Contemporary Issues and Challenges in Management in Digital Era

Editors
Dr. Sudip Basu
Mr. Robin K Agarwal

ASANSOL ENGINEERING COLLEGE
DEPARTMENT OF MANAGEMENT STUDIES
(BBA & BBA in Hospital Management)
Vivekananda Sarani, Kanyapur, Asansol – 713305, Paschim Bardhaman,
West Bengal, India

CONTEMPORARY ISSUES AND CHALLENGES IN MANAGEMENT IN DIGITAL ERA

Contemporary Issues and Challenges in Management in Digital Era

Editors
Dr. Sudip Basu
Mr. Robin K Agarwal

Title:	**Contemporary Issues and Challenges in Management in Digital Era.**
Editor(s):	**Dr. Sudip Basu, Mr. Robin K Agarwal**
Edition:	First
Volume:	I
Publisher	Ideal International E-Publication
Publisher Address	427, Palhar Nagar, RAPTC, VIP-Road, Indore-452005 (MP) INDIA
Language	English
Product form	Digital download and online (EB)

PREFACE

In the rapidly evolving landscape of contemporary management, navigating the challenges presented by the digital era has become not just a choice but a necessity. It is in this spirit of adaptation and innovation that Asansol Engineering College took the initiative to organize a National e-Conference titled "Contemporary Issues and Challenges in Management in Digital Era" in June 2023. This two-day event brought together academics, professionals, and researchers from various corners of the country, fostering an environment for intellectual exchange and exploration.

The book "Contemporary Issues and Challenges in Management in Digital Era" is a testament to the scholarly endeavour that transpired during the conference. It serves as a compendium of thought-provoking contributions from the conference's participants, offering insights into the multifaceted dimensions of management in an increasingly digitalized world.

The conference, held on the 21st and 22nd of June 2023, provided a platform for 87 researchers to share their findings, experiences, and innovative approaches to contemporary management issues. Of these, 43 papers were selected to be included in this edited volume, reflecting the depth and breadth of the discussions that took place.

We were honoured to have two distinguished keynote speakers grace the conference with their expertise. On the first day, we had the privilege of listening to Prof. (Dr.) Pankaj Madan, Dean of the Faculty of Management Studies at Gurukula Kangri Vishwavidyalaya, Haridwar. On the second day, we were inspired by the insights of Prof. (Dr.) Pradipta Banerjee, Dean of the Faculty of Commerce and Head of the MBA program at Sidho-Kanho-Birsha University, Purulia.

The conference was organized into four distinctive tracks, each chaired by eminent scholars in their respective fields. Dr. Debasish Biswas, Assistant Professor at Vidyasagar University, Midnapore, led the discussions in Track 1, which focused on HR and Interdisciplinary studies. Dr. Sudhanshu D Joshi, Associate Professor at Doon University, Dehradun, expertly guided Track 2, delving into the realm of Finance. Track 3, centred on Marketing, was skilfully overseen by Dr. Indrajit Ghosal, Associate Professor at Poornima University, Jaipur, Rajasthan. Finally, Track 4, an exploration of Interdisciplinary topics in Phase II, was expertly directed by Dr. Mahesh Luthia, Associate Professor at CIMR, Mumbai.

The success of the conference and this edited book would not have been possible without the dedication and hard work of the organizing committee. Their commitment to ensuring the highest standards of academic exchange and the support of the Management of Asansol Engineering College were instrumental in making this event a reality.

We hope that the insights and knowledge shared in this book will serve as a valuable resource for academics, researchers, professionals, and students alike, inspiring further exploration and innovation in the ever-evolving landscape of contemporary management.

Editors

Dr. Sudip Basu

Mr. Robin K Agarwal

<u>About the Conference</u>

The Department of Management Studies, Asansol Engineering College has organized a *Two-Day National e-Conference on "Contemporary Issues and Challenges in Management in Digital Era" (NCCICMDE 2023)* on 21st & 22nd June 2023. The Conference brings the avid Students, Alumni, Scholars, Academicians and Industry Experts on a single platform to cater the novel paradigms and focus on the pertinent research problems in the area of the academicians, researchers, students and representatives from the industry to deliberate on key research of Management, Science and Technology that are relevant in the changing global environment. Research and empirical studies in all the functional areas of Management, Science and Technology which are currently relevant and invited for presentation at the Conference. The conference is instrumental for avid Researchers, Academicians, Industry experts and Students.

About the Institute

Asansol Engineering College was established in the year 1998 with a mission to impart quality technical education matching the constantly changing global standards. With a humble start with four Departments consisting of 180 students, it has passed a number of glorious moments and now boasts of Nine Engineering Departments like CSE, CSBS, AI & ML, IoT-CSBT, IT, ECE, EE, ME and CE with Two Post Graduate Engineering Courses in ECE and EE along with BBA, BBA (Hospital Management), B.Sc. (Data Science), BCA and MCA with about 3300 students from all over India. The College is a joint venture of Techno India Group and JIS Group.

MANAGING DIRECTOR'S MESSAGE

Welcome to the First Edited Book titled *"Contemporary Issues and Challenges in Management in Digital Era"*. The success of publishing this edited book requires the commitment and contributions of many faculty members, student committee and staff of Management Studies Department, Asansol Engineering College, Asansol. I would like to take this opportunity to express my deep appreciation for the efforts of the all the members who provided the technical reviews and necessary discussions for the submitted research papers as well as all other committees and authors without whom this edited book would not have been published.

Best Wishes!

Mr. Taranjit Singh
Managing Director

DIRECTOR'S MESSAGE

"Contemporary Issues and Challenges in Management in Digital Era" is the first edited book you are reading. The dedication and efforts of numerous academic members, a student committee, and the faculty members of the Management Studies Department of Asansol Engineering College, Asansol, are necessary for the publication of this edited book. I would like to take this opportunity to express my sincere thanks for the efforts of all the committee members, authors, and other contributors without whom this edited book would not have been published.

Best Wishes!

Mr. T. K. Ghosh

Director

PRINCIPAL'S MESSAGE

I am thrilled to extend my heartfelt congratulations on the publication of research book *"Contemporary Issues and Challenges in Management in Digital Era"*. This accomplishment is a testament to the intellectual rigor, dedication, and unwavering pursuit of knowledge.

This book not only showcases the expertise of the contributor in the management domain but also contributes significantly to the broader academic community. Research works published here in this book will undoubtedly leave a lasting impact on the field and inspire future generations of practitioners, educators, and scholars.

Warmest regards,

Prof. (Dr.) Avijit Bhowmick

Principal
Asansol Engineering College

VICE-PRINCIPAL'S MESSAGE

On behalf of the entire AEC family, I want to extend my warmest congratulations on the publication of book *"Contemporary Issues and Challenges in Management in Digital Era"*. This is an achievement which is testament to talent, dedication, and passion for Editors and contributors.

Such creativity and hard work have not only enriched our institute but will also inspire countless others who have the privilege of reading this work. This book is a shining example of the power of words to educate, enlighten, and excel.

Warm regards,

Dr. Gouri Sankar Panda

Vice-Principal
Asansol Engineering College

Table of Content

THE IMPACT OF CHANGE MANAGEMENT IN HIGHER EDUCATION: A DESCRIPTIVE STUDY

[1]Mr. Avik Sanyal, [2]Dr. Sriparna Guha, [3]Ms.Priyanka Chakraborty

[1, 3]Assistant Professor, Department of Business Administration, JIS College of Engineering

[2]HOD, Department of Business Administration, Narula Institute of Technology

ABSTRACT

Change is a common factor which continues through all sectors of work regardless of size, industry and age. The world changes fast and organizations must change quickly, too. According to Kurt Lewin, Change is an inevitable part of any organization which is ever changing and can be implemented through various step-by-step process.

The aim and objective of this paper is to explore the various aspects of change management in higher educational institutions impacts on society and also try to identify the different factors responsible for the change and their inter-relationship as well. Change management has different facets and factors both internal and external. In this paper, we have analysed how the colleges and universities (higher educational institutes) are using the change management strategies for their further betterment and holistic development. Because of ever increasing demand of competitive advantage and the market competitiveness now-a-days each organization is applying the change management strategies and strive towards 'Adaptation' to 'Adoptation' gradually.

In this paper, it has been found that change management has got a great impact on the colleges and universities (higher educational institutes) regarding their further growth and development.

Keywords: *Change management, Adaptation, Competitive advantage, Market competitiveness, Holistic development*, *efficiency.*

I. INTRODUCTION

'Change' is an inevitable & unavoidable concept which works in all sectors of life. As we know that, due to the constant up-gradation of technology, education, market competitiveness, demand & supply scenario, all the product and service sectors are getting changed day by day.

The word "Change management" can be defined as the manners and methods which an organization adopts within both its internal and external processes. Change management can be implemented through all aspects of an organization, including people management, skill & competency mapping along with preparation of the premises of change management.

Notable and significant changes is the most challenging work for any organization. This change often needs cooperation form all the levels of the organization and it may involve different autonomous bodies within an organization. In the sector of education also various new policies and guidelines have been implemented as well.

II. OBJECTIVES

The primary objective of this empirical study is to explore different aspects of change management & the impacts of change management on the higher educational institution. Another objective of this paper is to find out the different factors that trigger the change impacts.We have also studied the National Educational Policy 2020 to find out what are the changes it is going to formulate in the educational system of the country.

III. LITERATURE REVIEW

All the organizations across the globe are affected by change. Only the organizations that support change and adopt the change successfully can survive in the long run. Change can help the organization as well the individuals working in that organization grow. However, many a times the stakeholders obstruct change and the plans for inculcating change management. Kovoor- Misra and Stouten etal said that three facets must be considered to achieve successful change:

• Motivation of organizational members;

• External as well as internal sources of change;

•The association of change with organizational coherence, accord and order.

It would be more advantageous if the employees of a particular organization clearly understand why the change is required and also understand the preparations needed for the changes visualized by the management.

According to HBS (Harvard Business School) organizational **change** refers to the actions in which a company or business alters a major component of its organization, including its work culture, the underlying functional technologies or infrastructure, strategy formulation and decision making process etc.etc. moreover, it is the process of guiding organizational change to a successful execution of action plans, and it typically includes three major phases: preparation, implementation, and follow-up.

Basically, if we think about the change management dimensions, we can notice that, there are three major dimensions that are witnessed by organizations: Transitional, Transactional & Transformational.

The question is, having brought about some fundamental change, is the centralised planning approach the most suitable for the on-going development of the tertiary education sector? Is it time the question was changed from 'What is an efficient way to manage higher education?' to 'What is the most effective?'

Efficiency is not the same as effectiveness. Viljoen (1994: 9) described efficiency as relating to 'how well an activity or operation is performed.' Effectiveness relates to performing the correct activity or operation. We can say that efficiency calculates that how well an organisation does what it does, but effectiveness raises value questions about what the organisation should be doing primarily. We can insist that the point has been reached in higher education, where the drive for efficiency is reducing effectiveness and the quality of teaching and learning.

IV. RESEARCH METHODOLOGY

This research paper is entirely based on empirical study. The authors have used secondary data to achieve the aims and objectives of the project. The data was collected from various books and journals of repute. We had chosen these sources because of the reliability and suitability of these sources, and we were sure about the accuracy of the data.

V. ORGANIZATIONAL CHANGE MODELS
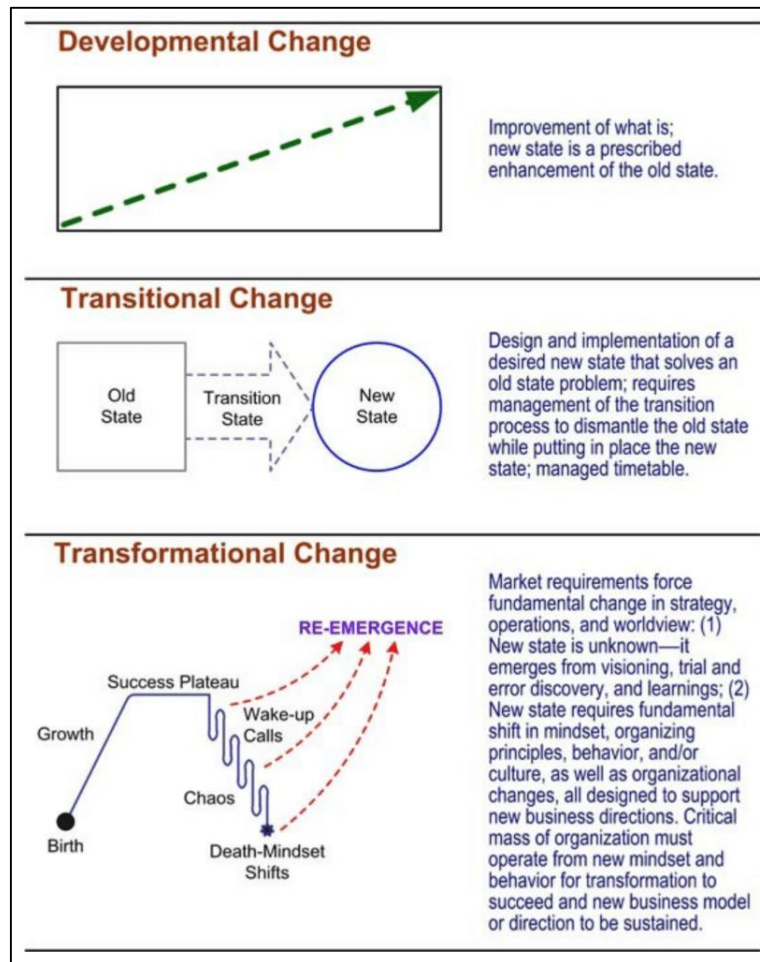
Image-1 *Source: www.beingfirst.com (Three types of organizational change)*

VI. THE IMPLEMENTATION OF HIGHER ORDER THINKING SKILLS (HOTS) IN HIGHER EDUCATIONAL SECTORS

Implementation of HOTS is a very important initiative that has to be achieved in the higher educational institutes. Several proposals have been done in order to cultivate the atmosphere of HOTS amongst students. In complementing this necessity, the government has spent plenty in executing this purpose. (Aziz @ Esa, Muda, Ibrahim & Mansor,2017).

THE KOTTER MODEL

Kotter's widely used model lists eight actions necessary for successful change:

- ✓ Establish a sense of urgency
- ✓ Develop a vision.
- ✓ Communicate the vision
- ✓ . Empower action according to the vision

✓ Plan for and achieve short-term wins

✓ Consolidate improvements and maintain change.
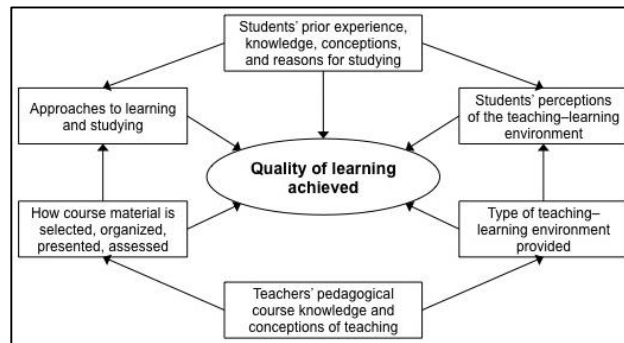
Image 2*: https://in.images.search.yahoo.com/yhs/search;_ylt=Awr1QG.Z8I9kth46yqHnHgx.*

VII. DIFFERENT FACTORS OF CHANGE MANAGEMENT IMPACTING ON HIGHER EDUCATION SYSTEM

Change has its various facets and factors which are affecting the system overall likely the organizational governance pattern, leadership, diversity in stakeholder, institutional culture, brand value of the institution etc. etc. (Duderstadt & Womack, 2003; Welsh and Metcalf, (2003); Kezar and Eckel, 2002).

By analyzing Shephard's (1960) model of planned change to this reality, we can come up with that the first step of the process—creating and agreeing on objectives and its implication on the plan—can be observed as a very crucial factor (Change and Higher Education: A Multidisciplinary Approach Julia Storberg-Walker Richard Torraco). In any case, it is derived that the first step of any thing is very difficult to apply specially whenever it will be a question of change then most of the people want to resist it because of their insecurity & other professional fears & hazards.

Apart from these all, there are some other factors underlying with the concept and application of change management as- budgetery constraint, ever increasing demand of market in respect of placement and job opportunities for the students, the growth of information technology in higher education etc. (Change and Higher Education: A Multidisciplinary Approach Julia Storberg-Walker Richard Torraco).

VIII. IMPLICATIONS OF THIS CONCEPT FOR FUTURE RESEARCH

The changes facing higher education providers are transformational by its nature. In the higher educational sectors every year the education policies are changing and accordingly the

overall situation is also changing. The technology, teaching-learning essentials, exam pattern, syllabus structure, classroom facilities etc. everything is getting changed day by day as per the ever changing demand of market. So, there is a wider scope of future studies can be taken out by the researchers. **A comparative analysis between NEP 1986 and NEP 202**
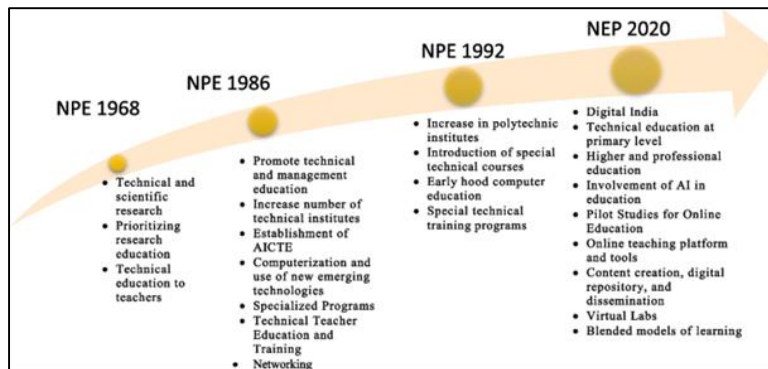
Image 3*: Singh, M., Saini, M., Adebayo, S.O. *et al.* Comparative analysis of education policies: A study on analyzing the evolutionary changes and technical advancement in the education system. *Educ Inf Technol* **28**, 7461–7486 (2023). https://doi.org/10.1007/s10639-022-11494-7

IX. CHALLENGES FACING BY THE HIGHER EDUCATIONAL INSTITUTES (HEIs) REGARDING THE IMPLICATION OF CHANGE MANAGEMENT

Various challenges which are facing by the HEIs while implementing the change policies can be assimilated like:

- Lack of proper Government support to the higher educational institutes.

- Inadequacy of trained faculties, staffs (both academic & non-academic) in the institutions.

- Absence of proper strategies regarding the implementation of NEP which results more drop-outs in the middle of the course.

- Improper designing of the layout of curriculum structure for every classes without studying its feasibility.

- Most of the institutes are not providing adequate manner of training to their staffs which results the incompatibility with the changing scenario day by day.etc.etc.

X. CONCLUSION

After studying this, it has been observed that change and its implications are very much essential for the educational institutes to upgrade their level of performance, further accolades & accreditation etc. We have explored some of the factors which affecting on the system along with some drawbacks simultaneously. It's an obvious thing that at the very beginning stage of the implementation of the new changing rules & strategies every organization is facing some dilemma and conflicts between their employees but ultimately, if they will get proper facilities and support from their organizations they can successfully proceed on the path. Likewise, in the sector of higher education also the decision makers should study the feasibility first then should go for the final implementation led by proper planning & execution of planning. This study is totally based on the secondary data sources so by studying various authors and resource personnel we have find out this extract.

REFERENCES

Abdelouahab Errida, Bouchra Lotfi (2021). *Determinants of organizational change management success: Literature review and case study.* https://journals.sagepub.com/doi/full/10.1177/18479790211016273.

Aziz @ Esa, Muda, Ibrahim & Mansor(2017). The Application of Kurt Lewin´s Model of Change in the Implementation of Higher Order Thinking Skills in School. *International Journal of Academic Research in Business and Social Sciences 2017, Vol. 7, No. 8 ISSN: 2222-6990.*

Norshidah, N. (2011). The influence of emotional intelligence, leadership behaviour and organizational commitment on organizational readiness for change in higher learning institution. *Procedia - Social and Behavioral Sciences, 29, 129-138.*

Hassan A.T., Organizational change management: A literature review, *SSRN-id3135770*.

Nandini, ed. (29 July 2020). "New Education Policy 2020 Highlights. School and Higher Education to see major changes". *Hindustan Times*

Rae, ID (1997). 'Strategic Planning-is it war by other means?' *Journal of Higher Education Policy and Management*, Vol 19, no. 2, pp. 185-194.

Stacey, RD (1995). 'The Science of Complexity: An Alternative Perspective for Strategic Change.' *Strategic Management Journal*, Vol 16, no. 6, pp. 477-495

Viljoen, J (1994). *Strategic Management-Planning and implementing successful corporate strategies.* (2nd Ed.). Melbourne: Longman Australia Pty Ltd.

Weitzel, W & Jonsson, E (1989). 'Decline in Organisations: A Literature Integration and Extension'. *Administrative Science Quarterly,* Vol. 34 (March), pp. 91-109.

Whittington, R & Melin, L (2003). 'The challenge of organizing/strategizing'. In Pettigrew, AM, Whittington, R, Melin, L, Sanchez-Runde, C, Van Den Bosch, FAJ, Ruigrok, W & Numagami, T (Eds). *Innovative forms of Organizing*. Sage Publications. London, pp. 35-48.

Singh, M., Saini, M., Adebayo, S.O. et al. Comparative analysis of education policies: A study on analyzing the evolutionary changes and technical advancement in the education system. *Educ Inf Technol 28, 7461–7486 (2023). https://doi.org/10.1007/s10639-022-11494-7* Duderstadt, J. J., & Womack, F. W. (2003). *The future of the public university in America: Beyond the crossroads. Baltimore: Johns Hopkins University Press*.

Julia Storberg-Walker Richard Torraco, *Change and Higher Education: A Multidisciplinary Approach.*

EMPLOYEE EMPOWERMENT AND JOB SATISFACTION IN PRIVATE SECTOR BANKS IN INDIA: A META-REVIEW OF THE LITERATURE

[1]Sayan Mondal, [2]Anindita Bose, [3]Durba Mukherjee, [4]Chitra Kisku, [5]Dipjoy Sen Burmon, [6]Dr. Sudip Basu

[1,2,3,4,5]*BBA 5th Semester, Asansol Engineering College, Paschim Bardhhaman, West Bengal, India*

[6]*Assistant Professor, Management Studies Department, Asansol Engineering College, Paschim Bardhhaman, West Bengal, India*

_____

ABSTRACT

Employee empowerment is a management practice that aims to give employees more autonomy, involvement, and responsibility in their work. Employee empowerment is frequently thought to improve job satisfaction, which is a favorable attitude towards one's employment that includes emotions of fulfillment, success, and acknowledgment. The majority of these factors have a direct bearing on the climate in which private sector banks operate. Banks must acknowledge and take steps to address the constantly changing needs of their employees in order to boost job satisfaction. The main goal of the current study is to investigate the many factors that contribute to job satisfaction across staff members of private sector banks. The notion that banks employees in the private sector are overworked and under constant pressure has to be carefully investigated. Numerous factors, including job security, schedule flexibility, and promotions, affect how well employees bring back services.

Research Methodology: In this study, we gathered secondary data sources, such as bank-related research papers, journals, theses, project reports, and newspaper articles, from all over the world.

Research Gap: This study, which concentrates on private banks, ignores public banks. Customer behavior is not taken contemplated, the paper's focus is on employee satisfaction and employee empowerment.

Result: The study indicated that job security, schedule flexibility, and promotions—all of which are favourably influenced by the workplace and organisational culture—are the top factors impacting job satisfaction across staff members of private sector banks. By granting autonomy, participation in decision-making, and responsibility in their work, employee empowerment can increase job satisfaction.

Conclusion: Benefits of employee empowerment can include employee motivation, engagement, and job satisfaction. Empowered employees tend to feel valued, trusted, and more connected to their work. Moreover, Employee Empowerment can lead to improved

organizational performance, productivity, and adaptability, as employees are better equipped to respond to challenges and contribute to innovation and continuous improvement.

Keywords: *Employee Empowerment, Job Satisfaction, Public-Sector Banks, promotions, Performance.*

I. INTRODUCTION

Due to the fact that banking is a service sector, human resource management is crucial for banks. Banks must deal with two major challenges: managing people and managing risk. To be successful in the financial sector, you must effectively manage both people and risks. Effective and educated personnel in this sector can only manage the financial risks that the banks need to take on a regular basis. The HRD departments have periodically discovered new approaches to enhancing staff competencies through training, performance evaluation, potential evaluation, feedback and counselling, mentorship, organization development interviews, etc. The highly regulated banking sector is a global force multiplier that keeps the world's economies stable. Green human resource management is a novel concept integrating environmental and social responsibility into investing decisions. It is described as a method of conducting business that strikes a balance between social and environmental concerns and the requirement to generate a profit.

Employee Empowerment in Banks

In the dynamic realm of banking, where innovation meets financial expertise, employee empowerment holds the key to unlocking remarkable success. Empowerment ignites a spark, propelling banking professionals to go beyond the mundane, embracing creativity, and charting new horizons where customer satisfaction and growth intertwine. In the financing sector, by granting decision-making authority, employees feel a sense of accountability, which motivates them to go above and beyond their assigned responsibilities which ultimately translates into employees proactively identifying and addressing customer needs, ensuring seamless experiences, and safeguarding trust customers place in financial institutions. When individuals feel empowered, they are willing to share knowledge, offer support, and collaborate with colleagues, fostering a sense of camaraderie. In the banking sector, where collaboration across departments is vital for delivering comprehensive financial solutions, empowered employees become catalysts for cohesive teamwork, breaking down silos and enhancing organizational synergy.

Job Satisfaction in Banks

The banking industry places a high priority on job satisfaction, where employees face unique challenges and demands. It encompasses the contentment, fulfillment, and overall positive experience individuals derive from their work. Job satisfaction is intrinsically linked to employee motivation and productivity. In the financing sector, where performance and efficiency are paramount, More engaged, devoted, and committed workers are more likely to be satisfied with their jobs. When people are happy in their jobs, they are more motivated to work hard, which boosts productivity, improves customer service, and produces better results for the business. Also in the banking sector, where long hours and high-stress levels are common, ensuring employees' satisfaction is crucial for their mental and physical health. When employees feel supported, valued, and able to keep up a healthy work-life integration, their overall job satisfaction improves. Job satisfaction in the finance sector is closely tied to opportunities for career growth and development. Banks that invest in training, and mentorship programs, and provide clear paths for advancement create an environment that fosters job satisfaction. Empowering employees to acquire new skills, take on challenging assignments, and pursue professional development opportunities not only enhances job satisfaction but also strengthens the talent pool within the organization.

II. STATEMENT OF THE PROBLEM

Policymakers can make the most use of this knowledge to nurture a positive work environment. The study investigates the gaps and limits in the literature, as well as what areas require additional research and investigation to enhance our understanding of this relationship.

III. REVIEW OF LITERATURE

Jain, Sharma, Jain (2012) conducted a study to evaluate employee satisfaction levels across private and public banks from Panipat and Samalkha. The study gathered initial data from 60 respondents via a questionnaire (15 employees at each of the four banks under examination) and additional information via the Internet and literature. according to five variables, the Likert scale is accustomed to measuring job satisfaction. These include pay, service conditions, working circumstances, relationships with peers, workers, and superiors, as well as the entire organization. The study discovered that the level of employee satisfaction in private-sector banks is much lesser compared to public-sector banks. The study's main flaw was the possibility that the sample did not fairly represent the whole population. It has been recommended that private banks provide their staff with some level of security.

Sinha and Shukla (2013) conducted studies using three private-sector banks from greater Noida as examples, including HDFC, Axis, and ICIC bank, to determine the measure of job satisfaction among private-sector banks. From these banks, 45 individuals were ultimately chosen at random to participate in the study. Data were assessed using fundamental statistical methods, and a five-point Likert scale was used to measure job satisfaction. In accordance with the study, 35.56% of respondents are dissatisfied with their jobs, compared to 64.44% of employees of private sector banks. Along with employment security, private banks must offer their staff members enough opportunities for promotions and transfers, as well as work stability.

Yoganandan and Divya (2013) outlined using convenience sampling and survey methods that banks require to meet the continuously changing needs of staff members working in the banking industry in the private sector. The employee in Tiruchengode town's private banks reported high levels of job satisfaction. The study was limited to looking at employee satisfaction and did not examine issues or dissatisfactions. They contend that for private-sector banks to achieve an excellent level of job satisfaction, programmers for training, efficient evaluation of professional performance, strengthening the caliber of superior-subordinate interactions, and collaboration among peers via both official and unofficial facilities or opportunities, such as holding seminars or experience-sharing programmers in the banking industry, must be implemented.

Priya and Eshwar (2014) look into how incentives and rewards affect satisfaction with employment at banks in the public and private sectors. In the current research, both primary and secondary data are used. Through the execution of a detailed and well-structured questionnaire, the primary information on the many different aspects of incentives, motivation, and satisfaction with the work of those banks' employees was gathered. There is an important association between incentives for workers, motivation, and satisfaction with work in both public and private commercial banks. Financial services industry workers place a higher value on monetary or economic incentives, which must be economically revised to meet organizational objectives, increase employee motivation to perform better, jobs, and boost job satisfaction.

Madan and Srivastava's (2015) study tries to ascertain whether there were variations in employee engagement dimensions and to analyze how improving engagement could give organizations building quality workforces a strong competitive advantage. Statistical methods such as Descriptive Statistics, One-Way ANOVA, Independent t-test, and Regression were used. The small sample size of middle-level managers (88) thus it's possible that using the

convenient sampling approach increased the chance of biases in selecting the sample. Females were shown to be more involved and satisfied with their employment than their male colleagues. and have more positive views of their senior management than males. Employee Engagement has a substantial effect on Job Satisfaction, which is essential for a productive and happy workforce. It is associated with higher productivity, customer satisfaction, lower absenteeism, and turnover.

Annammal and Indirajith (2016) looked at women's employment satisfaction and sociodemographic traits in both public and private banks. 100 employees were surveyed through a questionnaire to get primary data, while secondary data was gathered from a variety of unpublished and published sources. The researchers analyzed every socio-demographic characteristic of the female respondents and came to the conclusion that while public-sector banks should pay closer attention to empowering women, private banks attract and retain employees with additional amenities like high salaries, good promotion opportunities, and welfare programs.

Das and Jain (2018) discovered that elements such as pay, job stability, and work-life balance affect job satisfaction. SPSS was utilized to examine the data collected using descriptive statistics. The primary objective is to highlight the essential components for Private-sector bank employees. The influence of the identified variables on general satisfaction. They argue that maintaining or even trying to increase employee satisfaction to the highest level will help them achieve their goal of being in the top ten, as this is essential for the growth and survival of the organization.

Garg, Dar, and Mishra (2018) Researchers looked at whether managers working for private sector banks were happier with their jobs intrinsically rather than extrinsically. For their research, information was collected from managers at the highest levels who work for the private banking industry in India. Approximately 147 questionnaires were taken. They contend that the main factor influencing work engagement is job satisfaction. The study ignored other variables such as organizational commitment, compensation, retention, incentives, and many more that could be connected to the work involvement of employees and only measured how they related to work engagement and job satisfaction.

Manonmani (2019) executed a survey to figure out how the empowerment of employees affected job satisfaction in the Thanjavur District. The majority of the study's core data were collected utilizing a questionnaire from 513 employees working at particular banks within and around the Thanjavur area. Secondary data were collected through journals, reports, books, seminars, personal meetings, and internet-based resources. For data analysis, SPSS.20

and several statistical techniques such as reliability analysis and the Chi-square test were utilized. The outcomes revealed that the empowerment of employees had a strong association with activating satisfaction among employees. It is suggested that the Indian banking sector encourage the empowerment of employees in order to increase performance and work satisfaction.

Bhargava (2019) undertook a study to empirically determine the relationship between worker satisfaction and engagement, as well as their relationship with employee gender. 232 workers from three different Indian commercial banks (Axis, HDFC, and ICIC banks) responded to a Google Form-based online poll that was utilized to collect primary data. Secondary data were also utilized. T-test analysis Correlation analysis was employed to analyze the data. The study's conclusions showed a significant link between work satisfaction and employee engagement. Work satisfaction and employee engagement levels were similar for female and male employees working in Indian commercial banks. One of the study's major flaws was that there were much more male employees in the sample than female employees.

Baira and Singhal (2020) present a study to show how work-family conflict (WTC) influences stress levels and job satisfaction in Delhi NCR, India for public-sector bank employees. Data were gathered using a sampling strategy. The outcome suggests that improved workplace communication lessens the workload burden that has grown as a result of misunderstandings and skewed perceptions of the nature of the work. To be able to prevent employees from being trapped by powerful customers who jeopardize them in the name of executive officials and chairman, banks need to place a greater emphasis on employee-oriented policies than customer-oriented ones. Correct stress management must be incorporated by the Indian banking sector to improve employee well-being and intrapersonal relationships.

Uddin (2021) determine how motivation and rewards affected employees' job satisfaction in Bangladesh's private banking sector. A well-structured questionnaire was used to gather information from 40 workers of several private banks in the Rajshahi district of Bangladesh. Data analysis was performed using SPSS Version 23.0. Pearson correlation and descriptive statistics were utilized to examine the acquired data. The analysis's findings reveal strong, positive connections involving the independent and dependent variables. However, the study was constrained by the small sample size, respondents' lack of awareness, and time constraints.

Hashima, Faisal, and Khan (2022) gave focused on the intent to create a theoretical foundation for widely accepted job satisfaction theories in the banking industry, including both the private and governmental sectors. By employing a questionnaire with a 5-point Likert scale, the data was gathered from 120 employees of both commercial and public banks. one-way ANOVA test is conducted in order to determine employee work satisfaction. The study found that working hours had a merely minor impact on worker satisfaction in both the private and public-sectors. Compared to those who work in public banks, private sector employees have more opportunities for promotion and greater job flexibility.

Malik and Wats (2022) performed a survey to compare and investigate how employee empowerment affects employee retention in a few governmental and private sector banks in India. With a semi-structured questionnaire, primary data were gathered for the study from banks in the public and private sectors of Punjab, Chandigarh, and Haryana. While secondary information was gathered from books, reputable national and international journals, theses, websites, and magazines. SPSS Version 23 was used to evaluate the data. To determine the relationship between the two constructs, a variety of statistical approaches including mean, correlation, and regression were used. According to the study's findings, the effect of empowerment on retention was stronger in the public-sector banks but employee retention and empowerment levels were higher in private-sector banks than in public-sector banks. This study was restricted to commercial public and private banks, but future research may also take into account other banks, such as international or cooperative banks.

Singh (2022) examines how to effectively manage human resources and still achieve greater employee happiness levels in banks, factors that not only influence the profitability of the bank but also the expansion and health of the economy as a whole. The goal of the study was to evaluate the levels of work-related happiness in the public and private banking sectors and to examine how these factors relate to one another. Regarding remuneration, organizational culture, work hours, workload fairness, the feeling of inequality, and commitment to their jobs, public-sector employees reported higher levels of satisfaction.

IV. RESEARCH METHODOLOGY

This study adopted a systematic literature review methodology, especially a meta-review of existing literature. It involved the comprehensive analysis of previous research studies, reviews, and scholarly articles related to employee empowerment and job satisfaction in private-sector banks in India. The search was conducted using appropriate keywords, including "employee empowerment," "job satisfaction," "private-sector banks," and "India." To ensure the relevance of the literature chosen for meta-review, specific inclusion and

exclusion criteria were applied where exclusion criteria included papers based on public-sector banks and studies conducted in other sectors or countries. More specifically, 15 research papers were judged to be the most pertinent to the subject of the review paper out of the 25 that were evaluated.

Research Papers 20	Thesis 5

↓   ↓

UCG Care Listed (11) Scopus Index (5) Web of Science (4)	ShodhGanga (5)

↓

3 Thesis were eliminated because their goals did not align with the study's objectives.

↓

22 papers were examined

↓

15 Research Papers were qualified
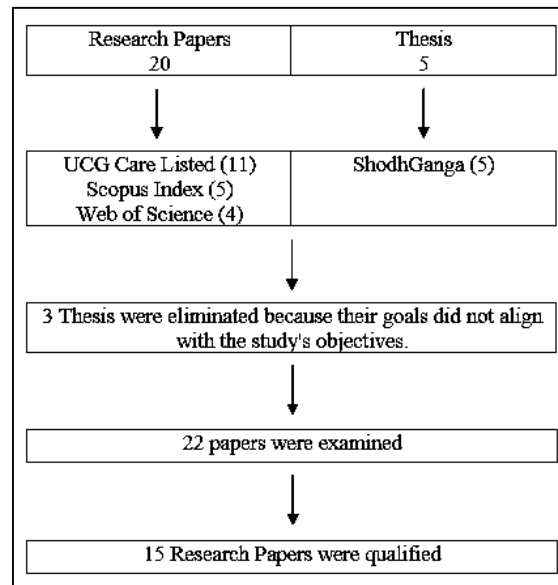
V. RESEARCH GAPS

1. There is a notable dearth of research that specifically focuses on identifying the determinants of job satisfaction in private-sector banks.
2. There is a scarcity of research that specifically examines the relationship between work happiness and employee empowerment in the context of private-sector banking.
3. A paucity of research exists that specifically identifies and investigates the factors impeding job satisfaction in private banks.

VI. OBJECTIVES OF THE STUDY

1. To identify the factors that directly influence the level of job satisfaction among bank employees in the private sector.
2. To study how employee empowerment can increase job satisfaction.
3. To find the stimuli that can significantly hinder job satisfaction amongst the employees of private banks.

VII. FINDINGS OF THE STUDY

1. The primary elements that significantly impact job satisfaction in the banking sector are the nature of the job, available avenues for career advancement, and the relative salary compared to other industries.
2. The presence of job security significantly contributes to job satisfaction, as a secure work environment elevates the overall satisfaction level.

3. In private sector banks, intrinsic elements like fulfilment, recognition, growth, autonomy, and challenge significantly impact managers' work satisfaction.

4. Factors such as layoff threats, high turnover rates, and limited welfare schemes, significantly hinder job satisfaction.

5. Private bank employees are content with the organization's reward and recognition process, indicating a positive satisfaction level.

6. Economic or financial rewards hold greater significance for employees in the banking sector compared to other forms of recognition.

7. Motivation is strongly correlated with job satisfaction among employees in the private banking sector.

8. A participative culture within a private bank is answerable for fostering job satisfaction among its employees.

9. The training of employees in a private bank is instrumental in promoting job satisfaction among its workforce.

10. A supportive and encouraging superior plays a vital role in boosting job satisfaction among private bank employees.

11. Employee empowerment significantly influences the level of contentment experienced by individuals in the workplace.

VIII.   SUGGESTIONS FOR THE STUDY

1. To enhance employee satisfaction, private banks should prioritize enriching job roles, offering abundant growth prospects, and ensuring competitive salary packages.

2. The foremost focus of management should be on establishing a work environment that is secure and stable for employees.

3. Promoting job satisfaction among managers across hierarchical levels requires the management or organizational leaders to prioritize intrinsic motivational elements, particularly recognition, and responsibility.

4. The private bank should improve its employee benefits and welfare programs, including healthcare benefits, flexible work options, and initiatives that promote a healthy work-life balance.

5. Private banks should consistently assess and revise the reward and recognition program to ensure it meets the changing needs and preferences of employees.

6. Private banks should ensure that their employees are provided with competitive compensation or financial incentives.

7. Private banks should proactively focus on boosting employee motivation in order to enhance job satisfaction.

8. Employee involvement should be encouraged in decision-making which fosters open communication, value diverse perspectives, and promote teamwork, to cultivate a participative culture.

9. Promote job satisfaction in a private bank through training by identifying needs, providing development opportunities, and fostering a supportive learning environment.

10. Superiors should regularly provide constructive feedback, offer guidance and support, and be approachable and available as a supportive superior in boosting job satisfaction.

11. Private banks need to facilitate self-esteem, autonomy, and decision-making among their employees, which promotes employee empowerment and ultimately leads to heightened job satisfaction.

IX. SOCIAL IMPLICATIONS OF THE STUDY

Job satisfaction plays a crucial part in the productivity of employees and nowadays almost every organization is making an attempt to do so. This is also applicable to the private banking sector after all the success of any organization depends immensely on its employees because they are the ones who provide services and interact with the customers. Job satisfaction also reduces the employee turnover rate and the employees compensate trust and commitment towards the organization they are working with, this will also aid in gaining the confidence of its clients. The banking sector plays a significant part in the development of the economy and hence the bank with high productivity will also lead to the expansion of the economy. This widely depends on its employees and hence employees are a valuable asset for any organization and banks are no exception.

In the corporate world full of competition, employee empowerment has become an emerging HR tool. Employee empowerment has a greater impact on employee retention and employee engagement. Employee retention reduces the costs incurred in recruiting and training new employees and as an outcome, the organization can focus more on its core activities. Empowerment makes the employees sense that they are important to the organization and that their decision, skills, and abilities are being valued by the organization. Employees must have the liberty to handle the task in their own way though supervision is necessary because not every employee is the same in commitment towards the organization. These overall increases the productivity of the employees and aid in significantly higher revenue generation, also this will improve the goodwill of the bank in the society.

X. FUTURE SCOPE OF THE STUDY

The existing works of literature on empowering employees and enhancing job satisfaction in private sector banks of India have gained quite a lot of attention. A meta-review can identify gaps, highlight trends, and inform future research in this domain. Further exploration and advancement are possible in this area. This study did not consider public-sector banks and the study is limited to India therefore further for more accurate results that may be used globally, research may take the data into consideration. Factors that directly influence job satisfaction have been the matter of focus but there are also indirect factors that can persuade job satisfaction which can be considered for the forthcoming studies. Employee empowerment can also have some detrimental outcomes which were not discussed in detail but it is possible in the future. The different age group has different level of job satisfaction which also applies to gender as well which can be studied and differentiated in the forthcoming studies. Moreover, the evolution of technologies also has a superior bearing on the banking sector which brings the essential to research how the Internet of Things, artificial intelligence, other automation, and data analytics are going to transform the working environment as well as how technology will work as a tool to ease the tasks of employees for better work experience. The future of studying employee empowerment and job satisfaction in private-sector banks in India is filled with exciting possibilities. By exploring emerging models, embracing technology, considering cross-cultural perspectives, conducting longitudinal studies, and examining the employee-customer relationship, researchers can uncover valuable insights to enhance the well-being of staff and contribute to the growth of private-sector banks in India.

XI. CONCLUSION

For India's private-sector banks, job satisfaction and employee empowerment are crucial factors. The meta-review of the literature on employee empowerment and job satisfaction in Indian private sector banks has thrown light on the present state of research in this field while highlighting numerous major results and research gaps. The findings highlight the importance of prioritizing various factors to create a conducive work environment and empower employees. To increase employee satisfaction, private banks should concentrate on enhancing work roles, creating growth opportunities, and offering competitive remuneration packages. Intrinsic motivational elements, such as recognition and responsibility, should be emphasized to promote job satisfaction among managers at different hierarchical levels. Also, according to the existing works of literature programs for employee well-being, such as healthcare benefits, flexible work arrangements, and efforts that support work-life balance, should be strengthened. Proactive efforts to boost employee motivation are crucial for enhancing job

satisfaction for instance employee participation in decision-making should be promoted in order to build open communication, value varied viewpoints, and promote collaboration. In addition to all these, superiors should offer regular constructive feedback, guidance, and support to employees, acting as approachable and available mentors. Human resource practices should be optimized to prioritize effective communication, recognition, career advancement, and work-life balance. Implementing these suggestions can lead to a more empowered and satisfied workforce in private-sector banks in India. Overall, private-sector banks may establish a healthy work environment, retain bright personnel, and ultimately contribute to the success and expansion of the Indian banking industry by prioritizing all the above-discussed criteria.

REFERENCES

Books

1. Karaeva, M. (2012). *Employee satisfaction and service performance in banking sector.* India: Lambert Academic Publishing.

2. Giri, A., and Biswas, D. (2019). Research Methodology for Social Sciences, New Delhi, India, Sage Texts.

3. Kothari, C. (2004). Research Methodology (2nd Revision). New Age International Publishers.

4. Shrivastava, D. V., & Mishra, D. P. (2020). *Human Resource Management.* Mahaveer Publications.

5. Varrkey, G. D. (2020). *Human Resource Management, 16e.* Pearson.

Articles

Annammal, J., & Indirajith, R. (2013). Study on Job Satisfaction of Women Employees in Public and Private Sector Banks – Thiruvarur District. *International Journal of Science and Research*, 262-265.

Garg, K., Dar, I. A., & Mishra, M. (2017). Job Satisfaction and Work Engagement: A Study Using Private Sector Bank Managers. *Advances in Developing Human Resources*.

Hashim, A., Faisal, S. M., & Khan, A. K. (2022). An empirical job satisfaction analysis in the banking sector of India. *Mazedan International Research Academy*, 27-30.

Islam, M. (2016). The Impact of Employee Empowerment on Employee Satisfaction and Service quality: Empirical Evidence from Financial Enterprizes in Bangladesh. *Verslas: Teorija ir praktika / Business: Theory and Practice*, 178-189.

