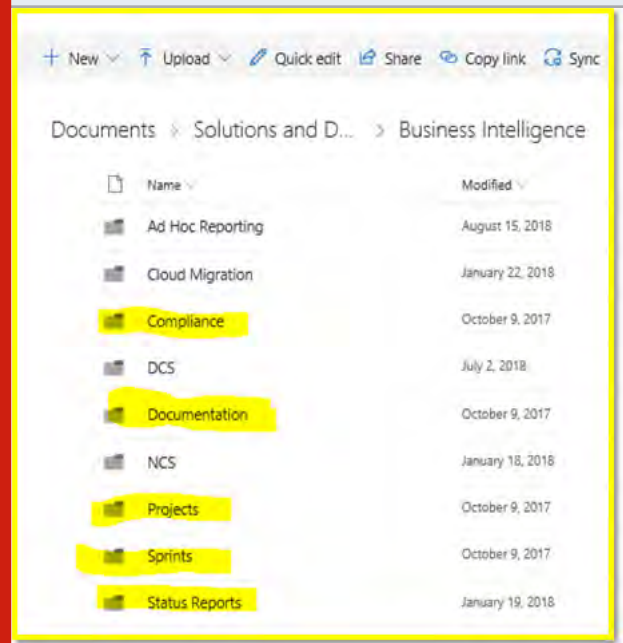
Figure 4.21: Showing Data Warehouse Architecture on Azure Cloud
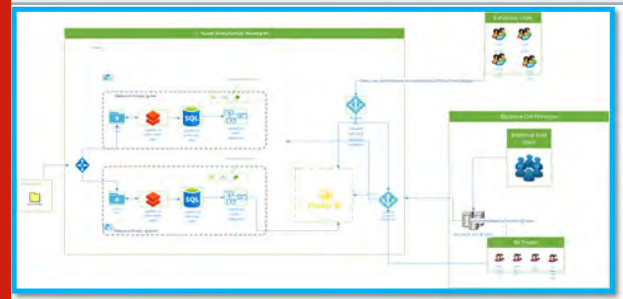
Team Members Communication: All team members are connected to each other by using Skype for Business for any immediate query/ questions. Based on the product line the team members are divided into sub groups to perform development and product feature release based on Product Charter and sprint meeting. Every day sub group of team members are having 10-minute standup meeting to provide the last status, to address any issues and next task to be taken of the day. This way all the team members get aware of the plan and know everyone's activities and dependency of each other. Based on the everyday stand-up meeting sprint gets updated. On weekly basis, all team members of all sub groups get connected for an hour and having consolidated weekly status updated and help each other on any technical, functional issues.

Project/Product Charter: All the features of the product are identified and defined in the product charter. All the features/functional specifications are mentioned in the product charter. In review meeting with the entire stakeholder the order of the features delivery is defined and then after the sprint is defined.

Sprint & Tracking: The Sprint planning and tracking is an important part of agile project management. The nature of this type of work is cyclical and effective. Once the team adapts to several sprint cycles, the time-saving nature of the process becomes apparent. Sprint is planned to be completed in the Sprint planning meeting, attended by Scrum Master, product owner and project team.

Centralized Product Documentation: All the product related documents are stored in SharePoint document library, where all the documents version controls are maintained. Once the new features of product are released, respective documents are updated. All the team members are having access based on the group policy. [7]

Architecture of Modern Data Warehouse on Azure Cloud

CONCLUSION

Put it to somebody context is a central concept in empirical software engineering research. In order to provide an in-depth understanding of what works for whom, where, when and why, empirical software engineering research should be "contextualized". The Empirical software engineering research can become sufficiently understandable through the perspective, understanding and assessment. The context of a research study, which depends on the research phenomena under scrutiny, must be articulated clearly, particularly on how contextual influences operate, in order to transfer evidence generated from one context to another. [8].

In this study, the project context which influences the strategies has been described in terms of the time overlap between sites, the number of sites of the distribution, size of the whole team, technical infrastructure for communication and collaboration, and criticality of the projects. Our purpose to make available distributed teams with ample explanation on how circumstance impacts the acceptance of the strategies may contribute to the successful uptake of research into practice. The tools and technologies that support distributed development, improve teamwork between dissimilar team members or computerize as much of the work as likely significantly contribute to the success of scaling Agile.

Its make clear how distributed teams used tools for communication and association in order to manage the product backlog and sprint backlog, to share project information and documentation, and to facilitate the software development process. The distributed teams that use Scrum requires an extensive range of tool support for communication, teamwork, project management, issue checking, bug checking or managing backlogs. [9] The Proactive resource management practice helps to ensure that Agile teams have the essential technical infrastructure and tools to support scrum practices in global software development. It was found in our study that distributed teams in Agile software development

depend broadly on technology for communication and collaboration.[10]

The Communication tools were used for daily scrum and collaboration tools were used for e-collaboration on a daily basis. Access to appropriate technical infrastructure thus in a straight line influences the acceptance of the strategies, such as the same time strategy which promotes synchronous communication and real-time collaboration across different sites. [11].

During field observations, we noticed our participants were using different tools in their projects. Though some team was using the free, open source tools available online, we found many teams were using vendors' products, mostly for reliability, support and completeness. The Agile methods in general focus on small, co-located teams, in which customers are an integral of part of the teams, and importance on testing before coding and frequent feedback into updated requirements .[12] The Argue it is unsurprising that projects in the "sweet spot" benefit from the use of Agile methods such as Scrum and XP.