J, M., Das, J., & Jain, P. K. (2018). Level of Job Satisfaction in Private Sector Banks: A Comparative Study of Various Private Sector Banks of Guwahati. 29-39.

Jain, S., Sharma, S., & Jain, R. (2012). Job satisfaction in banking: a study of private and public sector banks (comparative study). *International Journal of Science & Technology*, 40-48.

Kamakshi, M., & K, W. R. (2022). The Impact of Employee Empowerment on Employee Retention: A Comparative Study of Public and Private Sector Banks. *Apeejay Journal of Management & Technology*, 67-78.

Madan, P., & Srivastava, S. (2015). Employee Engagement, Job Satisfaction & Demographic Relationship: An Empirical Study of Private Sector Bank Managers. *FIIB Business Review*, 53-61.

Manonmani, A. (2019). The impact of employee empowerment on job satisfaction in banking sector with reference to thanjavur district. *Journal of Emerging Technologies and Innovative Research (JETIR)*, 101-110.

Md, U. S. (2021). Impact of Rewards and Motivation on Employees Job Satisfaction: A Study on Private Commercial Banks in Bangladesh. *IOSR Journal of Business and Management*, 21-31.

Priya, T. U., & Eshwar, T. S. (2014). Rewards, Motivation and Job Satisfaction of Employees in Commercial Banks- An Investigative Analysis. *International Journal of Academic Research in Business and Social Sciences*, 70-78.

Priyanka, & Singhal, S. (2020). Increasing Job Stress with declining Job Satisfaction in Banking Employees: A consequence of work-family conflict. *Sambodhi Journal* , 27-40.

Shukla, D. S. (2013). Study of Job Satisfaction of the Employees of Private Sector Banks. *International Journal of Education and Psychological Research*, 33-40.

Singh, S. (2022). Job Satisfaction of Employees in Public & Private Sector Banks of Varanasi with Special Reference to SBI and ICICI. *International Journal of Creative Research Thoughts (IJCRT)*, f294 - f300.

Yoganandan, G., & Divya, R. (2015). Job satisfaction of employees working in private sector banks at tiruchengode: an analysis of the contributing variables towards job

satisfaction. *EXCEL International Journal of Multidisciplinary Management Studies*, 34-41.

Web Links

1. https://www.iedunote.com/factors-affecting-job-satisfaction
2. https://www.achievers.com/blog/employee-empowerment/
3. https://www.loophealth.com/post/factors-affecting-job-satisfaction#:~:text=Factors%20influencing%20job%20satisfaction%20can,the%20job%20satisfaction%20of%20employees.

PERSONAL GROWTH AND EMOTIONAL INTELLIGENCE TOWARDS THE LEADERSHIP MANEUVERER

Kamal Golui, Animesh Mahato, Hiranmoy Samanta
Department of Mechanical Engineering, Gargi Memorial Institute of Technology
_____

ABSTRACT

EI is gaining insight into oneself and others and controlling one's behavior and relationships. EI has been studied from different perspectives and can be categorized into his three areas: Ability, Characteristic and Mixed Model. Stream 1 contains an inventory of capabilities or measurements. In contrast to cognitive intelligence or 'g', EI is considered more fluent in improving competencies. EI is therefore viewed as an opportunity for personal growth and change. Improving EI positively impacts empathy, communication, conflict management, burnout, and leadership. All of this takes relationships, trust and connection to the next level. The key points are

- ❖ Emotional intelligence (EI) can be improved and enhanced.
- ❖ Physicians with EI make better leaders and doctors.
- ❖ Empathy and conflict management skills can be improved to influence personal and professional relationships

How to achieve it

- ❖ Lead EI for positive team function and results
- ❖ Develop EI to influence emotions and work performance
- ❖ Promotes empathy for better relationships
- ❖ Manage conflict effectively and proactively to avoid toxic cultures;

Keywords: *Ability Model, Emotional Intelligence, Leadership, Leadership Skills*

I. INTRODUCTION

It is impossible to overstate the pressure placed on institutions and organizations in the age of globalisation to change in order to survive and remain relevant.The obligation to successfully lead change in their organisations falls on leaders in the twenty-first century. However, feelings are a part of the transition process. Because nobody enjoys giving up the comfort that comes with the status quo or giving up something they cherish. The emotions of individuals who will be impacted by the shift are just one of the difficulties that leaders will have to overcome. Consequently, there is a greater emphasis on emotional intelligence in leadership when managing the transformation process.

Because humans choose familiarity, change is always accompanied by emotions of some kind. However, change jars this sense of security, leaving the change recipients feeling uneasy and apprehensive. In addition, when change affects the assumptions, values, beliefs, and to a significant extent identities of individuals and can make the change recipients reluctant to accept the proposed status, they are more likely to react emotionally as a result of anxiety or fear of the unknown. As observed by Foltin and Keller (2012), fostering a culture of open communication is essential for implementing change inside an organisation.The authors claim that when faced with the necessity for a change, it is typical to see people of an organisation become resistive as well as sceptical:

The driving force behind change is change leadership, which is characterised by urgency, vision, human empowerment, and opportunity-seizing. The objective is to accelerate efficiency and make change happen more quickly and intelligently. It is the mechanism that drives extensive transformation.

It is the duty of leaders to implement change in their organisation or institution while overcoming obstacles. For instance, throughout time, initiatives to change education

leaders' inability to navigate the emotional difficulties of reform is one reason why it is fruitless. According to Mayer, Caruso, and Salovey (2004), emotional intelligence is the "set of emotional and social skills that influence the way we perceive and express ourselves, develop and maintain social relationships, cope with challenges, and use emotional information in an effective and meaningful way." Since emotional intelligence is a crucial skill set for leaders, leaders who are effective have a discernible level of it (Goleman, 2004, Table 1). Technical skills are a less important determining factor for successful leaders in organisations than emotional intelligence (Goleman, 2004). Furthermore, "leadership success in reflecting

"Emotionally intelligent competencies" are required in order to reflect on experiences, decipher contextual signs, relate to followers, and build connections (Watkins, Earnhardt, Pittenger, Roberts, Rietsema, & Cosman-Ross, 2017, p. 150).

II. LITERATURE REVIEW

Barling et al. (2000) conducted a study on 49 managers and aimed at examining the relationship between leadership and emotional intelligence and concluded the following: Emotional intelligence was positively related to three components of transformational

leadership (i.e. idealised influence, inspirational motivation, and individualized consideration) and contingent reward (a component of transactional leadership). The two leadership styles most unrelated to emotional intelligence were Laissez faire leadership and active and passive management-by-exception. The highest correlation was between emotional intelligence and inspirational motivation, which indicated that the emotional intelligence element of understanding emotions is mostly important in leadership effectiveness.

Similarly, a study carried by Palmer et al. (2001) observed the association between leadership and emotional intelligence in senior level managers. The results supported the existence of a strong relationship between transformational leadership and overall emotional intelligence.

Sivanathan and Fekken (2002) carried out a study to explore the association of Emotional Intelligence and Moral reasoning to leadership style and effectiveness. The statistical sample comprised 58 residence staff who assessed their Emotional Intelligence and Moral reasoning, 232 Subordinates who rated the residence staffs leadership behaviours and effectiveness and 12 residence staff's Supervisors who provided effectiveness ratings. Transformational leadership was found to be positively co-related to Emotional Intelligence and resident ratings of don effectiveness whereas transactional leadership was found to be negatively co-related with moral reasoning and positively co-related with supervisor ratings of don effectiveness. It was also found that leaders with high Emotional Intelligence were perceived by the residents to display greater transformational behaviours.

Likewise, an empirical study by Duckett and Macfarlane (2003) examined the association between transformational leadership and emotional intelligence of a group of retail managers within a small retail organisation operating from 21 stores in the United Kingdom. The results of this study demonstrate a relationship between success, emotional intelligence and transformational leadership.

Leban and Zulauf (2004), claim that there is minimal empirical research examining the relationship between emotional intelligence and effective leadership. They have thus embarked on a study to link emotional intelligence abilities to transformational leadership that provides data taken from real-world situations where project managers require leadership skills to do their job. The study addressed 24 project managers and their associated projects in six organisations from varied industries. Data collection instruments included use of the Mayer-Salovey- Caruso Emotional Intelligence Ability Test (MSCEIT) and the multifactor leadership questionnaire (MLQ) Form 5X. The results of the study showed that: There are a

number of linkages between emotional intelligence abilities and transformational leadership style. Overall emotional intelligence and the ability to understand emotions were found to relate significantly with the inspirational motivation (provide challenge and a mutual understanding of objectives) component of transformational leadership. In addition, the strategic use of emotional intelligence was found to relate significantly with the idealized influence (demonstration of high standards of conduct, self-sacrifice and determination) and individual consideration (provide support, mentoring and coaching while accepting follower's individual differences) components of transformational leadership. Finally, both the management-by-exception (failing to interfere unless problems become serious) component of transactional leadership and laissez-faire or non-leadership were found to have a significant negative relationship with the strategic emotional intelligence and understanding emotions component of emotional intelligence. Correlation studies run between the leader behaviour factors and the emotional intelligence factors showed significant relationships between components of all leader behaviour styles (transformational, transactional, and laissez-faire) and both strategic emotional intelligence and understanding emotions task. The results of this study provide further evidence that project managers use a transformational leadership style and emotional intelligence abilities to enhance actual project performance. In addition, the study shows that there are a number of linkages between transformational leadership style and emotional intelligence ability (Leban and Zulauf, 2004).

Butler and Chinowsky (2006) investigated emotional intelligence and leadership behaviour profiles of leaders in the construction industry on a sample of 132 leaders. The Bar-On EQ-i test was used to measure of EI and the MLQ 5x was used to measure transformational, transactional, and laissez-faire leadership. The results revealed that of the fifteen subscales of emotional intelligence were related to transformational leadership behaviour at a statistically significant level. Inspirational leadership was reported as the most commonly employed transformational behaviour.

Downey et al. (2006) examined the relationship between Leadership , Emotional Intelligence and Intuition on a sample of 176 female managers and the results revealed that managers displaying transformational leadership behaviours displayed higher levels of Emotional Intelligence and Intuition than managers displaying less transformational leadership behaviours.

Polychroniou(2009) conducted a study to assess the relationship between emotional intelligence and transformational leadership in Greek Organisations comprising of 267 managers as participants selected on the basis of convenience sampling. The final results revealed that emotional intelligence components-Social skills, empathy and motivation were positively related with transformational leadership thus increasing team effectiveness. Two major components of emotional intelligence (Self-awareness and Self-regulation) have been ignored.

Babelan and Rajabi (2009) conducted a study on the Heads of Departments and academic staff members and the sample selected for the study was 118. The empirically obtained results revealed that most of the members were highly satisfied about the leadership styles and performance of the Heads of Departments and further transformational leadership style was found to be more relevant among Heads. The relationship between transformational leadership style and emotional intelligence was found to be positive, negative between transactional leadership style and emotional intelligence but there was no significant relation between Laissez faire leadership style and emotional intelligence and researchers also suggested that Emotional Intelligence helps in predicting Leadership styles of the Heads of Departments.

Clarke (2010) carried out a study to determine the relationship between Emotional Intelligence and Transformational Leadership on a sample of 67 UK Project managers and found that Emotional Intelligence was significantly related with Idealised Influence and Individualised Consideration of Transformational Leadership.

Hur et al. (2011) examined whether transformational leadership acts as a mediator between emotional intelligence and team outcomes. Team outcomes as perceived by followers included: leader effectiveness, team effectiveness, and service climate. It was found that transformational leadership mediates the relationship between emotional intelligence and service climate but not between emotional intelligence and team effectiveness. Among the four dimensions of emotional intelligence namely Self emotion appraisal, Others emotion appraisal, Regulation of Emotion(of the self), and Uses of emotion to facilitate performance, it was found that Regulation of Emotion (ROE) was highly co-related with dimensions of transformational leadership.

On the other hand, Esfahani & Soflu (2011) investigated the relationship between emotional intelligence and transformational leadership in physical education managers of Golestan state

and the population of their study consisted of all presidents and deputies of provinces and districts physical education offices and general department of Golestan State physical education and a sample of 47. It was found that emotional intelligence and transformational leadership had a significant relationship. The results also revealed that personal considerations was the strongest predictive variable in transformational leadership and empathy was the strongest variable in emotional intelligence. The highest mean score in transformational leadership was found to be for Individualized consideration and least for Intellectual Stimulation. Similarly for Emotional intelligence, the highest was for Social skills and least for Individual properties.

Mwangi et al.(2011) analysed the significance of emotional intelligence on transformational leadership in four public Universities of Kenya and the sample was selected with the help of Stratified Random Sampling. The results revealed that emotional intelligence is significant in transformational leadership.

Fatima et al. (2011) conducted a study to examine the influence of emotional intelligence on transformational leadership style as well as the disparity with regard to gender in the hotel industry of Pakistan with the total sample of 238 who were managers. The objectives of the study were to examine the impact of emotional intelligence on transformational leadership style, to know the impact of facets of emotional intelligence on transformational leadership style and also to analyze differences in gender among emotional intelligence scores and transformational leadership style of managers. The results revealed that overall emotional intelligence and the facets of emotional intelligence i.e. appraisal and expression of emotions, regulation of emotions, and utilization of emotions co-related significantly and positively with transformational leadership style. It was also found that there was no significant difference between male and female managers on emotional intelligence, female managers were found to have more transformational leadership style.

Mustafa & Abbasi (2012) conducted a study on 345 faculty members from 20 Universities to examine the relationship between Emotional Intelligence and Transformational leadership in Higher Education sector of Pakistan and the type of sampling used was Simple Random Sampling technique. The results of the study revealed that Emotional Intelligence is significantly related to Transformational Leadership and more specifically Self-awareness and Motivation play an important role in developing transformational leadership in higher education sector of Pakistan.

Lam & Higgins (2012) investigated the mediating role of transformational leadership style between managers emotional intelligence and various employee outcomes in china comprising of 323 participants which included both managers as well as sub-ordinates. The results revealed that transformational leadership style mediates the relationship between managers emotional intelligence and employee job satisfaction(outcome) and it was also found that no mediating effect of transformational leadership style was found on the relationship between managers emotional intelligence and other employee outcomes-employee performance, organisational commitment and Job stress. Further the study also revealed that emotional intelligence has a great influence on the development and maintenance of transformational leadership.

Ying and Ting (2012) conducted a study to determine the relationship between emotional intelligence and transformational leadership in institutions of higher learning in Malaysia and the data was collected from lecturers in order to know their perception towards academic heads emotional intelligence and the outcomes of transformational leadership. The final results revealed that transformational leadership outcomes and emotional intelligence outcomes co-related significantly and it also demonstrated that academic heads with high emotional intelligence resulted in higher level of satisfaction among lecturers and also the heads with high emotional intelligence resulted in extra effort from lecturers.

Mirza and Redzuan (2012) conducted a study to examine the relationship between principal's emotional intelligence and leadership styles on a sample of 268(male=126, female=142). The final results revealed that there was a significant relationship between emotional intelligence of principal's and their leadership styles and further they found higher the level of emotional intelligence, the more it is linked with transformational leadership style. Transactional and Laissez-fair type of leadership were not positively associated with emotional intelligence.

San Lam and O'Higgins (2013) examined a correlation between EI and TL with data from 50 managers and 273 employees across two Chinese construction companies. Using the MLQ and the Wong Emotional Intelligence Scale (WEIS) developed by Wong et al.(2004), tailored to the Chinese context (San Lam & O'Higgins, 2013), and designed to measure four dimensions of EI (self-awareness, self-management, social awareness, and relationship management), the authors found that there is a positive correlation between EI and TL in a Chinese context.

Sumathy et al. (2015) carried out a study to explore the impact of emotional intelligence on Leadership and his decision making skills of the leaders. The result indicated that there is association between the level of emotional intelligence and the decision making. Further, the results indicated that emotional intelligence had highly influenced the transactional leader's decision making than the transformational leader's decision making. The participation dimension in decision making highly influenced the transformational leader's decision making and felt accountability influenced the transactional leader's decision making. In both the type of leaders, decision making was more influenced by the empathy dimension of emotional intelligence.

In fact, experts have argued that in order to bring about change through higher .

Table 1. Component of Emotional Intelligence

Component	Definition	Elements
Self-awareness	Understanding of one's own modes, feelings, and desires, as well as how these impact others	Self-confidence,Realistic,self-assessment Self-deprecating sense of humor
Self-regulation	The capacity to regulate or reroute disturbing urges or emotions	Trustworthiness and integrity Comfort with ambiguity
Self-motivation	Ability to put off making decisions and to consider things through. Passion for work that is not motivated by money or prestige.inclination to exert effort and perseverance in pursuing goals	Strong drive to achieve optimism, even in the face of failure Organizational commitment
Empathy	the capacity to comprehend how other people's emotions are expressed understanding of how to respond to people's emotions and reactions	Expertise in building and retaining talent Cross-cultural sensitivity Service to clients

Social skill	mastery of relationship management and network development	Effectiveness in leading change persuasiveness
	the capacity to establish rapport and identify common ground	Expertise in building and leading teams

<div align="center">Source. Goleman (2004, p. 4).</div>

"Leaders must fully engage and connect with their followers" (p. 53) in order to perform well. Additionally, empathetic leadership can increase organisational and institutional performance. The material that is currently available points to the growing significance of emotional intelligence in leadership (Foltin & Keller, 2012; Momeni, 2009; Srivastava, 2013). Salovey and Mayer (1990) assert that individuals who have mastered emotional intelligence-related abilities make use of their own feelings as well as those of others to inspire them to adopt the desired behaviours. For leaders to successfully enable change, they need to possess certain traits and talents.

Leadership is crucial to institutional or organisational change, according to Moore (2009), who asserted that change-leading success is most likely to be attributed to leaders who exhibit the right leadership behaviours and competencies. Leadership is able to integrate both mental and emotional processes to adapt suitable behaviours and control circumstances. It also helps leaders to analyse their own behaviour and that of others successfully. This article explores the use of social skills in directing change by leaders who possess emotional intelligence. According to Goleman (2004), effective leaders have the trait of emotional intelligence.

be aware of and to handle one's emotions in various situations" (p. 4). According to the author, "emotional intelligence" refers to five competencies. The five competencies "of emotional intelligence" as they were defined by Goleman (2004, p. 4) are the main topic of this article.

Perspective of Emotional Intelligence

There are three different ways to look at the idea of "emotional intelligence": The "ability model" "focuses on the ability" of the person "to process emotional information and use it appropriately within the social environment," the "trait model focuses on behavioural dispositions and self-perceived abilities," and the "mixed model describes the combination of

mental abilities, dispositions, and traits" (Mayer, Caruso, & Salovey, 2000, p. 268). For instance, the "mental ability model" is concerned with the capacity to apply the knowledge of emotions in emotional situations, whereas the traits perspective concentrates on "emotion-related predispositions," which involve the tendency to focus, especially under, emotion-related "situations" (Nelis, Quoidbach, Mikolajczak, & Hansenne, 2009). p. 36).According to supporters of the ability model, the operations of concepts, connection to intellect, and developmental traits also applicable to the emotional domain (Humprey, Curran, Morris, Farrell, & Woods, 2007).

However, both sides concur that emotional intelligence should be taken into account by both experts and practitioners because cognitive capacity is not a reliable predictor of success in the ability to adapt.

abilities as well. According to Mayer, Caruso, and Salovey (2004), p. 199, the definition of emotional intelligence is "the ability to (a) perceive emotions, (b) use emotions to facilitate thought, (c) understand emotions, and (d) manage emotions, to promote emotional and intellectual growth." Emotional intelligence, according to Goleman (2004), is "the ability to be aware of and to handle one's emotions in various situations" (p. 4). According to the author, "emotional intelligence" refers to five competencies. The five competencies "of emotional intelligence" as they were defined by Goleman (2004, p. 4) are the main topic of this article.

Emotional Intelligence's Origins

In the 1990s, Peter Salovey and John D. Mayer established the notion of emotional intelligence, which was later expanded and made available to the general public by Daniel Goleman. The notion of emotional quotient, or EQ, has acquired widespread recognition. Some psychologists contend that because EQ cannot be measured via psychometric tests (like general IQ), it lacks meaningful explanatory power.

Change leadership and emotional intelligence

The extent to which the leader is able to explain the need for the change to team members is a critical factor in determining the level of success in any circumstance involving change.Ely (1999) listed a number of factors that influence change,(p. 3) is "dissatisfaction with the status quo," therefore the amount to which members of the organisation will accept the idea

of change will depend on the leader's capacity to successfully explain the need to change the status quo.

According to Gaubatz & Ensminger (2017), even when members of the organization are content with the status quo and become resistant to the idea of change, the leader's communication skills are just as important to instill dissatisfaction among them. The recipients of the change experience feelings of fear, anxiety, and stress during the initial phase of the process. According to Foltin & Keller (2012), the leader's social skills are crucial at this point in the change process in order to effectively communicate the change to the staff. Leaders who are emotionally intelligent are aware of this and, as a result, create an atmosphere of open communication so that those who will be impacted by the change can contribute to the analysis of the organization's current situation and share in its desired future state (Foltin & Keller, 2012; Zimmerman and Issah, 2016). According to Foltin & Keller (2012), change typically takes place within an organizational setting where there is chaos, individual uncertainty, and psychological reactions to change. As a result, a successful organizational change relies heavily on strong leadership.

Sincerely keen pioneers can really work with

change and deal with the feelings engaged with change. Leaders are able to identify the skills necessary to form a winning team and overcome resistance to change thanks to this.

According to Strickland (2000; Foltin & Keller, 2012, p. 22), "emotional intelligence is the most important ingredient contributing to increase moral, cooperation, teamwork, motivation, and a positive work environment."

Building a Team/Coalition to Affect Change

Change in "the 21st hundred years" requests a collaboration to create and convey the vision to enormous quantities of individuals, conquer obstruction, create transient successes, also, coordinate the progressions into the hierarchical culture (Kotter, 2012). Pioneers who endeavor to carry out change alone are bound to be confined and probably won't succeed in the change cycle. The job of the pioneer is hence to set up a triumphant alliance. The individuals from the alliance should be energetic, dedicated, and dependable to guarantee a fruitful change of the association (Kotter,2012).

All the more in this way, a powerful alliance can handle data rapidly and spread the execution of significant administration choices. Pioneers shouldn't set up an alliance and anticipate that

it should prevail in the change, yet rather work with the alliance to share the feeling of the issues, open doors, and obligation to the change cycle. In advancement, pioneers should speak to the feelings of the individuals to persuade them to want to accomplish greatness (Kotter, 2012).

As indicated by Goleman (2001), a powerful urge to accomplish objectives as well as an interest in keeping up with scores can stimulate individuals.. Accordingly, pioneers with such qualities have a more prominent possibility fabricating a group with comparable properties to lead change. These are components of the inspiration part of the capacity to understand individuals on a profound level.

Thusly, genuinely smart pioneers can perceive the thought processes of individuals and act properly by giving the devices and required help, which will propel them to accomplish greatness (Foltin and Keller, 2012). Pioneers and colleagues "exact social discernment permits people to acquire impressive information on other gathering individuals' perspectives, objectives, and interests, which ought to empower impact by recognizing, understanding, and tending to individuals' implicit requirements and making objectives that may be acknowledged" (Srivastava, 2013, p. 9). "Interactive ability part of the capacity to understand individuals on a profound level is a perfection of different parts of the ability to understand people on a profound level"(Goleman, 2004, p. 9). For example, compassionate people who are pioneers know when to draw in with feelings and when to draw in with reason. Goleman (2001) affirms that "socially talented pioneers are adjust at overseeing groups, a sign of mindfulness, self-guideline, and sympathy joined" (p. 10).Genuinely smart pioneers can utilize their social abilities in building and keeping up with connections (Goleman,2001).

Kotter (2012) noticed that the presence of confidence in an alliance is fundamental for the production of a cooperation regardless of process embraced in framing the alliance. As per

Goleman (2001), the signs of self-guideline, a part of the capacity to understand individuals on a deeper level incorporate reliability, respectability, and receptiveness to change. Pioneers who are not critical be that as it may, think prior to acting have the inclination to divert problematic driving forces and temperaments into positive energy toward authoritative change.

Overcoming Resistance in Change Leadership

During the course of authoritative change, a few devotees

feel hesitant to take part in the change endeavors. Two classifications of obstruction have been distinguished, the objective and unreasonable opposition. de Jager (2001) states that objective obstruction incorporates the sensation of noninvolvement by supporters, while silly opposition alludes to obstruction from individuals for its purpose. As indicated by the creator, devotees who fall inside the sane obstruction are bound to be convinced to take part in the change endeavors. In facilitation, Gaubatz and Ensminger (2017) saw that a few individuals standing up to change might be "disputes" and are bound to crash the change endeavors in view of either the sensations of hatred or the dread that they are not perceived for the worth they bring to the office or association and until their unique negative feeling is tended to, they could keep on disrupting the change process. (p. 160)

Accordingly, genuinely smart pioneers can utilize their social abilities to motivate and convince this class of devotees to embrace the proposed change and endeavor to proficiently contribute toward accomplishing the authoritative objective (Srivastava, 2013).

Likewise, genuinely clever pioneers don't stop at the point when they experience silly obstruction however utilize the profound abilities and what the authoritative culture grants to defeat the opposition. The purposes behind the hesitance or protection from partake in the change endeavors can range from dangers to character, ability/abilities or the need of self-assurance, apprehension about the obscure future, and losing

something significant (de Jager, 2001; Kirkpatrick, 1985). In expansion, since representatives have a feeling of dread toward losing something important, genuinely wise pioneers can make due the feelings by empowering individuals change their profound responses and that of different individuals to specific courses of activity (Srivastava, 2013).

As indicated by Moore (2009), the feelings inside any hierarchical climate faced with change can be troublesome, rousing or de-inspiring, thrill, positive or "pessimistic, and can challenge the capacities of any individual" shared with the obligation with lead change (p. 21).

A sincerely wise pioneer perceives and comprehends their feelings as well as that of the subordinates and in this way oversees and diverts these feelings into a positive energy for change. Moreover, mindful pioneers are fearless. Assuming adherents see that the pioneers are positive about the change they propose, they might be impacted to have the trust in their capacity to execute the change. "The precise articulation of feeling guarantees that individuals can actually speak with others to address their issues and achieve the objectives and targets"(George, 2000, p. 8). For example, to conquer comparative difficulties in the

school,framework, school pioneers should show considerable level of the ability to appreciate individuals at their core (Moore, 2009). Also,"attention to the feelings of staff individuals during school change drives will empower the" pioneer to give "support what's more" guide the "educators" in "the change cycle" (Moore,2009, p. 22).

As per Kouzes and Posner (2007), heads of associations frequently come up short on tolerance for finishing things since notwithstanding the association's vision, is the sense of earnestness. Be that as it may, when adherents are abandoned due to the pioneers' need to keep moving, the association neglects to understand the vision. Along these lines, pioneers distinguished as powerful take into account the necessities and upsides of devotees to make a local area of shared values that will eventually prompt the age of a typical game-plan (Kouzes and Posner,2007). One more significant expertise that can empower pioneers to tune in, grasp devotees, and hold ability is sympathy.

Sympathy is "placing yourself in the shoes of the other individual" (Kirkpatrick, 1985, p. 112). By perceiving the worries of individual individuals, sincerely shrewd pioneers utilize their interactive abilities to persuade the individuals who appear to be hesitant to take part in the change endeavors. Furthermore, such pioneers are delicate to variety — a test in the 21st century association. Pioneers able in sympathy carve out opportunity to grasp the points of view of others prior to offering heading, exhortation, or backing (Issah and Zimmerman, 2016). Likewise, genuinely astute pioneers perceive that the response of the change beneficiaries is an impression of the underlining dread and vulnerability (Foltin and Keller, 2012). Coupled with mindfulness, pioneers pursue choices that doesn't string on covered values which can possibly make internal conflict (Goleman, 2001). For example, Mulford (2006) takes note of that change administration for "understudy accomplishment" will succeed when individuals are enabled to take part in the demonstration of pursuing choices effectively by the production of equal trust and regard through administration. Moreover, pioneers "advance proficient turn of events, and win the help of compelling instructors"(Zimmerman, 2006, p. 241). In this way, any pioneer who is overwhelmed at the response of progress beneficiaries in the type of dread and tension upon a choice to modify the status quo is most likely not all around informed about the variables that decide feelings. In the mean time, pioneers "who are genuinely clever are" expected to "deal with their feelings" in expansion to that of others (Moore, 2009, p. 25). Thus,pioneers in schools can channel their feelings into the precise handling of prompts about any difficulties, dangers, and valuable open doors confronting their organizations (George, 2000).

Nonetheless, the ability to appreciate anyone on a deeper level doesn't be guaranteed to imply the interest or the status to apply the expertise inside a specific situation(Ivcevic, Brackett, and Mayer, 2007). In this way, dependability, reasonableness, and transparency are significant in the perspectives of pioneers in establishing an ideal change climate (Tiuraniemi,2008).

Concurring Momeni (2009), the capacity to understand people at their core is a mental capacity that has effect on different capacities of supervisors, particularly, their administration capacities. In addition, the way of life experienced by workers in the association is impacted more by what they think about the dependability of the conduct of their administrators or pioneers. Administrators need to demonstrate consideration, regard, decency, and take on eye to eye correspondences as well as make occupations significant and beneficial for representatives to expand their faithfulness to the association.

Likewise, sincerely insightful school chiefs can establish a great climate to get the unwaveringness of educators, understudies, guardians, and overseers in their endeavors toward school change. As per Bennis (2009), a pioneer being mindful is the establishment to creating the ability to understand people on a deeper level. Pioneers can comprehend and uphold others assuming they know their qualities, shortcomings, feelings, and have the limit with respect to self-administration (Jacobs, Kemp, and Mitchell, 2008). Comparable to Kouzes and Posner's (2007) instances of authority rehearses, the capacity to understand anyone on a deeper level isn't fixed hereditarily as in level of intelligence after particular age however can be created over the course of life. More in this way, the idealness of progress specialists relies upon the sort of relationship they lay out with all the vested parties in the authoritative climate. Gaubatz and Ensminger (2017) noted in their investigation of fruitful and fruitless change endeavors by office seats as change specialists in safe conditions that relationship with the change members matters.

As expressed by Moore (2009), pioneers can utilize close to home data to "construct trust and" secure "participation, show sympathy to workers, social mindfulness, foster coordinated effort, comprehend the misfortune that individuals experience during the change cycle and show" their abilities "in resolving issues and tackling issues". That's what proof in the writing proposes the school chiefs' inability to rebuild and overhaul schools is a significant mark of the degree to which most heads of schools are unfit to address personal difficulties and clashes exuding from "school change" (Moore, 2009, p. 25).One of the distinctive highlights among groundbreaking and conditional authority is the way that groundbreaking chiefs

animate positive feelings among their supporters through acting with excitement and articulating their vision (Rowold and Rohmann, 2009). In addition, the capacity to understand people on a deeper level is a fundamental element for the foundation of believability which is the groundwork of administration(Momeni, 2009).

Pioneers should exhibit reliability for their constituents to trust in their promise, and furthermore show their energy and excitement about the work they do, and be learned and gifted to lead (Kouzes and Posner, 2007). Pioneers capable in self-guideline construct respectability that can move devotees to accept and confide in the authority to do the best thing (Goleman, 2001). Genuinely savvy pioneers are outfitted with the imperative expertise to establish a confiding in climate. Jacobs et al. (2008) deduced in their concentrate on the close to home wellbeing of educators in South Africa that instructors should be furnished with the ability to appreciate people at their core to prevail even with unfavorable conditions. Along these lines, to fabricate the required limit of elite pioneers for associations or establishments, profound keen abilities should be consolidated in the limit building program.

The significance of this article is its worth in making a difference pioneers better grasp the significance of utilizing the ability to understand individuals on a profound level to work with hierarchical change. Additionally, it tends to be utilized by pioneers to see some of the particular manners by which the capacity to understand individuals on a deeper level can be applied to really deal with the change cycle, including dealing with the feelings of themselves as well as other people, particularly the individuals who appear to oppose the change endeavors. George(2000) noticed that supervisors "high in capacity to understand people on a deeper level are bound to" think helpfully, "assemble and keep up with elevated degrees of collaboration and trust" among their adherents (p. 1042). The helpful reasoning might work with pioneers to see the interconnectedness of issues (George, 2000). All the more thus, it might add to the fruitful execution of changes by the forerunner in their association. It is even "more significant in" hierarchical circumstances where the arrangements must be created "from profound inside the association and pioneers should have the option to suspend inner selves to permit all assessments to be head" (Watkins et al., 2017, p. 150).

Albeit the conversation in this article is restricted to two explicit ways that pioneers can involve the ability to understand people on a profound level in the change cycle, it very well may be utilized in numerous alternate ways. "The ability to appreciate people on a profound level" is fundamental in authority on the grounds that administration is an "inwardly charged"

process both for the pioneer and the adherents (George, 2000). For example, "educators moved from working in detachment to working cooperatively, expanded responsibility, execution of checking frameworks, and conveying initiative can be a immense change in outlook in" most school conditions, and can have an immense "close to home cost for the educators, the understudies and administrators". Accordingly, for instructors and understudies to reach their maximum capacity mentally, cooperatively, and in interactive abilities, "the pioneers should be sincerely equipped"(Moore, 2009, p. 22).

The Best Ways to Develop Emotional Intelligence

The good news is that one can learn and improve emotional intelligence. As well as dealing with your abilities in the five regions above, utilize these techniques:

Take note of how you respond to others. Do you jump to conclusions before you have all the facts? Do you generalize? Take a hard look at yourself and how you think and talk to other people. Try to put yourself in their shoes and be more receptive to their viewpoints and requirements.

Take a look at your workplace. Do you look for consideration for your achievements? It is not necessary to be shy or lacking in self-confidence to possess humility, which can be a wonderful quality. At the point when you practice modesty, you say that you understand what you did, and you can be unobtrusively sure about it. Allow others an opportunity to sparkle - put the emphasis on them, and don't stress a lot over getting acclaim for yourself.

Do a self-assessment. Evaluate our capacity to appreciate anyone on a profound level test. What are your shortcomings? Are you prepared to accept that you are not perfect and that you have room for growth in some areas? It can change your life if you have the courage to examine yourself honestly.

Examine your responses to stressful circumstances. Do you get angry whenever there is a delay or something doesn't go the way you want it to? Even when it's not your fault, do you place blame on others or get angry with them? In the business world as well as outside of it, it is highly valued to be able to maintain composure and control in difficult situations. When things go wrong, control your emotions.

Take ownership of your actions. Assuming that you put somebody in a terrible mood, apologize straightforwardly - don't disregard what you did or keep away from the individual.

If you try to make things right in an honest way, people are usually more likely to forgive and forget.

Inspect what your activities will mean for other people - before you make those moves. Put yourself in their shoes if your choice will have an effect on other people. What effect will this have on them? Would you want to go through that? How can you assist others in coping with the consequences if you are forced to act? For specific advice on how to succeed in a leadership position, see our article on Emotional Intelligence in Leadership.

How Does Emotional Intelligence Show Up?

Several essential indicators and instances of emotional intelligence include:

1.The capacity to recognise and articulate the emotions of others

2.knowledge of one's own abilities and limits.

3.Self-assurance and acceptance of oneself.

4.The capacity to forgive errors.

5.An aptitude for embracing change and a great sense of curiosity, especially about others.

6.Having compassion and understanding for others.

7.Demonstrating consideration for the feelings of others.

8.Taking responsibility for errors.

9.The capacity to control one's emotions amid trying circumstances.

Measurement of Emotional Intelligence

Emotional intelligence levels can be assessed using a variety of tools. Typically, these tests fall into one of two categories: ability and self-report tests.

Self-report tests are the most well-known on the grounds that they are the least demanding to manage and score. On such tests, respondents answer questions or articulations by rating their own ways of behaving. For instance, on an explanation, for example, "I frequently feel that I comprehend how others are feeling," a test-taker could portray the assertion as deviate, to some degree dissent, concur, or emphatically concur.

On the other hand, ability tests involve having people respond to scenarios and then evaluating their skills. People who take such tests frequently have to demonstrate their skills, which are then evaluated by a third party.

There are two approaches that could be taken if you are taking an emotional intelligence test that is administered by a mental health professional:Mayer-Salovey-Caruso The capacity to understand individuals on a deeper level Test (MSCEIT) is a capacity based test that actions the four parts of Mayer and Salovey's EI model. The tasks that test takers complete are designed to evaluate their capacity to perceive, identify, comprehend, and manage emotions.

The Self-Assessment Questionnaire, which is based on the Emotional and Social Competence Inventory (ESCI), asks people who know the person to rate their abilities in a number of different emotional competencies. The test is intended to assess the social and profound capacities that assist with recognizing individuals as solid pioneers.

To learn more about your emotional intelligence, you can also use a lot of free, less formal online resources.

How to Apply Emotional Intelligence

There are numerous applications of emotional intelligence in everyday life. An alternate ways of rehearsing the capacity to understand people on a deeper level include:

1.Having the option to acknowledge analysis and obligation

2.Having the option to continue on subsequent to committing an error

3.Having the option to say no as the need should arise

4.Having the option to talk about your thoughts with others

5.Having the option to take care of issues in manners that work for everybody

6.Having sympathy for others

7.Having incredible listening abilities

8.Knowing why you do the things you do

9.Not being judgemental of others

10. The capacity to appreciate people at their core is fundamental for good relational correspondence. This ability, according to some experts, is more crucial to life success than

IQ alone. Fortunately, you can improve your social and emotional intelligence by doing certain things.

Better relationships, increased well-being, and improved communication are all possible outcomes of cultivating an understanding of one's emotions.

Is Emotional Intelligence a Negative Quality?

A lack of emotional intelligence can result in a number of potential pitfalls that can have an impact on multiple areas of life, including relationships and work. People who lack emotional skills are more likely to get into arguments, to have less satisfying relationships, and to struggle with emotions.

Being falling short on capacity to understand individuals at their core can have various downsides, yet having an extremely elevated degree of close to home abilities can likewise accompany difficulties. For instance:

People with high emotional intelligence may actually be less creative and innovative, according to research.

People with high emotional intelligence may find it difficult to provide constructive criticism for fear of offending others.

Research has found that high EQ can now and again be utilized for manipulative and tricky purposes.

What Makes Emotional Intelligence More Important Than IQ.

Daniel Goleman, a psychologist, was the first to introduce the entire concept of emotional intelligence (EQ) in his 1995 book "Emotional Intelligence: "Why it can matter more than IQ," which is now regarded as a significant milestone in emotion classification and research, Understanding the concept of EQ can assist us in developing better relationships with other people. In recent years, EQ has emerged as an essential skill that successful individuals demonstrate in their professional lives.

The EQ (Emotional Intelligence Quotient) is a measure of your capacity to comprehend and control your emotions, whereas the IQ (Intelligence Quotient) is a measure of your capacity to solve problems and think logically. Your EQ can affect your outcome in life than your level of intelligence.

People who have strong emotional skills are more likely to be happy and do well in life, as well as to master the mental habits that help them be productive; People who are unable to exert some control over their emotional lives engage in conflicts that hinder their ability to concentrate on their work and think clearly.

source: "Emotional Intelligence" by Daniel Goeman

Top 5 Reasons EQ Predicts Life Success

Top 5 Reasons EQ Decides Progress Throughout everyday life

In this day and age, our capacity to understand people at their core to a great extent affects our progress throughout everyday life; we genuinely must completely foster our close to home abilities. Here are the main five justifications for why your ability to understand anyone on a profound level decides your outcome throughout everyday life.

1. EQ greaterly affects accomplishment than different variables.

Certain individuals say that your level of intelligence can find you a task, yet it is the absence of the capacity to understand people on a profound level and social knowledge in you that will get you terminated. It is accepted that your intelligence level records for just 20% of your outcome throughout everyday life. The other still up in the air by your ability to understand anyone on a profound level and social knowledge.

2. The capacity to postpone satisfaction is an essential sign of future achievement.

Deferred satisfaction is the top indicator of future achievement. Individuals who can follow through on the cost today and defer the prizes are substantially more prone to prevail in life.Unfortunately we have turned into a country that looks for moment satisfaction. This appears in our daily existences in the food sources we decide to eat, the purchase presently pay-later lifestyle, our trouble in

3. High EQ prompts sound associations with others.

Our close to home abilities have an immediate and significant bearing on our associations with others. We want to grasp our sentiments, where they come from, and how to communicate them appropriately. We won't keep up with sound connections except if we have some control over our feelings, convey our sentiments in a productive way, and grasp the sensations of others.

4. Close to home wellbeing influences actual wellbeing.

There is an immediate association between our profound wellbeing and our actual wellbeing. Assuming our lives are loaded up with pressure, our actual wellbeing endures. It has been assessed that well more than 80% of our medical conditions are pressure related. We experience pressure fundamentally on the grounds that we are not happy inwardly. We want to figure out the connection between our close to home wellbeing and our actual wellbeing.

5. Unfortunate EQ is connected to wrongdoing and other untrustworthy ways of behaving.

Tragically, there's an immediate association between poor close to home abilities and the increasing crime percentage. Kids who have poor close to home abilities become oddballs very early in life. They could turn into the class menace as a result of a hot attitude. They might have figured out how to respond with clench hands instead of with reason. Unfortunate social and profound abilities add to unfortunate consideration in class as well as sensations of disappointment. Such understudies quickly fall behind in school, and may will more often than not befriend others in a comparable situation. The way to wrongdoing begins from the get-go throughout everyday life. While there's no question that family and climate are solid supporters, the consistent idea is poor close to home and interactive abilities.

Here an ounce of counteraction would surely merit a pound of fix. The expense of mediation when a kid is in grade school is minor contrasted with the expense of imprisoning them in their teenagers and twenties.

Advantages of Emotional Intelligence and Personal Development in Leadership

1.Upgraded Mindfulness

Self-improvement and the capacity to understand people on a deeper level develop mindfulness, which is fundamental for viable initiative. Pioneers who have mindfulness have a profound comprehension of their assets, shortcomings, values, and feelings. This elevated mindfulness empowers pioneers to settle on cognizant choices, adjust their activities to their qualities, and deal with their feelings really. Subsequently, pioneers can stay under control, act genuinely, and move trust among colleagues.

2.Further developed Relationship Building

Self-awareness and the capacity to appreciate people at their core add to major areas of strength for building in positions of authority. Pioneers with high EI are adroit at understanding and relating to the feelings and points of view of others. This compassionate methodology encourages trust, makes a feeling of having a place, and advances open

correspondence inside groups. Solid connections in view of trust and sympathy upgrade joint effort, work with powerful compromise, and urge colleagues to perform at their best.

3.Compelling Correspondence and Affecting Abilities

Self-improvement and the capacity to understand people on a deeper level upgrade correspondence and impacting abilities in pioneers. Pioneers with created EI are capable in undivided attention, compassionate correspondence, and non-verbal signs. They can actually convey their contemplations, thoughts, and assumptions, while likewise being open to input and various perspectives. Such pioneers are influential and can impact others by speaking to their feelings, cultivating commitment, and inspiring their groups towards shared objectives.

4.Versatile Independent direction

Self-improvement and the capacity to understand people on a deeper level add to versatile dynamic in authority. Pioneers with improved EI are gifted at overseeing and directing their feelings, permitting them to move toward decision-production with lucidity and objectivity. They think about the normal viewpoints as well as the profound ramifications of choices. This comprehensive dynamic methodology considers the effect in colleagues, partners, and the by and large hierarchical culture. Pioneers who embrace self-improvement and the ability to understand people on a profound level can make more educated, adjusted, and versatile choices, prompting further developed results for their groups and associations.

5.Successful Compromise

Struggle is unavoidable in any authoritative setting, yet pioneers with created self-awareness and the ability to understand people on a deeper level can really oversee and determine clashes. These pioneers serious areas of strength for have abilities, like undivided attention, compassion, and point of view taking. By understanding the feelings and hidden worries of people associated with clashes, pioneers can work with open discourse, intervene debates, and track down commonly helpful arrangements. Successful compromise cultivates an agreeable workplace, upgrades group union, and jam efficiency.

6.Expanded Worker Commitment and Prosperity

Pioneers who focus on self-awareness and the capacity to understand individuals on a deeper level establish a positive workplace that advances worker commitment and prosperity. Pioneers with high EI can really perceive and address the feelings of their colleagues. They

offer help, consolation, and valuable open doors for development, which lifts worker confidence level, inspiration, and occupation fulfillment. At the point when representatives feel esteemed and upheld, they are bound to be locked in, committed, and useful.

7.Strength and Versatility

Self-improvement and the ability to understand anyone on a profound level outfit pioneers with the flexibility and versatility expected in the present unique business scene. Pioneers who embrace self-awareness ceaselessly foster their abilities, information, and mentality, permitting them to embrace change and explore difficulties successfully. Also, the capacity to appreciate people on a deeper level empowers pioneers to oversee pressure, stay created under tension, and quickly return from mishaps. Strong and versatile pioneers move trust in their groups and are better prepared to lead through vulnerability and change.