In practice, many projects are not a part of the Agile "sweet spot": projects with a large number of team members, projects with distributed teams or projects with inadequate customer collaboration. The development methods and practices must be adapted to fit their projects' contexts. Understanding the background of agility is significant for other agile teams to become accustomed with development processes to fit their projects contexts . Hence, we have described in detail the context of projects investigated in this study, and in particular the circumstances that impact the adoption of the strategies.[13]

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Women Empowerment through specified Public Services in South 24 Parganas District of West Bengal: Not Devoid of the Role of Public Library

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ABSTRACT

Women play a critical role in the family which is the basic unit of a civilized society. The purpose of conducting this study was to assess the factors in which students of Bhangar –I block in the district of South 24 Parganas of West Bengal acquired knowledge, practice and was influenced by public services through public libraries in Bhangar- I Block. Kanyashree Prakalpa is an initiative of the West Bengal government aimed at improving the lives and conditions of young girls, improving their education, preventing child marriage and achieving economic status. The programme aims at reducing child labor or dropouts, violence against women, eliminate illiteracy, child marriage, and promote economic activities for economically weak students. The public library is the local centre of information, making all kinds of knowledge and information readily available to its users. The services of the public libraries are provided on the basis of equal access for all, regardless of age, race, sex, religion, nationality, language or social status. Public Library disseminates information for empowering the women. This study has shown that almost all variables play powerful roles in finding public libraries' activities to enhance women development through specified public services of Bhangar- I Community Development Block in South 24 Parganas District of West Bengal. The findings are used in various public services to empower women.

KEY WORDS: WOMEN EMPOWERMENT, WOMEN EDUCATION, PUBLIC LIBRARIES, KANYASHREE PRAKALPA, CHILD MARRIAGE, DROPOUT, REGRESSION EFFECT ETC.

INTRODUCTION

Empowerment enables individuals to reach their full potential, improve their political and social participation, and inculcate a deep belief in the same as well as their ability. Women's empowerment is particularly difficult to achieve within a generation, as it depends not only on information about choices, but also on their acceptability. Unless women can help themselves, it is impossible to empower women. There is a need to develop regulations that reduce feminization of poverty, promote education for women, and prevent and eliminate violence against women.

Kanyashree Prakalpa, launched by Government of West Bengal is a Conditional Cash Transfer (CCT) Scheme that concentrates on girls currently at-a-high-risk of dropping out of school and the evil effects of child marriage. These are mainly within adolescents between the ages of 13 and 18.The CCT component of the scheme is supported by a multipronged communication strategy addressing

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key stakeholders' attitudes and practices towards female adolescents in families and communities and other stakeholders, including state and district administrators implementing the scheme. The scheme contains mainly three benefit components. The first is a cash benefit to be paid annually Rs.750/- (K1) to the girl students between 13 and 18 years of age from or above the 8th standard in a formal school, madrassah or equivalent open school course for every year so that they remain in education, provided they are unmarried at the time.

The second benefit is a one-time grant of Rs. 25000/- (K2) to be paid after a girl between the age of 18 and 19, provided that she is enrolled in an educational institution and is unmarried. The third benefit is Kanyashree girls, whether single or married can receive financial assistance from Kanyashree Prakalpa (K3) while studying postgraduate degrees in West Bengal, provided that these girls have scored at least 45% in graduation and pursuing a postgraduate degree in the Arts, Commerce or Science. Beneficiaries will be paid a grant of Rs 2,000 for Arts and Commerce and Rs. 2500 per month for Science . Thus Kanyashree Prakalpa scheme is a gateway of empowerment of girl students in West Bengal.

The IFLA/ UNESCO Public Library Manifesto 1994 elaborates the significance of public libraries as "the local gateway to knowledge, providing a basic condition for lifelong learning, independent decision- making and cultural development of the individual and social groups", and further stated impact of public libraries for education and society as " a living force for education, cultural and information, and as an essential agent for fostering of peace and spiritual welfare through the minds of men and women".

In Bhangar- I Community Development Block Public Library provides various types of information such as educational, commercial or amusement purposes. These types of information are very essential to the female students regarding their empowerment. Ugwoke and Omekwu (2014) stated in their study about the role of culture in the development of a society. It has discussed some of the ways the cultures of different Nigerian ethnic groups have been negatively influenced; and the problems hindering public libraries in the country from performing their cultural functions creditably .

Bushra and Wajiha (2015) found in their study, to explore the determinants that have an influence on women empowerment in Pakistan. The content of education, economic participation of women, poverty and economic opportunity available for women increases their empowerment. Pratley (2016) found in a study the conceptual challenges to measuring women's empowerment and its associations with maternal and health outcomes. Women's agency, autonomy, empowerment and status, different terms, related concepts. of measurement of women's empowerment continue to vary widely between individual studies and comparison between studies remains problematic.

In the study of Mello and Schmink (2017) it reveals the effects on rural women's empowerment of participation in collective microenterprises: access and decision-making power for land use, as well as on changes in their resource management practices. Women's economic empowerment contributed to their strengthened capacity for adaptive governance in the household due to improvements in their awareness of environmental issues and practices used to manage forest resources; and greater access to resources and to decision-making power about land use.

In the study of LaFever (2017) it is revealed that, how a group of contemporary nuns is utilizing and redefining their situated empowerment within their religious community and beyond. It explores what empowerment opportunities and challenges they face as twenty-first century nuns, and how their roles and identities as Buddhist nuns are evolving in increasingly empowering ways.