Relationship Between Personal Growth and Emotional Intelligence

The connection between self-awareness and the ability to understand people on a profound level is cooperative and commonly building up. Self-awareness goes about as an establishment for the improvement of the capacity to understand individuals on a deeper level, while the capacity to appreciate people at their core supports and encourages self-awareness.

Self-awareness includes consistent personal development, mindfulness, and the development of a development mentality. It improves mindfulness and self-guideline, empowering people to figure out their feelings, assets, shortcomings, and values. Self-improvement rehearses add to self-reflection, care, and the advancement of profound versatility.

The ability to appreciate people on a deeper level envelops the ability to perceive, comprehend, and deal with feelings, both in oneself as well as other people. It underlines mindfulness, self-guideline, sympathy, and interactive abilities. The ability to appreciate people at their core upholds self-awareness by encouraging mindfulness of feelings, triggers, and ways of behaving. It advances self-guideline, empowering people to deal with feelings actually and answer difficulties with strength. Besides, the capacity to appreciate individuals at their core improves sympathy and interactive abilities, working with significant connections and compelling correspondence.

The cooperative energy between self-awareness and the capacity to understand people on a deeper level is obvious. Self-awareness rehearses develop the mindfulness and self-guideline

fundamental for the capacity to understand people on a deeper level. The capacity to appreciate anyone at their core, thusly, upholds self-awareness by extending mindfulness, upgrading self-guideline, and working with sympathy and interactive abilities. Together, self-awareness and the ability to appreciate people at their core add to people's general turn of events, prosperity, and progress in private and expert settings.

III. CONCLUSION

In conclusion, this research paper emphasized the significance of emotional intelligence and personal growth in professional and personal development. The results show that personal development and emotional intelligence are closely related concepts that complement one another.

By encouraging self-awareness, self-regulation, and a growth mindset, personal growth provides the foundation for the development of emotional intelligence. People can learn more about themselves, their feelings, and their actions by engaging in self-reflection, mindfulness, and continuous learning. By enabling individuals to effectively manage their emotions, make decisions based on information, and construct meaningful relationships, self-awareness lays the groundwork for emotional intelligence.

In conclusion, this research paper emphasized the significance of emotional intelligence and personal growth in professional and personal development. The results show that personal development and emotional intelligence are closely related concepts that complement one another.

By encouraging self-awareness, self-regulation, and a growth mindset, personal growth provides the foundation for the development of emotional intelligence. People can learn more about themselves, their feelings, and their actions by engaging in self-reflection, mindfulness, and continuous learning. By enabling individuals to effectively manage their emotions, make decisions based on information, and construct meaningful relationships, self-awareness lays the groundwork for emotional intelligence.

In contrast, emotional intelligence promotes personal development by strengthening self-awareness, improving self-regulation, and cultivating empathy and social skills. It gives people the ability to identify, comprehend, and control both their own and other people's emotions. Effective communication, conflict resolution, and relationship building are all

made easier by this emotional intelligence, which is necessary for personal development and leadership success.

Personal development and emotional intelligence work well together, according to the research. The mindset and skills necessary for emotional intelligence are developed through personal development practices. Emotional intelligence, on the other hand, fosters self-awareness, self-regulation, empathy, and social skills, all of which contribute to personal development.

Personal development and emotional intelligence can have significant repercussions for individuals, organizations, and society as a whole if they are recognized as important. Leaders are more likely to inspire and motivate their teams, cultivate strong relationships, and make decisions that are well-informed and adaptable if they place a high value on personal development. In addition, cultivating emotional intelligence and personal development in educational and professional settings may aid in the development of compassionate, empathetic, and effective leaders.

In conclusion, individual development, leadership effectiveness, and overall well-being of individuals and organizations are all dependent on emotional intelligence and personal growth. Emotional intelligence development and personal and professional growth should be top priorities for companies and individuals who want to create a welcoming and inclusive workplace.

REFERENCES

1. Foltin, A., & Keller, R. (2012). Leading change with emotional intelligence. Nursing Management, 43, 20-25. doi:10.1097/01. NUMA.0000421675.33594.63

2. Avolio, B. J., & Gibbons, T. C. (1988). Developing transformational leaders: A life span approach. In J.A. Conger, R.N. Kanungo, & Associates (Eds.), Charismatic leadership: The elusive factor in organisazational effectiveness (pp.276-308). San Francisco: Jossey-Bass.

3. Babelan, A., & Rajabi, S. (2009). A study of relationship between emotional intelligence with leadership styles in the heads of departments at University of Mohaglegh Ardabili. J Appl Sci, 9(20), 3682.

4. Barbuto, J. E., & Burbach, M. E. (2006). The emotional intelligence of transformational leaders: A field study of elected officials. The Journal of social psychology, 146(1), 51-64.

5. Barling, J., Slater, F., & Kelloway, E. K. (2000). Transformational leadership and emotional intelligence: An exploratory study. Leadership & Organisation Development Journal, 21(3), 157–161.

6. Bar-On R. (2000), "Emotional and Social Intelligence: Insights from the Emotional Quotient Inventory (EQ-i)", in Bar-On R., Parker J. D. A. (Eds.), Handbook of Emotional Intelligence, Jossey-Bass, San Francisco, 363–388.

7. Bar-On, R. (1988). The development of an operational concept of psychological well-being, unpublished doctoral dissertation, Rhodes University, South Africa. Bar-On, R. (1997). The emotional intelligence inventory (EQ-I): Technical manual. Toronto, Canada: Multi-Health Systems.

8. Bar-On, R. (2006). The Bar-On model of emotional-social intelligence (ESI). Psicothema, 18.

9. Bass, B. M., & Riggio, R. E. (2006). Transformational leadership. Psychology Press.

10. Boyatzis, R. E., Goleman, D., & Rhee, K. (2000). Clustering competence in emotional intelligence: Insights from the Emotional Competence Inventory (ECI). Handbook of emotional intelligence, 99(6), 343-362.

11. Bryman, A. (1992). Charisma and leadership in Organisations. London: Sage.

12. Burns, J. M. (1978). Leadership, 1978. New Yorker: Harper & Row.

13. Butler, C. J., & Chinowsky, P. S. (2006). Emotional intelligence and leadership behaviour in construction executives. Journal of Management in Engineering, 22, 119-125. doi:10.1061/ (ASCE)0742-597X(2006)22:3(119)

14. Carasco-Saul, M., Kim, W., & Kim, T. (2015). Leadership and employee engagement: Proposing research agendas through a review of literature. Human Resource Development Review, 14, 38-63.

15. Cavazotte, F., Moreno, V., & Hickmann, M. (2012). Effects of leader intelligence, personality and emotional intelligence on transformational leadership and managerial performance. The Leadership Quarterly, 23(3), 443-455.

16. Cherniss, C. (2010). Emotional intelligence: Towards clarification of a concept. Industrial and Organisational Psychology, 3(2), 110-126.

17. Clarke, N. (2010). Emotional intelligence and its relationship to transformational leadership and key project manager competences. Project Management Journal, 41(2), 5-20.

18. Cooper, R. K., & Sawaf, A. (1997). Emotional Intelligence in business. Orion.

19. Downey, L. A., Papageorgiou, V., & Stough, C. (2006). Examining the relationship between leadership, emotional intelligence and intuition in senior female managers. Leadership & Organisation Development Journal, 27(4), 250-264.

20. Downtown, J. V. (1973). Rebel Leadership: Commitment and Charisma in the Revolutionary Process, Free Press, New York. Downtown Rebel Leadership: Commitment and Charisma in the Revolutionary Process1973.

21. Duckett, H., & Macfarlane, E. (2003). Emotional intelligence and transformational leadership in retailing. Leadership & Organisation Development Journal, 24(6), 309-317.

22. Esfahani, N., & Soflu, H. G. (2011). Relationship between emotional intelligence and transformational leadership in physical education managers. Procedia-Social and Behavioural Sciences, 30, 2384-2393.

23. Fatima, A., Imran, R., & Awan, S. H.,(2011). Emotional intelligence and Transformational leadership: Finding Gende Differences. World Applied Sciences Journal 14(11), 1734-1743.

24. Gardner, H. (1983). Frames of mind. New York: Basic Books.

25. Gardner, L., & Stough, C. (2002). Examining the relationship between leadership and emotional intelligence in senior level managers. Leadership & Organisation Development Journal, 23, 68-78.

26. Goleman, D. (1995). Emotional Intelligence: Why It Can Matter More than IQ. London: Bloomsbury Publishing.

27. Goleman, D. (1998). Working with emotional intelligence. Bantam.

28. Goleman, D. (1998a). Working with Emotional Intelligence, Bantam Books, New York, NY.

29. Goleman, D. (1998b). "What makes a leader?", Harvard Business Review, 76(6), 93-102.

30. Goleman, D. (2001). An EI-based theory of performance. The emotionally intelligent workplace: How to select for, measure, and improve emotional intelligence in individuals, groups, and organisations, 1, 27-44.

31. Harms, P. D., & Credé, M. (2010). Emotional intelligence and transformational and transactional leadership: A meta-analysis. Journal of Leadership & Organisational Studies, 17(1), 5-17.

32. Hur, Y., van den Berg, P. T., & Wilderom, C. P. (2011). Transformational leadership as a mediator between emotional intelligence and team outcomes. The Leadership Quarterly, 22(4), 591-603.

33. Lam, C. S., & O'Higgins, E. R. (2012). Enhancing employee outcomes: The interrelated influences of managers' emotional intelligence and leadership style. Leadership and Organisation Development Journal, 33(2), 149-174.

34. Leban, W., & Zulauf, C. (2004). Linking emotional intelligence abilities and transformational leadership styles. Leadership & Organisation Development Journal, 25(7), 554-564.

35. Lowe, K. B., & Gardner, W. L. (2001). Ten years of the leadership quarterly: Contributions and challenges for the future. The Leadership Quarterly, 11(4), 459-514.

36. Mayer, J. D., Salovey, P., & Caruso, D. R.,(2008). Emotional intelligence: New ability or eclectic traits?. American Psychologist, 63(6),503-517.

37. Mayer, J., & Salovey, P. (1997). What is emotional intelligence?'', in Salovey, P. and Sluyter, D.(Eds), Emotional Development and Emotional Intelligence: Implications for Educators, Basic Books, New York, NY, 23-31.

38. Mirza, M., & Redzuan, M. R. (2012). The relationship between principal's emotional intelligence and leadership styles in primary schools. Life Science Journal, 9(4), 29-33.

39. Mustafa, G., & Abbasi, A. S. (2012). Role of emotional intelligence in developing transformational leadership in higher education sector of Pakistan.

40. Muyia, H. M.(2009). Approaches to and instruments for measuring emotional intelligence: A review of selected literature. Advances in Developing Human Resources, 11(6),690-702.

41. Mwangi, C., Mukulu, E. & Kabare, K. (2011). The significance of emotional intelligence in transformational leadership for Kenyan public universities. International Journal of Humanities and Social Science Vol. 1 No. 7 [Special Issue – June 2011].

42. Palmer, B., Walls, M., Burgess, Z., & Stough, C. (2001). Emotional intelligence and effective leadership. Leadership & Organisation Development Journal, 22(1), 5-10.

43. Payne, W. L. (1985). A study of emotion: Developing emotional intelligence; self-integration; relating to fear, pain and desire.

44. Rozell, E.J., Pettijohn, C.E., & Parker, R.S. (2001). An empirical evaluation of emotional intelligence: The impact on management development. Journal of Management Development, 21, (4), 272–287.

45. Salovey, P., & Mayer, J. D. (1990). Emotional intelligence. Imagination, cognition and personality, 9(3), 185-211.

46. San Lam, C., & O'Higgins, E. (2013). Emotional intelligence and leadership styles in China. Asia Pacific Management Review, 18, 441-465.

47. Shamir, B., House, R. J., & Arthur, M. B. (1993). The motivational effects of charismatic leadership: A self-concept based theory. Organisation science, 4(4), 577-594.

48. Shirazi, A., Ghasemi, Z., Shiezade, E., and Seydabadi, S. (2013).Assessing the Relationship between Emotional Intelligence and Transformational and Transactional Leadership Styles. Elixir Human Res. Mgmt., 62, 17604-17607.

49. Sivanathan, N., & Cynthia Fekken, G. (2002). Emotional intelligence, moral reasoning and transformational leadership. Leadership & Organisation Development Journal, 23(4), 198-204.

50. Sosik, J. J., & Megerian, L. E. (1999). Understanding leader emotional intelligence and performance: The role of self-other agreement on transformational leadership perceptions. Group & Organisation Management, 24(3), 367-390.

51. Stough, C., Saklofske, D. H., & Parker, J. D. (Eds.). (2009). Assessing emotional intelligence: Theory, research, and applications. Springer Science & Business Media.

52. Stump. G. (2000). Emotional Competence and Leadership, The Leadership News.

53. Sumathy, L., Madhavi, C., & Felix, A. J. W. (2015). Influence of Emotional Intelligence on Decision Making by Leaders. American International Journal of Social Sciences, 4, 134-140.

54. Thorndike, E.L. (1920). Intelligence and its uses. Harper's Magazine, 140, 227-235.

55. Wong, C. S., Law, K. S., & Wong, P. M. (2004). Development and validation of a forced choice emotional intelligence measure for Chinese respondents in Hong Kong. Asia Pacific Journal of Management, 21, 535-559.

56. Ying, C. Y., & Ting, S. K. T. (2012). Emotional intelligence and transformational leadership outcomes: insights from a Malaysian perspective. World Journal of Social Sciences, 2(2), 151-160.

MACHINE LEARNING IN STRESS MANAGEMENT IN WORKPLACE AND EDUCATION: A SYSTEMATIC LITERATURE REVIEW OF APPLICATIONS

Srijita Bhattacharyya[1], Sreejit Roy Chowdhury[2], Subhas Halder[3], Itu Chowdhury Gupta[4],

Hiranmoy Samanta[5]

[1]*Department of Computer Science and Engineering,*

[3,4]*Department of Basic Science and Humanities,*

[2,5]*Department of Mechanical Engineering*

[1,2,3,4,5]*Gargi Memorial Institute of Technology*

ABSTRACT

The world of competition put a note on stress and becomes an integral part of everyone's life and directly or indirectly affects individuals in many ways. The COVID-19 pandemic has had a tremendous impact on the economy, education, health care, the business sector, and other aspects of society in every imaginable way, with stress, anxiety, and depression. It even glorifies the importance and importance of managing stress, anxiety and depression. The purpose of this study is to identify all possible personal, occupational, psychological, and interpersonal reasons that contribute to stress, anxiety, and depression affecting individuals with vibrant professional backgrounds using machine learning. to identify the factors of Our study aims to define and explain the impact of technological advances and the COVID-19 pandemic on individual stress levels. It includes various supervised and unsupervised machine learning algorithms for efficient and effective detection of stress in large populations. The purpose of this study is to sensitize millions of people to early detection and treatment of stress before it becomes life-threatening. The paper concludes by highlighting how stress-related research can help policymakers in the education and general industry sectors redesign stress policies and measures to prevent stress.

Keywords: *Machine Learning, Stress Management, Deep learning, Stress factors, Technology, COVID-19*

I. INTRODUCTION

Stress is a state of physical or mental tension or worry that a person may experience as a result of inescapable events or any thinking that causes them to feel agitated, irate, or frustrated. A person displays their body's response to whatever change they go through in the form of emotional, mental, or physical reactions. Simply said, when expectations predicted and actuality experienced are not in sync, a person feels stressed. This causes them to become restless and tight. Stress can be good if it keeps a person alert, energised, and prepared for any danger. On the other hand, if the stressors (i.e., stress-related elements) persist for prolonged periods of time without relief or waiting until a breakdown occurs, stress may have a general detrimental effect on an individual. We are fully aware that stress cannot be eliminated, but we can at least recognise and deal with the numerous elements of stress in people from diverse vocational fields. Consequently, overcoming the stresses is crucial to creating a stress management strategy that works. Stress is typically brought on in humans for several reasons. Some of them include life's financial demands, emotional stress, and work- or career-related issues. In recent years, there have been many developments in the field of stress. Stress levels increased as a result of housekeeping, online classes, and assignments, and COVID infection, particularly during the COVID-19 pandemic. Stress is seen as a mental cancer and the health epidemic of the twenty-first century. Everyone encounters stress because it is an inevitable part of life and is regarded as one of its unique traits. It is regarded as one of the most important parts of our present-day existence, which has resulted from modernity and changes in human beings. As a result, this time is known as the "age of stress." A stressor is any circumstance or element that can make an organism feel threatened, whether that threat is real or imagined. Stressors come in many different forms, including life events, bodily changes, environmental changes, and social influences.

In recent years, there have been many developments in the field of stress. The amount of stress rose because of housekeeping, online classes and assignments, and COVID infection, especially throughout the COVID-19 pandemic. There are numerous machine intelligence techniques that are available to aid in stress prediction. An innovative machine learning technique for binary classification among a stressed situation and a non-stressed condition is the linear discriminant analysis (LDA). Support Vector Machines, or SVMs, are excellent tools for categorising stress into different levels according to severity, such as modest (manageable), medium (under concern), and high (immediate action needed). These tools incorporate the process of analysing signals based to the respective classification technique.

Probabilistic theory is used by the naive Bayes algorithm to carry out the classification task. EXtreme Gradient Boosting is the abbreviation for XGBoost. A collection of weak models for prediction, often decision trees, is what gradient boosting, a machine learning method used for regression and classification problems, provides as a prediction model . The algorithm known as Random Forest can be used extensively to categorise people with schizophrenia, a condition that affects a person's reading, writing, and cognitive abilities and renders them unconscious of their environment and harsh reality.

Numerous deep learning techniques have also been applied in applications like image processing and data mining. Among the more well-known methods used in a deep learning context are Convolution Neural Network (CNN), Artificial Neural Network (ANN), and Recurrent Neural Network (RNN). A superb deep machine learning algorithm to measure the significant psychological stress that college students experience is CNN. As an extension of the current neural network (RNN), the LSTM (long short-term memory) network has been applied to mood prediction issues in the past.

While numerous organisations and institutions have implemented stress management strategies for staff and students, it's equally critical to talk about the root causes of stress. Our review is restricted to students and workers in general and lists the numerous stressors in a methodical manner. The factors are divided into four categories: COVID-19 related factors, workplace related factors, education-related factors (students), and education-related factors (teachers). Each category has been compared to the classification of factors, which includes work-related, personal, psychological and interpersonal factors.

To sum up, the paper's main contribution is as follows:

o Our comprehensive review identifies various machine learning and deep learning-based stress/prediction algorithms.
o The report outlines several stressors and their effects on deep learning and automated stress prediction in the business and educational sectors.
o The essay also examines how the development of technology has contributed to an increase in peoples' general levels of stress.
o Additionally, the study discusses the stress-related studies that was conducted during the COVID-19 epidemic.

Our in-depth analysis of stress management places special emphasis on the techno-psychological side of people. In other words, it not only discusses the technology aspects of

recognising stress utilising intelligent techniques like deep learning, machine learning, however it also provides a list of many stress-related elements, causes of stress, and effects of technological fear on stress. at order to adopt appropriate techniques and maintain best practises of stress management at universities and workplaces, the article will provide educationalists, policymakers, and industrialists with a point of view.

II. LITERATURE REVIEW

Murphy et.al (1984) describe all the benefits and essentials over stress management and describe stress management techniques. Murphy, Lawrence R. "Occupational stress management: A review and appraisal." Journal of occupational psychology 57, no. 1 (1984): 1-15. Greenberg et.al (2002) studies evaluating the merits of occupational stress management and describe Worksite stress management studies are compared along dimensions of type of work group, programme orientation and format, stress management methods, non-specific effects, and long-term maintenance of skills and benefits Greenberg, J.S., 2002. Comprehensive stress management. Bryant et.al (2016) focus on differences as well as commonalities, Boss, P., Bryant, C.M. and Mancini, J.A., 2016. Family stress management: A contextual approach. Sage Publications. Murphy et.al (1996) Combinations of one or more stress management techniques linked into a single intervention Murphy, L.R., 1996. Stress management in work settings: A critical review of the health effects. American journal of health promotion, 11(2), pp.112-135.

III. MACHINE LEARNING & STRESS MANAGEMENT PROGRAMME

Machine learning models aid in the recognition, evaluation, and prediction of stress in smaller and larger populations. These models are used in stress management programmes to teach people how to respond better to stressors, which lowers overall stress levels.

Health-related applications and devices are becoming more popular due to the growing fitness platform and wearable health gadget sectors; stress management courses that interact with these kinds of devices and applications should also continue to increase in size and quantity.

Effective stress reduction raises people's standards of living. However, to aid in this effort, technologies that use machine learning programmes can analyse enormous amounts of data, typically biometric data. These models can pinpoint stress levels and its causes, as well as the best stress relief methods for a certain person. They can even forecast future stress levels.

Additionally, these programmes might suggest stress reduction methods that are most effective for a particular demographic before modifying their recommendations for the person.

IV. CONCEPTION MAP & SEARCH PARAMETERS

We started out by compiling a list of stress management-related terms. In order to avoid scope irrelevance, as indicated in the beginning section, we have restricted our investigation to the education and workplace sector. We discovered that the majority of stress management approaches are built on static parameters. We also discovered that financial and employment-related problems are the main causes of stress-related problems. Fig. 1 depicts the conceptual map in detail.

A systematic review's search criteria include looking up pertinent documents on the Scopus, Web of Science, and Google Scholar platforms. Various search terms, such "Stress Management," "Stress Level + ML," "Management of Stress with Machine Learning," "Management of Stress with Deep Learning", "Detection of Stress with Machine Learning", "Detection of Stress With Deep Learning", "Stress Detection + Deep Learning", "Stress management + COVID", "Stress management + education", " Stress management + Work environment", "University stress levels in COVID 19", "Employee stress management in COVID 19" and "Stress management in COVID 19" etc. are used to look up papers.

The following research issues are addressed by our comprehensive survey on stress management:

i   What are the various strategies for stress identification and prediction utilising machine learning and deep learning for stress management?

ii   What Factor Affects Stress, and How Does It Affect Automatic Stress Prediction Applying Intelligence Technologies for the education & Workplaces?

iii   Does a person's general increase in stress levels correlate with the development of technology? How?

iv   What impact did the COVID-19 epidemic have on an individual's increased stress levels? How?

➤ **Using deep learning and machine learning, stress identification and prediction methods**:

In the current day, stress has taken a major role in the development of various diseases that adversely affect a person's physical, emotional, mental, and social well-being. About 33% of adults, in accord to data from the American Institute of Stress, report feeling severely stressed, which is a significant percentage to note and a cause for serious concern [citation]. Therefore, it becomes imperative for us to create methodologies, construct systems, and apply the appropriate approaches in the appropriate way to recognise stress at an early stage in order to avoid this terrible danger before it manifests and reaches.

In the past, stress was identified through questionnaires, physical exams, quick mock trials, or performance evaluations over extended time periods with an emphasis on the individual. These techniques were extremely targeted, narrow, and person-centred, all of which had an impact on the goals and purposes of the measures. The early techniques were influential and prone to human error because they relied on a person's responses for mock-up and questionnaire rounds and health-oriented questions for medical testing, which also depended on the time the samples were obtained. Transparency and accuracy were lacking in these methodologies. As a result, the demand for contemporary techniques and technology to effectively address the stress problem emerged.

There are currently systems, methods, procedures, or algorithms that can accurately, consistently, and precisely identify stress at its root causes and address it on a broad scale. The approaches that can be employed for stress management are described in this section.

Machine learning, whether supervised or unsupervised, is one of the primary methods used to detect stress in recent years. The most common method for resolving issues with mental health involves supervision learning from these. The SVM (support vector machine) technique is used the most frequently, followed by decision trees and neural networks. The accuracy of all three algorithms is greater than 70% and they can all prevent overfitting. A decision tree is a technique for decision-making that employs a tree structure to arrive at conclusions for a specific topic. It is one method of displaying an algorithm that only uses control and conditional expressions. By carefully examining a variety of measures, decision trees are frequently used to determine whether a person is stressed or prone to stress. Even if the initial data is of a subjective nature, they can be used to determine a person's mental state and identify him or her as stressed. Subjective data includes information from sources like

interviews, Reddit, electronic health records (EHRs), and electronic clinic records (ECRs). This data can then be pre-processed using different NLP (Natural Level Techniques) like lemma, POS (part of speech), and CUI (concept unique identifier), which identifies the key words associated with stress, such as tension, depressed, mental pressure, and many more, to have a broad theoretical understanding of the terms. The language information must then be transformed into numerical information so that several classification methods, such as DT, Logistic Regression, or SVM, can be utilised to determine the values.

For binary classification between a stressed condition and a non-stressed condition, the LDA (Linear Discriminant Analysis) machine learning technique was applied . The classification problem is carried out by the naive Bayes algorithm employing probabilistic theory. The Bayes Theorem is used to determine the likelihood that A will occur given that B has already happened. Assuming that the predictors and features are independent, B represents the evidence and A the hypothesis in this situation.

Logistic Regression is one of the core algorithms to implement the concept of probability in classification issues, although it uses a more complicated cost function known as the Sigmoid function. To forecast an output value (y), independent values (x) are linearly blended with weights or co-efficient values. Support vector machines (SVMs) are a class of linear algorithms that can be applied to a variety of tasks, including classification, regression, density estimation, novelty detection, and others. SVM creates a predictive model by using classification methods. With the SVM technique, a hyper-plane in an N-dimensional space that clearly classifies the data points is sought after.

When used in conjunction with the process of processing data in accordance with the appropriate classification technique, SVMs are an excellent tool for categorising stress into different levels according to severity, such as low (manageable), medium (under concern), and high (urgent action needed). The classifier used data that was acquired from numerous sources organically and in vivid situations and while driving, including respiration, finger temperature, skin temperature, GSR hand, heart rate, and EEG, to determine the degree of stress or pressure. The information was then split up into time intervals of 100, 200, and 300 seconds. The separator was then loaded with the remaining mathematical features once they had all been removed. The pressure was finally determined to have been reached with an accuracy of 99% in 300 s and with a precision of 98.41% in 100 s and 200 s concurrently, according to SVM.

Extreme Gradient Boosting is referred to as XGBoost. Gradient boosting, a machine learning method for classification and regression problems, creates a prediction model from a group of weak prediction models, often decision trees. The method uses a stage-wise approach to create the model, similar to existing boosting techniques, but generalises them by enabling the optimisation of any differentiable loss function.

In applications for image processing and data mining, there are a number of deep learning techniques that have been applied. The more well-known deep learning methods are convolution neural networks (CNN), artificial neural networks (ANN), and recurrent neural networks (RNN). Deep CNN algorithms with a triplet loss function have been utilised for stress detection.

The input layer, hidden layer, connection weight, and output layer components of the neural network are parts of the brain model architecture. Processing that transforms input into output takes place in the buried layer. As the relative strength of the input, connection weights are expressed. In the input and hidden layers, every node has a summing function and a transformation function. Nodes that stand in for the input variables are found in the input layer. A prediction problem's output variable is now being displayed in the output layer.

CNN s' is a fantastic deep learning algorithm for measuring the psychological stress that college students experience on a large scale. The ECG signals must first be acquired using an ECG signal acquisition system in order to provide the desired output. Next, the gathered ECG signals must be denoised using the wavelet transform method. The characteristics of psychological stress indicators are then chosen using the sequential backward selection approach to reduce the feature subspace, increase computational efficiency, and lower error. In the end, a recognition model for mental pressure indicators based on convolutional neural networks is created, and the model's parameters are optimised to obtain the mental pressure indicators of college students. The recurrent neural network (RNN)'s expanded structure known as the long short-term memory (LSTM) network has been applied to mood prediction issues in the past.

Each mental health issue is tested using a different model, algorithm, and feature selection process, and the results show that while there are fewer students who experience extremely high levels of stress and depression, there are more than 100 students who do so. As a result, it is assumed that students are unsure of what their future holds. The best model for stress detection is a

decision tree, which has six attributes: good feelings, memory, negative feelings, interpersonal interactions, leisure, and religion.

The distributions of the data may differ from participant to participant due to individual differences when we train generalised machine learning models from human data, which is a prevalent issue. It is possible for two participants with similar levels of well-being to use mobile phones differently, leading to internal covariate shifts between datasets and inequality in feature representation. So, in order to lessen participant heterogeneity, we suggest an LSTM structure that incorporates batch normalisation (BN).

Convolutional neural networks (CNN) are extensively utilised in deep learning, particularly in the computer vision application area. CNNs are capable of accurately capturing the spatial and temporal correlations in an image through the application of filters (convolutional kernels). Combining the aforementioned ideas, CNN and RNN may both use timestamp dependencies to extract features from data. Our data is in a high-dimension feature space, which increases the likelihood that the training models would be over-fitted. We can actively extract high-level features from our high-dimension data using CNN's convolutional kernels.

In terms of participant-independent wellbeing prediction, the deep LSTM model fared better than the CNN-LSTM model. The SVM, DNN, CNN, and XGBoost algorithms all performed well in predicting stress, but CNN performed the best.

Although there are numerous machine learning algorithms for stress prediction, all of the strategies use the same fundamental principles. The relevance of the final result is the same in all circumstances, regardless of how differently formatted or how differently it distinguishes between different levels of stress the output of each unique method applied is. Consequently, the following procedures are carried out in order to detect stress while utilising various machine learning techniques:

Step-1: Dataset for Stress Input: In the first stage, data for stress is gathered from a variety of sources, including quick mock test rounds, questionnaire sets, and performance-related data. The dataset is given attributes and class labels based on the user's clear needs. When a student is being taken into consideration, elements like the amount of study pressure, the behaviour of the teachers, the school atmosphere, etc., are significant considerations. However, when it comes to working professionals, these characteristics are considerably less relevant. So, just those aspects that contribute are to be taken into account.

Step-2: Data Pre-Processing: In the second stage, data is screened for any extraneous fields or qualities that are not relevant for the process of stress detection. Additionally, duplicate, null, and missing value checks are performed on the data. In order to prevent any irrational errors when processing the dataset for prediction, the samples that contain any of the aforementioned values will be eliminated from the dataset.

Step-3: Train-Test Split: The dataset is split into training and testing data in the third step. 70% of the data will typically be used for training, and 30% for testing. The model will learn to distinguish between stress levels and determine threshold values for various situations through the use of training data. To check for over- or underfitting issues, the trained model will be applied to the testing data.

Step-4: Implementation of Stress Detection Model: Depending on the sort of user being observed, the fourth phase will involve the application of the chosen algorithm for determining stress levels based on inputs vivid traits or features.

Step-5: Performance Evaluation: The model's performance will be assessed in the final stage based on a number of different metrics, including accuracy, precision, F-score, and others, to ensure that the method was implemented correctly.

As a result, all implementations of algorithms for stress detection follow a similar basic architecture.
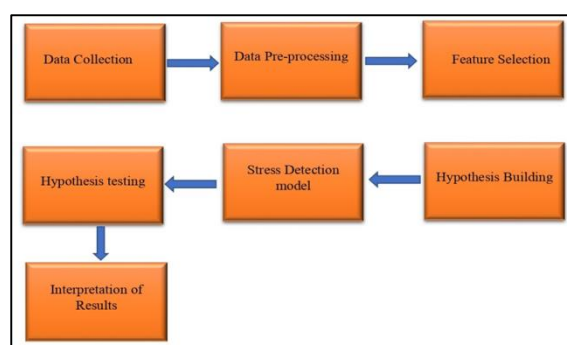
Fig. 1: Block Diagram of Stress Detection System

V. STRESS-RELATED VARIABLES AND THEIR EFFECTS ON THE AUTOMATIC PREDICTION OF STRESS   UTILISING INTELLIGENT TECHNIQUES

This section discusses a variety of variables that influence stress prediction and their effects on the automatic prediction of stress made possible by intelligent techniques. The factors have been divided into general, education-related (student and teacher), work-related, and

COVID-related categories. There may be some factors that appear in numerous categories because all the categories that are described overlap. Additionally, personal, work-related, psychological, and interpersonal elements are included in the list of stressors.

5.1 <u>General Category:</u>

The stressors mentioned in this area are those that cause stress in people either directly or indirectly, regardless of where they are from in terms of their professional backgrounds. In other words, the elements discussed here apply to all people and have an identical effect on everyone.

I.   <u>Personal Factors</u>: Age, gender, education, race, profession, and nationality are all important stress-related personal characteristics. These elements compromise the person's morals and have a limited positive impact on performance. Even while none of these characteristics are genetically based, they nonetheless influence how people are shaped. Social exclusion, violence, and discrimination against different groups of people are all influenced by these causes.

II. <u>Occupational Factors:</u> It includes any workplace activities, conditions, or issues that have an impact on the output and productivity of a working professional. Work-life balance, experience, and employment status are a few of the variables. These elements are crucial for job happiness. When used as a motivator, these foster innovation and satisfaction, which eliminates boredom. However, when they work poorly, they cause aggressiveness and low job satisfaction.

III. <u>Psychological factors:</u> These have to do with a person's mindset, drive, and beliefs on his or her life. Psychological stressors represent how an individual will behave or respond in the face of an unclear situation, which in turn leads to stress. Anxiety about the condition and depression are two of the most important variables. These elements cause people to isolate themselves, reduce their social circle, and stop engaging in a variety of enjoyable activities.

IV. <u>Interpersonal factors:</u> These take into account how people interact with one another, such as how one gets along with peers and co-workers in the workplace or with teachers and students in schools or universities. These include verbal and psychological abuse, as well as problems brought on by their relatives, friends, and senior citizens. If we look at these aspects positively, having supportive peers can aid in improving performance, however having peers that push others in a bad way can result in a decline in performance.

5.2 <u>Factors relating to education (Students):</u>

Although stress in general is nothing new, the topic of student stress is somewhat newer. Today's pupils are overworked from the start of their secondary education (and occasionally even during their basic education), which is one of the main causes of stress among students. As a result, it's crucial to recognise academic pressures and deal with them appropriately and at the appropriate time.

I. <u>Personal issues:</u> These elements have an impact on a person's inner self and cause stress by causing them to overthink. Physical attractiveness, online addiction, a lack of confidence, and self-desire are a few examples. These things help one become aware of oneself. Physical beauty, self-desire, and other factors are not very significant. Being happier than having a great body is better for one's wellbeing. If one is affected by such conditions, it can result in low self-esteem and confidence.

II. <u>Work-Related Factors:</u> The setting and climate where an individual learns and completes their educational process are crucial to take into account because they serve as the foundation for the student's future. Study facilities, a competitive setting, peer behaviour, and the teacher-student connection are a few variables that affect a student's academic performance. If seen positively, elements like a highly competitive setting and a solid teacher-student connection can drive pupils to do their best work rather than settle for mediocrity. On the other hand, if these elements are viewed incorrectly, the student becomes more angry, insecure, etc.

III. <u>Psychological variables:</u> These variables show how a student would react or respond to both planned events, such as exams, viva-voces, and practical tests, as well as unplanned events, such as haphazard mock tests or exams. Accounting for such circumstances is crucial because they may have a negative impact on a student's performance. Exam anxiety, the dread of failing, receiving poor results, and difficult learning are a few examples.

IV. <u>Interpersonal factors:</u> Interpersonal factors are those relating to a student's interactions with his teachers, friends, and other relevant entities in his environment. These relationships have an impact on a student's behaviour and working style, which may later lead to stress. Several elements come into play, such as overcrowded classrooms, peer and group bullying, and team performance. These elements directly affect the educational atmosphere of an individual and have a negative impact on the workplace. We prefer learners who are able to appreciate others and occasionally inspire them.

5.3 <u>Factors relating to education (Teachers):</u>

Many students' lives are illuminated by teachers in order to give them the best chance for a bright future. They provide us direction, moral ideals, manners, and advice so that we can all succeed. Even though they give it their all, we students occasionally fail to comply with our teachers, or rather, teachers, if not by us then perhaps due to other circumstances such as stress. As a result, it's crucial to comprehend and act appropriately at the appropriate time.

I. <u>Personal variables:</u> These variables cause teachers to overthink and misinterpret their abilities or standards, which undercuts their performance. Examples include self-worth, outlook, management skills, and problem-solving talents. Based on a teacher's personality, the teaching process may be favourably or badly impacted. If a teacher has a terrible personality, the classroom will have a negative atmosphere, which will negatively affect student learning. On the other side, if a teacher has a good outlook on life, both the pupils and the teachers will benefit. The appropriate actions taken at the right time are crucial.

II. <u>Factors at Work:</u> These considerations include workplace-related emotional, psychological, and physically distressing incidents that stress educators. Long work hours, job uncertainty, a dismal work environment, and abnormal behaviour are some of the factors. These number of factors affect teachers' productivity and efficiency, which in turn affects their level of job satisfaction, team cohesion, absenteeism, etc.

III. <u>Psychological variables:</u> These variables affect teachers' attitudes and behaviour in response to well-known events or hypothetical yet stressful situations. These elements include emotional weariness and a delay in material provision. High concentrations of these elements are harming teachers' health and wellbeing, which results in burnout, disengagement, the greatest turnover rates, etc.

IV. <u>Interpersonal Factors:</u> It involves elements connected to teachers' behaviour, the type or attitude of the students around them (i.e., students), social aspects, and openness to group discussions and cooperative activities. Emotional intelligence, effective communication, and team performance are a few of the reasons. These variables directly affect the organisational culture. These variables are ineffective, which damages the work environment. There should be more people who can occasionally comprehend and inspire others.

5.4 <u>Factors associated with the workplace:</u>

The most difficult places to work and survive are offices. Stress is influenced by a variety of environmental, social, and idiosyncratic elements in corporate offices and workplaces in addition to workload or work pressure. Thus, it is essential to define and describe them.

I. <u>Personal factors:</u> These aspects concern the identity of a worker or a professional from a working class. If these aspects aren't taken into account beforehand, they negatively affect an individual's productivity and performance for the firm. Rank/designation, personal inadequacy, and internal conflict are examples. Employees find it challenging to focus, make judgements, and feel confident in what they are doing when faced with such circumstances. A work-life balance imbalance, emotional disorders, and absenteeism are additional consequences.

II. <u>Work-Related elements:</u> These elements primarily have to do with the individual's working environment and any challenges or troubles they encounter at work while they are employed. Workload volume, working relationships, workload regulation, and poor member coordination are a few examples. These elements increase an employee's risk for mistakes, subpar work performance, fatigue, mental health issues, and workplace problems.

III. <u>Psychological factors:</u> These describe how working professionals respond to and perceive both official and non-official events or circumstances. Depression, anxiety, and stress are a few contributing elements. Employees with psychological disorders are more likely to experience depression, anxiety, and sleeping problems, all of which affect their ability to perform and be satisfied at work.

IV. <u>Interpersonal factors:</u> These aspects have to do with how well an employee gets along with their co-workers, boss, and other team members or group members when working on group projects. These characteristics also take into account how seniors and their coworkers behave and think in social and professional contexts. Examples include interpersonal conflicts and an increase in tasks. These elements directly affect the work environment, work-life balance, and working conditions. It might be viewed favourably outside of the job because it enables employees to control the stress brought on by environmental stresses.

5.5 <u>Factors connected to COVID-19 (Frontline employees):</u>

However, during this difficult time, our doctors and nurses were the nation's saviours as they worked day and night as frontline workers, that too efficiently and effectively. COVID-19 had affected and is still affecting the entire world in a way that no one could have ever

envisaged. Due to long work hours and challenging working conditions, nurses experienced the most stress over the past one to two years. It became vital to talk about those stressors in order to deal with similar circumstances in the future.

I. Personal Factors: These pertain to the nurses' character, upbringing, and employment status (i.e., full- or part-time employment), as these aspects also have an impact on their professional lives. Examples include being married, having home duties, and not having enough personal time. During the epidemic, many frontline employees encountered these factors. While many saw these characteristics favourably in order to assist as many patients as possible, others did so in a way that decreased their performance and level of satisfaction.

II. Work-Related Factors: These factors show how workplace customs, working conditions, difficulties with the workplace, and work overload may affect employees' productivity and effectiveness at work. Abuse, sexual harassment, gender discrimination, and a lack of chances are a few of the contributing reasons. Such characteristics were highly frequent for frontline workers to experience during the epidemic, which decreased the amount of work they were completing and their level of job satisfaction.

III. Psychological variables: These are the factors that describe how nurses would feel mentally or emotionally in difficult or urgent situations. These events could later prove to be extremely stressful because the circumstances at the time were also abnormal. Examples include the worry of contracting an illness, the possibility of spreading it to others, and the support of loved ones. These elements caused the frontline employees' sleep difficulties, elevated levels of anxiety and despair, and reduced work-life balance.

IV. Interpersonal variables: These characteristics describe how nurses interact with their co-workers, peers, and colleagues. These also exhibit effective teamwork and case management skills. Interpersonal conflict and teamwork with peers are some of the contributing elements. These elements aided front-line employees in overcoming the stress brought on by job stressors. But the environment and the peer groups were directly impacted by these elements.
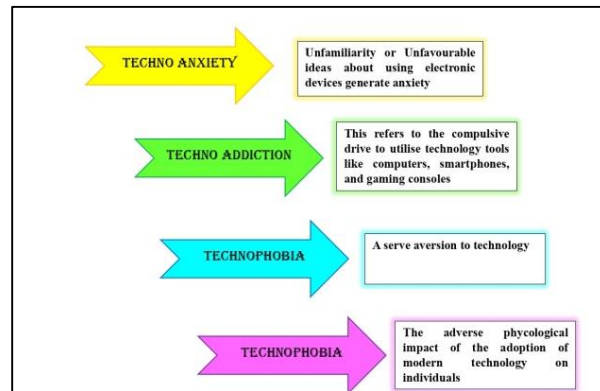
Fig. 2 Stress-related research work in various do- mains

V. DOES A PERSON'S GENERAL INCREASE IN STRESS LEVELS CORRELATE WITH THE DEVELOPMENT OF TECHNOLOGY?

Our lives have been made easier by modern communication technologies, for example, changes that once took weeks to occur on the other side of the planet can now occur within minutes or seconds. They have, nevertheless, accelerated their pace of movement. Modern technology has become so ingrained in our lives that it is simple to develop a dependence on it to the point that it begins to negatively affect us on a variety of levels. This study would examine how technology has changed our lives and contributed to a rise in people's general levels of stress. First off, it has been proven that people who use information and communication technology, or ICT, experience stress, concern, and tension as a result of using the technology.

Techno-anxiety is a term used to describe this problem. Second, users may encounter psychological effects that can cause them to feel less confident. Such situations can cause powerlessness, discomfort, and the condition known as technophobia, which is an aversion to or dread of using computers. Thirdly, over use of ICTs might result in a condition called techno-addiction. Last but not least, Technostress is a condition of the current era of adaptation brought on by the incapacity to deal with new computing technology in a healthy and productive manner.
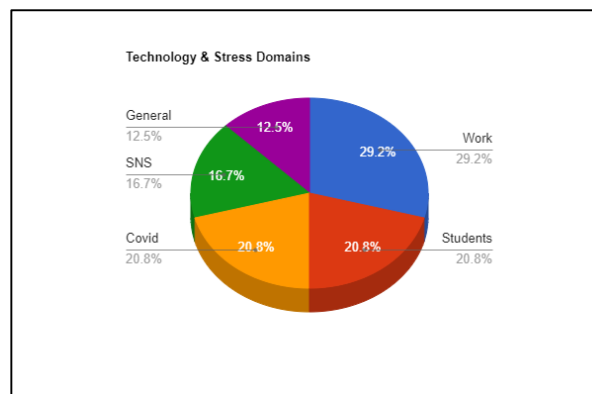
Fig. 3 Impact of Increased Use of Technology

Social networking sites, often known as SNS, have a significant role in the current occurrence of the aforementioned disorders in people. For an increasing number of people accessing the internet from many areas and dimensions of life, they pose several challenges to self-control. SNS is an environment where users can publish images, videos, and other details about their lives and respond to other users' posts to connect with others who share their interests. Increased usage of ICT tools like cell phones, desktop computers, tablets, etc. can also include increased use of SNS. In addition to being potentially dangerous and addicting for a small percentage of people, there is evidence that excessive use of social networking sites, defined as more than two hours per day, is connected to poor mental health, increased psychological distress, and suicidal ideation. The labels "SNS addiction" and "problematic SNS use" (PSNSU) have been correctly described as an engrossing pastime that consumes a person's thoughts for those who fall under this category. It is driven by a strong need to access or use social networking sites, which is occasionally unhealthy. As a result, the person ends up investing a lot of time and energy in SNSs. Other social activities, interpersonal relationships, work/study, and/or psychological health and well-being are all severely harmed by this. More research also revealed that stress brought on by SNS addiction is a factor in psychiatric disorder characteristics such OCD, anxiety, ADHD, depression, and stress.

Along with other serious health issues, technology use has been linked to sleep issues.

Additionally, several academics have studied the factors that predict procrastination when using technology and the internet. The definition of procrastination is the "failure of self-regulation or not exerting enough self-control for task management." Notably, the frequent uncontrolled and possibly procrastinatory use of SNS has resulted in low trait self-control and decreased self-directed learning in children. This is because SNS can provide short-term guilty pleasures by the experiences and enjoyment of certain activities like gambling,

pornography, etc. as opposed to important but unpleasant academic tasks. In conclusion, we can state that interrupted internet use seriously impairs key facets of personal, academic, familial, social, occupational, and other functioning.

The covid-19 pandemic has been a problem since early 2020. The authorities enacted a number of emergency measures. These included the methods that both public and private organisations might use to access home-based remote work. In order to alleviate crowding and restrict travel across the country's territory, the administration did not want to jeopardise the quality of the services being provided. Every profession was impacted by the government's decision. Although it expected quick and good responses from employees, there was still a technology-related concern. Concerns about insufficient technical readiness and preparation were prevalent in the educational sector. Patients in the medical and healthcare fields were continuously anxious about any outcomes that could indicate dangerous conditions or inaccurate diagnosis. While in the banking industry, customers' attitudes towards technology are what gave rise to the worry. Customers are concerned about using their data for mobile payments and providing it. In terms of households, less focus has been placed on technology use due to both a fear of it and the growing amount of family duties.

Teachers are increasingly expected to integrate the usage of technology into their teaching approaches in the classrooms due to the rising workload. For teachers, this results in an excessive workload, a challenge, and stress. With the limited time they have at their disposal and the rising expectations of the schools and colleges, teachers are often at a loss. For the teachers, keeping up with new emerging technologies and the innovations connected with them has been extremely demanding and difficult. Even though teachers may view technology as a tool for lesson planning, knowledge delivery, or student recruitment, many lack the necessary skills and competencies to put this positive use of technology into practise.

Organisations, on the other hand, have boosted their ICT investments. Benefits for both businesses and employees have been discovered as a result, but certain drawbacks have also been noted. By altering the internal organisation of the businesses, traditional workplace stress is replaced with mobile workplace stress, which includes raising employee engagement to help them fulfil their duties, enhancing individual performance, and accomplishing organisational objectives. Such factors that contribute to technological stress are also linked to negative psychological effects like a rise in role stress, a decline in job satisfaction, and a decline in organisational commitment. Additionally, a poor information system (IS) leads to

less creativity in employee duties, less productivity when utilising the IS, and unhappiness with the IS.

This pandemic is making it difficult for students to concentrate because of their emotional states, which can also affect their ability to learn independently and their health. This applies to children at both the high school and undergraduate levels. 93% of the 3670 medical students surveyed had a smartphone, compared to 83% who owned a laptop or desktop. 79% of the students had a post-paid internet connection, whereas only 19% used prepaid mobile data to access additional online resources. Out of all the barriers, it was challenging to adapt learning styles, having to handle obligations at home, and poor communication or a lack of clear instructions from educators that were most frequently faced. Following these obstacles, their workload increased.

As seen, felt anxiety and expectation confirmation were important variables in determining intention to employ mobile learning. Additionally, previous studies shown how employing mobile learning (ML) in the educational setting during the pandemic presented a potential benefit for both teaching and learning. The dread of losing friends, a stressful home environment, and the worry about future academic performance may lessen this effect. Therefore, it is crucial to properly assess pupils both during and after the epidemic to prepare them to cope emotionally and mentally.

VII. IMPACT OF THE COVID-19 EPIDEMIC ON AN INDIVIDUAL'S INCREASED STRESS LEVELS

The World Health Organisation (WHO) proclaimed the COVID-19 coronavirus disease to be a pandemic on March 11, 2020. It is an infectious sickness brought on by the

SARS-CoV-2 virus, a brand-new coronavirus. Due to this pandemic, the entire planet was placed on lockdown, which prevented us from going about our daily lives as usual. Both adults and younger generations of people have experienced significant stress as a result of the pandemic's ongoing repercussions and aftereffects (Yasmin, 2020). Fig. 6 illustrates the direction of the conversation by enumerating the important words associated to stress and COVID 19-related research.

The amount of time we spent in the virtual zone significantly rose since everyone was cooped up inside their homes. People's concentration on their online and virtual lives increased significantly as a result of the pandemic. Online discussions and comments regarding the

stress, worry, and trauma brought on by the epidemic became quite popular as mental health issues increased and stress levels peaked. In relation to the Indian virtual scenario, the findings indicate that stress and mental health problems were mostly brought on by death and the lockdown. On March 24, 2020, a national lockdown was imposed by the Indian government since the pandemic was a recognised disaster. All around the nation, students were in the middle of board exams and other exams. Throughout the epidemic, the education sector was one of the ones that was most severely affected. Multiple levels of academic disruption resulted from the closure of all schools, colleges, and institutions. All students' levels of stress and anxiety were shown to be increased by this abrupt alteration in the status quo. As educational institutions battled to establish a virtual classroom atmosphere, the lockdown only caused more problems. No student had ever learned in such a setting before, thus everyone had to quickly get used to the new methodology. Many people found studying from home in virtual environments to be incredibly boring, and the amount of exam copying increased significantly. Even educators made an effort during this time to meet the requirements of all pupils and developed numerous teaching methods to reduce stress for students. The increasing workload in the form of extra term work, assignments, presentations, activities, etc. was another problem for students that contributed to higher stress. Although this was done in an effort to help students make better use of their free time, it ended up making the entire experience for the students exceedingly stressful.

Both younger and older persons have been impacted by social isolation policies and lockdowns. The pandemic compelled all schools, colleges, and educational institutions to place more of a focus on online learning environments like Microsoft Teams, Google Classrooms, Zoom, etc. rather than on traditional face-to-face instruction. Due to financial and technological limitations, some institutions were able to retain their academic continuity while others were unable to. Computer work has always been difficult and taxing, but it can also foster employee involvement and, ultimately, encourage inventive behaviour. Numerous issues have also been documented, such as how changes have made it harder to distinguish between work and personal obligations, leading to conflicts that ultimately impair workers' ability to think creatively.

A person's personality greatly influences how they respond to certain circumstances. Different people with different personality types reacted to the changes and increased stress in different ways when faced with circumstances as extreme as the pandemic and lockdown. Studies have revealed that excessive amounts of time spent at home, social media use, self-

reflection, the need for information on medications and vaccines, the decline in physical health, and other factors contributed to higher than average levels of sadness, weariness, anxiety, and stress.

People would become anxious and overanalyse every virus sign during the pandemic due to basic fever and cough. As was already mentioned, different personality qualities such as extroversion, conscientiousness, and sociability each had a unique impact on how people responded to stress. Many individuals interpret depression as a loss of hope. In turn, depression severely depletes a person. Every front-line professional, including doctors, nurses, scientists, and others, was a beacon of hope for everyone during the pandemic. But we must keep in mind that these glimmerings of optimism were under a great deal of pressure and stress, particularly during the height of the pandemic waves. Studies have revealed what aspects of the epidemic did exhaust our front-line staff. What function a specific person plays is one of the key variables in determining the decline in a worker's mental health. The amount of COVID-19 news that each employee consumes per day is another aspect that we would like to draw attention to. The use and consumption of alcohol and cannabis, as well as other factors, have been linked to frontline employees experiencing higher levels of stress than typical, according to studies. We should examine what may have and did simultaneously lower stress levels now that we've talked about the elements that made frontline workers more stressed. Every medical workplace was in some way connected to a setting where the nurses' and doctors' mental health was good.

The pandemic's impact on everyday people's stress levels, the educational field, online communities, personality, and front-line personnel has been seen. In a study, anxiety levels of infected patients were predicted using micro-EMA questions. We can forecast how the stress levels are changing in infected patients over a period of days using the micro-EMA questions.

It is widely believed that a person's ability to handle their stress may be somewhat influenced by their spiritual well-being. Recently, a study involving sociodemographic data was undertaken, and it revealed some intriguing findings. Furthermore, those who have strong spiritual selves need not be less stressed. Even resiliency and hope cannot be used as predictors of stress during this epidemic, along with spiritual well-being.
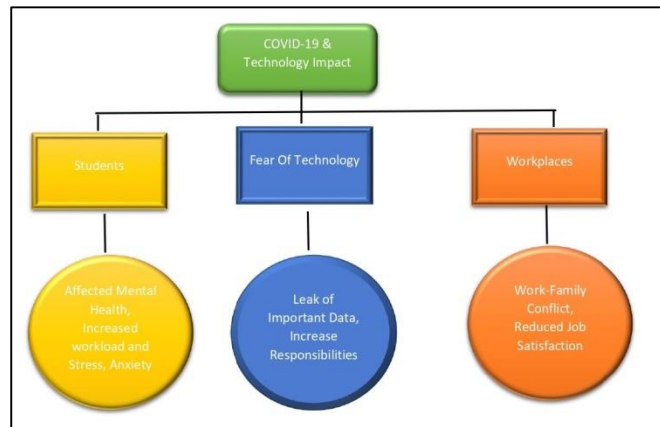
Fig. 4 Stress Factors and Covid-19

VIII. DISCUSSION AND CONCLUSION

8.1 Literature Contributions

Every time we hear about stress, it seems like an abstract concept, but today, stress affects the lives of many people, either directly or indirectly, depending on their personal, professional, social, and demographic factors, which can have a negative impact if not recognised early. Multiple machine learning (ML) models exist now to predict stress, and increasingly more sophisticated approaches are being adopted to increase the accuracy of stress detection. Therefore, it is clear how important stress management is in today's competitive world. We try to provide a summary of the contributions made by the discussed ML techniques and models in practical settings.

The following are a few applications where stress detection may be crucial:

- With the aid of stress scaling scores based on a set of questions pertaining to the activities carried out by students, stress detection models can be used to anticipate stress in school and college students at earlier stages.
- Working professionals spend the majority of their time in offices and frequently participate in challenging team projects or activities at various times when the competition to outperform others lead them to stressful situations causing them to overthink and have an adverse effect on their health. Systems that track every activity taken by employees during the course of the day while they are at the office using a variety of models are being integrated.
- In fact, as stress and anxiety are a major contributor to cardiovascular and neurological issues, attention is being placed on stress prediction as a contribution to the healthcare

sector. In order to quantify stress, health checking equipment have incorporated stress detection monitoring systems.

8.2 Implications

The impact of the epidemic in today's time, especially ever since the modern era has exploded, has brought everything to a standstill. Every industry suffered, and it is plausible to infer—as well as to draw the conclusion from the research studies and findings noted above—that people's levels of stress abruptly rose to unprecedented heights. People from many backgrounds and occupations found themselves at home trying to keep the job going after an unexpected turn of events.

The main goal of the thorough review was to pay close attention to each occupational background that the individual was coming from so that the best stressors that were affecting that particular class of people could be analysed and according to them the accurate techniques and methods could be applied to get a proper result and output. to investigate and comprehend the root of the problem and how stress might be appropriately controlled. With accuracy, honesty, and consistency upheld, the emphasis was on evaluating a wide range of populations collectively based on the most significant elements that contribute to stress among them. Therefore, we went through a variety of machine learning algorithms to comprehend the process of identifying the top characteristics that greatly contribute to people's feelings of stress based on different demographic, social, educational, and professional factors. A key benefit of these procedures has been the mathematical and statistical results, which have allowed for the most accurate detection of stress levels over extended periods of time using a fixed criterion established at the beginning of training.

As was already mentioned, the development of technology made living easier. Although using technology made it simpler to collaborate, plan, and teach, it also contributed to an increase in workplace and student stress. The younger age was already heavily involved in social media, but now everyone staying at home during the pandemic had joined them. Additionally, it was noted that the tone of social media was often impartial.

8.3 Proposed next steps

As there is higher stress in the education and industrial sectors, these are the two areas on which the study concentrates. The majority of documents on stress were found in the aforementioned two areas while searching on sites like Google Scholar, Scopus, ERIC, and

Web of Science. The techno-psychological element of the human being is the subject of our methodical review of stress management. In other words, it not only discusses the technological side of identifying stress using intelligent techniques like machine learning and deep learning, but also enumerates many aspects that affect stress, causes of stress, and the fear of technology and how it affects stress.

The article will offer an argument for educationalists, policy-makers, and businesspeople to put appropriate measures into place and maintain best practises for stress management in workplaces and institutions. In the near future, the similar conversation may be expanded to include industries like finance or healthcare.

REFERENCES

1) Mittal, Shivani, et al. "How can machine learning be used in stress management: A systematic literature review of applications in workplaces and education." *International Journal of Information Management Data Insights* 2.2 (2022): 100110.

2) Pereira, V., Hadjielias, E., Christofi, M. and Vrontis, D., 2023. A systematic literature review on the impact of artificial intelligence on workplace outcomes: A multi-process perspective. *Human Resource Management Review*, *33*(1), p.100857.

3) de Wet, Tessa, and Sebastiaan Rothmann. "Capabilities of secondary school teachers in sub-Saharan Africa: A systematic literature review." *SA Journal of Human Resource Management* 21 (2023): 15.

4) Alaql, Abeer Abdullah, Fahad Alqurashi, and Rashid Mehmood. "Multi-generational labour markets: data-driven discovery of multi-perspective system parameters using machine learning." *arXiv preprint arXiv:2302.10146* (2023).

5) Sau A, Bhakta I. Screening of anxiety and depression among seafarers using machine learning technology. Informatics in Medicine Unlocked. 2019 Jan 1;16:100228.

6) Chhetri, B., Goyal, L. M., & Mittal, M. (2023). How machine learning is used to study addiction in digital healthcare: A systematic review. *International Journal of Information Management Data Insights*, *3*(2), 100175.

7) Nanath, Krishnadas, Sreejith Balasubramanian, Vinaya Shukla, Nazrul Islam, and Supriya Kaitheri. "Developing a mental health index using a machine learning approach: Assessing the impact of mobility and lockdown during the COVID-19 pandemic." *Technological forecasting and social change* 178 (2022): 121560.

8) Chung, J., & Teo, J. (2022). Mental health prediction using machine learning: taxonomy, applications, and challenges. *Applied Computational Intelligence and Soft Computing*, *2022*, 1-19.

9) Zheng, T., Ardolino, M., Bacchetti, A. and Perona, M., 2021. The applications of Industry 4.0 technologies in manufacturing context: a systematic literature review. *International Journal of Production Research*, *59*(6), pp.1922-1954.

10) Ardolino M, Bacchetti A, Ivanov D. Analysis of the COVID-19 pandemic's impacts on manufacturing: a systematic literature review and future research agenda. Operations Management Research. 2022 Jun;15(1-2):551-66.

11) Benavides, L. M. C., Tamayo Arias, J. A., Arango Serna, M. D., Branch Bedoya, J. W., & Burgos, D. (2020). Digital transformation in higher education institutions: A systematic literature review. *Sensors*, *20*(11), 3291.

12) Nuseir, M. T., Al Kurdi, B. H., Alshurideh, M. T., & Alzoubi, H. M. (2021, May). Gender discrimination at workplace: do R intelligence (AI) and machine learning (ML) have opinions about it. In *Proceedings of the International Conference on Artificial Intelligence and Computer Vision (AICV2021)* (pp. 301-316). Cham: Springer International Publishing.

13) Benos, Lefteris, Aristotelis C. Tagarakis, Georgios Dolias, Remigio Berruto, Dimitrios Kateris, and Dionysis Bochtis. "Machine learning in agriculture: A comprehensive updated review." *Sensors* 21, no. 11 (2021): 3758.

14) Kipper, Liane Mahlmann, Sandra Iepsen, Ana Julia Dal Forno, Rejane Frozza, Leonardo Furstenau, Jéssica Agnes, and Danielli Cossul. "Scientific mapping to identify competencies required by industry 4.0." *Technology in Society* 64 (2021): 101454.

15) Goetz, C., Bavaresco, R., Kunst, R., & Barbosa, J. (2022). Industrial intelligence in the care of workers' mental health: A review of status and challenges. *International Journal of Industrial Ergonomics*, *87*, 103234.

DE- DOLLARIZATION AND IT'S IMPACT

[1]Trisha Karmakar, [2]Ishika Banerjee, [3]Koisiki Singh, [4]Rashi Choudhary, [5]Tisha Mondal, [6]Armina Khatun, [7]Santanu Bera, [8]Priyanka Kanjilal

[1, 2, 3, 4, 5, 6] Student, Asansol Engineering College, Paschim Bardhhaman, West Bengal, India
[7, 8] Assistant Professor, Asansol Engineering College, Paschim Bardhhaman, West Bengal, India

---

ABSTRACT

De-dollarization is nothing but the substitution of US Doller by other currencies as the global reserve currency. De dollarization involved in lowering the US dollar dominance in global market by surrogating it as a lawful currency other than US Doller. In 2023 one of the fascinating financial trends is movement of de dollarization. A good number of countries like India, China, Brazil, and Malaysia shows effort to minimize the role of US dollar in international trade. With exceptionally revamp of world economy itself after pandemic season is the reserve status of US Doller knock-on effect to fall? Most of the countries are think that economic power to influence by the superiority of the dollar in global trade not only that which give some control over the global economy and gain economic advantage across other countries. This kind of dominance also increase the financial risk and dependency. The main purpose of this research study is to show the impact of de dollarization in the current economy. The study is a descriptive study and concludes by cardinal stages to be followed in currency rehabilitate to avoid dual economic downfall.

Keywords: *De-dollarization, Role of Us dollar, global economy, economic downfall*

I. INTRODUCTION

After 2nd world war global economy was collapsed and multilateral economic cooperation among the countries was need. From 44 countries 730 delegated gather in Bretton wood and new agreement come to setting up rules regulation and institution from 01st of July 1944

After that IMF and IBRD is known as World Bank from this corporation it was define to promote multilateral trade in USD. From 1960 -69 decade USD was more profitable than to stock gold. 1970 US started to nullify Bretton Woods after the rise of Arabic country for crude oil and Vietnam war, USA decided to cancel the convertibility of USD into gold and delink the value of dollar from the value of asset of the country. Then the value of USD was started to measure by global demand and not asset held by USA Govt. Then USA started to print more and more dollars. Since the foundation of IMF and World Bank, USA is the highest contributor and it is done through USD. After the collapse of USSR (Soviet Union)

90% of global trade done through USD. Then hoarding is found by different countries- that also prompted USA Govt. to print more and more dollar.

Currently 84% of cross-border transactions are done through USD and 58% of global currency reserves are held in same currency. The dominance of dollar in international trade has given USA considerable oversight through SWIFT transfer network.

The Policy makers thought USD demand is too high and so it can continue to sail on its artificial bubble. Several year USA Sponsored war, war like situation, domestic war and forced countries and groups in arms trade through USD. IT boom at the beginning of this century also increase demand of USD because mostly the IT grants are USA based.

But after global economic disaster in 2008 and impose of economic restrictions on Russia by USA gradually change the situation. Many countries started to think to use alternanative currency to avoide to use USD (through bilatareal currency swap agreement). The introduction of Euro helped to curb the dominance of USD. Basically First China and Russia being giant economy to start to use their own currency to make business deal with their preferred country. Now large no of Asian, African and Latin American countries make trade in Riemenbi (Chinese currency) with China. India also started the practices and in INR 44 countries make the trade. It is thought that global trade in USD reduced by 20% in last few years and It is expected to reduce more 40% to 50% in another 2 to 3 years.
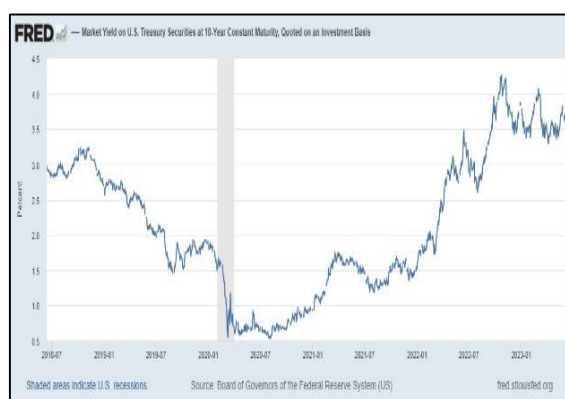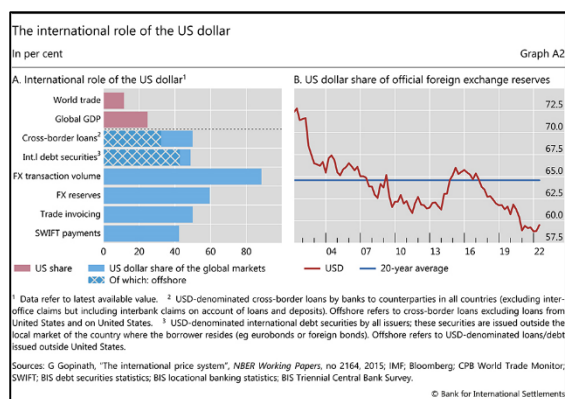
If large no of countries goes outside outside USa shelter and take shelter under BRICS may be IMF or WB face   major problem. We will have alternative of IMF/WB by the name of Asian Infrastructure & Investment Bank or Asian Monetary Fund or BRICS Fund. What amount of dollar is roaming in international trade now they are going back USA. Now USD is gradually devaluated. To protect US Treasury Bond they have to increase the interest rate in a regular periodic interval. Within one decade we can see multipolar world, paradigm shift of international politics and end of dominance of USD.

II. LITERATURE REVIEW

There are various approaches to studying and explaining dollarization, its persistence, and the related monetary policies. According to the currency substitution approach (Sahay, Végh, 1995; Savastano, 1996; Armas, 2016; Rossini, 2016), dollarization occurs when a small economy experiences prolonged periods of high inflation, leading to a shift towards a more stable foreign currency, such as the US dollar. However, this perspective fails to fully explain why dollarization often continues even after the inflationary period ends and the economy stabilizes. Three other approaches shed light on this persistence, as discussed by Levy Yeyati (2006) and Hippolyte Balima (2017). The first approach is the portfolio hypothesis, which emphasizes the differences in returns and volatility between currencies (Ize, Yeyati, 2003; Hippolyte Balima, 2017). According to this view, dollarization persists because individuals perceive foreign currencies, like the US dollar, as offering better investment opportunities and lower risks compared to the local currency. The second approach, known as the market development view, highlights how dollarization is reinforced by market failures that limit investment alternatives and financial instruments denominated in the local currency (Yinusa, 2009; Hippolyte Balima, 2017; Christiana, Dalgic, Nureyev, 2021). Insufficient financial infrastructure and limited access to diverse financial products make foreign currencies more attractive and accessible for economic agents, leading to the persistence of dollarization. The

third approach, the institutional view, focuses on the role of political or economic uncertainty, which undermines confidence in the local currency (Nicoló, Honohan, Ize, 2005; Hippolyte Balima, 2017). When institutions are weak or unstable, individuals and businesses tend to prefer holding their wealth in a more stable foreign currency, such as the US dollar, as a safeguard against uncertain economic conditions. Several studies combine multiple views to provide a comprehensive understanding of dollarization. For example, Rappoport (2009) explains dollarization as a demand for insurance against real crises and exchange rate depreciation, which is more prevalent in emerging economies. Similarly, Vieira et al. (2012) empirically characterize dollarization as a response to high domestic debt, inflation, and default risk, treating it as a form of insurance. Winkelried and Castillo (2010) develop a model for an emerging economy, arguing that dollarization arises due to variations in information processing among different economic agents. Lastly, Imam and Corrales (2019) use panel data analysis to explain financial dollarization among households and firms across countries. They find that variables associated with market development, such as financial deepening and access to external debt, have the most significant explanatory power.

In summary, these different approaches and studies contribute to our understanding of dollarization, its persistence, and the factors influencing it. They highlight the role of inflation, investment opportunities, market failures, institutional factors, and uncertainty in shaping dollarization patterns in various economies. Interestingly, while there is a considerable amount of research on the factors influencing dollarization, there is a lack of studies examining the specific impact of policies on the circulation patterns of the dollar. However, there are a few exceptions. Castellares and Toma (2020) examine the case of Peru, where a law was passed requiring sellers to display prices in the local currency. This increased costs for firms that originally priced their goods in foreign currency, resulting in a decrease in both exchange rate pass-through and the extent of price dollarization. Castillo et al. (2016) and Contreras et al. (2019) investigate the effects of unconventional monetary policies, such as increasing relative reserve requirements and expanding local currency liquidity compared to the dollar. These policies raised the costs of providing credit and deposits in foreign currency, thereby incentivizing the supply of credit in the local currency. As a result, financial dollarization decreased. Although there are no experimental studies specifically addressing the impact of policies on dollarization, previous theoretical and experimental work provides a foundation for understanding this relationship. Notably, a branch of theoretical work in monetary economics employs search and matching models to examine the functions of money. Kiyotaki and Wright (1993) introduce these models to

highlight the benefits of money as a means of payment, addressing the challenges of barter and the "double coincidence of wants" problem. These models allow for multiple currencies to circulate simultaneously but primarily focus on a single, closed economy with exogenous money supplies and similar intrinsic properties.

Matsuyama et al. (1993) extend the framework to include two economies and two intrinsically worthless currencies competing as mediums of exchange. The equilibrium in this environment determines the circulation pattern based on relative size and trade integration between the economies. In this context, we extend the setting to characterize a small open economy and analyze the impact of two government policies: taxes on domestic transactions settled in foreign currency and policies aimed at reducing the storage or usage costs of the local currency. By examining these policies, we aim to understand their effects on reducing the acceptance rate of the foreign currency in the small open economy.

Overall, while there is limited research on the specific impact of policies on dollarization, existing studies provide insights into the relationship between policies and the circulation patterns of the dollar. Theoretical and experimental work on the functions of money and currency competition offers a foundation for understanding the potential effects of various government policies on reducing dollarization. An increasing body of research has conducted experimental studies to test the assumptions and predictions of theoretical models related to currency circulation. Notably, Duffy and Ochs (2002) empirically examined the theoretical predictions of Kiyotaki and Wright (1993) regarding the emergence of money and found that reducing transaction costs incentivizes agents to accept a worthless token as a medium of exchange. Jiang and Zhang (2018) conducted an experiment based on the model of Matsuyama et al. (1993) to investigate currency circulation patterns in a two-economy, two-currency environment. Their findings emphasized the importance of relative economic size and trade integration in determining the acceptance rates of the two currencies. Importantly, their study also explored the role of government as a coordination device to promote a higher preference for the domestic currency.

Building upon this research, our study extends the environment to examine the impact of government policies on reducing the circulation of foreign currency and whether these policies serve as coordination devices among multiple equilibria. We find that such policies not only reduce foreign currency circulation but also facilitate local currency circulation, which is a novel result and an alternative coordination mechanism compared to Jiang and Zhang (2018).

There have been recent experimental studies focusing on the circulation patterns of a second currency alongside the official local currency, as well as the impact of policies on these patterns. Rietz (2019) investigated a closed economy where an additional coin representing a cryptocurrency circulated to a limited extent, meaning it was not accepted in all transactions. In this study, the author compared a barter economy to a non-barter economy and found that, as predicted by theory, the secondary currency facilitated further trades by reducing transaction costs in the non-barter economy. However, in the barter economy, there were no incentives to accept the cryptocurrency, resulting in limited circulation. Ding and Puzzello (2020) examined a two-country, two-currency search model and evaluated two government policies aimed at promoting the international adoption of a domestic currency. In their experiment, each economy had buyers and sellers, with two types of sellers: those accepting any currency and those accepting only the local currency. Selling in foreign currency incurred a cost. The study implemented three treatments: (i) unrestricted acceptance of any currency by traders, (ii) lower cost of accepting foreign currency (FC), and (iii) a "very low" cost of accepting FC. These policies represented trade liberalization and the provision of information to reduce transaction costs in FC, respectively. The authors found that only the "very low" cost policy led to a regime shift. However, all policies improved aggregate welfare, increased transactions, and resulted in more stable prices.

Drawing from these models and studies, we aim to examine how policies may, on the other hand, hinder the convergence to an internationally circulating currency regime in a similar two-country, two-currency search model environment. IN summary, experimental research has contributed valuable insights into the functioning of currency circulation and the impact of policies on these patterns. By conducting experiments, researchers have explored the role of transaction costs, government policies, and economic conditions in shaping currency preferences and circulation, offering a deeper understanding of these phenomena.

III. WHAT WOULD HAPPEN IF THE DOLLAR LOSES RESERVE STATUS?

If the dollar were to lose its reserve currency status, the repercussions would be far-reaching. Firstly, the United States would experience a decline in its global influence, as it would have less control over international economic policies and financial systems. Additionally, the value of the U.S. dollar could depreciate significantly, leading to higher import costs, inflation, and reduced purchasing power for American consumers. Borrowing costs for the U.S. government, businesses, and individuals would also rise, as they would need to offer higher interest rates to attract lenders. Other currencies like the euro, the yen, or the yuan

could potentially replace the dollar as the primary reserve currency, strengthening the status and influence of the respective countries. The shift away from the dollar would likely disrupt international trade and financial systems, causing instability and market volatility. Furthermore, U.S. Treasury bonds, considered safe-haven assets, would face diminished demand, resulting in higher yields and increased borrowing costs for the U.S. government. Ultimately, the loss of reserve currency status for the dollar would create opportunities for other countries to strengthen their financial sectors, expand trade relationships, and enhance their global economic presence. However, it's important to note that while such a scenario is possible, the dollar's reserve currency status is currently supported by various factors and is not likely to be lost in the near future.

IV. ADVANTAGES AND DISADVANTAGES OF DE-DOLLARISATION

De-dollarization, the process of reducing reliance on the U.S. dollar in international transactions, comes with several advantages and disadvantages. On the positive side, de-dollarization enhances monetary sovereignty by allowing countries to regain control over their monetary policies, interest rates, and domestic economic stability. It also reduces vulnerability to U.S. monetary policy decisions, shielding economies from potential shocks. Diversifying currency risk is another benefit as it spreads exposure across multiple currencies, reducing the impact of adverse fluctuations. Additionally, de-dollarization can promote regional integration by encouraging trade and financial cooperation within a specific region. However, there are challenges to consider. De-dollarization involves costs and logistical hurdles, such as establishing new financial systems and payment mechanisms. It may limit global market access since the U.S. dollar is widely accepted and traded. Exchange rate risks and uncertainties associated with alternative currencies can arise, and countries may experience a loss of financial and economic leverage that comes with the dollar's status. It's crucial for countries to carefully weigh these advantages and disadvantages based on their specific circumstances and goals before embarking on de-dollarization efforts.

One of the key benefits of de-dollarization is the diversification of risks. Currently, the global economy is heavily dependent on the USD, which makes it vulnerable to fluctuations in the US economy and monetary policy decisions. By reducing reliance on the USD, countries can mitigate the impact of economic shocks originating from the United States. Another benefit is that de-dollarization can strengthen national currencies. When countries use their own currencies for international transactions, it increases demand for their currencies, which can lead to their appreciation. A stronger national currency can enhance a country's economic stability, reduce import costs, and boost confidence in the domestic economy. De-

dollarization also offers the advantage of improved monetary policy independence. When a country's currency is not directly linked to the USD, its central bank can have greater control over its monetary policy. This independence allows for more flexibility in managing inflation, interest rates, and economic stability, which can be crucial for achieving long-term sustainable growth. Additionally, de-dollarization can decrease susceptibility to US sanctions. The United States has a significant influence over global financial systems due to the USD's dominance. By reducing reliance on the USD, countries can reduce their vulnerability to economic sanctions imposed by the US government.

V. IMPLICATIONS FOR THE STARTUP ECOSYSTEM

De-dollarization can have various implications for the startup ecosystem. One of the significant effects could be funding challenges, as startups reliant on U.S. dollar-denominated investments may face difficulties if access to such funding sources diminishes. Currency volatility may also increase, adding complexity to financial planning and projections for startups operating in international markets. Additionally, investment patterns within the startup ecosystem may shift as investors prioritize regions or countries that demonstrate a stronger commitment to local or regional currencies, potentially redirecting investments away from dollar-dependent economies. On the positive side, de-dollarization can foster regional economic integration, presenting opportunities for startups to access larger markets and leverage regional networks. It may also drive innovation in financial technology as startups develop solutions to facilitate cross-border transactions and mitigate currency risks. Regulatory adjustments may be necessary to accommodate transactions and investments in alternative currencies, and startups should stay informed about evolving trends and adapt their strategies accordingly. The specific implications will vary based on the pace and extent of de-dollarization and country-specific factors within the startup ecosystem.

The shift away from the US dollar, known as de-dollarization, brings both advantages and drawbacks for startups. In regions embracing alternative currencies, startups may enjoy improved access to capital, attracting investments from local and regional sources. However, the adoption of non-US currencies may pose obstacles to attracting international investments due to currency-related concerns. Additionally, cross-border transactions could become more intricate, resulting in increased transaction costs and operational complexities. The market may pose obstacles to attracting international investments due to currency-related concerns. Additionally, cross-border transactions could become more intricate, resulting in increased transaction costs and operational complexities. The market may become more volatile as it adjusts to new currency dynamics, necessitating effective financial risk management by

startups. Expanding globally may become more challenging due to limited acceptance of alternative currencies worldwide, impacting growth strategies and decisions regarding entering new markets. Enhanced regional collaboration could foster innovation, offering opportunities for startups to collaborate on fresh technologies and business models. Changes in regulations may require startups to adapt their business models to comply with new rules. De-dollarization has significant implications for both the global economy and the startup ecosystem. While reducing dependence on the US dollar has benefits, the transition also presents challenges. Recognizing and comprehending these implications is essential for businesses, investors, and policymakers in order to adapt to the evolving landscape of international trade and finance.

VI. OBJECTIVE OF THE STUDY

The main goal of this research is to examine the trend of de-dollarization, which refers to the reduction in the use of the US dollar as a dominant currency in international transactions. The study aims to understand the reasons behind de-dollarization, its potential benefits, and drawbacks. Additionally, it seeks to investigate the impact of de-dollarization on global financial stability

VII. RESEARCH METHODOLOGY

This research primarily employs a theoretical analysis approach to gather and analyze relevant information. It involves studying existing theories, models, and literature on de-dollarization to gain insights into its causes and effects. The research does not rely on empirical data or experiments but focuses on examining concepts, frameworks, and arguments put forward by scholars and experts in the field. By employing a theoretical analysis, the study aims to provide a comprehensive understanding of de-dollarization and its implications.

VIII. RESEARCH RESULTS

Research on the impact of de-dollarization indicates several key findings. Firstly, successful de-dollarization efforts can lead to a reduction in the dominance of the U.S. dollar in global trade and finance. This shift can reshape trade and economic relationships among countries, potentially fostering regional economic integration as local currencies gain prominence. However, de-dollarization can introduce increased currency volatility and risks, requiring effective risk management strategies. On the positive side, it can drive the development of domestic financial systems, enhancing financial stability and improving access to capital for businesses, including startups. Geopolitically, de-dollarization can be viewed as a shift in economic power away from the United States, potentially influencing global economic

dynamics and geopolitical alignments. To grasp the current impact of de-dollarization, it is crucial to review specific research studies, analysis, and real-time data that consider various factors such as de-dollarization efforts, regional dynamics, economic policies, and geopolitical considerations. We observed the decision of Federal Reserve. The Federal Reserve, often referred to as the Fed, is the central banking system of the United States. It is responsible for conducting monetary policy, supervising and regulating banks, maintaining financial stability, and providing certain banking services to the government and financial institutions.

One of the crucial tools the Federal Reserve uses to conduct monetary policy is the adjustment of interest rates. The Federal Open Market Committee (FOMC), a committee within the Federal Reserve, makes decisions regarding monetary policy, including changes to the federal funds rate, which is the interest rate at which banks lend money to each other overnight. By adjusting the federal funds rate, the Fed influences borrowing costs, which can impact consumer and business spending, investment, and overall economic activity.

IX. CONCLUSION

In conclusion, de-dollarization is a complex process with potential implications across various aspects of the global economy. While the exact impact can vary based on specific circumstances, research suggests several key findings. De-dollarization efforts can lead to a reduction in the dominance of the U.S. dollar in international transactions, potentially increasing currency volatility and requiring effective risk management strategies. However, it can also enhance monetary sovereignty, reduce vulnerability to U.S. monetary policy decisions, and promote regional economic integration. The development of domestic financial systems and innovation in financial technology may be stimulated. Geopolitically, de-dollarization can impact global economic power dynamics and reshape economic relationships. To fully understand the impact of de-dollarization, it is essential to consider up-to-date research and analyses that account for the specific context and strategies employed. Overall, de-dollarization represents a significant shift in the global financial landscape with potential advantages and challenges for economies and stakeholders involved.

While the specific impact varies depending on the context and strategies employed, research suggests several key findings. De-dollarization efforts can lead to a reduction in the dominance of the U.S. dollar in global transactions, potentially increasing currency volatility and introducing challenges in managing exchange rate risks. However, it can also enhance monetary sovereignty, reduce vulnerability to U.S. monetary policy decisions, and promote regional economic integration. De-dollarization may stimulate the development of domestic

financial systems and drive innovation in financial technology. Geopolitically, it can contribute to a rebalancing of global economic power and reshape economic relationships. It is important to note that the impact of de-dollarization is influenced by various factors and requires careful analysis of specific contexts and goals. Continued research and analysis are essential to understand the evolving implications of de-dollarization on global economies and financial ecosystems.

REFERENCES

Barajas, A. and R.A. Morales (2003) 'Dollarization of Liabilities: Beyond the Usual Suspects', IMF Working Paper 03/11 (Washington, DC: International Monetary Fund).

Cowan, K. and Q.T. Do (2004) 'Financial Dollarization and Central Bank Credibility', Policy Research Working Paper No. 3082 (Washington, DC: World Bank).

Galindo, A. and L. Leiderman (2005) 'Living with Dollarization and the Route to Dedollarization', Working Paper No. 526 (Washington, DC: Inter-American Development Bank).

Alvarez-Plata, P., and A. Garcia-Herrero. 2010. Dollarization and monetary stability. In *Dealing with multiple currencies in transitional economies,* ed. G. Capannelli and J. Menon. Manila: Asian Development Bank. http://www.adb.org/publications/dealing-multiple-currencies-transitional-economies-scope-regional-cooperation-cambodia.

Cayazzo, J., Pascual, A. G., Gutirrez, E., & Heysen, S. (2006). Towards the effective supervision of partially dollarized banking systems. In A. Armas, A. Ize, & E. L. Yeyati (Eds.), *Financial Dollarization—The Policy Agenda*. Washington DC: International Monetary Fund.

Mwase, N., and F.Y. Kumah. 2015. Revisiting the concept of dollarization: The global financial crisis and dollarization in low-income countries. IMF Working Paper WP15/12. Washington, DC: International Monetary Fund.

Akepanidtaworn, Klakow, and Cabezon Ezequiel, "Monetary Frameworks and Communication in the Caucasus and Central Asia", IMF Working Paper (Forthcoming).

Cohen Benjamin J. (2000) - "Dollarization: Pros and Cons." Los Angeles-based Pacific Council on International Policy. The Munich-based Center for Applied Policy Research.

Durden Tyler (2014) - The article "De-Dollarization Continues: China-Argentina Agree Currency Swap, Will Trade In Yuan" was published by ZeroHedge.com/ABC Media, LTD.

Feldman David H. (1999) - "Get Set For Dollarization Debate." 28 June 1999, Richmond Times-Dispatch (A9).

Fernández-Arias, E. (2005} - Financial dollarization and DE dollarization. Inter-American Development Bank, headquartered in Washington, D.C.

Galindo, A. & Leiderman L. (2005) - The path to de-dollarization and living with dollarization. Work in Progress 526. Inter-American Development Bank, Washington, D.C.

Heakal Reem (2014) - The phrase "Dollarization Explained." Investopedia.

Herrera O.L and Valdes R.O (2004) - "De-dollarization, indexation, and nominalization: The Chilean experience." Working Paper No. 261 of the Central Bank of Chile.

Heysen Socorro (2005) - Finance and Development. "Dollarisation."

TATA MOTORS: OVERCOMING CHALLENGES THROUGH STRATEGIC TRANSFORMATION – CASE STUDY

[1]Soumadwip Paul, [2]Sneha Pyke, [3]Robin K Agarwal, [4]Dr. Sudip Basu, [5]Sandip Karmakar,
[6]Priyanka Kanjilal, [7]Suchaitri Karmakar

[1,2]Student, Asansol Engineering College, Paschim Bardhhaman, West Bengal, India

*[3,4,5,6,7]Assistant Professor, Management Studies Department, Asansol Engineering College,
Paschim Bardhhaman, West Bengal, India*

ABSTRACT

At Global level because of turbulence due to all aspects of environment in which a company functions, there is an extreme requirement of strategic to operational revision of the organization to be at par with the challenges existed or anticipated. In this process of strategic transformation, different company met with a variety of destiny where rate of success and failure is quite unlikely to predict accurately. In this case, Tata Motors was studies and its journey from turbulence to flying steady was observed. This study revels various insights about the Tata Motors and proves the profitability and competitive edge is directly proportional to the strategic transformation keeping time, need of the market and ecology in focus.

Keywords: *Strategic Transformation, Business Environment.*

I. INTRODUCTION

Strategic management refers to the process of formulating and implementing strategies that enable an organization to achieve its long-term goals and objectives. (Chandler 1962; Ansoff, 1965; Andrews, 1971; Porter, 1980) It involves making decisions and taking actions that shape the overall direction of the organization, allocate resources effectively, and respond to the dynamic external environment.

Tata Motors, a leading automobile manufacturer based in India, has embarked on a remarkable journey of strategic transformation in recent years. Recognizing the evolving market dynamics, technological advancements, and changing customer preferences, Tata Motors has undertaken a comprehensive strategic overhaul to position itself as a global player in the automobile industry. This transformation encompasses various aspects, including product portfolio, operational efficiency, sustainability, and customer-centricity, among others. As part of its strategic transformation, Tata Motors has focused on diversifying its product portfolio to cater to a broader range of customer segments and markets. It has

introduced new models across different vehicle categories, including hatchbacks, sedans, SUVs, and electric vehicles (EVs). This diversification has helped Tata Motors expand its market share and appeal to a wider customer base, both domestically and internationally Tata Motors has focused on operational efficiency and cost optimization. The company has implemented lean manufacturing practices, streamlined supply chain management, and invested in advanced technologies like automation and robotics. These initiatives have helped Tata Motors improve productivity, reduce costs, and deliver high-quality vehicles to customers. In line with its transformational journey, Tata Motors has adopted a customer-centric approach. The company has invested in research and development to understand customer preferences and market trends, enabling it to design and deliver vehicles that meet the evolving needs of consumers. Tata Motors has also focused on enhancing the overall customer experience by offering personalized services, improving after-sales support, and leveraging digital technologies for seamless interactions.

II. BACKGROUND AND IMPORTANCE OF THE STUDY

The owner of Tata Group Mr. Ratan Tata once said *"The greatest pleasure I've had is trying to do something that everybody said could not be done".*

Tata Motors, a subsidiary of Tata Group, is one of India's largest automotive manufacturers. It has a rich history dating back to 1945 when it was founded by Mr. JRD Tata, and has since established itself as a prominent player in the domestic and international automotive markets. However, in recent years, Tata Motors faced various challenges and recognized the need for a strategic transformation to regain its competitive edge and position itself as a global leader in the industry.

Importance of Strategic Transformation:

Shifting Market Dynamics: The automotive industry is experiencing significant shifts in consumer preferences, technological advancements, and regulatory changes. Tata Motors recognized the importance of adapting to these evolving market dynamics to stay relevant and competitive. Strategic transformation enables the company to respond effectively to changes in customer demands, embrace new technologies such as electric vehicles, and cater to emerging markets.

Global Expansion: Tata Motors aimed to expand its presence beyond the Indian market and establish itself as a global player. Strategic transformation allows the company to enhance its product portfolio, develop competitive advantages, and penetrate new markets. It enables Tata Motors to leverage its strengths and resources to compete with international automotive giants and gain market share in different regions.

Innovation: Through strategic transformation, Tata Motors sought to diversify its product portfolio and cater to a broader range of customer segments. By introducing new models and technologies, such as electric and hybrid vehicles, Tata Motors aimed to meet the growing demand for sustainable mobility solutions. Strategic transformation fosters innovation and enables the company to stay ahead of the competition by offering differentiated and technologically advanced products.

Sustainability and Corporate Social Responsibility: Strategic transformation allows Tata Motors to align its business operations with sustainability goals and social responsibility. The company has placed a strong emphasis on developing and promoting electric vehicles, reducing carbon emissions, and adopting eco-friendly manufacturing practices. By integrating sustainability into its strategic initiatives, Tata Motors can meet societal expectations, comply with regulations, and contribute to a greener and more sustainable future.

Competitive Advantage and Brand Image: Through strategic transformation, Tata Motors aimed to develop a competitive advantage and enhance its brand image. By offering innovative products, delivering superior customer experiences, and aligning with global trends, Tata Motors can differentiate itself from competitors. A strong brand image enhances customer loyalty, attracts new customers, and supports the company's long-term growth and profitability.

III. BUSINESS STRATEGIES OF TATA MOTORS LTD.

Customer Centric approach

Global expansion

Technology and Innovation

Operational Efficiency and Cost Optimization

IV. REVIEW OF LITERATURE

Strategic Transformation of a corporate has multi-facet advantages as it reflects its organic growth, acquisitions, or different forms of collaborative strategies (Pearce and Robbins, 2008). The research worlds have been given a variety of concluding evidence in favour of strategic transformation and success of an organisation (Wirtz et. al., 2016; Teece, 2010).