Bonilla et al. (2017) pay attention to aspects of their study 1.To provide contextual information regarding gendered decision-making norms within the evaluation sample 2.To triangulate findings from the quantitative evaluation 3.To provides critique and reflection on the use of decision-making indicators, as included in the quantitative evaluation, as a proxy for women's empowerment. And empowerment dynamics are likely to vary significantly from populations in other geographic regions, particularly those with markedly different gender norms. Paudel and Araujo (2017) found in their study the reported behavioural change in resources distribution among individuals through a series of decision-making questions involving household purchases, visits to family and friends and use of husband's earnings. The violence against women strengthened and women's autonomy in decision making increased significantly after the abolition of the monarchy.

Ghara and Roy (2017) revealed in their study that Kanyashree Prakalpa not only minimizes the tendency of girl students to drop out from schools at an early age, but also creates a positive impact on the prevention of early marriage of a girl child. All the districts of the state are found not to perform with equal effectiveness nor are they found to be consistent over time. The far-away districts are more serious in implementing the Prakalpa in comparison to the nearby districts. Best performing districts are Darjeeling & Siliguri and less attentive districts seem to be North & South 24 Parganas along with Murshidabad. The reasons are neither gender ratio nor sex ratio.

In a study by Schuler and Nazneen (2018), found that 1. The social processes underlying a decline in rates of Intimate Partner Violence (IPV) during 2002–14. 2. To better understand the ambivalent findings in the literature regarding the relationship between women's empowerment and IPV. 3. To explore changes in the nature of women's empowerment that may explain a

recent quantitative finding suggesting that women's empowerment has evolved from a risk factor for IPV to a protective factor. And the relationship between women's empowerment and IPV may reflect contextual differences in the degree to which women's empowerment is seen as transgressive versus normal across settings and time .

Mir (2018) found in his study that the impact of Kanyashree scheme is very deep-rooted in the society of West Bengal .It has become a boon for adolescent girls of West Bengal and also for Didi (politically). According to Mamata Benerjee Kanyashree became "BISWASHREE". She is not just happy with the impact of Kanyashree, she feels proud for her brain child. Being inspired with the result of Kanyashree, she has now declared another scheme: "RUPOSHREE". In this scheme every Kanyashree girl will get a one-time of Rs.25000 at the time of their marriage. Flavin (2019) found in his study that spending of public goods can have important implications for the well-being of Americans and, more broadly, contribute to the growing literature on how Government policy decisions concretely impact the quality of life that citizens experience.

While studying the perception of students towards women empowerment: role of public libraries of Beldanga-II community development block of Murshidabad district of West Bengal, Biswas and Deb (2020) found that effectiveness of Kanyashree one time grant, availability of public library, use of public library, role of public libraries towards public services, role of public libraries towards women empowerment, role of public libraries towards job related training, role of public libraries towards kind of information and kind of books uses of School or College library, had strong bearing on perception level of students' role of public libraries in getting information towards women empowerment.

Objective of the study
General objectives: The aim of the study was to determine students' perceptions and attitudes towards public libraries and the framework for empowering women in the Bhangar-I community development Block of 24 South Parganas District, West Bengal. The study also explores factors that influence the acceptability, accessibility, and exploitation of women's education through different public services activities.

Specific Objectives of the Study
- To identify the trends in dropout rates for girls in the study area after receiving basic education.
- Identify the interrelationships between female dropouts, poverty and child marriage in the study area.

Scope of the Study: The scope of this study is to frame students' views and attitudes towards public libraries and women's empowerment in the Bhangar-I community development block in South 24 Parganas District, West Bengal.

MATERIAL AND METHODS

This study is based on a rigorous household survey conducted at the Bhangar-I Community Development Block, South 24 Parganas district, West Bengal from February, 2019 to March, 2019. With the help of the random sampling method 100 students are chosen who received a one-time grant of Rs. 25000 from Kanyashree. A structured schedule containing 31 different questions / statements / opinions were placed in front of each student. The study also interviewed to measure their education status, the age of the interviewees, the occupation of the parents, etc. Here, to explore this issue, we used different statistical methods such as correlation, regression, and step down regression with the help of SPSS 2.0 version.

Measures
Outcomes: Outcomes of the present analysis are of three steps. First one analysis determines effectiveness of Kanyashree one-time grant (Y), is expressed from 17 independent variables such as Educational status (X2), Age of the respondent (X3), Occupation of parents (X4), Monthly income of parents (X5), Monthly income of family (X6), Go to regular school or College (X7), Availability of food during school /college hour (X8), Electricity at home (X9), Availability of Aadhaar card (X10), The school's or college's distance from your home (X11), How you go to school or college (X12), Accessibility of private tuition (X13), Effectiveness of Kanyashree grant for dropout girls (X14), Family consent for studying in school or college (X15), Role of Schools in getting Kanyashree grant (X16), Role of Gram Panchayat in getting Kanyashree grant (X30) and Role of Block Development Office in getting public services (X31).

The second one analysis the perception level of students on women empowerment (Z) from different independent variables such as educational status (X2), age of the respondent (X3), occupation of parents (X4), monthly income of parents (X5), monthly income of family (X6), go to regular school or College (X7), availability of food during school /college hour (X8), electricity at home (X9), availability of Aadhaar card (X10), the school's or college's distance from your home (X11), how you go to school or college (X12), accessibility of private tuition (X13), effectiveness of Kanyashree grant for dropout girls (X14), family consent for studying in school or college (X15), role of Schools in getting Kanyashree grant (X16), role of Gram Panchayat in getting Kanyashree grant (X30), role of Block Development Office in getting public services (X31), effectiveness of Kanyashree one time grant (X1), impact of women empowerment (X17), public services will help the women empowerment (X19), encourage about job related work (X20), role of public libraries towards women empowerment (X24) and role of public libraries in getting information towards women empowerment (X26).