Strategies adopted by Tata Motors to be at par with the strategic transformation is well reflected in the works of different authors which can be seen in the following table

Component of Strategic Transformation	Research Work	Author
Shifting Market Dynamics Global Expansion Innovation Sustainability and CSR Competitive Advantage and Brand Image	When a target market changes, the need to target new market segments is necessary.	Foss and Saebi, 2017
	Value Chains are required to be more elastic so that new market segment can be addressed with extended customer support and offerings.	Chesbrough, 2007; Kindstrom, 2010
	Changes in Value Network triggers the development of new relationship.	Koen et.al., 2011
	Understanding the business environment is also important for the company's ability to manage change to remain competitive and to understand the potential of collaborative activities to facilitate competitive advantage through strategic transformation.	Giesen et al. 2007; Neu and Brown, 2008

Overall, the literature review provides a comprehensive understanding of Tata Motors' strategic transformation, offering valuable insights for researchers, practitioners, and policymakers interested in strategic management, corporate strategy, and the automotive industry.

V. OBJECTIVES OF THE STUDY

1. To study the strategic transformation journey of Tata motors.
2. This study aims to examine how Tata motors upgraded and remain competitive in the market.

VI. THE JOURNEY OF STRATEGIC TRANSFORMATION

Tata Motors Ltd embarked on a transformative journey aimed at reshaping its strategic direction. The company recognized the need to adapt to rapidly evolving market dynamics and emerging industry trends. The journey began with a comprehensive assessment of the company's strengths, weaknesses, opportunities, and threats.

Tata Motors identified the need to enhance its product portfolio by focusing on innovation, design, and technology. The company aimed to develop vehicles that not only met customer expectations but also incorporated sustainable and environmentally friendly features. This shift aligned with the growing demand for electric and hybrid vehicles globally.

To support this transformation, Tata Motors invested heavily in research and development, fostering collaborations with technology partners, and acquiring intellectual property rights. The company aimed to leverage emerging technologies such as artificial intelligence, autonomous driving, and connected car solutions to enhance the overall customer experience.

Additionally, Tata Motors recognized the significance of operational excellence and cost optimization. The company streamlined its manufacturing processes, supply chain management, and sourcing strategies to achieve greater efficiency and reduce costs. This allowed Tata Motors to offer competitive pricing while maintaining quality standards.

In terms of market expansion, Tata Motors pursued a global approach. The company aimed to strengthen its presence in existing markets while exploring new geographies. By establishing strategic alliances and partnerships, Tata Motors expanded its distribution network and localized production facilities, enabling it to cater to diverse customer preferences and regional requirements.

Moreover, Tata Motors embraced a customer-centric approach by enhancing its sales and after-sales services. The company focused on improving the overall buying experience, building long-term customer relationships, and providing comprehensive support throughout the vehicle ownership lifecycle.

Tata Motors also prioritized sustainability and social responsibility. The company implemented initiatives to reduce its environmental footprint, promote ethical business practices, and contribute to the communities in which it operated. This commitment aligned with the growing global emphasis on sustainability and corporate social responsibility.

Through its strategic transformation, Tata Motors aimed to position itself as a leading global automotive player, known for innovation, sustainability, and customer-centricity. By leveraging technology, focusing on operational excellence, expanding its market presence, and embracing social responsibility, Tata Motors sought to drive growth, profitability, and long-term success in the evolving automotive landscape.

Through various initiatives and improvements, the company has been able to enhance its financial performance and investor confidence. Here is an overview of the improvement journey of Tata Motors in stocks and shares.

It's important to note that stock performance is influenced by various factors, including market conditions, competition, and macroeconomic trends. The improvement journey of Tata Motors in stocks and shares is a result of a combination of strategic decisions, operational improvements, and market factors, all working together to enhance the company's financial performance and investor confidence.

VII. CONCLUSION

In conclusion, Tata Motors' strategic transformation has had a positive impact on the company's stocks and shares. Through restructuring, cost optimization, a focus on electric vehicles, a strong product portfolio, global expansion and partnerships, improved financial performance, and future growth prospects, Tata Motors has successfully enhanced investor confidence and improved its stock performance. These strategic initiatives have positioned Tata Motors as a competitive player in the automotive industry, attracting investors interested in its sustainable mobility efforts and long-term growth potential. The company's transformation journey showcases its commitment to innovation, efficiency, and capturing emerging market opportunities.

VIII. FUTURE AREA OF THE STUDY

A study can be taken up considering the following aspects:

Q1. How can Tata Motors further optimize its supply chain to enhance efficiency and reduce costs?

Q2. What strategies can Tata Motors adopt to expand its market share in emerging markets?

Q3. How can Tata Motors continue to innovate and develop advanced technologies for electric vehicles?

Q4. What steps should Tata Motors take to strengthen its brand presence and improve customer perception?

Q5. What measures should Tata Motors undertake to mitigate the impact of fluctuating raw material prices on its profitability?

Q6. What are the potential opportunities and challenges for Tata Motors in the autonomous vehicle market, and how can the company position itself as a leader in this space?

Q7. What strategies can Tata Motors implement to further strengthen its partnership with Jaguar Land Rover and maximize synergies between the two brands?

REFERENCES

1. Andrews K., 1971. *The Concept of Corporate Strategy.* R.D. Irwin Homewood.

2. Ansoff H.I., 1965. *Corporate Strategy: An Analytic Approach to Business Policy for Growth and Expansion.* McGraw Hill, New York.

3. Chandler A., 1962. *Strategy and Structure: Chapters in the History of American Industrial Enterprise.* MIT Press Cambridge.

4. Chesbrough, H. 2007. *"Business Model Innovation: It's Not Just About Technology Anymore."* Strategy and Leadership 35 (6): 12–17.

5. Foss, N., and T. Saebi. 2017. *"Fifteen Years of Research on Business Model Innovation: How Far Have We Come, and Where Should We Go."* Journal of Management 43 (1): 200–227.

6. Giesen, E., S. J. Berman, R. Bell, and A. Blitz. 2007. *"Three Ways to Successfully Innovate Your Business Model."* Strategy & Leadership 35 (6): 27–33.

7. Kindström, D. 2010. *"Towards a Service-based Business Model – Key Aspects for Future Competitive Advantage."* European Management Journal 28: 479–490.

8. Koen, P. A., H. M. J. Bertels, and I. R. Elsum. 2011. *"The Three Faces of Business Model Innovation: Challenges for Established Firms."* Research-Technology Management 54 (3): 52–59.

9. Neu, W., and S. Brown. 2008. *"Manufacturers Forming Successful Complex Business Services: Designing an Organization to Fit the Market."* International Journal of Service Industry Management 19 (2): 232–251.

10.   Porter M.E., 1980. *Competitive Strategy*. Free Press, New York.

11.   Teece, D. J. 2010. *"Business Models, Business Strategy and Innovation."* Long Range Planning 43: 172–194.

12.   Wirtz, B. W., A. Pistoia, S. Ullrich, and V. Göttel. 2016. *"Business Models: Origin, Development and Future Research Perspectives."* Long Range Planning 49: 36–54.

WEB-REFERENCES

Tata Motors official website (https://www.tatamotors.com)

Market Share Analysis (https://chartink.com/stocks/tatamotors.html)

Financial Analysis (https://www.moneycontrol.com/india/stockpricequote/auto-lcvshcvs/tatamotors/TM03),

(https://www.moneycontrol.com/stocks/company_info/print_main.php)

Dion Global Solutions Limited

Comparison (https://stocks.zerodha.com/stocks/tata-motors-TAMO/peers#overlay-default)a

CHALLENGES AND NEW DIMENSIONS OF JEWELLERY BUSINESS IN DIGITAL ERA

Rini Sarkar[1], Madhurima Chakraborty[1], Sakshi Roy[1], Ankita Singh[1], Soumik Podder[1] *

[1]Department of Electronics and Communication Engineering, Guru Nanak Institute of Technology, Sodepur, Kolkata-700114, West Bengal

_____

ABSTRACT

Digital era has transformed every sphere of our life very much advertising and extrovert in nature thus increasing demands and competition. This competitiveness also have engulfed jewellery business resulting increased uniqueness, enforcement of employee to satisfy customer needs, continuous updation in current market scenario etc. In this present review we are highlighting the challenges and solution of jewellery business in digital era. Online selling of jewellwery makes existing brands inscribed with bigger advertisement and budgets, involvement of different social media despite of bigger sale. These digitalized attempts make the jewellery business hard for small, emerging enterprises to keep up. This typical challenge can be overcome by following some strategies like selling jewelry for a target audience and designing for a specific purpose including weddings, themed parties, etc. For this small jewellery business, developing own website and selling costume jewellery may be a probable solution. Etsy, an online market place has established handmade jewelry and other handmade products centered customers' interest. Recently Customized jewelry is solely giving customer's name and the design is of customer's choice. This includes gold plated name written in key rings, pendants, bracelets/wristlets, rings according to customer's choice.

Keywords: *Costume jewelry, Fine jewellery, online marketplace, Etsy, Handmade jewellery, Customized jewellery*

I. INTRODUCTION

Jewellery is much more than diamonds, metals, and stones. It is an emotion that shines through festivals and occasions. Jewellery is not a trend but a part of a culture that has existed for ages. From then until now, the art of jewelry creation has undergone a tidal change to fulfill the fine needs of the clients. One of the important reasons why digital transformation is happening is changing consumer behavior, with individuals increasingly relying on the internet to explore, discover, and buy things, including jewelry. As e-commerce platforms have become popular, consumers are more comfortable purchasing products online, including high-value items like jewelry. Global online fine jewelry sales are expected to increase from

13% to 21% of the total global market by 2025. Moving online is essential for the Jewellery Industry as it enables businesses to access a larger audience, including potential buyers globally, thereby expanding their customer base and sales potential. In addition, an internet presence allows jewelry businesses to identify as modern and relevant, which is critical in today's digital world.

II. COSTUME JEWELLERY

In the digital era, costume jewelry continues to play a significant role in fashion and self-expression. Here are a few ways costume jewellery has adapted and evolved in the digital age:

1. **Online shopping:** The rise of e-commerce has made it easier than ever to browsw and purchase costume jewellery online. People can explore a wide range of options from various retailers and designers, compare prices, read reviews, and have their purchases conveniently delivered to their doorstep. [2]

2. **Social media influence:** Social media platforms like instagram and Pinterest have become popular platforms for discovering new fashion trends and styling ideas. Costume jewellery brands and influencers often showcase their latest desighns and styling tips, creating a virtual marketplace where people can find inspiration and make purchases directly. [2]

3. **Customization and personalization:**
Many costume jewellery brands now offer customization options, allowing customers to create personalized pieces that reflect their individuality. Online platforms often provide interfaces where customers can choose specific material, colours, charms or engravings to create unique pieces. [1]

4. **Virtual try-ons:** With the advancements in argumented reality (AR) and virtual reality(VR), some retailers and jewellery brands have implemented virtual try-on technologies. These tools allow customers to visualize how a particular piece of costume jewellery would look on them without physically trying it on. [3]

5. **Influencial collaboration:** Many costume jewellery brands collaborate with influencers and digital creators to promote their products. These collaborations often evolve limited edition collections or exclusive designs that appeal to the influencer's followers and fans. [3]

6. **Building brand loyalty:** With the vast number of online options are available fostering brand loyalty can be challenging. Businesses need to invest in building strong

relationships with customers through personalized communication, loyalty programs and exclusive offers. The digital era has brought new opportunities and avenues for costume jewellery to thrive. It allows people to explore a vast array of designs, connect with brands and designers worldwide, and express their personal style in innovative ways.[3]

III. FINE JEWELLERY

In the digital era, the fine jewellery industry has also embraced technological advancements and leveraged the online space to enhanced the customer experience and reach a broader audience. [4]

1. **Online presence:** The fine jewellery brands have established their online presence through dedicated websites, where customers can explore their collections, learn about the brand's history and craftsmanship, and make purchases. These websites often provide detailed product information, high quality images, and sometimes even virtual try on features. [4]

2. **E-commerce and online retailers:** Many fine jewellery brands have embraced e-commerce, allowing customers to conveniently purchase their pieces online. Additionally, online retailers specializing in luxury goods provide a platform for multiple fine jewellery brands to showcase and sell their products to a global customer base. [3]

3. **Personalized consultations:** Fine jewellery brands often offer personalized consultations via video calls or live chats. Customers can discuss their preferences, receive expert advice, and even get assistance I designing custom made pieces. The virtual interactions provides a more personalized experience and helps customers make informed decisions. [1-5]

4. **Virtual showrooms and 360 degree product views:** Virtual showrooms and 360-degree product views offer customers a digital experience that simulates the in-store shopping experience. Through interactive technologies, customers can examine fine jewellery pieces from different angles, zoom in to see intricate details. And get a realistic sense of the product's appearance and craftsmanship. [6]

5. **Education & expertise:** Fine jewellery often requires a certain level of knowledge and expertise to understand the quality, grading and value of precious metals & gemstones. [6]

6. **Market saturation & competition:** The digital era has opened up global market, leading to increased competition in the Fine jewellery Industry. Established brands, as well as new online sellers are buying for customer attention. Businesses must differentiate

themselves through unique designs, exceptional craftsmanship, personalized service and targeted marketing strategies. [6]

The digital era has opened up new avenues for fine jewellery brands to showcase their exquisite designs, reach a global audience, and provide customers with immersive and personalized experiences. It has expanded access to luxury jewellery and transformed the way customers explore, purchase, and engage with fine jewellery. [6]

III.   CUSTOMIZED JEWELLERY

Customized jewellery refers to jewellery pieces that are personalized or made to order according to the customer's specifications. These pieces are unique and often hold sentimental value for the wearer. Customization can involve various aspects of the jewllery, such as the design, materials, gemstones, engravings, and overall style. [6] When it comes to customized jewellery, there are several options available:7,8]

1.   Custom design: Customers can work with a jeweler or jewellery designer to create a unique piece from scratch. This involves collaborating on the design, selecting the materials, and determining the specific features of the jewellery.

2.   Engravings: Many jewelers offer engraving services, allowing customers to add personalized messages, names, dates, or symbols to their jewellery. Engravings can be done on various parts of the jewellery.

3.   Birthstone jewellery: Birthstones are gemstones associated with each month of the year. Customized jewellery can incorporate birthstones, allowing customers to create pieces that represent their nirth month or the birth months of loved ones.

4.   Initials and monograms: Jewellery can be customized with initials or monograms, creating a personalized and meaningful piece. This can be done theough the use of letter pendants, charms, or engravings.

5.   Remodeling or repurposing: Existing jewellery pieces can be customized by remodeling or repurposing them. This involves altering the design, adding or removing gemstones, or incorporating new elements to create a fresh and personalized piece.

6.   Quality control: Ensuring quality control in customized jewellery can be more challenging compare to mass produced jewellery. Each piece is unique and requires meticulous attention to detail. Jewellery businesses need to have robust quality control processes in place to maintain consistency and meet customer expectations.

To get personalized jewellery, it is recommended to consult with a reputable jewellery or jewellery designer. They will guide you through the customization process, help you with design choices, and ensure that the final product meets your expectations.

V. Handmade jewellery Handmade jewellery has found a significant place in the digital era, with various platform and opportunities that support artisans and independent jewellery makers. [6-8]

1.   Online marketplaces: Online marketplaces like Etsy, Artfire, and Handmade at Amazon provide dedicated platforms for artisans to showcase and sell their handmade jewellery.

2.   Social media presence: Handmade jewellery makers have leveraged social media platforms like instagram, Facebook, and Pinterest to showcase their creations. They use visually appealing images and engage with their followers, building a strong brand presence.

3.   Online communities and personalization: Online communities and forums dedicated to handmade jewellery provide spaces for artisans to connect, share ideas, and learn from each other. Online workshops and tutorials offers opportunities for skill development and continuous learning.

4.   Personal branding and authenticity: Handmade jewellery makers often develop a personal brand and create a connection with their customers. The passion they have for their craft. This authentically helps build trust and loyalty among customers.

Authenticity & trust: Handmade jewellery is often valued for its uniqueness and craftsmanship. However, in digital era it can be challenging to convey the authenticity of handmade pieces online. Establishing trust with customers becomes crucial. Providing detailed information about the artisans, their techniques can help build trust and differentiate the business from mass produced alternatives. In the digital era, handmade jewellery has thrived through online marketplaces, social media platforms, personalized experiences, and a foc us on sustainability and authenticity. These digital tools and platforms have expanded the reach and accessibility of handmade jewellery.

VI. ONLINE MARKETPLACE

In the digital era, online market places have experienced tremendous growth and transformation, revolutionizing the way people buy and sell products. Here are some key characteristics and trends of online marketplaces in the digital era. [7-8]

1.   E-commerce dominance: Online marketplaces become the preferred method for conducting e-commerce transactions. They provide a centralized platform where multiple sellers can showcase their products and buyers can browse and purchase conveniently.

2.   Diverse product ranger: Online marketplaces offer an extensive range of products, spanning various categories such as Electronics, Fashion, Home goods, Beauty product and more. Customer can find almost anything the need in one place saving time and effort and effort.

3.   Personalization and recommendation: Many online Marketplaces use algorithms to personalize the shopping experience for customers. They analyze the customer preferences, purchase history, and browsing behavior to offer tailored product. Recommendation, customer satisfaction and engagement.

4.   Customer reviews and ratings: Online marketplaces incorporate customer reviews and ratings foe product seller. This reviews provide insights and help buyer make informed decision. Positive ratings and high reviews can boost a seller's reputation and credibility.

5.   Pricing pressure: Online marketplaces often foster price competitiveness ,leading to price pressures for jewellery businesses. Customers have easy access to various sellers and can compare prices effortlessly. Maintaining profitability while offering competitive prices requires careful pricing strategies and cost management.

6.   Mobile commerce and apps: With the proliferation of smartphones, online marketplaces have developed dedicated mobile application. Mobile commerce allow customers to shop on the top go increasing convenes and accessibility. Mobile app often offer additional feature like push notification and navigation. Online marketplaces continue evolve, adapting to changing customer preference and technological advancement. They have become essential part of digital economy, providing the convenient and efficient way for buyers and sellers to connect transact, and access a vast array of products and services. [6-8]

VII. ETSY

ETSY is an online marketplace that has thrived in the digital era, catering specifically to artisans Crafter and independent sellers. Here's how ETSY has adapted and succeeded in the digital era:

1.   Artisanal focus: Etsy has curved out a niche by focusing on handmade and unique, and vintage product**.** It provides a platform where seller can showcase their craftsmanship and creativity, attracting buyers looking for a one of the kind items.

2.   Global reach: Etsy has expended has reach globally, connecting buyers and sellers from around the world. This allows a seller to border customer base and buyers to discover the unique products from different region and culture.

3.   Community and engagement: Etsy fosters a sense of community by providing forums, team, and social networking feature. Sellers can connect with each other, share insights, and support to one another. Buyers can engage with sellers directly asked questions and provide feedback.

4.   Adapting to changes and policies: Etsy frequently updates its policies, guidelines and algorithms, which can impact how jewellery businesses operates. Staying informed about these changes, adapting business practices accordingly, and complying with Etsy's policies are important for maintaining a successful presence in the platform.

5.   Intellectual property & copyright infringement: Protecting intellectual property rights can be a challenge on ETSY, where designs can be easily replicated or imitated. Jewellery businesses must be vigilant in monitoring unauthorized use or copying of their designs and take unnecessary steps to protect their intellectual property rights. Registering designs for copyright or trademark protection, reporting infringements, and actively monitoring the marketplace are important measures.

6.   Building a brand identity: Establising a strong brand identity is essential for jewellery businesses on ETSY. With numerous sellers offering similar products, developing a unique brand story, visual aesthetic and consistent branding across all touch points can help in attracting customers and building brand loyalty.

VIII. NEW DIMENSIONS OF JEWELLERY BUSINESS IN DIGITAL ERA

1.e-commerce oppurtunities: The digital era has provided jewellery businesses with global e-commerce platforms to reach a broader customer base. Online marketplaces and dedicated e-commerce websites offer accessibility and convenience, enabling businesses to expand their reach and increase sales.

2. Social media & influencer marketing: Social media platforms have become powerful marketing tools for jewellery businesses leveraging platforms like Instagram, Facebook, & YouYube allows businesses to showcase their products, engage with customers, and collaborate with influencers to amplify their brand's reach and visibility.

3. Data-driven insights: The digital era provides access to valuable customer data & analytics, which can help jewellery businesses understand customer preferences, trends,and buying behavior,By analyzing this data,businesses can make informed decisions,tailor their offerings,& improve their overall marketing strategies

4. Personalized customer experiences: Digital technologies such as AR, virtual try-on tools,and customization options have opened up new dimensions for creating personalized customer experiences.Offering virtual try-on experiences or customizing jewellery pieces to meet individual preferences enhances customer satisfaction and loyalty.

5. Online education & story telling: The digital landscape allows jewellery businesses to educate customers about their craft, material used, and brand story. Through informative content, blog articles, and videos, businesses can establish themselves as experts and build a deeper connection with customers.

IX. CONCLUSION

Today's retail environment is challenging, but that doesn't mean jewellery retailers can't find smart ways to connect with consumers and keep them coming back. Armed with online and offline customer data and the right marketing technologies, retailers can create personalized experiences for their customers with a multi-channel approach that bridges departmental and builds loyal relationships with shoppers.

REFERENCES

1.Eriksson P, Kovalainen A. (2008) Qualitative Methods in Business Research. SAGE Publications; DOI: http://dx.doi.org/10.4135/97

80857028044

2.https://chaindrive.com/problems-faced-by-jewellery-industry/

3.https://triologic.com/in-2022-5-major-issues-that-jewellers-should-be-concerned-about/?cn-reloaded=1

4. Dr. C. Vijaykumar, R. k. (January 2015,). Buyer behaviour towards costume jewellery in ramnathapuram district, Tamilnadu. International journal of research in commerce & management, 6(01).

5.https://www.entrepreneur.com/en-in/news-and-trends/8-challenges-any-fashion-jewellery-startupfaces/304444

6. Md. Mahiuddin Sabbir, M. H. (December 2017,). Analysis of women's preference of Imitation jewellery: Bangladesh perspective. Journal of business,socity and science.,

7.https://multidev.com/blog/latest-digital-marketing-trends

8. A.Lake, l. (2009). consumer behavior for dummies. NJ: Wiley publishing inc.

TELEMEDICINE: A STUDY FROM THE PERSPECTIVE OF COMMON PEOPLE

[1]Mr. Supratim Chakraborty, [2]Dr. Swati Pal

[1]*MBA 2nd Semester, Department of Business Administration, JIS College of Engineering (Under Maulana Abul Kalam Azad University of Technology, West Bengal)*

[2]*Head of the Department, Department of Business Administration, JIS College of Engineering (Under Maulana Abul Kalam Azad University of Technology, West Bengal)*

_____

ABSTRACT

Telemedicine is now an important part of medical science. Starting from ECG in the last century, telemedicine has evolved a lot till days. Until today, it has come through a journey from ECG to common people's daily medical issues who are staying outside of the city, where facilities are less. Space Organisations from both India and USA have taken great initiative for launching it. From the India Government as well, few initiatives have been taken in terms of Laws and task force. Those who believe in general physicians, they also get help for better understanding the health condition and evaluate it through its fast forward process. There are different types of Telemedicine facility available throughout the country depending upon types of illness. Telemedicine might not be a solution for every problem we face, but it can reduce many health care issues.

Keywords: *Telemedicine, Rural Healthcare, Medical Facility, Telefitness, Telediagnostics, Tele Diagram, Tele Counselling.*

I. INTRODUCTION

1.1 BACKGROUND OF THE STUDY

India contributes 2.96% of GDP (according to https://data.worldbank.org) followed by USA (18.82%), Canada (11.68%), UK (11.94%), Brazil (10.31%) and other countries such as, Russia (7.60%), Germany (12.81%), France (12.21%), but India is better than few countries such as Pakistan (2.95%), Bangladesh (2.63%) (GDP 2020 report). Even India has a density of 0.7 doctors per 1,000 population, lagging behind major countries such as the US (2.6),the UK (3.0), Brazil (2.3) and China (2.2). In fact, the average density of doctors per 1,000 population at global level is way more than what we actually have in our country. Most of India's population lives in semi urban and village areas where very few numbers of doctors are available which is actually less than 5% and most of them are qualified doctors from

reputed institutions. 23% of total numbers of doctors work in small or big towns, and maximum numbers of qualified doctors (professionals) work in small or big cities. So, India has a huge workforce here too. The first attempt made in India was by Apollo Hospital at Chitto and was connected to Chennai Centre using it wisely. First center was inaugurated by Mr. Bill Clinton. After that, the Govt of India has periodically provided money for the construction of telemedicine industry. Purpose of allocating funds to "reach unreached areas" in the Indian subcontinent. With a low physician population and very few hospitals, telemedicine can bring solutions to many problems.. Now the question is, has telemedicine achieved its goal to provide common people a good solution to their health issue? This has not been answered, hence this particular research has been done to dig out the future prospect of Telemedicine in the eastern part of India with special reference to Agartala, Tripura.

1.2 Objectives

a) To explore the concept of telemedicine from the perspective of common man

b) To explore the future scope of Telemedicine in eastern India with special reference to Agartala   Tripura.
c) To assess the various challenges for the implementation of Telemedicine with special reference to Agartala Tripura.

1.3 Scope

The key focus of the pertinent research paper is to assess how telemedicine can affect the post-pandemic period in India. It is the department's scope to organise suitable advisory groups that can help. The geographical area of the study is in India, especially Agartala, West Tripura, Tripura. It can be used for public health purposes, for the health department in rural areas.

1.4 Significance of The Study

For the studied firms, the results of the study will help them to know about Telemedicine and its benefits in the current scenario in India. Telemedicine has a great scope to improve today's healthcare development and transform it into a better world. It is a great step of improvement not only because it reduces long distance travel problems but also it helps to reduce many other geographical, demographic, communication and unneccesasy paperless processes.

Therefore, telemedicine, reducing the cost of common people of India who are the sufferers of high paying cost as well as also trying to meet the demand for a better healthcare system which can be trusted across the globe.

1.5 Limitations of The Study

Although extensive research has been done to identify the number of units present nowadays on eHealth and mHealth systems in India. However, it is difficult to gather the exact figures of Telemedicine units. Due to lack of public resources to find all information related to centers and systems. In contrast, information on eHealth and Telemedicine is available separately. In addition, the continuous development and launch make it difficult to gather the stipulated numbers. Lack of understanding is one of the main ingredients in it.

II. LITERATURE REVIEW

Pal (2005) described the present scene of Telemedicine in a developing country like India. With 75% of people living around villages and small cities. Author discussed the need for telemedicine in India and presented three case studies and discussed some important factors for the further implementation of telemedicine.

Xiao (2007) said that Telemedicine has a great scope in the upcoming future. This is still in the research stage. Although it has potential to grow in the near future only. The LINCOS project was briefly discussed. Various technical issues like compression, artificial intelligence are discussed in detail. Helping hands in the common day health issues and maintaining a regular record were also briefly discussed as the future of telemedicine systems.

Das (2008) stated a new ideology where an image is prepared to develop a new facility in this process. In his system, it consists of a mobile telemedicine unit and a mobile core unit. Using TCP/IP makes the system work more efficiently in the telemedicine environment.

Mishra (2008) presented the undergoing development stage in India for Telemedicine. He said that the representation and upholding knowledge in Telemedicine is still under a lot of progress in India, there are many initiatives going on not only in the Government sector but in the Private Sector as well. Library in Digital form is also introduced to help this.

Sinha (2012) discusses various technical issues and shortcomings in India, on the basis of State Punjab. A set of patterns must be implemented. Discusses telemedicine issues in neurosurgical emergencies and recommends continuous improvement of standards for successful implementation of emerging technologies.

Ramesh (2014) said that from the last few years, telemedicine is developing and there are common people who benefited from their own home because they used it as a healthcare process. Not only it reduces the cost of the medical system but also it helps them to recover fast. If we join medical facilities with modern technological progressive thinking, it would be a miraculous step.

Hassibian (2016) said that telemedicine is needed most in underdeveloped nations and developing nations because there are more rural areas. For critical scenarios, Telemedicine would be a better solution if provided on time. Telemedicine can heal many problems there. Bwalya published "Next Wave of Tele-Medicine": "Virtual Presence of Medical Personnel (in the year 2017). Information and Communication Technologies (ICTs) are being embedded into healthcare system front-end and back-end platforms both in the developing and developing world contexts in ways unimaginable 20 years ago. This trend has brought about ubiquity culminating into spatial-temporal healthcare delivery models where health practitioners and patients do not need to be simultaneously in the same physical domain in order for healthcare to be delivered".

Kohler (2019) said that the villages and underdeveloped areas can be medically effective if Telemedicine comes into a bigger picture. Although there are missing links, still if proper initiatives have been taken, it would be a great step for adjoining the hospital sectors with common public health in those areas.

Burke (2022) said that it has a great potential in the healthcare system although this is not yet discovered, specially in the units where it is needed most like villages and small towns. The development is still very slow and a lot of progress has to be built.

III. RESEARCH METHODOLOGY

3.1 Overview

The present look at is primarily based on collection of data. Due to the practice of these studies various research papers and applicable authorities branch web sites have been accessed with a view to understand and apply on practicality point of view. The Observer tries to find out various other possibilities including new changes and what common people think today, additionally a diverse survey has been accomplished with it. We realise we have no clarity on fees structures, consequences and usefulness of this technique. We also understand that the private organisation has a keen interest in the development of this process, although infrastructure, facility and money involved in this process still not on the

mark. The process which is now following is still undergoing many changes. India might grow its own technology very soon in this field. Many new developments such as Machine Learning, Communication bots, chatbots are introduced till now to fecilitate it. Indian Defence also put its fingerprint on the research field of Telemedicine to help Army and their families.

The actual scope of work of telemedicine is still unknown to us as this is growing very fast in India. It has a great interest on how to help mankind with fast and modern techniques followed by previous ideas and problems. This is a step for common people to reduce the cost of their medical care and helps them to have a quick solution. Records are being processed on telemedicine facilities on such matters as prices, get admission to, practice styles, and affected person management, and coverage development will be more suitable though. Another part which might be helpful is to include the regions of charge, output oriented excellent guarantee.

3.2 Process of Telemedicine:
This method is structured in various ways, such as Era concerned and application followed.

a) APPLICATION FOLLOWED ON STIPULATED TIME FRAME
Real time management may be as easy as a cellphone name or as complex as tele clinical video conference and tele robotic Surgery. It calls for the presence of each event at the identical time and a telecommunication hyperlink among them. Video-conferencing software is one of the key facts here.

(b) STORE-AND-FORWARD PROCESS:

It helps to obtain clinical records (i.e scientific data, pictures) after which transfer the information to a physician or scientific expert. In this method this is not required to gather both information in the same time zone. Few examples are tele pathology, Tele dermatology etc.
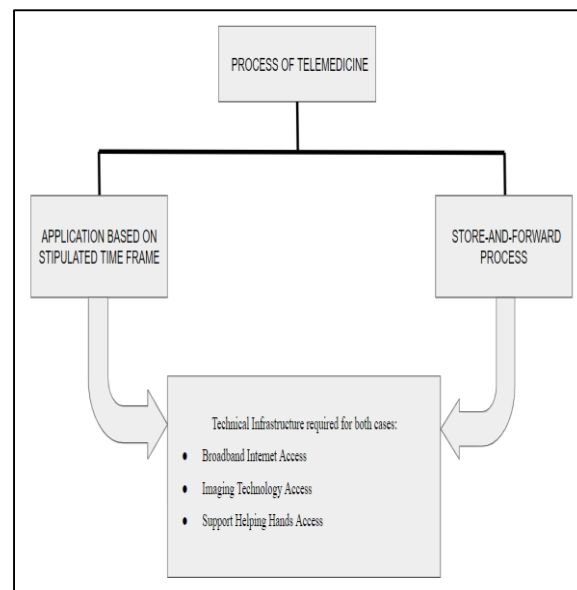
Image 1: Process Flow of Telemedicine

3.3 TECHNICAL INFRASTRUCTURAL REQUIREMENTS OF TELEMEDICINE:

This is the required steps depending upon which unit you want to work and which is your required process for developing a telemedicine unit. Few are given:

BROADBAND INTERNET ACCESS. Broadband helps us to gather audio as well as visual data sets. But apart from the City area, it is very hard to have a proper internet connection especially in villages and small towns.

IMAGING TECHNOLOGY ACCESS. This is the main key factor for developing telemedicine. It helps the doctors to have a proper idea of what a common person is facing. Digital stethoscope is one of the greatest creations here.

SUPPORT HELPING HANDS EASY ACCESS. This is one of the important parts of the telemedicine industry. If a common person has questions, he/she might get his/her answer properly without any hesitation, this can only be possible if the proper person or supporting hands are there in every step.

IV. INTERPRETATIONS

For this report, I have taken 87 people of different backgrounds from Agartala, West Tripura location conveniently from Milanchakdi location (Pin 799001) and I asked a few questions to them about telemedicine.

4.1 SAMPLE DESIGN:

1. SAMPLE SIZE: 87 Nos of Common Man
2. SAMPLE TYPE: For this purpose of research Convenient/Non probability sampling approach has been used. Non-probability sampling is arbitrary and subjective.
3. Sampling collection method or data collection method is used here.
4. GENDER: Male: 58 Nos, Female: 29 Nos.

4.2 TOOLS FOR ANALYSIS:

1. Questionnaire Preparation & Analysis: Here various questions are being asked to different types of people with their suitable time. In this method, we make sure that they answer all the questions freely without any external pressure and without any hesitation.
2. Simple percentage analysis: With the help of their answers We have prepared an analysis of what the common person thinks today for telemedicine and what is their observation regarding the development of fitness.
3. With help of Pie Chart analysis: With the help of Pie chart analysis, it becomes easy to calculate and easy to understand. To understand the criticality of the project, this was needed to better understand.

4.3.1 PROFESSIONAL OUTLOOK

Out of 87 People, 8% People are from different Job/Business background, 48% are students studying in different colleges and 44% People are from Logistics background ie, delivery food business. This is a good blending from different types of people in this report, although this is taken from a non probability approach.
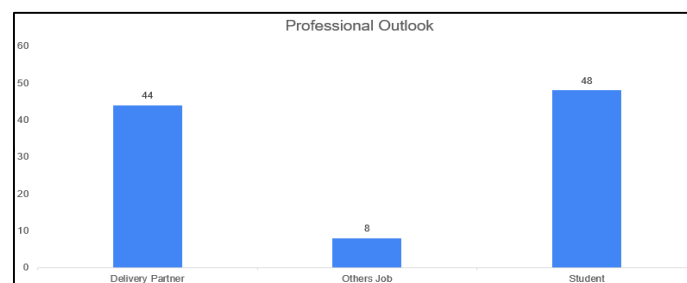
Chart 1: Professional Outlook

4.3.2 AWARENESS ABOUT TELEMEDICINE

Out of 87 People, 70% People said they have ideas about telemedicine whereas 30% People don't know about it. Those who said they knew it, although they didn't define it properly.
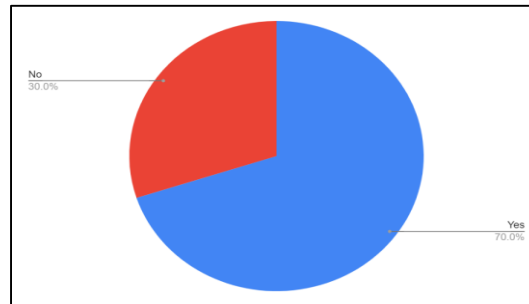
Chart 2: Awareness about Telemedicine

4.3.3 FAITH IN ONLINE MEDICAL TREATMENT

In this question, 48% said Yes whereas 52% said No. Those who said yes, are students in maximum cases. For other job holders or businessmen, this goes pathetic. They have less ideas about it.
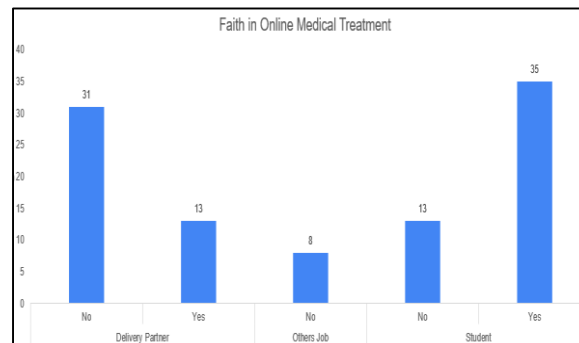
Chart 3: Faith in Online Medical Treatment

4.3.4 IS THIS MEDICALLY EFFECTIVE

Same like the previous answer, 52% People think that this is not medically effective for them. Because they think that if this is effective then why no government is taking proper initiative then? If this is effective then why no positive response is there. Actually their point is laying on the basis of how the society reacts and what is their reaction towards it.
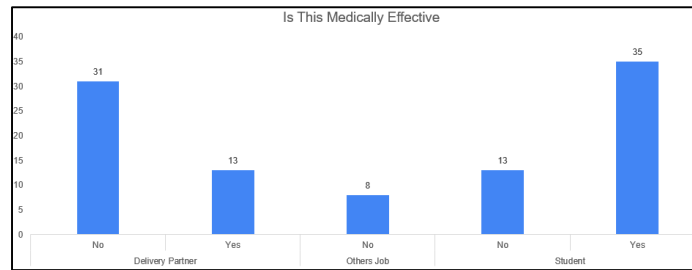
Chart 4: Medical Effectiveness

4.3.5 DO YOU THINK THIS IS COST EFFECTIVE FOR YOU

In this question, the majority answer is either No idea or maybe. They are not confident about how it works. As they don't have a proper clarity that is the reason they don't have any proper ideas of how it works.
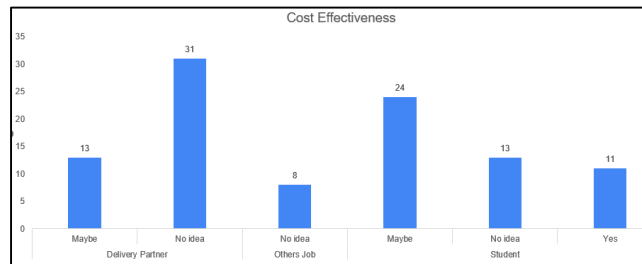
Chart 5: Cost Effectiveness

4.3.6 TELEMEDICINE CAN CURE ANYONE ONLINE

Here, only 35% People said Yes. Those who have a very clear understanding of telemedicine and those who have no idea said no in this question too. In this question, a mixed reaction was seen.
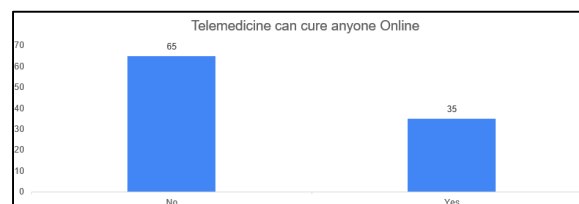
Chart 6: Telemedicine can cure anyone online

4.3.7 IF THIS IS FREE, WILL YOU TAKE

Although they have no idea, still if this is free, they will take it, 81% Cases they said it. In India we don't let go of free things. Who said yes has put us in many conditions like this must be from the governmental side, or these must be easy to access from everywhere. The Internet must not be a very big problem.
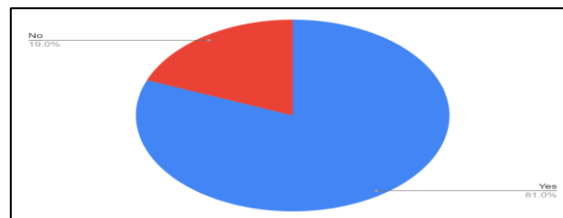
Chart 7: If free, will you take it

4.3.8 BELIEVE SYSTEM: QUALIFIED ONLINE DOCTORS OR SEMI QUALIFIED NEARBY DOCTORS

87% People prefer nearby doctors because of human touch, they said they feel more comfortable there sitting in front of a real person. In this question, we observed few doubts and few conservative ideology, although those who said yes, in maximum cases they are students.
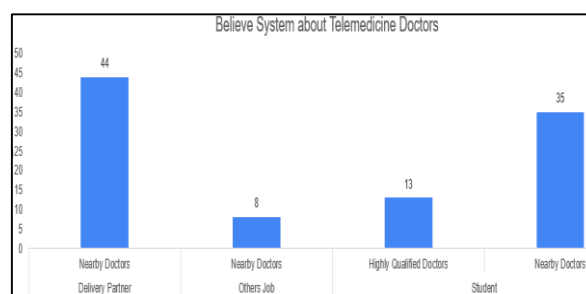
Chart 8: Believe System about Telemedical System

4.3.9 IN EMERGENCY, IF NO DOCTORS ARE AVAILABLE NEAR YOU, WILL YOU CONSULT WITH ONLINE PHYSICIAN?

Here the majority said yes they will consult otherwise. This was a do or die case, in this question Intention was to know what is the mental setup for medical system, they answered if this is registered from a governmental site, then only they can follow it.
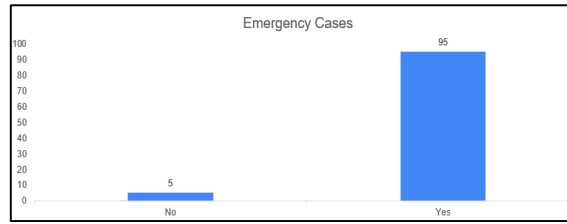
Chart 9: Emergency Cases quick solution

4.3.10 HAVE YOU READ IT EVER IN ANY NEWSPAPER OR SOCIAL MEDIA PLATFORM

Few students knew that before, others had no idea, 65% people said No. This is simply because in this state there are no advertisements for telemedicine. Although few applications are present, they are not in such a good profitable position right now.
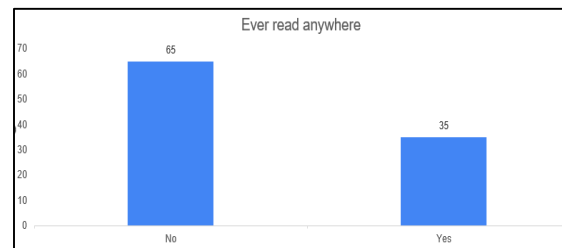
Chart 10: Ever Read anywhere

4.3.11 THERE MUST BE MORE INITIATIVE FROM GOVT ABOUT TELEMEDICINE

Here all people said Yes. Now they understand that this is important to develop the medical facility. But as there is no proper access this is always unknown for them. But all agree on one point that there must be more and more initiative taken from governmental end.
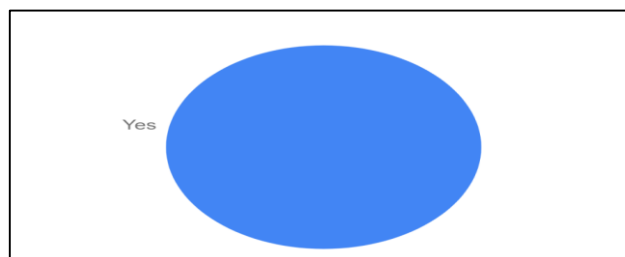
Chart 11: Govt Initiatives

4.3.12 EVER SEEN ANY AWARENESS PROGRAM ABOUT TELEMEDICINE IN YOUR SOCIETY

Here everyone said No. As this is a small town, awareness camp is never organised as of them. They said they have seen political awareness camps, health awareness camps but never seen awareness camps for telemedicine. If that was done, it would be a great step.
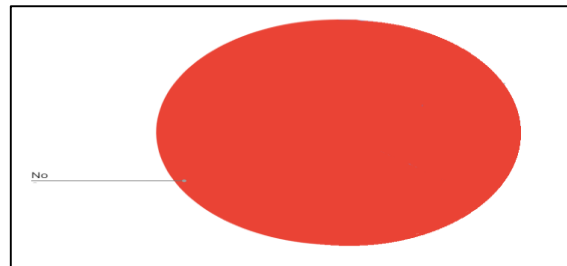
Chart 12: Ever Seen Any Awareness Program

V. RESEARCH FINDINGS AND DATA ANALYSIS

Few Findings are there from these dataset, such as:

Students have more ideas of telemedicine than other professions because of their syllabus. Although they didn't know it clearly, still they had ideas about it.

When they are being asked about the belief system of telemedicine, they are not fully convinced.

As they have less belief in this, the majority of them think that this will not be medically appropriate to them.

Knowledge is a great barrier till now for this, when they are asked about cost, few have knowledge otherwise they don't have.

They believe in physical doctors more than online qualified doctors. That is the reason they are unsure about the cure and how this will treat them.

Proper governmental initiative is lagging here till now. Although few projects are going on, still common people have very few ideas about it. Projects like National Digital Health Authority (2017), National Task Force formation and many more are going on. We need to focus on these as well.

VI. RECOMMENDATION FOR FUTURE SCOPE

Telemedicine faced a lot of problems on its journey till now. Cost was one of the most important parts of it, also to understand what is the key parameter to drive it inside the country. It's been more than decade but this is not actually scaling up faster as it should be.

• More awareness would be given from Educational Organisation such as School, College and University. A compact syllabus will help to enforce it.

• Groups of workers ought to be prompted and promoted for the usage of telemedicine, and authorities medical practitioners should guide the common people in every aspect of it. Common people must have an idea very clearly.

• Software issues with less facility and low performance shall be modified because if common people don't understand the interface then it would be an issue.

VII. MANAGERIAL IMPLICATIONS

A Telemedicine unit is nowadays playing a crucial role. From last decade it is growing significantly. This is an emerging field in medical science and hospital industry for many reasons. Till now we have understood that apart from city areas, villages and small towns are always in a critical zone for one country's own health development. Maximum number of people stays there but health care facilities are very less. Telemedicine is a perfect blend in this problem's solution. If we look from Hospital Management's point of view, at hospital availability of doctors are less and patients have way more numbers to handle. Some of the patients have minor issues which can be sorted out if proper numbers of first aid centres are available near them, few have major issues which need to be prioritised as soon as possible. Telemedicine has its solution because not only is this cost effective to both parties such as hospitals and Common People but also it helps to reduce waiting time for them. Reduction of waiting time actually helps to smoothen the management of hospitals and it creates a smooth transaction from common people to the hospitals. Another major facility is it helps to understand basic problems people are facing and then it helps to prioritise and deprioritize the hospitals. Because of that, the unavailability of medical care units at hospitals can be reduced and productivity would be increased. With the help of Telemedicine if basic counselling is done, then it's easier to get a proper department call without a hustle. It not only improves the utility of hospitals but also be helpful for common people to understand what his/her actual problem lies and how to resolve it. Even psychological help can be done through it. Today

major numbers of people are affected because of mental health, many problems are very light in nature and many have severe issues. Mild or light issues can be addressed through telemedicine. It will help productivity, utilisation of resources as well as it helps to restructure the cost model of the hospital industry. As this is an emerging face, still lots of work to be done here to become successful in this industry.

VIII. CONCLUSIONS

A Telemedicine carrier presents price-effective remedies for all common people of this developing nation. As the population is increasing day by day, the need for telemedicine is also increasing in a significant way. Industry researchers calculate this as an emerging sector in our country, where common people have more access to medical facilities and those who stay in villages could get help. Health practitioners also need to find out how to effectively use this weapon in their day to day life in a medical facility. Telemedicine also helps common people not only in their emergency health care service as well as their normal livelihood problems which they are facing such as fitness issues. It has never been a solution to all the problems but a large number of issues can be resolved using this.

REFERENCES

[1] Pal A, Member, Mbarika V, Fay Cobb-Payton Telemedicine Diffusion in a Developing Country: The Case of India (March 2004) IEEE TRANSACTIONS ON INFORMATION TECHNOLOGY IN BIOMEDICINE, VOL. 9, NO. 1, MARCH 2005 .

[2] Dasgupta A and Deb S , Telemedicine: A New Horizon in Public Health in India Indian Journal of Community Medicine. 2008 Jan; 33(1): 3–8. Ø

[3] Kumar A, Ahmad S- A Review study on utilization of Telemedicine and eHealth services in Public Health, Asian Pac. J. Health Sci., 2015; 2(1): 60-68 e-ISSN: 2349- 0659, Ø

[4] Bhowmik D, Duraivel S, Kumar R, Sampath K Telemedicine- An Innovating Healthcare System In India,THE PHARMA INNOVATION – JOURNALISSN: 2277- 7695, Vol. 2 No. 4 2013.

[5] Ramkumar P Landscape of tele-health infrastructure at points-of service in India - 2010- International Telecommunication Union (ITU), Geneva Ø

[6] Kavitha R, Health Care Industry in India International Journal of Scientific and Research Publications, Volume 2, Issue 8, August 2012 1 ISSN 2250-3153 Ø

[7] Wainstein L on Jan 18, 2018: telemedicine.arizona.edu/blog/telemedicine-trendswatch-2018 Ø

[8] HaqWani N, Taneja K, Adlakha N Health System in India: Opportunities and Challenges for Enhancements -e-ISSN: 2278-487X, p-ISSN: 2319-7668. Volume 9, Issue 2 (Mar. - Apr. 2013), PP 74-82 Ø

[9] Mathur P, Srivastava S, Lalchandani A, Mehta J- Evolving Role of Telemedicine in Health Care Delivery in India Prim Health Care, an open access journal Volume 7 • Issue 1 • 1000260 ISSN: 2167-1079 Ø

[10] Acharya1 R, Rai J Evaluation of patient and doctor perception toward the use of telemedicine in Apollo Tele Health Services, India,Journal of Family Medicine and Primary Care | Published by Wolters Kluwer –Medknow,March 01, 2017, IP: 86.120.33.40 Ø

[11] Gamasu R Literature Review of Telemedicine System for Emergency Health Tribulations International Journal of Electronics and Electrical Engineering Vol. 3, No. 2, April, 2015 Ø

[12] Ebad R Telemedicine: Current and Future Perspectives,IJCSI International Journal of Computer Science Issues, Vol. 10, Issue 6, No 1, November 2013 Ø

[13] Sood S, "India telemedicine venture seeks to improve care, increase access," TeleMedicine Today, pp. 25–26, Oct./Nov. 2002.

[14] Kustwar1 R, eHealth and Telemedicine in India: An Overview on the Health Care Need of the People, J. Multidiscip. Res. Healthcare. Vol. 6, No. 2 (2020), pp.25–36

[15] Kumar R, Pal R. India achieves WHO recommended doctor population ratio: A call for paradigm shift in public health discourse!. *Journal of family medicine and primary care*. 2018 Sep;7(5):841

[16] *World Health Organization. World health statistics 2022: monitoring health for the SDGs, sustainable development goals. 2022. Available from:* https://cdn.who.int/media/docs/default-source/gho-documents/world-health-statistic-reports/worldhealthstatistics_2022.pdf?sfvrsn=6fbb4d17_3.

[18] Who.int [Internet].Global health observatory data repository – medical doctors [updated 2017; cited 2019Apr14] Available from http://apps.who.int/gho/data/node.main HWFGRP_ 0020?lang=en.

[19] Un.org [Internet]. World population ageing [updated 2015; cited 2019 Apr 13]. Available http://www.un.org/en/development/desa/population/publications/pdf/ageing/ WPA2015_Report. Pdf.

[20] Pacitaproject.eu [Internet]. Telecare technology for an ageing society in Europe – current state and future developments [updated 2013; cited 2019 Apr 13]. Available from http://www.pacitaproject.eu/wp-content/uploads/2012/11/Telecaredescription-web.pdf

[21] Ganapathy K, Chawdhry V, Premanand S, Sarma A, Chandralekha J, Kumar KY, et al. Telemedicine in the Himalayas: operational challenges – a preliminary report. Telemed J E Health. 2016;22: 821-35.

[22] Chandwani RK, Dwivedi YK. Telemedicine in India: current state, challenges and opportunities, Transforming Government: People. Process and Policy. 2015;9:393-400.

[23] Rogers H, Madathil KC, Agnisarman S, Narasimha S, Ashok A, Nair A, et al. A systematic review of the implementation challenges of telemedicine systems in ambulances. Telemed J E Health. 2017;23:707-17.

[24] Bujnowska-Fedal MM, Grata-Borkowska U. Use of telemedicine based care for the aging and elderly: promises and pitfalls. Smart Homecare Technology and TeleHealth. 2015;8:91-105.

[25] Thailandometers.mahidol.ac.th [Internet]. Thailandometers [updated 2019 Apr 12; cited 2019 Apr 12]. Available from http://www.thailandometers.mahidol.ac.th.

[26] Moph.go.th [Internet]. MoPH Application [cited 2019 Apr 10]. Available form https://www.moph.go.th/index.php/home/ app_moph.

[27] Thomas GP, Christian AB, Suzanne KP, Renald L. Social acceptance and population confidence in telehealth in Quebec. B MC Health Services Research. 2015;15:72.

[28] Carlo C, Gabriele P, Giuseppe P. Telemedicine for developing countries – a survey and some design issues. ApplClin Inform. 2016;7:1025-50.

[29] Clarke EA. What is preventive medicine? Can Fam Physician. 1974;20:65-68.

[30] Aparajita D, Soumya D. Telemedicine: a new horizon in public health in India. Indian J Community Med. 2008;33:3-8.

[31] Richard W, Nivritti GP, Richard ES. Telehealth in the developing world. Royal Society of Medicine Press Ltd. London; 2009.

[32] Stensland J, Speedie SM, Ideker M, House J, Thompson T. The relative cost of outpatient telemedicine services. Telemed J. 1999;5:245-56.

[33]   Current   Health   Expenditure https://data.worldbank.org/indicator/SH.XPD.CHEX.GD.ZS?end=2021&start=2000

COMPARATIVE ANALYSIS OF BUSINESS MODEL AMONG PUBLIC AND PRIVATE SECTOR BANKS IN INDIA

[1]Suchismita Ghosh, [2]Chiya Paramanick, [3]Agni Rudra Samal, [4]Trisha Nandi, [5]Shruti Saha, [6]Robin K Agarwal

[1,2,3,4,5]*Student, Department of Management Studies, Asansol Engineering College*

[6]*Assistant Professor, Department of Management Studies, Asansol Engineering College*

ABSTRACT

Research works are quoting that the banking industry has undergone significant transformations in recent years, driven by technological advancements and changing customer expectations. Traditional banks are facing stiff competition from fintech startups and digital-only banks, leading to the need for innovative business models to stay relevant and competitive. In such circumstances, because of the diverse nature of the private and public sector banks of India, their business models are studies under the framework of Business Model Canvas (BMC) proposed by Osterwalder. A unique matrix analysis is done with respect to all the nine parameters of the BMC. The study reveals that data-driven banking models, advanced analytics, artificial intelligence and customized client services with focused customer-centricity, agility and embracing digital technologies are helping both private and public sector banks to provide comprehensive financial ecosystem, enhancing customer engagement and loyalty.

Keywords: *Business Model, Business Model Canvas, Banks*

I. INTRODUCTION

In the dynamic and competitive landscape of today's business world, understanding and analyzing business models is of paramount importance. A business model serves as a blueprint that outlines the core activities, strategies, and mechanisms through which a company generates value, delivers products or services, and sustains its operations (Teece, 2010). Business model analysis involves a comprehensive evaluation of these fundamental aspects, enabling stakeholders to gain valuable insights into the strengths, weaknesses, and overall viability of a business.

At its essence, business model analysis aims to provide a holistic view of how a company creates, captures, and delivers value to its customers while ensuring sustainable profitability.

By scrutinizing the key elements of a business model, such as value proposition, target market, revenue streams, cost structure, and competitive advantages, analysts can assess the overall effectiveness and potential of a company's operations. Though the business model analysis of banks were done but a comparative study in this area covering the difference between business models of Private and Public sector banks were yet to be done which is now healed through this study.

Business Model Analysis through Business Model Templates: The business model templets like Business Model Canvas (Osterwalder, 2004, 2010), the STOF model (Bouwman, Faber, et al., 2008), VISOR (El-Sawy & Pereira, 2013), BM Navigator (Gassmann, Frankenberger, & Csik, 2015) and the Business Model Cube (Lindgren & Rasmussen, 2013) are available. Though all of the templates are different as per scope and focus the common set of variables are centered on value proposition (Haaker et. al. 2017).

Business Model Canvas (BMC) – The most useful template for Business Model Analysis: As per BMC there are nine key elements for building any Business Model: Value Propositions (VP), Customer Segments (C), Customer Relationships (CR), Channels for customer engagement (CH), Key Activities (KA), Key Resources (KR), Key Partners (KP), Cost Structure (CS), and Revenue Streams (RS).

KP	KA	VP	CR	C
	KR		CH	
CS		RS		
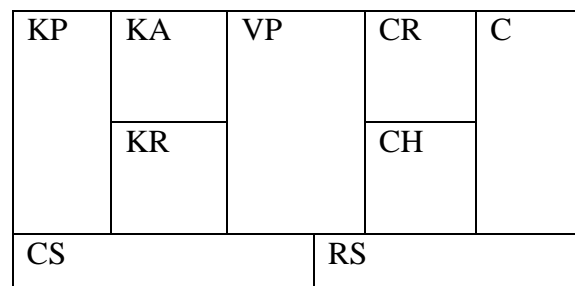
Figure: Business Model Canvas

II. LITERATURE REVIEW

Business Model Canvas matched with the expectation of many researchers. Ritter (2014) concluded that a business model must be internally aligned and coherent while Birkinshaw & Ansari (2015) commented that a business model must be aligned with the internal structure and overall management model of the company. Individual components of BMC are at par with these integrations. Zott et al. (2011) argue that the business model canvas is capable to explain not only a focal firm while it goes beyond its boundaries by articulating partners and customer business in a business ecosystem. Chesbrough & Rosenbloom (2002) supported this

approach, affirming that the Business Model explained through BMC correspond basically to an open network where there is an important flow of knowledge between all implied actors.

III. RESEARCH OBJECTIVE

- In this research paper, different components of BMC were studies through 5 Public and 5 Private sectors banks in India to know the strategic differences among them.
- Component wise analysis of BMC were done to find the unique steps of banks to become more competitive.

IV. BUSINESS MODEL CANVAS OF PUBLIC AND PRIVATE SECTOR BANKS IN INDIA

Component of BMC - Key Partners

State Bank of India
- Banking & financial services
- Risk management & regulatory compliance
- Market research and customer analytics

Punjab National Bank
- Retail banking services, including deposits, loans, and investment products.
- Corporate banking services, including working capital loans, project finance, and trade finance.
- Treasury operations, including foreign exchange and money market activities.

Bank of India
- Retail banking services
- Corporate banking services
- Investment banking and capital markets operations

Canara Bank
- Core banking services, including deposit accounts, loans, and credit facilities.
- Payment and transaction processing.
- Risk management and compliance.

Union Bank of India
- Retail banking services, including deposits, loans, and mortgages.
- Corporate banking services, such as cash management and trade finance.
- Investment banking activities, including underwriting and advisory services.

HDFC Bank
- Marketing and sales of financial products and services
- Risk management
- Customer acquisition and retention

ICICI Bank
- Retail banking services
- Corporate banking services
- Wealth management and private banking

Axis Bank
- Retail banking services.
- Corporate banking services
- Digital banking services

Kotak Mahindra Bank
- Retail banking services
- Corporate and wholesale banking services
- Investment banking and capital market operations

Yes Bank
- Retail banking services including savings accounts, current accounts, loans, and credit cards.
- Corporate banking services such as working capital loans, trade finance, and cash management.
- Investment banking services including capital market operations, advisory, and underwriting.

Component of BMC - Key Activities

State Bank of India
- Range of services
- Convenient and accessible banking through physical branches
- ATMs, and online/mobile banking

Punjab National Bank
- Wide range of banking products and services to cater to diverse customer needs.
- Accessibility through a large network of branches and ATMs.
- Competitive interest rates and charges.

Bank of India
- Wide range of banking products and services
- Trust and reliability
- Convenient and accessible banking channel

Canara Bank
- Access to a wide range of banking products and services.
- Convenient banking solutions, including digital and mobile banking.
- Competitive interest rates on deposits and loans.

Union Bank of India
- Customer-centric banking services tailored to individual and corporate needs.
- Convenient and accessible banking channels, including online and mobile banking.
- Competitive interest rates on deposits and loans.

HDFC Bank
- Wide range of financial products and services
- User-friendly digital banking services.
- Convenient and easily accessible branch and ATM network.

ICICI Bank
- Extensive range of banking and financial services
- Convenient and accessible banking experience
- Integrated digital solutions and technology-driven services

Axis Bank
- Personalized wealth management and investment solutions.
- Strong customer service and support.
- Extensive branch network for easy accessibility.

Kotak Mahindra Bank
- Customer-centric approach
- Technological innovation
- Trust and reliability

Yes Bank
- Comprehensive banking solutions tailored to individual and corporate needs.
- Efficient and convenient banking experience through digital channels.
- Strong focus on customer service and relationship management.

Component of BMC – Value Propositions

Component of BMC – Customer Relationship

Component of BMC – Customer Segment

State Bank of India
- Skilled workforce and management team
- Technology infrastructure for online and mobile banking
- Physical branches and ATMs

Punjab National Bank
- Skilled workforce, including bankers, financial analysts, and IT professionals.
- Branch network and physical infrastructure.
- Information technology systems and software.

Bank of India
- Physical branches and ATMs
- Banking infrastructure and technology platforms
- Skilled workforce

Canara Bank
- Skilled workforce, including bankers, financial advisors, and support staff.
- IT infrastructure for core banking operations and digital services.
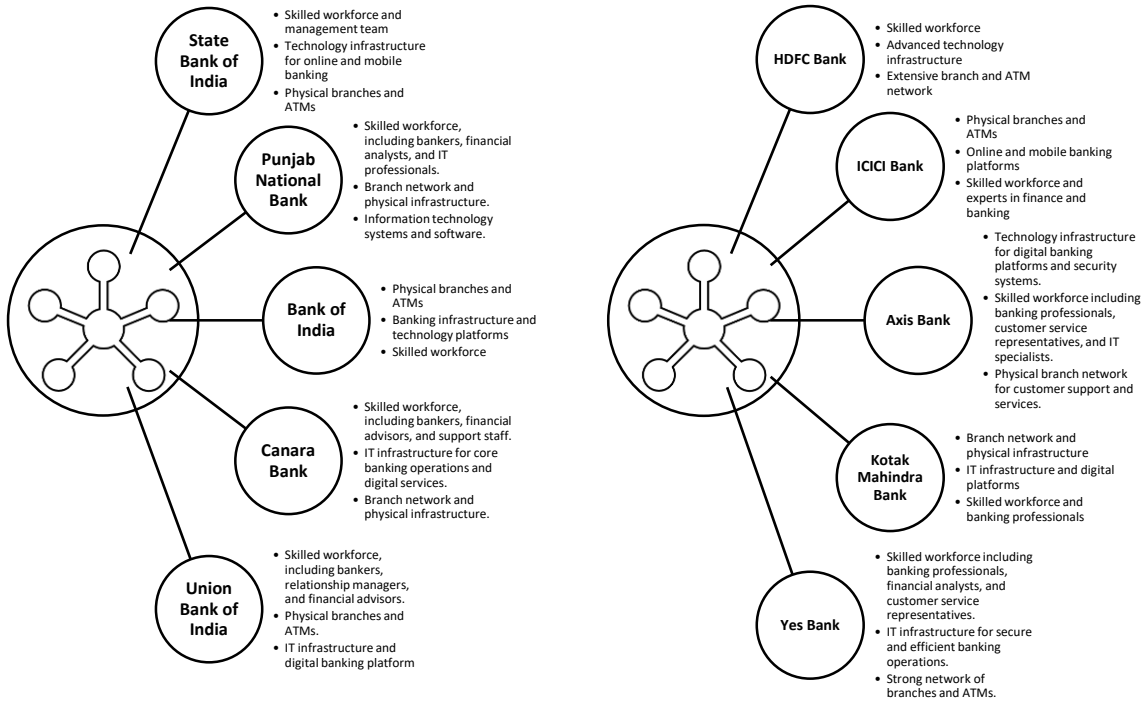- Branch network and physical infrastructure.

Union Bank of India
- Skilled workforce, including bankers, relationship managers, and financial advisors.
- Physical branches and ATMs.
- IT infrastructure and digital banking platform

HDFC Bank
- Skilled workforce
- Advanced technology infrastructure
- Extensive branch and ATM network

ICICI Bank
- Physical branches and ATMs
- Online and mobile banking platforms
- Skilled workforce and experts in finance and banking

Axis Bank
- Technology infrastructure for digital banking platforms and security systems.
- Skilled workforce including banking professionals, customer service representatives, and IT specialists.
- Physical branch network for customer support and services.

Kotak Mahindra Bank
- Branch network and physical infrastructure
- IT infrastructure and digital platforms
- Skilled workforce and banking professionals

Yes Bank
- Skilled workforce including banking professionals, financial analysts, and customer service representatives.
- IT infrastructure for secure and efficient banking operations.
- Strong network of branches and ATMs.

Component of BMC - Key Resources

State Bank of India
- Physical branches
- ATMs
- Online and mobile banking platforms

Punjab National Bank
- Physical branches for face-to-face banking transactions and customer support.
- Online banking platform and mobile apps for self-service transactions.
- Call centres for customer inquiries and support.

Bank of India
- Physical branches for in-person banking
- ATMs for cash withdrawals and basic transactions
- Online banking portal and mobile apps

Canara Bank
- Physical branches for in-person banking services.
- Online and mobile banking platforms.
- ATMs and cash deposit machines.

Union Bank of India
- Physical branches for in-person banking services.
- Online banking portal and mobile app for digital transactions.
- Customer service centers for support and query resolution.

HDFC Bank
- Branches and ATMs
- Online and mobile banking
- Customer care centers

ICICI Bank
- Physical branches and ATMs
- Online banking platforms
- Mobile banking applications

Axis Bank
- Physical branches for face-to-face interactions and services.
- Online and mobile banking platforms for self-service and transactions.
- Call centers for customer support and query resolution.

Kotak Mahindra Bank
- Branches and physical offices
- Online and mobile banking platforms
- ATMs and cash deposit machines

Yes Bank
- Branch network for in-person banking services and customer support.
- Online and mobile banking platforms for self-service transactions.
- Relationship managers for personalized assistance and advisory services.

Component of BMC - Channels

State Bank of India
- Employee salaries and benefits
- Technology and infrastructure costs
- Branch and ATM maintenance costs

Punjab National Bank
- Employee salaries and benefits.
- Rent and maintenance costs for branches and offices.
- Technology infrastructure and software licensing fees.

Bank of India
- Employee salaries and benefits
- Rent and maintenance of physical branches
- Technology infrastructure and maintenance costs

Canara Bank
- Employee salaries and benefits.
- IT infrastructure and maintenance costs.
- Rent and utilities for physical branches.

Union Bank of India
- Employee salaries and benefits.
- Branch maintenance and operational costs.
- IT infrastructure and software expenses.

HDFC Bank
- Employee salaries and benefits
- Technology infrastructure
- Rent and utilities for branches and offices

ICICI Bank
- Employee salaries and benefits
- IT infrastructure and technology investments
- Marketing and advertising expenses

Axis Bank
- Employee salaries and benefits.
- Technology infrastructure maintenance and upgrades.
- Marketing and advertising expenses.

Kotak Mahindra Bank
- Employee salaries and benefits
- Technology infrastructure and maintenance
- Marketing and advertising expenses

Yes Bank
- Employee salaries and benefits.
- Infrastructure and technology costs.
- Marketing and advertising expenses.

Component of BMC – Cost Structure

State Bank of India
- Interest income from loans and advances
- Fee income from various banking services
- Investment income from securities and other financial instruments

Punjab National Bank
- Interest income from loans and credit facilities.
- Fee income from banking services such as account maintenance fees, transaction fees, etc.
- Income from treasury operations, including foreign exchange gains.

Bank of India
- Interest income from loans and credit facilities
- Fees and charges for various banking services
- Commission income from investment and insurance products

Canara Bank
- Interest income from loans and credit facilities.
- Fee-based income from transaction services, such as remittances and foreign exchange.
- Investment and wealth management fees.

Union Bank of India
- Interest income from loans and mortgages.
- Transactional fees for various banking services.
- Investment banking fees, including underwriting and advisory services.

HDFC Bank
- Interest income from loans and advances
- Fees and commissions from various financial products and services
- Foreign exchange income

ICICI Bank
- Interest income from loans and advances
- Fees and commissions from banking services
- Insurance premiums

Axis Bank
- Interest income from loans and credit facilities.
- Fees and commissions from financial products and services.
- Foreign exchange and trade finance revenues.

Kotak Mahindra Bank
- Interest income from loans and advances
- Fee-based income (transaction fees, service charges, commissions)
- Insurance premiums and investment management fees

Yes Bank
- Interest income from loans and advances to customers.
- Fee income from various banking services such as account maintenance fees, transaction charges, and wealth management fees.
- Income from investment banking activities such as underwriting and advisory services.

Component of BMC – Revenue Stream

V. CONCLUSION

Business Model reengineering with organization structure, organisation culture, cross-border innovation and intellectual property can be proven as an effective mechanism to create a successful organization (Agarwal & Helfat, 2009). In this study, comparative diagnosis of Public and Private Sectors banks was concluded which is shown below:

PUBLIC SECTOR BANKS	PRIVATE SECTOR BANKS
In value propositions, SBI has wide range of banking solutions	In value propositions HDFC has personalised customer service
In customer segment, Punjab National Bank would target different customer segments such as retail customers, small and medium sized enterprises, large corporations, government organisations and institutional clients.	In value propositions, ICICI Bank maintain diverse and comprehensive range of financial and banking products.
In key resources, Bank of India has skilled workforce with expertise in various banking functions, also regulatory compliance and risk management frameworks.	In value propositions, Axis Bank had focused on customer centricity and personalised banking experience.
In value propositions, Canara Bank emphasis on priority sector lending to support inclusive growth and social development.	In key partners, Kotak Mahindra Bank collaborate with fintech companies for innovative product offerings and digital solutions. And in key activities this bank had wealth management services, including capital market operations, underwriting services and advisory services.
In key activities, Union Bank of India has priority sector lending to support agricultural, micro, small, medium sized enterprises and other priority sectors. And in value propositions the bank access to international banking services and foreign exchange solutions.	In key resources, Yes Bank has a good branch network and physical infrastructure. Also it has regulatory compliances and risk management frameworks.

VI. FUTURE SCOPE OF STUDY

Business Model Analysis becomes critical with external environments affecting the business. Hence there is a serious requirement of cross-boarder study of business model of banks so that more idea about the effective banking system can be developed. Apart from that, specific components of business model is required to be stressed so that scope od radical innovation in the studies segment can be identified.

REFERENCES

Agarwal, R., Helfat, C.E. (2009). Strategic renewal of organizations. Organ. Sci. 20 (2), 281-293

Amit, R., & Zott, C. (2013). Creating value through business model innovation. Sloan Management Review, 53(3).

Birkinshaw, J., Ansari, S. (2015). Understanding management models: going beyond "what" and "why" to "how" work gets done in organizations. In: Foss, N.J. , Saebi, T. (Eds.), Business Model Innovation: the Organizational Dimension. Oxford University Press, Oxford, pp. 85-103.

Bouwman, H., Faber, E., Haaker, T., Kijl, B., & De Reuver, M. (2008b). Conceptualizing the STOF Model. In H. Bouwman, H. De Vos, & T. Haaker (Eds.), Mobile Service Innovation and business models (pp. 31–70). Springer.

Chesbrough, H. (2010). Business model innovation: Opportunities and barriers. Long Range Planning, 43(2), 354–363.
Chesbrough, H., & Rosenbloom, R. S. (2002). The role of the business model in capturing value from innovation: Evidence from Xerox Corporation's technology spin-off companies. Industrial and Corporate Change, 11, 529–555.

El-Sawy, O., & Pereira, F. (2013). Business modelling in the dynamic digital space: An ecosystem approach. Heidelberg, New York: Springer.

Gassmann, O., Frankenberger, K., & Csik, M. (2015). The business model navigator: 55 models that will revolutionise your business. Upper Saddle River, NJ: FT Press.

Haaker T., Bouwman H., Janssen W., De Reuver M (2017): "Business model stress testing: A practical approach to test the robustness of a business model", Futures 89 (2017) 14–25

Lindgren, P., & Rasmussen, O. (2013). The Business Model Cube. Journal of Multi Business Model Innovation and Technology, 1(2), 135–182.

Osterwalder, A. (2004). The business model ontology – A proposition in a design science approach. Lausanne.

Osterwalder, A., & Pigneur, Y. (2010). Business model generation. John Wiley Sons, Inc.

Ritter, T. (2014). Driving Competitiveness and Growth through Business Model Excellence. CBS Competitiveness Platform, Frederiksberg, Denmark.

Teece, D.J. (2010). Business models, business strategy and innovation. Long. Range Plan. 43 (2), 172-194.

Zott, C., Amit, R., & Massa, L. (2011). The business model: Recent developments and future research. Journal of Management, 37(4), 1019–1042.

RESHAPING THE INSURANCE INDUSTRY: EXPLORING THE ROLE OF BANCASSURANCE AND ONLINE INSURANCE CHANNELS

[1]Sandipam Palit, [2]Dr M Rajkumar

[1]Research Scholar, ICFAI University, Jharkhand,

[2]Associate Professor, ICFAI University, Jharkhand

ABSTRACT

The insurance sector in our country has seen rapid upgrades, technological advancements, and model developments over the last few years. Inspired by the Government of India's vision of financial inclusion and social reforms, the Insurance Regulatory and Development Authority of India (IRDAI) has committed to achieving 'Insurance for All' by 2047. IRDAI aims to ensure proper life, health, and property insurance coverage for all citizens by 2047. Insurance sales in India have been predominantly through agency distribution channels. During the last few years, there has been an emergence of alternate insurance channels like bancassurance and online insurance delivery channels. These more recent channels have completely changed how insurance is advertised and delivered, giving clients more simple and reachable ways to buy insurance. The business process known as "bancassurance" involves an alliance between banks and insurance providers for the purpose of selling insurance policies to customers. The established distribution channels of a bank, i.e., bank branches, are used in this strategy to sell insurance policies. Banks already have a huge customer base and deep penetration through their large network of branches. Online insurance delivery channels and the growth of digitization in the country have eased the accessibility of insurance. Bancassurance has emerged as a preferable option owing to its unique integration of insurance with other financial services, while online delivery channels have the advantages of convenience and price comparability at our fingertips.

Keywords: *Bancassurance, Online Insurance Channels, Insurance Industry, Insurance distribution channel*

I. INTRODUCTION

The growth of the insurance sector is crucial for the economy of every nation. The sector seems to be very much positive especially post-pandemic where the awareness and requirement of insurance have seen tremendous growth. There has been a major focus in this sector especially by the Government of India to improve social security. Government of India has implemented ambitious national insurance schemes aiming to provide social security to the nation and securing human life from unforeseen risks/losses and financial uncertainties. A

strong insurance market supports the economy by providing customers with some level of safety in the case of an unforeseen incident that causes financial loss. It also gives family members the crucial financial security they need in the case of a loss of life or health. There has been a steady rise in the number of Insurance firms as well as demand for insurance in the last few decades. As a result, the sector has now become highly competitive. Any product or service reaches the customers through various distribution channels. Traditional agent-based distribution of insurance policies has dominated the market over the years. However, it's worth noting that the insurance industry has seen the rise of alternative distribution channels, such as bancassurance and online insurance distribution channel which have gained popularity in recent years. In this study, we will try to explore the role of Bancassurance and Online Insurance Channels in reshaping the Insurance Industry in India.

Bancassurance involves an alliance between banks and insurance providers for the purpose of selling insurance to consumers. The established distribution channels of a bank i.e, Bank Branches are used in this strategy to sell insurance policies. The development of new technologies, the ubiquity of banking services, and the expansion of non-banking financial activities are all credited with the growth of the bancassurance industry. All of these elements have weakened the divisions that have kept different financial services apart from one another. One outcome of such a 'financial union' is bancassurance. The bank makes money by marketing insurance policies referred to as Fee Based income. The bank merely acts as an intermediary for the purpose of sourcing business for the insurance company. Thus, the revenue earned is completely risk-free for the bank. This business endeavour is very appealing to the insurance industry also due to benefits like reduced customer acquisition costs and lesser administrative costs. Insurance firms get benefit from the expanded market and subsequently rising earnings. From, the customers' point of view, Customers gain from having easier, more affordable, and higher-quality access to insurance goods along with normal Banking services under one roof. Insurance companies are seeing the growing significance of cost reductions and client retention as insurance market rivalry heats up. As a result, they are always looking for novel ways to increase revenue, improve consumer comfort, and optimise processes while preserving cost effectiveness.

The insurance companies were for a long time dependent on traditional insurance agents who shared a good commission and limited the profitability of the companies. This led to increased premium charges which made insurance unaffordable for economically lower middle-class families who had the awareness and necessity of buying insurance but the same

remained a distant dream for these strata of society. Bancassurance and Online Insurance Channels bridged this gap lowering the distribution costs and increasing the ease of service.

II. PROBLEM STATEMENT

The study is done to understand the role of Bancassurance and Other Online Insurance Channels in reshaping the Insurance Industry.

III. RESEARCH OBJECTIVES

1. To understand the significance of Bancassurance and Online Insurance Channels in the Indian Insurance Industry

2. To understand the factors influencing customers' preference for Bancassurance and Online Insurance Channels

IV. LITERATURE REVIEW

There is significant influence of insurance sector in the macroeconomic development of any economy. Compared to more developed countries, India's insurance penetration and density in the life and non-life insurance sectors may be lower, yet there has been a noticeable and steady rising trend in recent years. There has been a significant impact of the insurance sector in India over the last few years with the nationalisation of the life and non-life insurance sectors, the creation of the IRDAI, the liberalisation of the sector to allow participation from private and foreign players, and the raising of the foreign investment cap to 49 percent. The industry has undergone a transformation from a closed state monopoly to a vibrant and a very highly competitive market.(Ray et al., 2020). There was only public sector insurer i.e LIC for a long-time post-independence. LIC was having its presence in all states of the country with its widespread Branch network. It allowed local people to act as its agents. In the Indian market, these linked agents have historically been the main distribution route for insurance. The scenario started changing post privatization (A. Singh et al., 2020). This expansion of Indian Insurance industry is mainly due to the ever evolving and exemplary performance of the various channels of insurance distribution. These channels play a crucial role in bridging the gap between clients looking for insurance policies or products and insurance companies looking for efficient marketing strategies. They cover interrelated and dependent channels for businesses and consumers to trade products, services, and information (R. K. Singh & Deshmukh, 2022).

According to (Nasir et al., 2021) Bancassurance basically benefits all the three main parties concerned i.e; the banks, the insurers and the customers. Bancassurance enables banks to more effectively meet the specific needs of their customers and improve accessibility by

providing insurance services when and where they are required. Bancassurance is a vital part of banks' distribution channels since they see it as a tool to engage with a range of target consumers. With respect to the benefits of the insurers (i.e., the insurance companies), bancassurance is a gold mine for them. The insurance companies reach the large customer base of Banks as their potential customers by partnering with them. They reach a lot of areas and places of the country without having a physical branch by using the Banks. Bancassurance offers a customer wide choice with free comparability and choice between products of different companies as most of the Banks have tie up with multiple insurance companies. Customers are also more likely to buy insurance goods through their banks since they already trust and are familiar with banks. There are many ways to offer insurance goods, but reaching the 66.46 percent of people who live in rural areas (according to the World Bank Collection of Development Indicators) requires a special route that enables insurance companies to connect with every person through nearby bank branches. Here, bancassurance appears as a critical remedy (Swetha Joseph & Merin Joseph, 2018). In India, Bancassurance kicked off with the issuance of Government of India Notification on 3rd August, 2000, specifying 'Insurance' as a permissible form of business that could be undertaken by banks under Section 6(1)(o) of the Banking Regulation Act, 1949. The importance of face-to-face communication is still significant in insurance industry, which benefits the growth of bancassurance. According to (Devi, 2019) Insurance companies of India prefer adopting bancassurance channel for selling insurance products because Banks can operate this business at low cost due to their existing branch network, infrastructure, structured systems and dedicated workforce. Bancassurance is a very efficient way to offer insurance products because it takes use of the long-standing connections that have been built between banks and their clients.. The feasibility and effectiveness of bancassurance operations in India are attributed to the large network of banks, their enormous client databases, and the faith that consumers have in them.

There has been a paradigm shift in consumer behaviour and spending patterns during the last two decades. Cost reductions and client retention have emerged as significant insurer initiatives as a result of the escalating competition in the insurance markets. In order to increase sales, improve consumer convenience, and preserve profitability while keeping expenses down, they have been forced to look at new strategies. As a result, new channels are developing as efficient ways to achieve these goals, including call centers, mobile apps, and web platforms (A. Singh et al., 2020). Online purchasing has inherent advantages of being easy, eco-friendly, efficient, paperless. It saves a lot of operational expenses. Renewal of

insurance through online portals is also very easy and smooth. There are additional advantages of auto reminders too. With all these benefits, the customer service delivered becomes fast, reliable and easy. Social media, mobile applications, and direct mailers are the programs implemented to raise the degree of awareness of online insurance channels in order of ranking. Web-based applications, mobile apps, and kiosks are the current online distribution methods utilised by insurance companies, with Web-based applications being the most popular (R. K. Singh & Deshmukh, 2022). Sales and distribution have been the parts of the value chain that have been most affected by technological improvements. The use of digital technology has significantly changed how services are delivered, changed how they are used, and, as a result, changed how companies interact with our customers (Cappiello, 2020). According to (Grazy & Parimalarani, 2019), Internet insurance services is also known as E-insurance. It is basically online sales of insurance policies or sales of insurance policies using internet channels. E-insurance is generally defined as the production and distribution of insurance services through the use of the internet and related information technologies. Within the insurance industry, online insurance has become a new distribution channel. E-insurance refers to internet channels for information, services, and sales of insurance. It describes how insurance services or policies are produced and distributed via the internet and services associated to the internet. E-insurance, when used in a more specific sense, refers to the delivery of insurance products through various online platforms, where insurance plans are proposed, sold and subscribed digitally (Supriya et al., 2014).

According to (Choudhury & Singh, 2021), factors influencing the customer experience in insurance sector are Ease of Buying, Reliability and Responsiveness of the channels, digitization of the process, service quality, prices, after sale service etc. Bancassurance genuinely ticks most of the boxes for the above-mentioned factors. Customers exhibit knowledge of bancassurance as an effective channel for the sale of insurance and a desire to adopt it as their choice for getting both life and non-life insurance. They already have a relationship with the bank, which influences their preference for bancassurance, followed by the bank's reputation, features, and level of service (Deepalakshmi & Kavyaa, 2019). According to (Nasrin, 2022), Focused on customers adoption of online insurance products on the basis of demographic and psychological factors. The results show that customers who have less social need, more pricing awareness, and less risk perception are more likely to purchase a wider range of insurance products online. Additionally, customers who are female and married tend to adopt online insurance products more frequently than consumers who are single. (Biswas et al., 2022) has worked on the "Factors Influencing Customer Preferences

towards Purchasing of Mediclaim Insurance from Banks". Based on his studies, he has concluded that the customer preference is mainly influenced by factors majorly related to service and products aspect. Perceived service elements including client communication, hospitalization benefits, claim settlement, customer awareness, and service quality are among the main drivers of choice. The most important influencer of these elements is customer communication, followed by customer awareness and service quality, while claim settlement has the least impact. Banks should thus concentrate on these aspects to draw in more consumers for Mediclaim insurance. Customers also give importance to claim settlements and hospitalization benefits. Customers' preference for insurance is also influenced by factors including product knowledge, safety concerns, and business reputation.

V. METHODOLOGY

The methodology of this paper is exploratory research approach which is based on a thorough assessment of the relevant literature review and data analysis from various sources like annual reports of relevant companies, reports from regulators of insurance and banking sector, websites and etc. The major data collection methods include Literature review, Annual reports, and website data.

VI. FINDINGS AND DISCUSSION

Bancassurance:

Bancassurance refers to a partnership between banks and insurance companies for the sale of insurance to consumers. In this technique, insurance policies are sold through the existing distribution channels of a bank, or bank branches. Bancassurance is an arrangement that is a win-win situation for all three parties concerned i.e., the Banks, Insurance firms, and Customers. One additional advantage of Bancassurance for Banks which many a time goes unnoticed is that it secures some of the financial exposure of Banks too during unforeseen situations like an unfortunate death of a customer (Loan secure policies). It's a full package of benefits for the Bank as all this comes with very less additional expenditure under its existing network.

Online Insurance Channels:

Online channels of Insurance are one of the newest and technology dependent channels which has revolutionized the way insurance products are sold and purchased in the Indian insurance industry. These channels leverage the use of internet and digital technologies to provide customers with easy access to insurance products and services thereby making this very convenient and cheap. Insurance products can be purchased either directly from the respective company website or mobile applications. Besides this, there are online platforms

called aggregators which further provide the freedom to compare between policies and then make a purchase decision. They provide the option to enter the basic details of the customers, the requirements and expectations and then show the best suited policy for them. This helps the customer in making an informed decision. Online insurance channels have a number of benefits. They offer convenience by enabling users to look up, evaluate, and buy insurance products at their own pace and convenience of home. These channels' digital nature also enables quicker and more effective operations, decreasing paperwork and doing away with the requirement for in-person visits to insurance offices.

Online insurance channels have revolutionized the insurance industry by providing customers with transparency, flexibility, convenience and better pricing structure. These channels are anticipated to develop further and play a significant role in the future of insurance distribution as technology advances.

Table -1

CHANNEL-WISE - LIFE INSURANCE - INDIVIDUAL NEW BUSINESS*							
S.No.	Particulars	Number of Policies Issued			Premium (₹Crore)		
		2019-20	2020-21	2021-22	2019-20	2020-21	2021-22
1	Individual Agents	2,26,14,911	2,14,07,714	2,24,33,867	61,068	66,259	68,873
		78.40%	76.11%	77.06%	60.09%	58.18%	55.01%
2	Corporate Agents-Banks	32,37,319	36,61,658	37,62,186	27,893	33,027	39,992
		11.22%	13.02%	12.92%	27.45%	29.00%	31.94%
3	Online**	3,04,536	2,98,704	2,50,548	1,470	1,795	1,698
		1.06%	1.06%	0.86%	1.45%	1.58%	1.36%
4	Others	26,89,879	27,59,349	26,66,260	11,190	12,807	14,642
		9.32%	9.81%	9.16%	11.01%	11.25%	11.69%
	Total	2,88,46,645	2,81,27,425	2,91,12,861	1,01,620	1,13,889	1,25,205
		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

*New business premium includes first year premium and single premium.
** Business procured through Company website only.

-Source-IRDAI Handbook 2021-22

From the above table it can be found that though Individual agents continue to dominate the individual life insurance industry, Corporate Agents - Banks are also fetching a good amount of premium during the last three years through Bancassurance model. The share of bancassurance in terms of the number of policies issued has been approximately between 11% and 13% over the last three years. However, in terms of premium the share of bancassurance has shown a steady increase, rising from 27.45% in FY 2019-20 to 29.00% in FY 2020-21 and further to 31.94% in FY 2021-22. This clearly shows that slowly Bancassurance is also skimming the market. In this table, data in Online tab is reflecting only the business procured through company website. However, it clearly shows that the share of Online channel (company website) is ranging around 1.46% (average premium percentage) which is very low as compared to Individual agents and Bancassurance.

Table -2

SHARE OF DIFFERENT CHANNELS IN HEALTH INSURANCE (INDIVIDUAL BUSINESS) IN FY 2021-22			
Name of the Channel	No. of policies Issued	No. of persons covered	Gross Direct Premium
Individual Agents	65%	21%	71%
Corporate Agent - Banks	12%	60%	7%
Direct Sale - Online	6%	1%	5%
Direct Sale -Other than Online	6%	12%	8%
Others	12%	6%	9%
Total	100%	100%	100%

-Source-IRDAI Handbook 2021-22

From the above table, it can be concluded that the share of Health Insurance Business through Bancassurance channel is 12% in terms of policy issuance whereas it is 7% in terms of gross direct premium in FY 2021-22. Online Sale has been 6% in terms of policy issuance and only 5% in terms of gross direct premium. Individual agents have collected 71% of the gross direct premium in FY 2021-22 and 65% of the number of policies issued in health insurance individual business. However, it is worthy to note that Bancassurance has covered 60% of the total number of persons covered in FY 2021-22 which shows the reach of Bancassurance in terms of distribution.

As per Reserve Bank of India, "Banks should disclose in the 'Notes to Accounts', from the year ending March 31, 2010, the details of fees / remuneration received in respect of the bancassurance business undertaken by them". We went through the Annual reports of FY 2019-20, FY 2020-21 and FY 2021-22 of SBI, PNB, Bank of Baroda, HDFC Bank and Axis Bank on a sample basis.

Table - 3

FY	2021-22		2020-21		2019-20
Bank Name	Income (in Crs)	YoY%	Income (in Crs)	YoY%	Income (in Crs)
SBI	1,889	20.32%	1,570	9.33%	1,436
PNB	408	7.37%	380	52.00%*	250
BOB	253	31.09%	193	21.38%	159
HDFC	1,823	3.58%	1,760	22.05%	1,442
AXIS	1,321	21.53%	1,087	41.54%	768

*FY 2020-21 onwards represents amalgamated figures

From, the above table it can be concluded that, over the years Bancassurance Business has become one of the major revenues earning source for the Public Sector Banks. SBI has

registered a growth of Rs. 319 Crs (20.32%) in FY 2021-22 as compared to the previous financial years. Income from Bancassurance Business for Bank of Baroda too has registered a growth of 31.09% in FY 2021-22 as compared to FY 2020-21. Income from bancassurance Business for Punjab National Bank also increased to Rs. 408 Crs in FY 2021-22 from being at Rs. 380 Crs in FY 2020-21 thereby registering a growth of 7.37% YoY. The same growth is also seen in case of the Private Sector Banks. Axis Bank registered a growth of 41.54% and 21.53% in consecutive years. HDFC Bank also fetched Rs. 1,823 Crs in FY 2021-22, Rs. 1,760 in FY 2020-21 and Rs. 1,442 Crs in FY 2019-20 from Bancassurance business.