The third one analysis the perception level of students role of public libraries in getting information towards women empowerment (W) from different independent variables

like effectiveness of Kanyashree one time grant (X1), impact of women empowerment (X17), public services will help the women empowerment (X19), encourage about job related work (X20), the perception level of students on women empowerment (X18), availability of public library (X21), use of public library (X22), role of public libraries towards public services (X23), role of public libraries towards women empowerment (X24), role of public libraries towards job related training (X25), role of public libraries towards kind of information (X27), uses of school or college library (X28), and kind of books uses of school or college library (X29).

Analysis

Table 1. Correlation Analysis between dependent variable effectiveness of Kanyashree one time grant (Y) and 17 casual variables

Variables	'r' Value
Educational status (X_2)	0.0382
Age of the respondent (X_2)	-0.0592
Occupation of parents (X_4)	-0.4414**
Monthly income of parents (X_5)	-0.4648**
Monthly income of family (X_6)	-0.4077**
Go to regular school or College (X_7)	0.3068**
Availability of food during school /college hour (X_8)	0.2737**
Electricity at home (X_9)	-0.6295**
Availability of Aadhaar card (X_{10})	-0.5120**
The school's or college's distance from your home (X_{11})	-0.4876**
How you go to school or college (X_{12})	-0.5009**
Accessibility of private tuition (X_{13})	-0.5160**
Effectiveness of Kanyashree grant for dropout girls (X_{14})	0.5362**
Family consent for studying in school or college (X_{15})	-0.4059**
Role of Schools in getting Kanyashree grant (X_{16})	0.4357**
Role of Gram Panchayat in getting Kanyashree grant (X_{30})	0.0049
Role of Block Development Office in getting public services (X_{31})	-0.1799

Critical value (2-Tail, 0.05) = +or- 0.197 *Significant at 5% level
Critical value (2-Tail, 0.01) = +or- 0.256 ** Significant at 1% level

Table I describes the students perception on the effectiveness of Kanyashree one time grant (Y) from 17 independent variables such as Educational status (X2), Age of the respondent (X3), Occupation of parents (X4), Monthly income of parents (X5), Monthly income of family (X6), Go to regular school or College (X7), Availability of food during school /college hour (X8), Electricity at home (X9), Availability of Aadhaar card (X10), The school's or college's distance from your home (X11), How you go to school or college (X12), Accessibility of private tuition (X13), Effectiveness of Kanyashree grant for dropout girls (X14), Family consent for studying in school or college (X15), Role of Schools in getting Kanyashree grant (X16), Role of Gram Panchayat in getting Kanyashree grant (X30) and Role of Block Development Office in getting public services (X31) had applied a significant impact on the dependent variable that is, on the level of perception about the effectiveness of Kanyashree one time grant.

In these regions where the female literacy rates are low, parent's role in understanding Occupation of parents (X4), Monthly income of parents (X5) and Monthly income of family (X6) is important. Because children's parents are the key figures in family income, children do not receive family support in understanding empowerment, and the role of parents has a negative impact on the level of perception about the effectiveness of Kanyashree one time grant. Most students in the village are first-generation learners and she will be more interested in learning.

The variables like Go to regular school or College (X7), Availability of food during school /college hour (X8) had strong positive impact on the level of perception about the effectiveness of Kanyashree one time grant. Schools and Colleges play a great role to disseminate lots of information regarding how to get Kanyashree, Shikshashree, Sabujsathi, Yobuhree and other schemes offered by the West Bengal Government to the students. On the other hand Kanyashree Prakalpa helps to reduce school drop-out rate.

That is why the variables such as effectiveness of Kanyashree grant for dropout girls (X14) and role of Schools in getting Kanyashree grant (X16) have strong

positive impact on the level of perception about the effectiveness of Kanyashree one time grant. The variables such as electricity at home (X9), availability of Aadhaar card (X10), the school's or college's distance from your home (X11) had strong negative impact on the level of perception about the effectiveness of Kanyashree one time grant. The student goes to School or colleges in different ways. The student goes to their institutions by walking, someone by cycle, someone by bus or auto etc. Here the variable 'How you go to school or college (X12)' had strong negative impact on the level of perception about the effectiveness of Kanyashree one time grant.

Table 2: Multiple Regression Analysis

Variables	"β" value	"t" value
Educational status (X_2)	-0.037696	-0.521
Age of the respondent (X_3)	-0.060854	-0.832
Occupation of parents (X_4)	0.088614	0.459
Monthly income of parents (X_5)	-1.602339	–5.113**
Monthly income of family (X_6)	1.126162	4.207**
Go to regular school or College (X_7)	-1.109987	-3.364**
Availability of food during school /college hour (X_8)	0.897745	2.732**
Electricity at home (X_9)	-1.555862	-2.994**
Availability of Aadhaar card (X_{10})	0.038468	0.146
The school's or college's distance from your home (X_{11})	5.105009	5.664**
How you go to school or college (X_{12})	-3.993795	-5.959**
Accessibility of private tuition (X_{14})	1.252747	3.221**
Effectiveness of Kanyashree grant for dropout girls (X_{14})	1.181658	1.973
Family consent for studying in school or college (X_{15})	-1.008899	-4.683**
Role of Schools in getting Kanyashree grant (X_{16})	-0.792481	-1.975
Role of Gram Panchayat in getting Kanyashree grant (X_{30})	0.039353	0.618
Role of Block Development Office in getting public services (X31)	-0.157560	-2.411*