Based on the literature review done, it is found that most of the researchers believe that the convenience of purchasing, dependability and responsiveness of the channels, digitalization of the process, service quality, costs, and after-sale support are some of the elements affecting the customer experience in the insurance business. Most of these criteria are successfully met by bancassurance. Customers exhibit a willingness to select bancassurance as their preferred alternative for both life and non-life insurance since they are aware of it as an effective channel for the selling of insurance. Their selection for bancassurance is significantly influenced by their current relationship with the bank and the established trust with the Banks. Bancassurance prospers in the insurance industry because to the continuous importance of in-person contacts which is absent in case of online channels. To advertise their insurance offers, banks are now using direct marketing and internet banking. This face-to-face interaction, the trust and loyalty as well as the demography of India are the reasons which are giving competitive advantage to bancassurance model. The adoption of online insurance channels in India has been relatively slow until now, as they are still in their early stages. However, it is anticipated that these channels will gradually gain momentum over time.

VII. CONCLUSION

Based on the data from IRDAI handbook FY 2021-22, it is found that Bancassurance has emerged as the second most preferred channel. In case of health insurance, Bancassurance has 60% share in number of persons covered in FY 2021-22 which reflects that the customer-bank relationship is becoming one of the most important factors for increasing popularity of the Bancassurance channel. Based on the analysis of the annual reports of three major public sector banks of the country as well as two private sector banks it is found that all banks have shown steady increase in bancassurance business over the last few years. The adoption of

online insurance in India is still in very early stages owing to concerns about trust and security.

It can be concluded that convenience, better pricing, service quality and trust with the Banks has been the major contributing factors for preference of bancassurance channels. Bancassurance thrives in the insurance sector as a result of the ongoing value of face-to-face interactions, which is missing from internet channels. However, it is expected that these channels will gain traction in the future and be more generally accepted by customers thanks to technological developments, expanding internet access, and greater knowledge of the advantages of online insurance. Bancassurance through its wide advantages has continuously remained a focus for Banks and Insurance companies around the globe. The future seems to be very much positive especially post-pandemic where the awareness and requirement of insurance have seen tremendous growth. Future prospects for Online insurance channels will be improved if the issues like technological awareness, lack of trust etc. are addressed in a much better way. It is necessary to have a workable plan, coordination, management, and appropriate roadmap for the same.

VIII. IMPLICATIONS AND FUTURE SCOPE OF RESEARCH

Implications: This study has several policy implications, managerial implications as well as academic contribution in the field of Bancassurance and online channels of delivering insurance products. Policymakers should consider these factors when formulating strategies to enhance the delivery of a distinctive customer experience through the bancassurance channel and online channels.

Limitations: There are a few limitations to this research paper. This paper has reliance on only secondary data sources and the findings may be influenced by potential biases present in the selected secondary data sources. The study may not directly capture consumer preferences and their impressions of the function of bancassurance and online insurance channels due to the lack of questionnaires or primary data collecting.

Future scope of research: The present study attempts to find out the role of bancassurance and online insurance channels in reshaping the Indian insurance industry. With the advent of technology, insurance industry is changing rapidly. A detailed study can be done in the field of influence of technology in shaping the future of insurance industry in India. Future research may be done to determine whether factors impacting customer experience differ between the traditional insurance policy purchasing channel and the bancassurance channel or online insurance channels.

REFERENCES

1. Kajwang, B. (2022). EFFECT OF DIGITAL DISTRIBUTION CHANNELS ON PERFORMANCE OF INSURANCE SECTOR. Journal of Marketing Studies, 5(1), 32-42.

2. Singh, R. K., Singh, A., & Chavan, S. (2020). Distribution Channels in Life and General Insurance: A Conceptual Analysis. Studies in Indian Place Names, 40(27), 590-609.

3. Ray, S., Thakur, V., & Bandyopadhyay, K. (2020). India's insurance sector: challenges and opportunities.

4. Singh, R. K., & Deshmukh, A. A. (2022). Comparison Between Offline and Online Distribution Practices for the Insurance Industry in India. International Journal of Asian Business and Information Management (IJABIM), 13(1), 1-19.

5. Nasir, N. F., Nasir, M. N. F., Salleh, S. M., Nasir, M. A., Borhanordin, A. H., & Nasir, M. F. (2021). The effects of bancassurance: Reviews from the perspectives of banks, insurers, and customers. International Journal of Academic Research in Business and Social Sciences, 11(5), 579-585.

6. Sagaya, S., Teena, M., & Haresh, R. (2019). Bancassurance-A Panoramic Outlook. International Journal of Banking, Risk and Insurance, 7(1), 41-47.

7. BISWAS, P. (2022). Factors Influencing Customer Preferences towards Purchasing of Mediclaim Insurance from Banks (Doctoral dissertation, ICFAI UNIVERSITY JHARKHAND).

8. Tyagi, A. (2021). Bancassurance in India: Issues & Challenges. Available at SSRN 3980539.

9. Devi, P. P. (2019). Bancassurance: a marketing Perspective. International Journal of Civil Engineering and Technology (IJCIET), 10(3), 2093-2102.

10. Grazy, M. L. T., & Parimalarani, G. (2019). E-Insurance: A Platform for insurance penetration in India. Restaurant Business, 118(6), 90-93.

11. Sapa, S. G., Phunde, S. B., & Godbole, M. R. (2014). Impacts of ICT Application on the Insurance Sector (e-Insurance). IBMRD's Journal of Management & Research, 3(1), 311-320.

12. Choudhury, M., & Singh, R. (2021). Identifying factors influencing customer experience in bancassurance: A literature review. Journal of Commerce & Accounting Research, 10(2).

13. DEEPALAKSHMI, D., & KAVYAA, K. (2019). Policyholders Perception on Bancassurance-An Analytical Study. Age, 16(40), 34-4.

14. Nasrin, M. S. (2022). FACTORS INFLUENCING THE ADOPTION OF ONLINE INSURANCE PRODUCTS. International Journal of Accounting, 7(41).

15. BISWAS, P. (2022). Factors Influencing Customer Preferences towards Purchasing of Mediclaim Insurance from Banks (Doctoral dissertation, ICFAI UNIVERSITY JHARKHAND).

16. Website and Annual Reports/Circulars of – IRDAI, RBI, LIC, State Bank of India, Punjab National Bank, Bank of Baroda, HDFC Bank and Axis Bank

THE PRESENT SCENARIO OF CORPORATE GOVERNANCE IN INDIA: AN ANALYSIS

Sanjit Sarkar

Research Scholar, Kazi Nazrul University, Asansol, West Bengal, India

ABSTRACT

Corporate governance helps to deal with the "Board of directors" of the company. This also helps to increase sustainability in the business and organizational performances. However, this evaluates the importance of corporate governance in the corporate sectors of India and it has a major impact on the present scenario of India. The aim of the study is to analyse the present scenario of India's corporate governance. However, a literature review also has been analysed based on the effectiveness and roles of corporate governance in the present scenario of India.

Keywords: *Corporate governance, Board of directors, organizational performances, effectiveness and roles*

I. INTRODUCTION

1.1 Background

Corporate governance is referred to as a set of conditions which shapes the ex-post of bargaining on the "quasi-rents generation" by a firm. Corporate governance in India is also defined as a system of law approaches by corporations which are directed and controlled on the external and external structure of corporate governance. This also helps to mitigate the risks of the agency which might be misdeeds by the corporate officers. Corporate governance is a process which provides a mechanism to set a firm and corporation on based on certain principles and guidelines by which a company is directed or controlled. As said by Almaqtari *et al.* (2021), these principles provide the system to ensure the governance of the company to achieve goals in the context of regulatory, social and market environments. Corporate governance also helps to maximize profits as well as provide benefits for involvement.
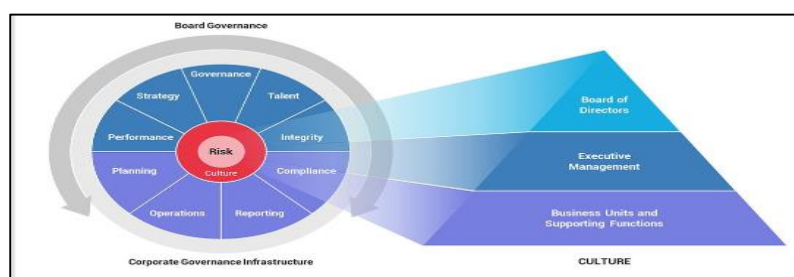
Figure 1.1: Infrastructure of Corporate Governance in India
(Source: Almaqtari *et al.* 2021)

Corporate governance in India refers to a code of conduct by which the "Board of Directors" needs to abide by this while running a corporate enterprise. Corporate governance helps to create a proper "corporate culture of accountability". A major change has been made in 2020, 1st April. The initiative of the organizational framework in India is "The Securities and Exchange Board of India"(SEBI) and "The Ministry of Corporate Affairs"(MCA), these two monitor and regulate companies of India under corporate governance. The present scenario of corporate governance helps to cover the area of ethical behaviour, environmental awareness, and induced corporate strategy and helps to manage risks, transparency and accountability (Abhilash *et al.* 2023). This corporate governance helps to manage the firm's work more effectively. This is also responsible for the governance of each company. The impact of stakeholders on organisation is to directly appoint and auditors and helps to satisfy the structure of governance in India.

1.2 Research Aim

The aim of the research is to "review prior articles" and analyse the "present scenario of corporate governance" in India.

1.3 Research Objectives and Questions

- To analyse the current scenario of "Corporate governance in India".

- To find out the valid impact of corporate governance in the present scenario of India.

- To understand the value of corporate governance in "India's current scenario".

Research Question: what is the present scenario of Corporate governance in India?

1.4 Hypothesis

H0: There are major impacts of Corporate Governance in India's present scenario.

H1: there are no major effects of Corporate Governance in India's current scenario.

II. LITERATURE REVIEW

2.1 Role of Corporate Governance
The previous research on "Corporate governance" has a valid impact on the growing market of India. As proposed by Singh and Pillai, (2022), corporate governance helps to maintain transparency in the operations of a company and promote sustainable growth for the long term. The main purpose of corporate governance is to facilitate the effectiveness and manage the company to provide long term success. This has also had a huge impact on the financial

side of India. Corporate governance of India makes sure to the economic growth of India, as this helps to enhance the performance of the firm and helps in the economic growth of India. On the other hand, it is also suggested by Aksar *et al.* (2022), corporate governance has some negative impacts on the company. As this can diminish the stock value of a company, and also decrease the trust of stakeholders. This negative impact of corporate governance can lead to devastating consequences for a company.

Figure 1.2: Role of Corporate Governance in India
(Source: Singh and Pillai, 2022)

2.2 Major Effect of Corporate Governance in the Corporate Sector

In the present situation in India, corporate governance is becoming the most effective in the practices of b business and also in the policies of stakeholders and shareholders. As stated by Shahid and Abbas, (2019), corporate governance helps to protect the monitory of shareholders as this further helps in the management of accountability in this present situation of India. Corporate governance also creates a system of practices and rules which helps to determine the operations and align all stakeholders' interests. Current corporate governance in India helps to lead "ethical practices of business" which further leads to the financial viability of a firm that attracts more investors. On the other hand, it is also opined by Aksar *et al.* (2022), a lack of risk in the management issues of corporate governance can lead to a higher probability of the company. In India, corporate governance not only helps to manage the corporate and financial aspects but also increases the rate of stakeholder's interest and this helps in the progress of economic growth of India. The existing corporate governance helps to increase the level of company associations.

Figure 1.3: Importance of Corporate Governance in the corporate sector
(Source: Shahid and Abbas, 2019)

2.3 Challenges in corporate governance in corporate sectors

"SEBI committee" helps to recommend Governance in India. As opined by Col and Sen, (2019), the standards of "Corporate governance in India" help in the secure exchange of the board committees. There are many challenges associated with corporate governance if it is neglected by the auditors, and regulators it can show a negative impact on the financial results of a corporate sector and it also dereliction of the process of regulations. This is associated with the risk to the organization. Similarly, as stated by Sidhu and Kaur, (2019), with the rapid changes of globalization many companies are showing effects on the financial market as well as it is facing huge competition from before. Though India has the best laws in corporate governance their poor implementation of the policies has affected the corporate governance of India. These challenges will be mitigated by the "Boards of directors" of all the stakeholders of the corporation. Corporate governance has introduced some of frameworks to help the stakeholders in the right way, which will help them to provide opportunities for their rights. By applying these frameworks the challenges can be mitigated further.

2.4 Summary

The entire study has summarised that corporate governance is playing a crucial role in order to improve the process of decision-making in an organisation. In addition, corporate governance has a positive and significant impact on Indian companies or industries. Moreover, corporate governance is helping all current companies in India in managing accountability and protecting shareholders. Hence, it can be stated that Corporate Governance has a major and positive impact on the enhancement and improvement of Indian companies. Moreover, the aforementioned challenges are affecting the organisational performance of Indian companies hence; corporate governance is helping to maintain economic growth in its own industry.

III. METHODOLOGY

3.1 Eligibility Criteria

Inclusion and Exclusion Criteria

Eligibility Criteria	Inclusion Criteria	Exclusion Criteria
Type of the study	All selected articles are containing the present scenario of Corporate Governance in India	All selected articles are not only describing the present scenario of corporate governance but also demonstrate other than this topic
Country specification	All selected articles are demonstrating information based on India	Articles are describing other country's information
Outcomes measurements	The present scenario of corporate governance in India and its impact on finance and the economy are outcomes of this assessment that have been incorporated into all the articles	Basic information based on corporate governance and other information except for corporate governance
Searching procedure	All articles have been searched by using some crucial databases such as Springer, Google Scholar, Financial websites, and SSRN. Moreover, all articles are peer-reviewed and contain full-text journals	Not containing full texts like containing only abstracts and are not accumulated from financial databases.
Time Duration	All articles and journals have been selected between 2018-2023	Before 2018

Table 3.1: Eligibility Criteria
(Source: Self-developed)

3.2 Information Source of the Database and Keywords

Databases	Search Terms
Google Scholar	Corporate Governance AND its impact on Indian companies
Springer	Effect OR Impact of Corporate Governance on Corporate Sectors in India
SSRN	Efficacy AND Impact of Corporate Governance on Corporate Sectors AND India

Table 3.2: Database service and Keywords by using Boolean Operators
(Source: Self-created)

3.3 Search Strategy

Databases

Maintaining a proper search strategy is accurate and essential in terms of gathering information based on the process by which data can be accumulated and applying them to the study. This specific study has been developed based on Secondary resources such as articles and journals that have been selected with the help of secondary databases. Selecting secondary resources is accurate since it is giving unbiased and authentic information based on the present scenario of corporate governance in Indian companies (Sileyew, 2019). All those databases which include "Google Scholar, SSRN, Yahoo, and other financial websites" have been selected in terms of gathering all secondary information. According to the statement of Ruggiano and Perry, (2019), it has been observed that selecting secondary databases are accurate and effective in terms of gathering experts' opinions. Since all articles have been published with experts' knowledge and ideas hence, it is helpful for the research developer in terms of developing this specific study in a proper way.

Keywords

Some keywords have been selected in terms of searching those secondary resources and accumulating them in developing this study in a proper way. Corporate Governance, India, Indian sectors, Indian companies, and the impact of corporate governance have been considered as keywords which are helpful for searching those articles and developing this specific study more informative.

3.4 Data collection process

Collecting accurate and authentic information is a crucial step while developing a study in a proper way. This specific study has been developed based on secondary data which are entirely related to the current scenario of corporate governance in Indian companies. According to the statement of Scells *et al.* (2019), it has been observed that collecting or accumulating secondary information is beneficial for a research study because it is helping to gather expert opinions, ideas, and experiences. Moreover, all those authors are experts in their own field which is helping to share effective information based on the study topic. Around 3 articles have been selected based on this study topic to develop this specific study. All those 3 articles have been selected by screening with the help of the Quorum Flowchart. As opined by Palik and Østby, (2023), the utilisation of the Quorum Flowchart is accurate in terms of collecting or selecting articles since it is able to screen and eliminate duplicate articles. Hence, this study has been developed with accurate, relevant, and authentic information.

Title screening

- Corporate Governance in India

- Current scenario of corporate governance in corporate sectors in India

- Evaluate accurate corporate governance in Indian companies

3.5 Screening through Quorum Flowchart

The selection of an accurate framework in order to select articles for developing a study is a crucial step in order to accumulating relevant and unbiased articles. As a result, this study has been developed with the help of relevant and unbiased information. According to the statement of Ruggiano and Perry, (2019), it has been found that the application of the Quorum Framework is helpful for eliminating biased and duplicate articles which are affecting the quality and contents of this specific study due to deterioration. Initially, 15 articles have been selected, and after that screening was relevant, biased, and duplicity. Lastly, 3 article shave been selected with the help of the Quorum Flowchart. Hence, it can be stated that the application of the Quorum Flowchart is accurate and beneficial for screening duplicate information and extracting accurate and unbiased information based on the current scenario of corporate governance in Indian companies.
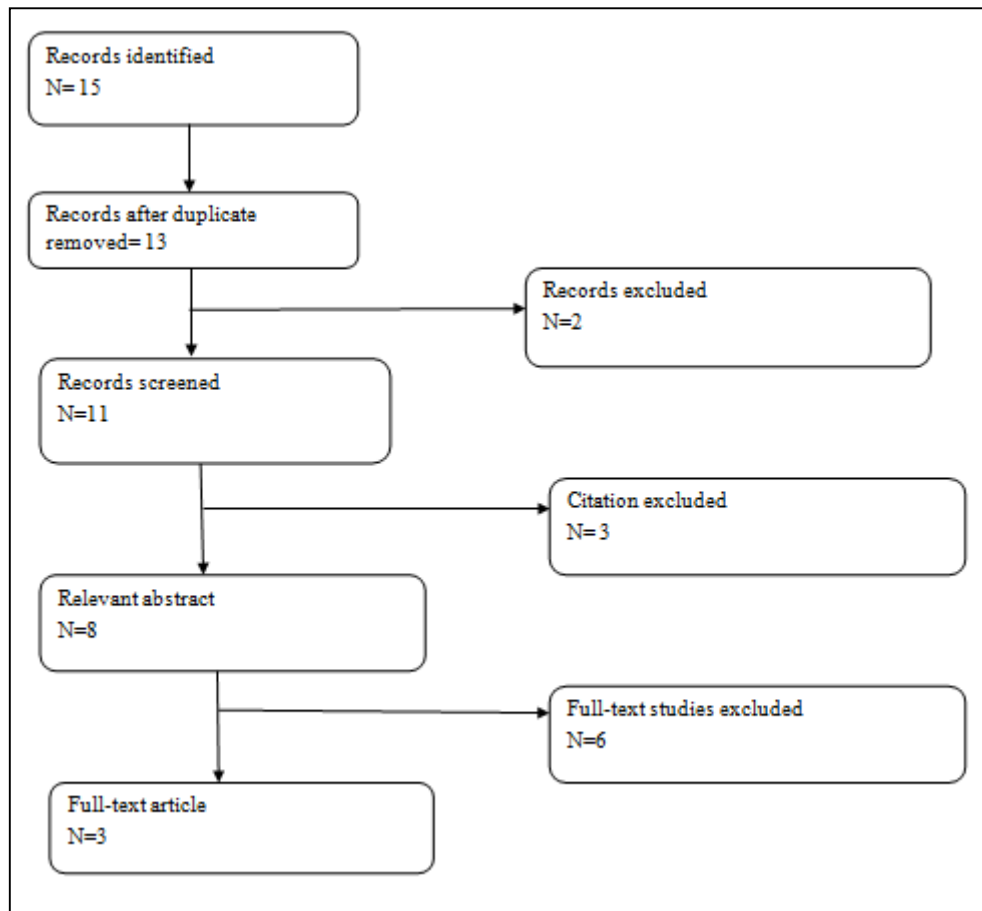
Figure 3.1: Quorum Framework
(Self-created)

3.6 Study Risk and Quality Assessment

CASP Questions	Sharma *et al.* (2020)	Almaqtari *et al.* (2020)	Pilz and Wiemann, (2021)
Q 1. "Was there a clear statement of the aim of the research?"	Yes	Yes	Yes
Q2. "Is the qualitative methodology appropriate?"	Yes	Yes	Yes

Q3. "Was the research design appropriate to address the aim of the research?"	Yes	Yes	Yes
Q4. "Was the recruitment strategy appropriate to aims of the research?"	Can't tell	Yes	Yes
Q5. "Was the data collected in a way that addressed the research issue?"	No	Yes	Yes
Q6. "How has the relationship between the researcher and participants been adequately considered?"	Yes	Not clear	Clear
Q7. "How ethical issue taken into consideration?"	High	Low	High
Q8. "Was the data analysis sufficiently rigourous?"	Yes	Yes	Yes
Q9. "Is there a clear statement of findings?"	Yes	Yes	No

Q10. "How valuable is the research?"	Yes	Yes	No
CASP score	8	9	8

Table 3.3: CASP assessment tool

IV. FINDINGS AND ANALYSIS

4.1 Study Characteristics

Author and Year	Study Design	Sample size	Findings
Sharma *et al.* (2020)	The "Ordinary Least Square Method" has been used in terms of developing this study	Employees of Indian companies have been selected in terms of collecting information based on Corporate Governance and the current situation of it in Indian companies	The findings of this study have shown that in recent days, corporate governance has a positive and significant impact on organisational performance and financial performance. In addition, it is helping the Indian government in ascertaining the ESC activity level with the help of "Corporate Social Responsibility" among Indian companies.

| Almaqtari *et al.* (2020) | A systematic review has been conducted in terms of completing and developing this study in a systematic way. | 161 research papers have been extracted for accumulating information and completing this study. Among those papers, 101 are journals, and 17 are publisher's databases. | The result so this study has indicated that among all issues related to Corporate Governance, "Institutional and Foreign Ownership" and "Audit and Board Committees" are focusing on Indian companies to improve their financial performance. Moreover, it has been observed that in recent days corporate governance has a significant impact on creating a strong relationship to improve the financial performance of Indian companies. |

| Pilz and Wiemann, (2021) | Primary qualitative research method has been utilised in this study to accumulate all information based on the study topic | 149 participants have been selected from 86 manufacturing firms. The open-ended questionnaire has been followed to gather information from the selected participants | The findings of this specific study have highlighted that a dual training model is helpful to tackle both skills shortages in different countries. As a result, it is helpful for all Indian companies in terms of improving their working efficiency and financial performance in a proper way. Corporate governance is referred to as a set of conditions which shapes the ex-post of bargaining on the "quasi-rents generation" by a firm. |

Table 4.1: Study Characteristics
(Source: Self-created)

4.2 ANALYSIS

4.2.1 Implantation of the System of Robotics

Technological enhancements have been a current scenario in India and that is changing the formation of IT-enabled services. On the other hand, cutting-edge technologies are included in the private and government sectors in India so that the acceleration of the procedure takes place. The implementation of the Blockchain, machine learning, robots and natural language processing is done in different sectors such as retail, IT, and other different sections. Deep learning, AI, VR, augmented reality and other technological upgrades have been done for the sake of better corporate governance (Timesofindia.indiatimes.com, 2021). The science and engineering sectors are also getting polished with the help of technology and robotics. Contemporary India has had a powerful preoccupation with technology and science, discovering that it is the only key component for financial evolution. India ranks in the third position among the numerous alluring investment termini for technology dealings on the

planet (Meity.gov.in, 2023). Additional and better international organisations establishing their research and development (R&D) epicentres in India, the platforms have seen norms in acquisition in recent years. Different sectors such as Infosys, TCS, Wipro and HCL tech are getting huge responses from the end consumers and other countries.

4.2.2 Revenue of financial services

The market in India is getting bigger with lots of opportunities for start-up businesses and that is creating better financial dealings with the domestic and foreign markets. The basic goals of the companies are to enrich the country in the economic situation and that can help the other SMEs to get a chance in the native market (Perwej, 2020). In that situation, the reforms and the regulations that are settled by the administration of India are to be followed. On the other hand, according to the view of Vidyarthi and Tiwari (2019), the business strategies of the companies are linked to the continuous enhancement of the infrastructure and service so that more and more investors are included in the business. The stable business performance is tried to be retained for the developing better economic performance than other countries.

The companies such as Wipro, Infosys and TCS are trying to use the stock market and include insurance options so that the business strategy gets more evolved to present a better situation of finance in India. The IT endeavour is the spine for the Indian economy to blossom exponentially and yield billions of employment (Ibef, 2023). Development in the IT platforms will drive the inhabitants to develop along with China in every domain and can assist in grasping the international market. The scenario that is seen in India will improve the socioeconomic status of Indians (Kumar, 2023). Financial incorporation and ascending income could improve government tax remunerations. Financial augmentation determines the proportions of an economy and the tax bottom. Economic inclusion enriches taxable financial conditioning. Improved monetary conditioning spawns wealth and augments consumption and acquisition actions in the economy and submits taxable revenue and tax payments.

4.2.3 Activities to raising capital for Business

The people in the country and tech companies in India are trying to raise capital through their businesses. In that case, the companies are trying to collaborate with the foreign companies so that the investments can be better and customers from the foreign can be attracted. In that situation, foreign direct investment (FDI) can be possible (Sharma *et al.* 2020). According to the view of Cumming *et al.* (2019), it has been seen that the infrastructure and service of the companies in India are getting enhanced and changed as per the needs of the customers. In

that situation, the aspects of the companies are getting more user-friendly for native and foreign customers.

From the activities of the companies in India, it has been observed that the options such as "*Export Oriented Units* (EOU)", "*Software Technology Parks* (STP)", "*Foreign direct investment* (FDI)", and "*Special Economic Zones* (SEZ)" have assisted this industry in achieving a foremost status in the world IT industry. The IT platform in India has supplemented its subsidy to the "*Gross Domestic Product* (GDP)" of India from 1.2% in the year 1998 to nearly about 10% in the year 2019 (Timesofindia.indiatimes.com, 2021). Even Though the Ciovid 19 pandemic succeeded to lower the economic gain, the situation altered after the corporate governance of Indian companies gained a better situation.

V. DISCUSSION

5.1 Summary of the Result
From the result, it can be seen that the financial sectors should enhance their performance for the overall enhancement of the country. The basic strategy of trading is getting changed in the companions in different sectors such as IT, medicine, education and others. According to the view of Sharma *et al.* (2020), it has been seen in recent years, the corporate governance of India has changed and that is a positive influence on the economic growth of the country. Corporate governance has a positive effect even on the organisational performance which is enhancing the service or the products offered by the companies. According to the supposition of Almaqtari *et al.* (2020), it has been witnessed that companies are getting enriched with technological details that can enhance the possibilities of the employment of the inhabitants of the country. The "*Institutional and Foreign Ownership*" and "*Audit and Board Committees*" are getting focused on Indian companies and that is helping them to enhance their financial performance. It has also been seen that the interrelationship among Indian companies is getting strong because of enhanced corporate governance. As opined by Bilz and Wiemann (2021), the scenario that can be highlighted is that corporate governance can highlight the competitive features of the country and this will enhance the position of India in the global market.

5.2 Limitation and Strength
In the corporate platform, there are several constraints and also essential resilience of the establishment. The operational workers and the employers ought to follow the directions of the firm as they should confound the constraints of the corporation. The corporate governance of the country is facing issues regarding the violation of regulations and also the lack of

resources (Meity.gov.in, 2023). The lack of cooperation of the workers can also be a limitation in the flexible dealings in the company. On the other hand, the research that is highlighting this topic lacks a critical analysis of the mitigation strategy for the gap in Indian companies.

5.3 Implication

The corporate platforms must promote the leading long-term significance in their professional domain as the employees of the corporation should be very valuable for this motivation. The most reasonable arrangement must be established in the evolution of the corporation (Timesofindia.indiatimes.com, 2021). The corporate domain also requires constructing a straightforward corporate civilisation as per their need and it also must be constructed with the help of translucency, honour, and consistent vulnerability in the corporation.

VI. CONCLUSION

The corporate governance of the country India may not be the engine or the monitor of economic expansion though it is extremely paramount for the identical position of the motor. From the results, it can be deciphered that TCS Organisation has a "*system of robotics''*. On the other hand, Wipro Association has acquired its borderline revenue anticipation and Infosys Organisation is capable of managing outsourcing favours. Consequently, it is extrapolated that the inclusion of corporate management in the corporate domain in India has enriched its effectiveness. The territory of the institution should be rudimentary for the operational employees in their trade enlargement in the native as well as international competitive market.

REFERENCES

Selected Articles

Sharma, P., Panday, P. and Dangwal, R.C., 2020. Determinants of environmental, social and corporate governance (ESG) disclosure: a study of Indian companies. *International Journal of Disclosure and Governance*, *17*, pp.208-217.

Almaqtari, F.A., Al-Hattami, H.M., Al-Nuzaili, K.M. and Al-Bukhrani, M.A., 2020. Corporate governance in India: A systematic review and synthesis for future research. *Cogent Business & Management*, *7*(1), p.1803579.

Pilz, M. and Wiemann, K., 2021. Does dual training make the world go round? Training models in German companies in China, India and Mexico. *Vocations and learning*, *14*(1), pp.95-114.

Books

Sileyew, K.J., 2019. *Research design and methodology* (pp. 1-12). Rijeka: IntechOpen.

Journals

Abhilash, A., Shenoy, S.S. and Shetty, D.K., 2023. Overview of Corporate Governance Research in India: A Bibliometric Analysis. *Cogent Business & Management*, *10*(1), p.2182361.

Aksar, M., Hassan, S., Kayani, M., Khan, S. and Ahmed, T., 2022. Cash holding and investment efficiency nexus for financially distressed firms: The moderating role of corporate governance. *Management Science Letters*, *12*(1), pp.67-74.

Aksar, M., Hassan, S., Kayani, M., Khan, S. and Ahmed, T., 2022. Cash holding and investment efficiency nexus for financially distressed firms: The moderating role of corporate governance. *Management Science Letters*, *12*(1), pp.67-74.

Almaqtari, F.A., Hashed, A.A., Shamim, M. and Al-ahdal, W.M., 2021. Impact of corporate governance mechanisms on financial reporting quality: a study of Indian GAAP and Indian Accounting Standards. *Problems and Perspectives in Management*, *18*(4), p.1.

Col, B. and Sen, K., 2019. The role of corporate governance for acquisitions by the emerging market multinationals: Evidence from India. *Journal of Corporate Finance*, *59*, pp.239-254.]

Palik, J. and Østby, G., 2023. Interventions to improve refugee children's access to education and quality learning: A scoping review of existing impact evaluations. *International Review of Education*, pp.1-21.

Ruggiano, N. and Perry, T.E., 2019. Conducting secondary analysis of qualitative data: Should we, can we, and how?. *Qualitative Social Work*, *18*(1), pp.81-97.

Scells, H., Zuccon, G. and Koopman, B., 2019, May. Automatic Boolean query refinement for systematic review literature search. In *The world wide web conference* (pp. 1646-1656).

Shahid, M.S. and Abbas, M., 2019. Does corporate governance play any role in investor confidence, corporate investment decisions relationship? Evidence from Pakistan and India. *Journal of Economics and Business*, *105*, p.105839.

Sidhu, M.K. and Kaur, P., 2019. Effect of corporate governance on stock market liquidity: Empirical evidence from Indian companies. *Decision*, *46*(3), pp.197-218.

Singh, K. and Pillai, D., 2022. Corporate governance in small and medium enterprises: a review. *Corporate Governance: The International Journal of Business in Society*, *22*(1), pp.23-41.

Malik, M., Wan, D., Ahmad, M. I., Naseem, M. A., & Rehman, R. U. (2014). Role of board size in corporate governance and firm performance applying Pareto approach, is it cultural phenomena?. Journal of Applied Business Research (JABR), (5), 1395-1406.

Saravanan, P. (2009). Corporate Governance Characteristics and Company Performance of Family Owned and Non-Family Owned Businessess in India. Available at SSRN 1360534.

Wahid, A.S and Welch K. (2017), ―Professionalization of Corporate Board and Its Impact on Governance Quality‖ Journal of corporate finance. Volume 3, pp 189-220.

Wang, W. (2014). Independent directors and corporate performance in China: A meta-empirical study. Available at SSRN 2417078.

EFFECTS OF CORPORATE GOVERNANCE AND RISKS ON VALUE OF SHARES OF FMCG INDUSTRY IN INDIA

[1]Debabrata Banerjee, [2]Indrajit Mondal, [3]Arindam Mukherjee
[1]Visiting faculty, Asansol Engineering College
[2,3]State Aided College Teacher, Raja Peary Mohan College

ABSTRACT

Market value of shares of companies is impacted by the corporate governance of the company. Current research is focused on the ramifications of corporate governance on market value of equity share in accordance with the data of FMCG companies of India taken from the website National Stock Exchange and Money Control. This industry contains 25 companies and the study period starts from April 2017 and ends in March 2022. The present study also explains the reflections of business risk, financial risk on the association between corporate governance and return on equity share as the mediating variables. Business risk, financial risk have been estimated by using Degree of Operating Leverage (DOL) and Degree of Financial Leverage (DFL). A significant effect of business risk can be observed in explaining the affinity between corporate governance and market value of equity share.

Keywords: *Corporate Governance, Business Risk, Financial Risk, Market Risk, Mediating Variables*

I. INTRODUCTION

Corporate Governance works as a shield to protect the shareholders' interests. Stakeholders are those who are directly or directly connected to the company. It is well documented that the financial performance of companies impacts the share price. Although it is thought that share prices incorporate all the available information (Especially semi strong form) but in reality this incorporation of financial performance into share price depends on the practice of CV. It is well documented in the previous studies that too much reliance on the accruals creates over reaction among the investors which creates a negative effect on the share price. So, to measure the effect of earnings surprise on the market value of the share, the good corporate governance implementation should be considered.

The impression of corporate governance on the share price can also be influenced by the risk appetite of the investors. Here risk can be economy specific, industry and firm specific. It can also be the financial risk as well market risk. Therefore, present research is an effort to check

the influence of business risk also financial risk on the association between corporate governance practice and return on share price. For estimation of business risk degree of operating leverage (DOL) has been used and to estimate the financial risk degree of financial leverage (DFL) has been used. There are several variables which can be used as proxy for corporate governance practice among them the of independent directors' percentage in the board has been used. On the basis of the calculations no such significant impact of corporate governance has been seen but a statistically impact of business risk has been observed.

This study has been segregated into the following sections: Section 2 comprises the literature reviews of some relevant works; section 3 defines the collection of data and methodology used in the current research. Section 4 accommodates the empirical outcome of the regression and lastly section 5 culminates the research with some future works.

II. LITERATURE REVIEW

Aggarwal (2013) examined the interrelation between companies' corporate governance and profitability. For this, a sample of 34 non-financial companies, which were listed on NSE during FY 2010-11 to FY 2012-13 were taken. Total 9 variables were considered, out of which 4 were dependent and 5 were independent variables. Dependent variables are actually the company's profitability indicators, these are Return on Assets (ROA), Return on Equity (ROE), Return on Sales (ROS) and Return on Capital Employed (ROCE) and explanatory variables are the corporate governance indicators which are Governance Rating of Firm (GOV), Size of Company (SIZE), Company's Performance along Employees (EMP), Community (COM) and Environment (ENV). For analyzing the relationship, statistical tools like descriptive statistics, multiple regression, correlation and tests of significance (t-test and F-test) were used. Researcher found that corporate governance is positive but insignificantly related to profitability.

Amba, S.K. (2013) investigated the relationship of corporate governance and financial performance of companies in Bahrain. 39 companies out of 49 companies listed in Bahrain during 2010 to 2012 have been selected as samples for this study. 6 corporate governance variables such as CEO Duality, Chairman of Audit Committee, Proportion of Non-executive Directors, Ownership structure, Institutional Investors and 1 financial performance ratio i.e. Gearing Ratio has been regarded for this study. For the analysis of the data, multiple regression analysis techniques have been used. This study brought out that CEO Duality and Proportion of Non-Executive Directors have negative affinity with financial performance and

Chairman of Audit Committee, Section of Institutional Ownership have positive influence on firms' financial performance.

Saravanan (2009) examined how corporate governance impacts financial performance in promoter family controlled and non-promoter family controlled companies in India. For this purpose, a sample of 771 firms out of 4573 firms listed on Bombay Stock Exchange (BSE) during the period 2001 to 2005 is selected using purposive sampling method. 2 independent variables (Corporate Governance Variables) i.e. Board Size and Board Composition and 4 dependent variables (Financial Performance Variables) i.e. Firm Sales, Firm Age, Asset Tangibility, Financial Leverage have been regarded for this study. Data have been examined using multiple regression analysis techniques. This study discovered that the existence of correlation between firm value and board size. This study finally summarized that the firm value is not significantly influenced by the firm's ownership.

Malik et al. (2014) analyzed the association between size of the board of directors and firm's performance of Pakistani commercial banks applying Pareto Approach. For sample of this study, 14 listed Pakistani commercial banks during FY 2008- FY 2012. This study shows a positive and significant relationship between board size and bank performance, signifying large sized board enhances bank performance in the Pakistani scenario.

Chen (2014) investigated the impact of CEO Duality on firm performance of EU listed firms. 56 companies which are listed on EU the top 200 spots of the Global Fortune 500 in the year 2013 were taken as samples for this study. Result of this study states that the effect CEO Duality towards firm performance is insignificant i.e. CEO duality does not influence firm performance much.

Dah et al. (2012) investigated the effects of independent directors towards worth of a firm. Data for this study has been collected from three major databases; CompuStat, ExecuComp and IRRC governance. Data consists of 24,479 observations covering the period between 1996 and 2009. This study identified a significant negative affinity between independent directors and firm value.

Wahid and Welch (2017) examined the association between professionalization of corporate board and governance quality. This study examines the difference between the professional independent directors and other independent directors and then the effect of professional boards on governance quality. Findings of this study recommend that professional boards are linked with weaker governance quality and the impact on financial acts of firms also weak. The study concluded that boards with a low percentage of professional directors on board are more effective compared to the firm with a high presence of professional directors on board.

Wang, W (2014) investigated the significance of board independence on firm performance. For this study, 30 sample articles of existing empirical studies on the affinity between independent directors and firm performance of listed companies in China have been selected. This study discovered that board independence has no significant impact on firm performance. This study concluded that primarily independent directors may play an advisory role but not a monitoring role subject to Chinese listed companies.

III. DATA COLLECTION & METHODOLOGY

This part deals with the collection of data which are used for the study. The type of data used for the study is of secondary. Specified time period of the research is from 01.04.2017 to 31.03.2022. The relevant variables of this study are DOL, DFL, ratio of independent directors of the board and the share price of the selected companies. As a sample for the study, the Indian FMCG belt has been considered, which consists of fifteen companies. The companies along with share price of the companies have been derived from the official website of national stock exchange i.e www.nseindia.com. To calculate the DOL, DFL and ratio of independent directors' data have been collected from the website of moneycontrol and individual annual reports of the company respectively.

To estimate the impact of different risks on the association between corporate governance practice and return on share price a pooled regression as well as random effect model (As the data over different time spans are less than the cross sectional units) has been used. Here stock return has been estimated by taking logarithm and making a first difference. The business risk has been estimated by using degree of operating leverage, financial risk has been estimated by using degree of financial leverage. To estimate the corporate governance practice the portion of independent directors in the board has been calculated. The regression is run by using Eviews 8 statistical software.

IV. EMPIRICAL RESULTS

Table 1 contains the six different types of regression results. It is being easily seen that inclusion of only DFL reduces the predictability of the model. The augmentation of both DOL and DFL makes the model better by observing adjusted R^2 values. But surprisingly whenever DFL is excluded, the predictability of the model increases rapidly, which clearly shows that business risk to some extent can discuss the association between corporate governance practice and market return on share. The insignificant results of DFL and ID lead to another finding and that is, the corporate governance and financial risks are incorporated

into the share price which makes it difficult to earn abnormal profit by using only this relationship.

Table 1: Results of regression equations

Details	C	ID	DOL	DFL
Panel A (Pooled excluding DFL)				
Coefficients (p-values)	0.410897 (0.0249)	- 0.105412 (0.6633)	- 0.105285 (0.0329)	
Adjusted R^2: 0.041878				
Panel B (Pooled excluding DOL)				
Coefficients (p-values)	0.053209 (0.9748)	0.041773 (0.8632)		0.063451 (0.9693)
Adjusted R^2: - 0.031703				
Panel C (Pooled with both DOL & DFL)				
Coefficients (p-values)	0.187930 (0.9086)	- 0.109556 (0.6560)	- 0.105587 (0.0340)	0.219735 (0.8910)
Adjusted R^2: 0.026473				
Panel D (Random Effect with both DOL & DFL)				
Coefficients (p-values)	0.178990 (0.9049)	- 0.052471 (0.8140)	- 0.089703 (0.0439)	0.169083 (0.9086)
Adjusted R^2: 0.276585				
Panel E (Random Effect excluding DOL)				
Coefficients (p-values)	0.105987 (0.9435)	0.082193 (0.6994)		- 0.006928 (0.9962)
Adjusted R^2: 0.232877				
Panel F (Random Effect excluding DFL)				
Coefficients (p-values)	0.349922 (0.0346)	-0.048221 (0.8260)	-0.089411 (0.0436)	
Adjusted R^2: 0.288881				
Note: Panel A to Panel C are showing results of pooled regression and Panel D to Panel F are showing Random effect model. The regression model is $Ln\_Return_{it} = c + \alpha_1 ID_{it} + \alpha_2 DOL_{it} + \alpha_3 DFL_{it} + \varepsilon_{it}$ where c means constant, ID means independence of directors, DOL means degree of operating leverage, DFL means degree of financial leverage and Ln_Return represents the log return of share price. P-values are contained in parenthesis. The results are computed and compiled by using Eviews 8 software.				

V. CONCLUSION AND FURTHER RESEARCH

The present research has concentrated on the effect of different types of risks on the association between corporate governance and share price return. Combining the results, it can be easily said that the business risk significantly influences the relationship of corporate governance practice and share price return. But unfortunately the effect of corporate

governance practice is not observed to be significant. So, different variables of corporate governance can be collected and they can be combined to create an index which will impact the return and for estimating the risk the Gini's coefficient of concentration can be used. It will be an interesting topic of future research.

REFERENCES

Aggarwal, P. (2013). Corporate governance and corporate profitability: Are they related?–A study in Indian context. International Journal of Scientific and Research Publications, 3(12), 1-8.

Amba, S. M. (2014). Corporate governance and firms' financial performance. Journal of Academic and Business Ethics, 8(1), 1-11.

Chen, H. (2014). CEO duality and firm performance: an empirical study of EU listed firms (Bachelor's thesis, University of Twente).

Dah, A., Beyrouti, N., & Showeiry, M. (2012). The effect of independent directors on firm value.

Malik, M., Wan, D., Ahmad, M. I., Naseem, M. A., & Rehman, R. U. (2014). Role of board size in corporate governance and firm performance applying Pareto approach, is it cultural phenomena?. Journal of Applied Business Research (JABR), (5), 1395-1406.

Saravanan, P. (2009). Corporate Governance Characteristics and Company Performance of Family Owned and Non-Family Owned Businessess in India. Available at SSRN 1360534.

Wahid, A.S and Welch K. (2017), ―Professionalization of Corporate Board and Its Impact on Governance Quality‖ Journal of corporate finance. Volume 3, pp 189-220.

Wang, W. (2014). Independent directors and corporate performance in China: A meta-empirical study. Available at SSRN 2417078.

FINANCIAL HEALTH ANALYSIS OF LEADING AUTOMOBILE COMPANIES WITH RESPECT TO RATIO ANALYSIS

[1]Jyoti Agarwal, [2]Purnima Kumari Ojha, [3]Nazya Parween, [4]Priyanka Mondal, [5]Priyanka Kanjilal

[1, 2, 3, 4] Student, Asansol Engineering College, Paschim Bardhhaman, West Bengal, India
[5] Assistant Professor, Asansol Engineering College, Paschim Bardhhaman, West Bengal, India

_____

ABSTRACT

Financial health analysis is the process of assessing a person's, a company's, or an organization's financial standing to ascertain their capacity to pay debts and reach financial objectives. To comprehend the organization's financial performance and position, the procedure entails a careful analysis of financial statements such as income statements, balance sheets, and cash flow statements.

An evaluation of the organization's financial health and the identification of potential improvement areas are the two main objectives of the analysis. Analysis of a company's financial health is especially important since it aids in decision-making regarding investments, cash flow, and debt management.

The acquisition of financial data, examination of financial statements, identification of financial ratios, and interpretation of financial outcomes are some of the main processes in the financial health analysis process. Gathering financial information is the initial phase, which can be done using financial statements or other documents like tax returns or bank statements. The financial statements are examined once the data has been gathered to find trends and patterns in the financial performance over time.