Critical value (2-Tail, 0.05) = +or- 1.989   *Significant at 5% level
Critical value (2-Tail, 0.01) = +or- 2.637   ** Significant at 1% level

Multiple R	= 0.83940
R Square	= 0.70460
Adjusted R Square	= 0.64335
Standard Error	= 0.73203

Analysis of Variance	DF	Sum of Squares	Mean Square
Regression	17	104.80868	6.16522
Residual	82	43.94132	0.53587

F =   11.50507   Signif F = 0.0000

As Bhangar- I C.D Block belongs from minority sections and most of the parents are related with cultivation and worker section. That's why most of the students belong from poor family. The parents did not afford private tuition for their child. As they are poor the parents did not take care for their children's education properly. Therefore the variables such as accessibility of private tuition (X13) and family consent for studying in school or college (X15) had strong negative bearing on the level of perception about the effectiveness of Kanyashree one time grant.

It is found from Table II that all seventeen (17) variables show their regression effects with β and corresponding t values, their effectiveness on Kanyashree one-time grant (Y), and they explain 70.46 per cent of the total aggregation effect (R^2 = 0.70460). Ten variables were identified in turn, such as monthly income of parents (X5), monthly income of family (X6), go to regular school or College (X7), availability of food during school /college hour (X8), electricity at home (X9), the school's or college's distance from your home (X11), how you go to school or college (X12), accessibility of private tuition (X13), family consent for studying in school or college (X15) and role of Block Development Office in getting public services (X31) which are the most important and explains the effect of total regression on predictors.

From the variables in Table III to the regression model of regression analysis, it is found that after step 5, five

variables are the Electricity at home (X9), Role of Schools in getting Kanyashree grant (X16), Monthly income of family (X6), Availability of food during school /college hour (X8) and Monthly income of parents (X5) had explained 53.19 per cent of the total effect. Therefore, the remaining 12 variables explain only about 17.27 percent of the total effect. Interestingly, in the step down model, the role of students in understanding age has innovatively increased to characterize the aggregate effect of these variables on the level of perception about the effectiveness of Kanyashree one time grant.

Table 3. Step-down Regression Model	
Step I: X_9	
Multiple R	= 0.62948
R Square	= 0.39625
Adjusted R Square	= 0.39009
Standard Error	= 0.95729
Step II: X_{16}	
Multiple R	= 0.66871
R Square	= 0.44717
Adjusted R Square	= 0.43577
Standard Error	= 0.92074
Step III: X_6	
Multiple R	= 0.68570
R Square	= 0.47019
Adjusted R Square	= 0.45363
Standard Error	= 0.90606
Step IV: X_8	
Multiple R	= 0.70852
R Square	= 0.50199
Adjusted R Square	= 0.48103
Standard Error	= 0.88305
Step V: X_5	
Multiple R	= 0.72932
R Square	= 0.53191
Adjusted R Square	= 0.50701
Standard Error	= 0.86066

Table IV describes the perception level of students on women empowerment (Z) from 23 causal factors, such as educational status (X2), age of the respondent (X3), occupation of parents (X4), monthly income of parents (X5), monthly income of family (X6), go to regular school or College (X7), availability of food during school /college hour (X8), electricity at home (X9), availability of Aadhaar card (X10), the school's or college's distance from your home (X11), how you go to school or college (X12), accessibility of private tuition (X13), effectiveness of Kanyashree grant for dropout girls (X14), family consent for studying in school or college (X15), role of Schools in getting Kanyashree grant (X16), role of Gram Panchayat in getting Kanyashree grant (X30), role

of Block Development Office in getting public services (X31), effectiveness of Kanyashree one time grant (X1), impact of women empowerment (X17), public services will help the women empowerment (X19), encourage about job related work (X20), role of public libraries towards women empowerment (X24) and role of public libraries in getting information towards women empowerment (X26). Education is only the way for the empowerment of women because women face lots of barrier like illiteracy, domestic violence and lack of motivation.

Higher education not only helps women acquire knowledge, but also enables them to make a living. Money is necessary to sustain life, and education helps to sustain life. Educated women play an important role in the family, dealing with both family health care and financial support. And the income of parents plays the key role of their children's education. Here, occupation of parents (X4), monthly income of parents (X5) and monthly income of family (X6) had a strong positive impact on the perception level of students on women empowerment.

Electricity is an essential element in our day to day life. Here the variable electricity at home (X9) had a strong positive bearing on the perception level of students on women empowerment. Aadhaar is a personal identification number issued to individuals by the Indian Unique Identification Agency (UIDAI) on behalf of the Indian government in order to determine the unique identity of each person. The Aadhar number will serve as proof of identity and residence anywhere in India. Here, availability of Aadhaar card (X10) had a strong positive bearing on the perception level of students on women empowerment.

Private home tuition can help students with personalized one-to-one attention and customized learning programs, especially for their weaker subject areas. Personal tutors will be able to quickly identify difficult topics or topics facing students. Here, accessibility of private tuition (X13) had a negative impact on the perception level of students on women empowerment. And the other variables such as the school's or college's distance from your home (X11), how you go to school or college (X12), family consent for studying in school or college (X15), impact of women empowerment (X17) and public services will help the women empowerment (X19) had a strong positive bearing on the perception level of students on women empowerment. Some variables like go to regular school or College (X7), availability of food during school /college hour (X8), effectiveness of Kanyashree grant for dropout girls (X14), role of Schools in getting Kanyashree grant (X16), effectiveness of Kanyashree one time grant (X1) and encourage about job related work (X20) had a strong negative bearing on the perception level of students on women empowerment.

It is found from Table V that all twenty three (23) variables show their regression effects with β and corresponding t values, their perception level of students

on women empowerment (Z), and they explain 77.22 per cent of the total aggregation effect (R2 = 0.77224). Four variables were identified in turn, such as age of the respondent (X3), occupation of parents (X4), role of

Schools in getting Kanyashree grant (X16) and public services will help the women empowerment (X19) which are the most important and explains the effect of total regression on predictors.

Table 4. Correlation Analysis between dependent variable the perception level of students on women empowerment (Z) and 23 casual variables	
Variables	r' Value
Educational status (X_2)	-0.0639
Age of the respondent (X_3)	-0.1199
Occupation of parents (X_4)	0.6079**
Monthly income of parents (X_5)	0.5519**
Monthly income of family (X_6)	0.5480**
Go to regular school or College (X_7)	-0.5978**
Availability of food during school /college hour (X_8)	-0.5518**
Electricity at home (X_9)	0.7588**
Availability of Aadhaar card (X_{10})	0.7740**
The school's or college's distance from your home (X_{11})	0.6828**
How you go to school or college (X_{12})	0.6793**
Accessibility of private tuition (X_{13})	0.7172**
Effectiveness of Kanyashree grant for dropout girls (X_{14})	-0.7304**
Family consent for studying in school or college (X_{15})	0.6357**
Role of Schools in getting Kanyashree grant (X_{16})	-0.7401**
Role of Gram Panchayat in getting Kanyashree grant (X_{30})	0.0895
Role of Block Development Office in getting public services (X_{31})	0.0443
Effectiveness of Kanyashree one time grant ($_{X1}$)	-0.4476**
Impact of women empowerment (X_{17})	0.4349**
Public services will help the women empowerment (X_{19})	0.7487**
Encourage about job related work (X_{20})	-0.7842**
Role of public libraries towards women empowerment (X_{24})	0.0958
Role of public libraries in getting information towards women empowerment (X_{26})	0.0854
Critical value (2-Tail, 0.05) = +or- 0.197 *Significant at 5% level	
Critical value (2-Tail, 0.01) = +or- 0.256 ** Significant at 1% level	

Table VI presents the step down regression model was applied to separate the prominent independent variables, then it was found that after step 3, three variables are encourage about job related work (X20), availability of Aadhaar card (X10) and age of the respondent (X3) had explained 69.65 per cent of the total effect. Therefore, the remaining 20 variables explain only about 7.57 per cent of the total effect on the perception level of students on women empowerment.

Table VII describes the students' views on the role of public libraries in women's empowerment (W) from 13 consequent variables such as effectiveness of Kanyashree one time grant (X1), impact of women empowerment (X17), public services will help the women empowerment

(X19), encourage about job related work (X20), the perception level of students on women empowerment (X18), availability of public library (X21), use of public library (X22), role of public libraries towards public services (X23), role of public libraries towards women empowerment (X24), role of public libraries towards job related training (X25), role of public libraries towards kind of information (X27), uses of school or college library (X28), and kind of books uses of school or college library (X29).

The roles of public services have a great responsibility for empowering the women through the different activities of Public Libraries. Availability of public library (X21) acts a great role in women's lives because it disseminates

information to empower women. This will help their own development, family and community development. In this sense, the use of public library (X22), Role of public libraries towards public services (X23), role of public libraries towards women empowerment (X24), role of public libraries towards job related training (X25) and role of public libraries towards kind of information (X27) had strong positive impact on the perception level of student's role of public libraries in getting information towards women empowerment.

Table 5: Multiple Regression Analysis

Variables	"β" value	"t" value
Educational status (X_2)	0.048094	0.672
Age of the respondent (X_3)	-0.187439	-2.771**
Occupation of parents (X_4)	-1.219110	-2.416*
Monthly income of parents (X_5)	-1.553559	-1.873
Monthly income of family (X_6)	0.751093	1.409
Go to regular school or College (X_7)	-1.943500	-1.632
Availability of food during school /college hour (X_8)	0.292426	0.550
Electricity at home (X_9)	-0.702081	-0.957
Availability of Aadhaar card (X_{10})	-0.416503	-0.331
The school's or college's distance from your home (X_{11})	0.830315	0.563
How you go to school or college (X_{12})	-0.711274	-0.789
Accessibility of private tuition (X_{13})	1.002668	1.798
Effectiveness of Kanyashree grant for dropout girls (X_{14})	-0.875053	-0.675
Family consent for studying in school or college (X_{15})	-0.194564	-0.523
Role of Schools in getting Kanyashree grant (X_{16})	2.299041	2.752**
Role of Gram Panchayat in getting Kanyashree grant (X_{30})	0.024693	0.402
Role of Block Development Office in getting public services (X_{31})	-0.060868	-0.934
Effectiveness of Kanyashree one time grant (X_1)	0.047485	0.432
Impact of women empowerment (X_{17})	1.407446	1.596
Public services will help the women empowerment (X_{19})	1.360335	2.715**
Encourage about job related work (X_{20})	-0.718365	-0.566
Role of public libraries towards women empowerment (X_{24})	0.127990	1.308
Role of public libraries in getting Information towards women empowerment (X_{26})	-0.079749	-0.807

Critical value (2-Tail, 0.05) = +or- 1.991 *Significant at 5% level
Critical value (2-Tail, 0.01) = +or- 2.642 ** Significant at 1% level
Multiple R = 0.87877
R Square = 0.77224
Adjusted R Square = 0.70332
Standard Error = 0.45023
Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	23	52.23459	2.27107
Residual	76	15.40541	0.20270

F =   11.20394   Signif F = .0000

It is found from Table VIII that all thirteen (13) variables show their regression effects with β and corresponding t values, their perception level of student's role of public libraries in getting information towards women empowerment (W), and they explain 90.79 per cent of the total aggregation effect (R^2 = 0.90793). Three variables were identified in turn, such as availability of public library (X21), role of public libraries towards job related training (X25) and role of public libraries towards kind of information (X27) which are the most important and explain the effect of total regression on predictors.

Table 6. Step-down Regression Model	
Step I: X20	
Multiple R	= 0.78417
R Square	= 0.61493
Adjusted R Square	= 0.61100
Standard Error	= 0.51554
Step II: X10	
Multiple R	= 0.82342
R Square	= 0.67803
Adjusted R Square	= 0.67139
Standard Error	= 0.47383
Step III: X3	
Multiple R	= 0.83458
R Square	= 0.69652
Adjusted R Square	= 0.68704
Standard Error	= 0.46241

Table IX presents the step down regression model was applied to separate the prominent independent variables, then it was found that after step 4, four variables are Role of public libraries towards job related training (X25), Availability of public library (X21), Role of public libraries towards kind of information (X27) and Role of public libraries towards women empowerment (X24) had explained 89.85per cent of the total effect. Therefore, the remaining 9 variables explain only about 0.94 per cent of the total effect on the perception level of student's role of public libraries in getting information towards women empowerment.

RESULT AND DISCUSSION

Throughout the dimension of the level of perception of students who have ever received Kanyashree one-time grant of Rs. 25,000 after turning 18, it was revealed that the variables such as going regularly to school or College (X7), availability of food during school /college hour (X8), effectiveness of Kanyashree grant for dropout girls (X14) and role of Schools in getting Kanyashree grant (X16) had strong Positive impact the level of perception about the effectiveness of Kanyashree one time grant. And the variables such as occupation of parents (X4), monthly income of parents (X5), monthly income of family (X6), electricity at home (X9), availability of Aadhaar card (X10), the school's or college's distance from your home (X11), how you go to school or college (X12), accessibility of private tuition (X13) and family consent for studying in school or college (X15) had strong negative bearing on the level of perception of Kanyashree one time grant. On February 12, 2015 the news e-paper 'Live mint' published a report that Headmaster of Arijullapur Siddiqa High Madrasah of North 24 Parganas Abu Tahir Md Mustafa said, "It has been possible to make one-fourth of the population, especially girls, school-bound.

Table 8. Correlation Analysis between dependent variable the perception level of students role of public libraries in getting information towards women empowerment (W) from 13 consequent variables	
Variables	'r' Value
Effectiveness of Kanyashree one time grant (X_1)	-0.0712
Impact of women empowerment (X_{17})	0.0386
Public services will help the women empowerment (X_{19})	0.1076
Encourage about job related work (X_{20})	-0.1452
The perception level of students on women empowerment (X_{18})	0.0854
Availability of public library (X_{21})	0.8867**
Use of public library (X_{22})	0.8999**
Role of public libraries towards public services (X_{23})	0.6999**
Role of public libraries towards women empowerment (X_{24})	0.7586**
Role of public libraries towards job related training (X_{25})	0.9209**
Role of public libraries towards kind of information (X_{27})	0.6062**
Uses of School or College library (X_{28})	0.1174
Kind of books uses of School or College library (X_{29})	0.1027

Critical value (2-Tail, 0.05) = +or- 0.197   *Significant at 5% level
Critical value (2-Tail, 0.01) = +or- 0.256   ** Significant at 1% level

This is largely because of the government's Kanyashree Prakalpa—annual scholarships and one-time grant to encourage girl students of poor families to study". Within a year after the scheme was launched on 1

October, 2013, the Madrasah saw a surprising increase in the number of girls attending higher classes. Dropouts among girl students fell from 100 to 30 and the number

of child marriages went down from 30 a year to seven. Kanyashree, the West Bengal government's initiative to financially assist and help educate and empower women, has bagged the National e-governance Award, for outstanding performance in citizen-centric service and the Manthan Award in the Women and Empowerment category. Girls aged 13-18 are entitled to an annual scholarship of Rs. 500 and those older can get a one-time grant of Rs. 25,000 provided that she pursues higher studies, takes up vocational training or starts a small business for her livelihood instead of getting married. With over 2.4 million girls between 13 and 25 availing of the scholarship, the project is a model for the centre's Beti Bachao, Beti Padhao (Educate the girl child, save the girl child) initiative. The Kanyashree budget is Rs. 1,000 crore, as against Rs. 100 crore allotted for its federal counterpart.

Table 8: Multiple Regression Analysis

Variables	" " value	"t" value
Effectiveness of Kanyashree one time grant (X_1)	-0.012240	-0.274
Impact of women empowerment (X_{17})	-0.030610	-0.672
Public services will help the women empowerment (X_{19})	0.030156	0.339
Encourage about job related work (X_{20})	0.006301	0.083
The perception level of students on women empowerment (X_{18})	0.012597	0.214
Availability of public library (X_{21})	0.293462	3.500**
Use of public library (X_{22})	0.126503	1.273
Role of public libraries towards public services (X_{23})	0.045166	0.919
Role of public libraries towards women empowerment (X_{24})	0.093016	1.786
Role of public libraries towards job related training (X_{25})	0.407834	4.819**
Role of public libraries towards kind of information (X_{27})	0.091816	2.003*
Uses of School or College library (X_{28})	-0.065718	-1.820
Kind of books uses of School or College library (X_{29})	0.049455	1.405

Critical value (2-Tail, 0.05) = +or– 1.988   *Significant at 5% level
Critical value (2-Tail, 0.01) = +or– 2.634   ** Significant at 1% level

Multiple R   = 0.95285
R Square   = 0.90793
Adjusted R Square   = 0.89402
Standard Error   = 0.97224
Analysis of Variance
                    DF   Sum of Squares   Mean Square
Regression   13   801.66797   61.66677
Residual   86   81.29203   0.94526

F =   65.23815   Signif F = .0000

It obtained students' awareness of women's empowerment from 23 consequent variables we found that occupation of parents (X4), monthly income of parents (X5), monthly income of family (X6), electricity at home (X9), availability of Aadhaar card (X10), the school's or college's distance from your home (X11), how you go to school or college (X12), accessibility of private tuition (X13), family consent for studying in school or college (X15), impact of women empowerment (X17) and public services will help the women empowerment (X19) had strong positive impact on the level of perception of students on women empowerment.

And the variables such as go to regular school or College (X7), availability of food during school /college hour (X8), effectiveness of Kanyashree grant for dropout girls (X14), role of Schools in getting Kanyashree grant (X16), effectiveness of Kanyashree one time grant (X1) and encourage about job related work (X20) had strong negative bearing on the level of perception of students on women empowerment. The English daily "The Economic Times" published a report on 15th October, 2018 where it has been shown 'Anandadhara' scheme has been launched successful by Mamata Banerjee, honourable Chief Minister in empowering rural women

in West Bengal. The state government also distributes animals for rearing among the rural women to ensure their economic prosperity, she stated. The 'Anandadhara' scheme, initiated in 2012, is an anti-poverty programme for the rural poor, implemented through the organising of women into self-help groups (SHG). The aim of the scheme is to mobilize the rural poor and vulnerable people into self-managed institutions and support them for livelihood collectives.

Table 9. Step-down Regression Model	
Step I: X_{25}	
Multiple R	= 0.92090
R Square	= 0.84806
Adjusted R Square	= 0.84651
Standard Error	= 1.17003
Step II: X_{21}	
Multiple R	= 0.93957
R Square	= 0.88279
Adjusted R Square	= 0.88038
Standard Error	= 1.03291
Step III: X_{27}	
Multiple R	0.94418
R Square	= 0.89147
Adjusted R Square	= 0.88808
Standard Error	= 0.99909
Step IV: X_{24}	
Multiple R	= 0.94792
R Square	= 0.89856
Adjusted R Square	= 0.89429
Standard Error	= 0.97099

On the other hand Public Libraries have an important responsibility in empowering women. It is introduced the level of perception of students on the role of public libraries in accessing information on women's empowerment from 13 independent variables. It was revealed that Availability of public library (X21), Use of public library (X22), Role of public libraries towards public services (X23), Role of public libraries towards women empowerment (X24), Role of public libraries towards job related training (X25) and Role of public libraries towards kind of information (X27) had strong positive impact on the perception level of student's role of public libraries in getting information towards women empowerment.

Recommendations

- The purpose of public libraries is to empower villagers by improving information literacy. Based on the results of a study on empowerment levels, the study showed that the entire villagers in Bhangar-I used the technology in their daily life to seek information to solve work, school or other related problems . Technology is closely related to social life and has now become an integral part of it. People who belong only to the elderly group do not use technology, while people in other age groups are used to using technology.
- In order for people to change their minds about the use of ICT for collection development, librarians must be trained and retrained.
- Librarians and staff in public libraries should know how the community's information literacy affects user needs. When public libraries know this, libraries can improve the quality of their services to the community. That is, the library can be called a user-oriented library.
- In Bhangar- I block one Librarian of a Public Library takes charge two or three libraries: therefore library services are hampered due to lack of proper library staffs.
- Take initiatives to improve the collections of the Library.
- Different training programmes, seminars, workshops etc. should be regularly organized for the library staff by the Public library Management.

CONCLUSION

In West Bengal out of 9.13 crore population, there are 48.71 per cent female population compared to 51.28 per cent males. Women empowerment is still a significant concern in the present situation. Women are discriminated and marginalised at every level of the society whether it is social participation, political participation, economic participation, access to education and also reproductive healthcare. Women are found to be economically very poor all over India. A few women are engaged in services and other activities. So they need economic power to be at par with men.

Public library is one of the most important places from where knowledge and information are disseminated to the common people on the basis of equality of access for all, regardless of age, race, sex, religion, nationality, language or social status. The lack of public library systems and the availability of facilities in rural public libraries in West Bengal are quite poor. If the public libraries come to the common people with better services and activities then the common people especially women will be surely benefited through them.

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