Keywords: *Financial health, Automobile companies, Ratio Analysis, comprehensive assessment, identify growth opportunities.*

I. INTRODUCTION

Then, financial ratios including liquidity ratios, profitability ratios, and solvency ratios are calculated to give a quantitative assessment of financial performance. To put these ratios into context and pinpoint areas where the business might be underperforming, they are compared to industry benchmarks or historical patterns.

The interpretation of results is the last phase in the financial health analysis procedure. This entails evaluating the company's entire financial situation, identifying its strong and weak points, and offering suggestions for improvement.

A financial plan, financial objectives, and strategic financial decisions can all be made using the outcomes interpretation.

In conclusion, financial health analysis is a crucial step in determining how well-off a person, company, or organization is financially. It offers useful insights into financial performance and position and aids businesses in making wise investment, cash flow, and debt management decisions. Gathering financial information, analyzing financial statements, identifying financial ratios, and interpreting financial results are only a few of the process' essential tasks. Organizations can improve their financial performance and reach their financial objectives by regularly conducting financial health analyses.

Calculating ratios from financial data is one of the most popular methods of analysis in

Many companies extend credit to their customers. The funds received from sales may therefore be postponed for some time. It is helpful for businesses with big receivables balances to measure days sales outstanding (DSO), which enables them to determine how long it takes to convert a credit sale into cash. An essential component of a business' overall cash conversion cycle is the average collecting period.

One of the most important aspects of corporate financial research is extrapolating a company's historical performance, such as net earnings or profit margin, into an estimate of the company's future success. This type of historical trend study can be used to identify seasonal tendencies.

For instance, stores may see a significant rise in sales in the months leading up to Christmas. This enables an analyst outside of the company to undertake an analysis for investment reasons in investment finance. Analysts have a choice between a top-down and bottom-up investment strategy. A top-down strategy starts by looking at macroeconomic opportunities, such as high-performing industries, and then digs deeper to identify the top businesses inside those industries. From here, they conduct additional research on the stocks of certain businesses in order to select those that may succeed. On the other hand, a bottom-up strategy focuses on a particular business and does a ratio analysis similar to those used in corporate financial analysis, looking at previous performance and anticipated future performance as investment indications. Bottom-up investment requires investors to prioritize taking into account microeconomic concerns. A

company's overall financial health, an examination of its financial accounts, the goods and services it offers, supply and demand, and other specific measures of its performance through time are some of these variables.

Calculating and understanding various financial ratios obtained from the company's financial statements is the task of ratio analysis. Ratios shed light on the financial performance, effectiveness, liquidity, solvency, and profitability of the organization.

Here are some crucial ratios for assessing financial health: Liquidity Liquidity ratios: These ratios assess a company's capacity to pay short-term obligations. Saturation Ratios: Solvency ratios evaluate a company's capacity to service its long-term debt. Efficiency Ratios: Efficiency ratios quantify the efficiency with which a business generates money from the use of its resources. Ratio analysis makes it possible to compare a company's financial performance over time and to industry benchmarks in a meaningful way. It aids in identifying advantages, disadvantages, patterns, and possible areas for development.

Third Statement of the Issue

Any industry's overall success is dependent on a number of elements, including financial, personnel, technology, excellence. According to this study, "financial health" refers to a company's current status in terms of profitability, solvency, and efficiency. This study mostly examines financial statements.

In this regard some require to solve these research question

➢ What is the profitability position of the select automobile companies?
➢ What is the solvency position of the select automobile companies?
➢ How much efficiency hold by the select automobile companies?

II. OBJECTIVES OF THE STUDY

➢ To evaluate the financial health of the company
➢ To compare the financial position before and after pandemic
➢ To comparative analysis between leading automobile companies

III. RESEARCH METHODOLOGY

➢ This research used secondary data Profit and loss account. balance sheet, income statement of the 5 leading automobile companies from the website and journals and use the Tool Ratio analysis for finding out the financial health of those companies and comparing them.

IV. TOOLS USED FOR ANALYSIS

➢ The data analysis was done using Ratio Analysis

V. SAMPLE SIZE

➢ Five leading companies are taken for this study Ashok Leyland's, Maruti Suzuki, Tata Motors, Bajaj Auto Limited, Force Motors

VI. FINDINGS

➢ Liquidity Ratios: Ashok Leyland's current ratio, which measures the company's ability to pay itsshort-term obligations, was 1.48 in FY21, indicating a satisfactory liquidity position.

➢ Profitability Ratios: The company's return on equity (ROE) was 2.61% in FY21, indicating arelatively low profitability level.

➢ Solvency Ratios: Ashok Leyland's debt-to-equity ratio, which measures the company's leverage,was 0.73 in FY21, indicating a moderate level of debt.

➢ Efficiency Ratios: The company's inventory turnover ratio, which measures how efficiently the company manages its inventory, was 6.29 in FY21, indicating an efficient inventory management.

➢ Liquidity Ratios: Tata Motors current ratio, which measures the company's ability to pay its short-term obligations, was 2.47 in FY21, indicating a satisfactory liquidity position.

➢ Profitability Ratios: The company's return on equity (ROE) was 2.61% in FY21, indicating arelatively low profitability level.

➢ Solvency Ratios: Ashok Leyland's debt-to-equity ratio, which measures the company's leverage,was 0.73 in FY21, indicating a moderate level of debt.

➢ Efficiency Ratios: The company's inventory turnover ratio, which measures how efficiently the company manages its inventory, was 6.29 in FY21, indicating an efficient inventory management.

➢ Maruti Suzuki is a leading manufacturer of passenger cars in India. In the fiscal year 2021, thecompany reported total revenue of INR 80,000 crores and a net profit of INR 5,500 crores.

➢ Liquidity Ratios: Maruti Suzuki's current ratio was 3.31 in FY21, indicating a satisfactory liquidityposition. Profitability Ratios: The company's return on equity (ROE) was 14.63% in FY21, indicating agood profitability level.

➢ Solvency Ratios: Maruti Suzuki's debt-to-equity ratio wasb 0.04 in FY21 indicating a low levelof debt.

➢ Efficiency Ratios: The company's inventory turnover ratio was 0.19 in FY21, indicating anefficient inventory management.

➢ Overall, Maruti Suzuki's financial performance was good in FY21, with a satisfactory

liquidity position, low debt levels, efficient inventory management, and a good profitability level.

➢ Liquidity Ratios: Bajaj Auto's current ratio

VII. CONCLUSION

The financial analysis research on the Indian automobile industry has given important insights into the performance and financial health of significant enterprises in the sector. We have gotten a thorough grasp of the financial stability, profitability, liquidity, and efficiency of these organizations through the examination of financial statements, ratio analysis, and interpretation of important financial indicators. According to the study, India's automotive industry has grown significantly over the past several years as a result of factors including rising demand, supportive government regulations, technical improvements, and strong supply chain networks. The financial analysis of companies like Ashok Leyland, Tata Motors, Maruti Suzuki, Bajaj Auto Limited, Force Motors, Eicher Motors, and Atul Auto has highlighted their strengths, weaknesses, and areas for improvement. The analysis demonstrated the value of assessing the financial health of an organization in assessing its overall performance and potential dangers. We were able to determine whether the businesses could handle their financial responsibilities, earn a profit, control their liquidity, and make defensible judgments about investments, growth, and financial strategy. The initiative also provided insight into the potential future applications and prospects for financial health analysis in the automotive industry. The accuracy, speed, and efficacy of financial health assessments can be further improved by developments in data analytics, real-time monitoring, industry-specific metrics, ESG integration, international standards, and visualization approaches. These developments will empower stakeholders to take well-informed decisions, spot new dangers and possibilities, and promote long-term expansion of the automotive industry. Finally, the project's financial study has offered . It has made it possible for stakeholders to navigate the competitive and dynamic environment successfully by identifying potential risks and opportunities. The research has also demonstrated the value of ratio analysis, trend analysis, and benchmarking methods for comprehending organizations' financial positions and assessing their performance in comparison to industry benchmarks. The Indian automobile industry is expected to continue growing and changing in the future. The study has provided insight into the potential application of financial analysis by recommending the incorporation of cutting-edge data analytics, real-time monitoring, metrics relevant to the industry, ESG aspects, global standards, and improved visualization and reporting. These developments will make it possible to conduct

more thorough, fast, and accurate financial analyses, assisting stakeholders in making informed choices and promoting the long-term expansion of the automotive sector. The financial analysis project's conclusion

VIII. LIMITATION OF THE STUDY

It is crucial to be aware of any restrictions when performing the research as they might affect the conclusions and interpretations. These restrictions consist of:

Because the study is based on historical data, it is necessary to rely on that data. The analysis's applicability and accuracy may be impacted over time by changes in economic conditions, industry dynamics, and company-specific factors.

Particularly when working with information that is made available to the public, the availability and accuracy of financial data can vary. The accuracy of our study and findings may be impacted by difficulties obtaining trustworthy and current financial statements.

Ratio analysis relies on skewed calculations and presumptions, which might not fully account for the complexities and nuances of a business's operations. Additionally, it may be difficult because different industries may have different standards and benchmarks.

IX. FUTURE SCOPE OF THIS STUDY

Understanding how to evaluate a company's financial stability, profitability, efficiency, and liquidity has been made possible thanks to research on financial health analysis. It is critical to investigate the future scope of this study in order to uncover prospective breakthroughs and opportunities as financial landscapes change and new difficulties materialize. The prospective future prospects and growth areas for financial health assessments are covered in this section.

With the development of technology, there is a lot of promise for merging big data analytics, artificial intelligence, and machine learning into financial health analysis. By utilizing enormous datasets, recognizing complicated patterns, and producing in-the-moment insights, these strategies can improve the accuracy, speed, and depth of research. Advanced decision-making, risk analysis, and predictive modeling can all be made possible by integrating such advanced analytics. the upcoming. Incorporating ESG factor into financial health analysis is gaining prominence. while environmental, social, and governance factors are taken into account while assessing financial performance, a full picture of a company's sustainability and long-term viability is produced.

REFERENCES

Houston, J. F., Brigham, E. F. (2018). Cengage Learning's Fundamentals of Financial Management.

2019; Palepu, K. G.; Healy, P. M.; and Peek, E. Financial statements are used in business analysis and valuation. Cengage Education.

(2017) Gibson, C. H. Cengage Learning, "Financial Reporting & Analysis: Using Financial Accounting Information."

Amir Damodaran (2012). Investment Valuation: Methods and Tools for Estimating Any Asset's Value. Wiley & Sons, Inc.

S. H. Penman (2013). Analysis of financial statements and security valuation. McGraw-Hill Learning.

K. R. Subramanyam, J. Wild, and others (2019). Analysis of financial statements. McGraw-Hill Learning.

Reeve, J. M., Duchac, J., & Warren, C. S. (2018). Managerial and Financial Accounting. Cengage Education.

Healy, P. M., Bernard, V. L., and Peek (2019). Palepu, K. G. IFRS Edition of Business Analysis and Valuation. Cengage Education.

H. Bhattacharya 2020. Analysis of Financial Statements

Web resource: Rediffmoney.com Individual company website.

INITIAL PUBLIC OFFERINGS IN INDIA: CONCEPT AND REGULATORY FRAMEWORK

Soumali Bose

Assistant Professor, Department of Business Administration, the Bhawanipur Education

ABSTRACT

One of the most significant and most researched decisions in corporate finance is whether to go public. Unlisted corporations may use the primary market to issue shares through initial public offerings. Through IPOs, many Indian companies have gone public. These businesses have the chance to grow, diversify, and expand with stronger long-term business prospects. The public has shown a great deal of interest in initial public offerings (IPOs). The economic economy can mobilize resources if the IPO market is working properly. The economy may not mobilize resources in the best way possible as a result of IPO valuation and pricing distortions. Given the economic importance of the IPO market, India has established a regulatory framework consisting of laws and guidelines. A growing volume of literature on Initial Public Offerings (IPOs) by Indian firms has sought to explain the efficiency of pricing and the post issue performance of companies that make IPOs, in terms of institutional features of the securities market or certain features of the issuers. The paper also tries to relate the changes in the profile of the issuers to certain regulatory developments which may have been intended to influence those attributes of issuers and issuances. The observations in this paper provide useful pointers to further research which may unravel the working of the Indian IPO market better.

Keywords: *Initial Public offer, Listing, Public Issues, Secondary Market, Securities and Exchange Board of India*

I. INTRODUCTION

The "Primary Market" and the "Secondary Market" are embodied in the capital market. The new issuers (primary market) and stock (secondary market) markets are two interdependent and close-knit areas of the capital market. Corporates looking to raise capital through the initial sale of shares or debt should go to the new issues market. Since investors in the primary market are assured of a continuous market where they have the opportunity to liquidate their interests, a vibrant secondary market promotes the expansion of the primary market and capital formation. A company can raise money in the primary market through a private placement, rights issue, or initial public offering. An Initial Public Offer (IPO) is the selling of securities to the public in the primary market. It is the largest source of funds with

long or unlimited maturity for the company. An IPO is a crucial development stage for a company. It allows a business to obtain capital through the public capital market. An IPO also significantly boosts a company's reputation and exposure.

II. SCOPE OF THE STUDY

The study entails a detailed description of Initial Public Offerings (IPO) in India, its process, eligibility Norms, Application procedure to understand the procedure of IPOs in India. The Paper also aims to understand the Legal framework prevalent in India for IPOs, so as to comprehend the Laws relating to IPO issues in India for corporates.

III. REVIEW OF LITERATURE

Worldwide, there have been two significant anomalies with regard to IPO literature: medium-to long-term post-listing underperformance and listing day underpricing. It is referred to as "underpricing" of IPOs when the closing price on the listing day is significantly higher than the issue price. One of the topics that has received the most attention in international financial literature over the past two decades is the underpricing of initial public offerings (IPOs). The widespread assumption is that IPOs are typically priced lower than their first day closing price, making it one of the most extensively studied and discussed topics in the field of financial economics. IPO underpricing, or the difference between the offer price and the market price once trading has begun, is the primary metric used in this study, as it is in the majority of worldwide IPO studies. For issuers and investors, pricing issues close to the market price is reasonable. When compared to fixed price IPOs, book-built IPOs have been found to have lower underpricing. When underwriters have influence over share allocations, this advantage is more obvious. The data are in line with the body of scholarly research that highlights the advantages of book building. The review of literature has been divided into two parts. First part deals with listing day underpricing and second part deals with long run performance. The signaling theory, according to which high-quality businesses underpriced their IPOs to convey their quality, was supported by the findings of Hameed and Lim (1998). Garfinkel (1993), however, shown via reports of IPO underpricing, that underpricing is not an indicator of the caliber of the issuing company. The "herding" argument put out by Welch in 1992 explains why IPOs are underpriced. The hypothesis states that initial public offerings (IPOs) hit the market in order, and later prospective investors base their judgments on what previous investors bought. In India, Narasimhan and Ramana (1995) found critical undervaluing of Indian Initial public offerings steady with worldwide perceptions. Concentrate on additionally uncovered that superior issues are undervalued than standard issues. Endeavoring to distinguish the causal factors liable for undervaluing of Indian Initial

public offerings, Chaturvedi, Pandey, and Ghosh (2006) found that the degree of oversubscription of an Initial public offering decides the primary day gain; flags that lead to oversubscription are market file during the time of Initial public offering, type and nature of business, unfamiliar cooperation, or the history of advertisers/organization. Garg, Arora, and Singla (2008) additionally recorded that Indian Initial public offerings are altogether undervalued and noticed that the degree of undervaluing doesn't fluctuate a lot of in the hot and cold Initial public offering market. Concentrating on book-constructed and fixed-value Initial public offerings in India, Bora, Adhikary, and Jha (2012) found undervaluing of 21.42% for fixed-value Initial public offerings and 18.22% for book-assembled Initial public offerings. Be that as it may, when adapted to advertise development, the relating figures are 16.71 and 16.75, individually. Einar (2015) utilizing an example of in excess of 5,000 Initial public offerings, recorded huge strange returns up towards 5% (barring Starting Day Returns) during the primary long periods of exchanging. These unusual returns are more noteworthy and more relentless in the event that general economic situations are solid, supporting a limited levelheadedness clarification. Madhusoodanan and Thiripalraju (1997) concentrated on both short run and long run execution of Indian Initial public offerings taking an example of 1922 Initial public offerings that opened up to the world somewhere in the range of 1992 and 1995. This study announced undervaluing of Indian Initial public offerings predictable with worldwide discoveries. Over the long haul, Indian Initial public offerings offered positive returns which went against the greater part of the global discoveries. Utilizing an example of 438 Initial public offerings that opened up to the world between June 1992 and Walk 2001, Sehgal and Singh (2007) found that the long run returns have been negative somewhere in the range of 18 and 40 months of holding while CAAR displayed the presence of underperformance in the second and third years.

IV. OBJECTIVES OF THE STUDY

The objectives of the Study are as follows:

1. To understand the conceptual framework of Initial Public Offerings in India.

2. To discuss the Legal Framework of IPOs in India.

V. CONCEPTUAL FRAMEWORK

Initial public offering represents first sale of stock. At the point when an organization, issues Offers interestingly to the overall population through the Essential Market, is known as Introductory Public Deal. An essential market, is otherwise called New Issues Market, it prepares for posting of the organization shares and is accessible for exchanging in the stock

exchange. Dutch East India Organization was the main organization to offer Initial public offering in 1602.

Public Issue Mechanism

With free pricing of issues coupled with an increasing trend towards equity financing by companies, more and more companies are entering the capital market for funds resulting in a great scope for merchant banking services. However, there are three types of pricing of public issues in India, namely (i) Fixed price method, (ii) Book-Building method and (iii) Pure Auction method.

The Fixed Price Method

Fixed pricing of public issues is one where company and BRLM fix a price in advance (called fixed price). In other words, the price will be set by the issuer in consultation with the merchant banker prior to the offer and allocation in a fixed price offer. The securities are offered to the investors through a detailed statement of terms and conditions known as prospectus. The issue by prospectus method is adopted when the company desires to issue fixed number of securities at a fixed price (which may be equal to, less than or more than the face value).

Book-Building Method of IPO

According to this method, share prices are determined on the basis of real demand for the shares at various price levels in the market. Book Building is a process of Price discovery used in public offers. Book Building is a process of Price discovery used in public offers. The issuer sets base price and a band within which the investor is allowed to bid for shares, the investor has to bid for a quantity of shares he wishes to subscribe to within this band. The upper price band can be maximum of 120% of the floor price. Further an Order Book, in which the investors can state the quantity of the stock they are willing to buy, at a price within the band is built. Thus, the term "Book- Building". Public issue may be open within 12 months from the date of issuance of the observation letter by SEBI, if any, or within 3 months of Expiry from 31st day from the date of filing of draft offer document with SEBI, if no observation letter is issued. A public issue must be kept open for at least 3 working days but not more than 10 working days including the days for which the issue is kept open in case of revision in price band. In case the price band in a public issue made through the book building process is revised, the bidding (issue) period disclosed in the Red Herring Prospectus should be extended for a minimum period of 3 working days.

Minimum Number of Share Application and Lot Size: The minimum application value shall be within the range of   Rs. 10,000 to Rs. 15,000. The issuer company, shall stipulate the

minimum application size (in terms of number of specified securities) falling within the aforesaid range of minimum application value and make upfront disclosures in this regard, in the offer document.

Determination of Cut-off price

Once the issue period is over and the book has been built, the BRLM along with the issuer arrives at a cut-off price. The cut-off price is the price discovered by the market. It is the price at which the shares are issued to the investors and Investors bidding at a price below the cut-off price are ignored. The cut-off price is arrived at by the method of Dutch Auction. In a Dutch Auction the price of an item is lowered, until it gets its first bid and then the item is sold at that price. Let us say a company wants to issue One million Shares. The floor price for one share of Face Value Rs. 10, is Rs. 48 and the Band is between Rs. 48 and Rs. 55. At Rs. 55, on the basis of the Bids received, the investors are ready to buy 2,00,000 shares. At Rs. 54, investors are ready to buy 4,00,000 shares. So, if Cut-off price is set at Rs. 54, then 6,00,000 shares will be sold. At Rs. 53 investors are ready to buy 4,00,000 shares. Now if the Cut-off price is set at Rs. 53, all 1 million shares will be sold. The minimum subscription to be received in an issue should not be less than ninety percent of the offer through offer document.

Application Supported by Blocked Amount

SEBI has introduced a supplementary process of applying in public issues, viz., the "Applications Supported by Blocked Amount (ASBA)" process. ASBA is an application containing an authorization to block the application money in the bank account, for subscribing to an issue. The ASBA process is available in all public issues made through the book building route. SEBI has made it mandatory for all investors to pay for the shares via ASBA, an IPO applicant's account doesn't get debited until shares are allotted to them. For investors who have been allotted the shares, their accounts will be debited according to the number of shares they have been allotted. This eliminates the task of issuing refunds to investors who have been left out.

Green Shoe Option

Green shoe option allows companies to intervene in the market to stabilize share prices during the 30-day stabilization period immediately after listing. Green shoe is a kind of option which is primarily used at the time of IPO or listing of any stock to ensure a successful opening price. The option is a clause in the underwriting agreement, which allows the company to sell additional shares, usually 15 per cent of the issue size (in case of IPO), to the public if the demand exceeds expectations and the stock trades above its offer price. The

underwriters are allowed to sell 15% more shares than the number of shares they originally agreed to sell, but the option must be exercised within 30 days of the offering. The underwriters, can exercise the overallotment option if the demand for the shares exceeds the expected demand and the sale price is significantly higher than the offer price. On the other hand, if the price is dipping, they buy back shares from the public, this option helps stabilize the pricing of the share without incurring any loss to the investors.

VI. REGULATORY FRAMEWORK FOR IPOS IN INDIA

SEBI (Issue of Capital and Disclosure Requirements) Regulations, 2018

It is important for Firms who wish to list on the stock exchanges of India, to comply and conform to the Listing and continued listing requirements under the uniform listing agreement, the SEBI (Issue of Capital and Disclosure Requirements) Regulations, 2018, amended as the ICDR Regulations and SEBI (Listing Obligations and Disclosure Requirements) Regulations, 2015, amended as the Listing Regulations. Indian regulatory framework, does not recognise the idea of dual listing.

Listing Requirements

Any corporate issuing shares through IPO must conform to the independent requirements of the relevant stock exchange on which it intends to list its stock, as well the eligibility norms laid down by SEBI in the ICDR Regulations and the Listing Requirements. The corporate also has to comply with the Companies Act, 2013 along with Securities Contract (Regulations) Act, 1956 and the Securities Contract (Regulation) Rule, 1957, as occasionally amended, as well as foreign investment laws in India.

Eligibility Norms for IPO in India

An unlisted company can make an initial public offering (IPO) of equity shares or any other security only if it meets all the following conditions:

• The company has net tangible assets of at least Rs. 3 crores in each of the preceding 3 full years (of 12 months each), of which not more than 50% is held in monetary assets.

• The company has a minimum average pre-tax operating profit of rupees fifteen crore, consolidated basis, during the three most profitable years out of the immediately preceding five years

• The company has a net worth of at least Rs. 1 crore in each of the preceding 3 full years (of 12 months each)

•   The aggregate of the proposed issue and all previous issues made in the same financial year in terms of size, does not exceed five (5) times its pre-issue net worth as per the audited balance sheet of the last financial year

•   In case the company has changed its name within the last one year, at least 50% of the revenue for the preceding 1 full year is earned by the company from the activity suggested by the new name.

Prospectus

"Draft Red Herring Prospectus" is   a prospectus, which does not have details of either price or number of shares being offered, or the amount of issue. Only on completion of the bidding process, the details of the final price are included in the offer document. The offer document filed thereafter with ROC is called a Prospectus. Prospectus means an "Offer Document" in case of a public issue or offer for sale. Prospectus is an offer document in case of a public issue, which has all relevant details including price and number of shares or convertible securities being offered. This document is registered with ROC before the issue opens in case of a fixed price issue and after the closure of the issue in case of a book-built issue. Abridged prospectus is an abridged version of offer document in public issue and is issued along with the application form of a public issue. It contains all the salient features from the prospectus. Issue of Advertisement: Advertisement includes:

•   Notices, brochures, pamphlets, circulars,

•   Catalogues,

•   Hoardings, billboards

•   Insertion in newspapers, pictures, films,

•   Cover pages of offer documents or any other print medium radio, television programs through any electronic medium

Appointment of Lead Manager

Every Public Offer through the Book-Building process has a Book Running Lead Manager (BRLM), a Merchant Banker who manages the Issue. As per SEBI Guidelines, it is mandatory that all public issues should be managed by Merchant Bankers in the capacity of Lead Manager's. Only in the case of Right Issues not exceeding Rs. 50 lakh, such an obligation is not necessary. The Number of Lead Managers to be appointed by a company depends upon the size of the Issue.

Appointment of Lead Managers

Sl. No.	Size of the Issue	Maximum Number of Lead Managers
1	Less than Rs. 50 crore	2
2	Rs. 50 crore to Rs. 100 crore	3
3	Rs. 100 crore to Rs. 200 crore	4
4	Rs. 200 crore to 400 crore	5
5	Above 400 crore	5 or more as prescribed by SEBI

Investor Categories in an IPO

Investors are broadly classified under following categories:

• Retail Individual Investors (RIIs): 'Retail individual investor' means an investor who applies or bids for securities of or for a value of not more than Rs. 2,00,000.

• Non-Institutional Investors (NIIs): All applicants, other than QIBs or individuals applying for more than Rs. 2,00,000 are considered as NIIs. Typically, this category includes High Net Worth Individuals (HNIs) and corporate bodies.

• Qualified Institutional Buyers (QIBs); QIBs are those institutional investors who are perceived to possess expertise and the financial strength to evaluate and invest in the capital markets. All the public financial institutions, commercial banks, foreign portfolio investors, mutual funds etc. apply under these categories.

In case of Non-Profitable Companies, the QIB Quota is set higher at 75%

• 15% for NIIs and 10% for Retail Investors

• The quota system is meant to ensure that if an IPO does not get sufficient bids from the bigger players, it fails to go through.

Anchor Investor:

The investors who are a Qualified Institutional Buyer and are making an application for investing 10 crores or more through the book building process fall under this category. Up to 60% of the QIB category can be allocated to Anchor Investors. The issue price for Anchor Investors is decided separately. The minimum application size for Anchor Investors is 10 Crores and merchant bankers, promoters and direct relatives of them can't apply under this category, they are not eligible to bid at the cut off price.

Promoter's Contribution:

'Promoter Group' includes the promoter, an immediate relative of the promoter (i.e., any spouse of that person, or any parent, brother, sister or child of the person or of the spouse) In case promoter is a body corporate, a subsidiary or holding company of that body corporate;

anybody corporate in which the promoter holds 10% or more of the equity capital. Promoter's Contribution and Lock-in. In case of an IPO/FPO, the promoters have to necessarily offer at least 20% of the post issue capital. In case of public issues by listed companies, the promoters shall participate either to the extent of 20% of the proposed issue or ensure post-issue shareholding to the extent of 20% of the post-issue capital. In case of any issue of capital to the public the minimum contribution of promoters shall be locked in for a period of three years, both for an IPO/FPO and public issue by listed companies. In case of an IPO/FPO, if the promoters' contribution in the proposed issue exceeds the required minimum contribution, such excess contribution shall also be locked in for a period of one year.

VII. FINDINGS

IPOs are significant as they are regarded as the barometer of the health of the capital market. A single bad IPO can create considerable market disruptions and stall the plans of other firms that want to go public.

•　　Relatedly, an important reason for ensuring a smoothly functioning IPO market is to manage investor frenzy. IPOs are closely watched by investors and the media.

•　　Overheated IPO markets could result in cascades in which enthusiastic investors overbid for IPOs, create bubbles, and ride them out. The subsequent correction of bubbles and the distorted real investments induced by wrong price signals could create negative externalities for the real economy.

•　　From a policy perspective, the key issue in ensuring a healthy IPO market is how to enable an environment where IPOs can be reasonably priced. Fair pricing ensures that firms sell instruments at acceptable prices, and investors get appropriate risk-adjusted returns. Thus, a main focus of IPO regulations is to mitigate information gaps between firms and investors. Regulators facilitate this through policies to increase the quality of pre-IPO disclosures and by specifying mechanisms by which firms can make IPOs.

VIII. CONCLUSION

India has tested a number of IPO techniques. Issuers have a choice between the fixed price and book building strategies beginning in September 1999. Prior to the offer date, fixed price offers fix the IPO pricing with no room for adjustment. Share allocations are based on the quantity offered. The underwriters distribute shares via book building techniques, and the distributions are not need to be proportionate. In the Indian market, there have been several variations of book building over the years. For instance, even in "book-built" IPOs, the underwriters' control over allocations was removed in November 2005. In 2009, the possibility of having "anchor" investors in the initial stage before the public offering was

added to book building. Recently, a platform specifically for small businesses looking to go public was established. Additionally, in 2007, the Securities and Exchange Board of India (SEBI) mandated that businesses get IPO "grades" from unbiased rating agencies. With a view to reducing reliance on credit rating agencies, the Financial Stability Board recommended that IPO grading be made optional in December 2013. An intriguing policy topic is whether requiring issuers to receive IPO ratings is advantageous.

REFERENCES

1.   Lowry, M., & Murphy, K. J. (2007). Executive stock options and IPO under-pricing. Journal of Financial Economics, 85(1),39–65. https://doi.org/10.1016/j.jfineco.2006.05.006.

2.   Lowry, M., & Shu, S. (2002). Litigation risk and IPO under-pricing. Journal of Financial Economics, 65(3), 309–335.https://doi.org/10.1016/S0304-405X (02)00144-7.

3.   Michaely, R., & Shaw, W. H. (1994). The pricing of initial public offerings: Tests of adverse-selection and signalling theories. Review of Financial Studies, 7(2), 279–319. https://doi.org/10.1093/rfs/7.2.279.

4.   Aggarwal, R., Leal, R., & Hernandez, L. (2007). The Aftermarket Performance of Initial Public Offerings in Latin America. Financial Management, 22(1), 42-53. https://doi.org/10.2307/3665964

5.   Bubna, A. & Prabhala, N.R. (2014). Anchor investors in IPOs, NSE-NYU Stern Working Paper. (Available at: http://www.nseindia.com/research/ content/BS4.pdf).

6.   Madhusoodanan, T. P., & Thiripalraju, M. (1997). Under-pricing in initial public offerings: The Indian evidence. Vikalpa,22(4), 17–30 https://doi.org/10.1177/0256090919970403.

7.   Sehgal, S., & Singh, B. (2007). The initial and after-market performance of Indian IPOs. The ICFAI Journal of Applied Finance, 13(11), 16–36.

8.   Gompers, P. A., & Lerner, J. (2003). The really long-run performance of initial public offerings: The pre-Nasdaq evidence. The Journal of Finance, 58(4), 1355–1392. https://doi.org/10.1111/1540-6261.00570.

9.   Brav, A., Geczy, C., & Gompers, P. A. (2000). Is the abnormal return following equity issuances anomalous? Journal of Financial Economics, 56(2), 209–249.https://doi.org/10.1016/S0304-405X(00)00040-4.

10.   Page, M. J., & Reyneke, I. (1997). The timing and subsequent performance of initial public offerings (IPOs) on the Johannesburg stock exchange. Journal of Business Finance & Accounting, 24(9&10), 1401–1420.https://doi.org/10.1111/jbfa.1997.24.issue-9&10

11. Carter, R. B., Dark, F. H., & Singh, A. K. (1998). Underwriter reputation, initial returns, and the long-run performance of IPO stocks. The Journal of Finance, 53(1), 285–311.https://doi.org/10.1111/0022-1082.104624

12. Rajan, R., & Servaes, H. (1997). Analyst following of initial public offerings. The Journal of Finance, 52(2), 507–529.https://doi.org/10.1111/j.1540-6261.1997.tb04811.x

13. Rock, K. (1986). Why new issues are underpriced. Journal of Financial Economics, 15(1–2), 187–212.https://doi.org/10.1016/0304-405X(86)90054-1

14. 18. Welch, I. (1992). Sequential sales, learning, and cascades. The Journal of Finance, 47(2), 695–732.https://doi.org/10.1111/j.1540-6261.1992.tb044.

EVIDENCE-BASED MANAGEMENT

[1]Rupak Das, [2]Shailaja Mukherjee

[1]State Aided College Teacher, Department of Commerce, Durgapur Women's College,
[2]M.A in English, Kazi Nazrul University, Asansol

_____

ABSTRACT

It is said that our life is the product of only 2% of what happens to us and 98% of how we react to it and the decisions that follow our reactions (mostly impulsive). The term *'evidence-based management* was first used in 1989 (McCluskey and Hoch 1989), then evidence-based medicine was first defined by Dr David Sackett in 1922, and now there have been efforts to make education evidence-based (Pashler et al. 2012). The study aimed to establish clinical practices that are based on the best available evidence. Hence, the purpose of this paper is to examine Evidence-Based Practice (EBP) and its application in management by exploring the fields of EBP in general, as well as its specific application in Healthcare and Policy-making; a framework for understanding the value and benefits of EBP, specifically in management will be revealed. This study discusses what Evidence-Based Practice is, why it should be implemented into healthcare, business, industry and policy-making management, and how stakeholders can overcome barriers to implementation.

Keywords: *Evidence-Based Practice, Evidence-based management in Healthcare, Evidence-based Management, Evidence-based decisions, Evidence-based HRM, Evidence-based policymaking*

I. INTRODUCTION

"Decisions make the world go round"- Every day we judge and decide and it's based on the consequences of our decision that our life and the related lives are affected for the better or worse.

EBP has become one of the fundamentally important concepts in modern health care. Scientific progress in evidence-based medicine (EBM) and management (EBMgt) has achieved great recognition and credibility among practitioners, professors, students and researchers.

This study outlines several problems to be more inclusive of EBMgt in the field of management research, for example, how do entrepreneurs and companies incorporate new ideas and practices? How do they go about including EBP in their management and business

approaches? We now have a vast amount of knowledge to support or refute the effectiveness of different management and business practices. Experiences such as that many managers and entrepreneurs still rely on intuition rather than trying and developing new ways of doing business have led to the implication of such studies. Some of the reasons are lack of availability of literature review studies, lack of empirical research design studies, lack of researcher training to develop skills on EBP, difficulty to use evidence from management research journals and some cultural factors that impede EBP application. This study explores why it may be so, how we develop the evidence, what is known about the adoption of these new practices and how we can increase the deployment of more evidence-based practices in future.

I.   Evidence-based management

Numerous studies have shown that managers with evidence-based management skills can lead to increased productivity and enhanced business and entrepreneurial performance. Since it is based on strong data evidence, the quality of decision making, optimum outcomes concerning the available resources under a specific situation is ensured. Therefore, it has caught on at a growing pace, largely influenced by the Evidence-based medicine movement which introduced the importance of using scientific evidence in healthcare practice. After a literature review examining the concept of evidence-based management, different EBM models and measures in practice, we outline our findings as results that reveal the productive tension between intuition and experience, and rational analysis is the basis of innovation.

What is the significance of Evidence-based decision making?

EBP in management and business by entrepreneurs and businesses is required to be successful since most managers even today, make decisions based on their intuition and often fall prey to biased psychology. Consequently, there are more than one factor leading to bad judgement-

Changing Trends, Introduction of the following generation with an innovative mindset and changed working patterns, Biased-opinions, Latent prejudices, Lazy thinking, Boss mentality, to state a few. Moreover, most humans cannot recognise if the judgement passed by them is biased.

However, the use of evidence is undoubtedly central to the practice of science, which has traditionally been used as the basis for intellectual progress in a wide range of disciplines (Huang 2014). On this basis, EBP is adopted by several professional groups as:

- There would be complete reliance on the scientific method and research which ensures rational decision making.

- EBP practices also set a clear path for the goal which is to achieve quality results.

- The creation of evidence-based practices uses synthesized information from different disciplines and types of organisations and sources, to identify best practices and improve decision-making furthering business competitiveness, social justice and improving the efficiency of the business operations.

- This process requires rigorous research methodologically sound evaluation and broad stakeholder support to make recommendations that reflect knowledge quality rather than popularity among staff or the client groups.

- Gives the management opportunity to explore and develop rigorous reasoning and problem-solving skills.

- According to recent studies, it is found that evidence-based approaches can be used to combat the most ongoing problems that businesses face, like poor management of employees leading to lower productivity, job dissatisfaction and low employee retention.

- Evidence-based practices are practical work cable ideas that can lead to greater employees' happiness and improved performance at work.

- EBP has become an essential skill in modern times that helps managers effectively lead their teams, understand how companies grow, compare with various disciplines and overcome obstacles.

Evidence-based Human Resource

Although it is proven that the application of evidence-based practices can bring leaps in the Human Resource Management domain, as studies have shown that evidence-based practices ensure better employee performance, streamline processes and improve quality of work at lower cost, the use of evidence-based practices is not widespread in Human Resource Management domain as most organisations are still operating on the time-tested rules and practices which are now outdated. For example- employers often base hiring decisions on first impressions made during interviews or judging one's suitability based on how they look during the interview despite evidence that first impressions are unreliable and sometimes

inappropriate predictors of job performance. The use of EBP in HRM is still new and therefore, academic research would be likely to focus on methodology, usefulness and significance. However, EBP still finds its place in HRM since it facilitates-

- Professionals to continue learning and upgrading skills.
- Helps to set and accomplish goals systematically.
- Provides support in rational decision making.
- Helps to utilise the workforce efficiently.
- Assists in identifying solutions for any concerns or obstacles.
- Helps to improve employee relations and productivity.

EBHR is thus the process of generating, gathering and disseminating information to guide decision making with the ultimate intent of increasing quality, improving productivity and reducing cost. The major problems faced by small and medium enterprises all around the world include improper employee selection, absenteeism, turnover and lack of training. The researcher reviewed qualitative research as well as secondary data.

How can we make policies based on evidence?

Despite well-intended efforts researchers policymakers and practitioners around the world are still dissatisfied with the effectiveness of evidence-informed policies 5 challenges persist:

1. The misalignment between academics and policymakers.
2. Over alliance on certain research.
3. Misunderstanding the role of theory in the policy process.
4. Uncritical theory approach
5. Lack of consideration of the implications of theory applied in new contexts.

Therefore, Evidence-based policymaking requires that governments acquire capacities to select and analyse, interpret and communicate scientific information and that such information be incorporated into the political process.

Evidence-based Health-Care

Evidence-based Healthcare is a systematic approach to making decisions about healthcare delivery, rather than relying on the opinions of experts only. In other words, it is the conscientious, explicit and judicious use of current best evidence in making decisions about the delivery of the health services. This is done-

(a) to improve health outcomes, as well as efficiency and reduce waste within the health system

(b) As a discipline, it applies to many aspects of healthcare and is closely associated with evidence-based practice.

(C) Helps doctors be better by making them compare what they do to other people who do the same thing.

(d) Makes it easier for doctors to decide what drugs to give patients- The old way was for doctors to look at the pills and make a guess. The new way is for them to use the information on a computer when they make a guess.

(e) Helps hospital managers make smart decisions by giving them scientific evidence from experts all over the country.

(f) Through a literature review, it explores how the method is applied to clinical and non-clinical domains to arrive at a practical understanding of its application in clinical practice and concludes the significance of its application within project management and offers issues requiring further exploration.

Evidence synthetic and systematic review

We often think we already have all the answers and that research is merely confirming our opinions but in reality, Research is asking different questions, rather than making judgments and considering the evidence. As the modern times progresses a new methodology through a literature review, and exploration of how the research is applied to the different domains to arrive at a rational understanding of its application in management practices evidencing and supporting change has become prevalent.

However, Evidence-based management practice is like one step at a time, based on the local map! We might know its definition and benefits and yet fail to meet proper execution if the roadmap isn't clear. The most common method used in making the evidence-based policy is to *ask> acquire> appraise>aggregate> apply> assess.*

Critical evaluation of the EBP system and cultural innovation:

1) **Ask**- This step is the most significant of all others as it requires a deeper understanding and communication with the stakeholders and identification of the problem.

2) **Acquire**- The EBP manager needs to have extensive research on the problem with respect to various other disciplines and evaluate the posed consequences and develop a hypothesis of its implications to the given problem.

3) **Appraise**- Critically judge the authenticity of the research data and the notions generated from the internal and external resources. This step may require delving deep and evaluating if the considered opinions and ideas have been biased or intuitive.

4) **Aggregate**- The gathered data and hypothetical conclusions are to be re-analyzed with respect to all the aggregated internal and external resources and evidence.

5) **Apply**- Once the hypothetical plan syncs with the execution plan, it is set forth for a policy development following the implementation map.

6) **Asses**- After the steps have rightly been formulated and the policies are executed, it is the duty of the evidence-based manager to collect the feedback from all the stakeholders from time to time and fill the gaps and re-implement the latest data understanding to optimise the outcome.

II. CONCLUSION

Evidence-based practice (EBP) in management is the application of evidence to support, modify and ultimately enhance clinical judgment and everyday professional practice. Evidence-based practice is often used interchangeably with the term best evidence synthesis but should be distinguished from it. The idea is to prove your ideas through data so that no argument remains unaddressed. we examine current practices research trends and unsolved problems related to EBP this study concludes that despite the recent advancements many difficulties remain like all research areas

REFERENCES

- https://cebma.org/faq/evidence-based-management/#:~:text=The%20starting%20point%20for%20evidence,and%20the%20best%20available%20evidence.&text=Evidence%20may%20come%20from%20scientific,can%20count%20as%20'evidence'

- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6308777/#:~:text=The%20four%20sources%20of%20evidence, expectations%20(1%E2%80%933)

- https://www.ckju.net/en/blog/benefits-evidence-based-management-nutshell/1246#:~:text=Evidence-based%20management%20(also%20known,%2C%20%26%20Briner%2C%202014)

- https://cebma.org/faq/evidence-based-management/

- https://www.scrum.org/resources/evidence-based-management-guide

- https://hbr.org/2006/01/evidence-based-management

A STUDY ON MUTUAL FUND INVESTMENT DECISION BY INDIVIDUAL INVESTOR BASED ON ASANSOL LOCATION

Torsha Thakur[1], Harshita Gupta[2] Raktim Khatua[3], MD Rumail[4], Subham Das[5],

Sandip Karmakar[6]

[1,2,3,4,5]*Student, Department of Management Studies, Asansol Engineering College*

[6]*Assistant Professor, Department of Management Studies, Asansol Engineering College*

ABSTRACT

The study was based on Mutual Fund investment decision by individual investor based on Asansol location. The objective of the study was to gain insights into the investment behaviour of individuals regarding mutual funds and to explore factors that influence investment decisions, such as risk tolerance, investment, knowledge about mutual funds and the role of financial advisors and to find out how people are aware about the risk associated in mutual fund. We have taken the sample of 125 respondents based on Asansol location. We have divided the responses in different age group and under different age group again we have taken few factors such as Income, Source of Information, risk tolerance etc. to get more insights into the topic and fulfil the objective. At the end we have highlighted different findings in different age group like income variations, risk tolerance and expectations etc. and according to the findings we have given our recommendations and conclusions, that how individual preference are changing.

Keywords: *Mutual Fund, Investment, Investor, Asansol, Risk.*

I. INTRODUCTION

Although a large number of surveys have been conducted out in our country regarding Mutual Funds, but in this vast population we have targeted a city which is the second largest city in the state (West Bengal), which has a strong industrial infrastructure as compared to other parts of the states. This study is based on the Behavioral Perspectives which defines the investors decisions to select Mutual Funds (a kind of investment that uses money from investors to invest in stocks, bonds or other types of investment) in which they want to invest as per their risk preferences. This research paper aimed to provide evidence on the Behavioral Perspectives of the investors towards Mutual Fund. It is based on which Mutual Funds they prefer, which mode and their perspectives.

An attempt has been made to identify that which sectors of people of this city invest the most and at what level they do invest. This study or survey has been conducted to analyze and

compare different types of investors investing in Mutual Funds. In addition, the mutual fund makes it easier for small investors who do not have adequate knowledge, expertise, and low-risk tolerance to invest their savings in profitable portfolios by more skilled fund managers. A mutual fund is a pool of money managed by a professional Fund Manager. It is a trust that collects money from a number of investors who share a common investment objective and invests the same in equities, bonds, money market instruments and/or other securities. The Mutual Fund industry in India started in 1963 with formation of UTI.

II. LITERATURE REVIEW

Zoran Ivković and Scott Weisbenner (2009), Three main conclusions are drawn from this study of the relationship between individual mutual fund flows and fund features. First, individual investors are hesitant to sell mutual funds that have increased in value but are quick to sell losing funds, which is consistent with tax-related incentives. As redemption decisions are sensitive to both expense ratios and loads, people pay attention to investment costs. Third, although in different ways, the inflows and outflows of particular funds are responsive to performance. Only "relative" performance is correlated with inflows, indicating that new money seeks the strongest performers in an endeavour. Only "absolute" fund performance, the appropriate benchmark for taxes, is connected to outflows.

Warren Bailey, Alok Kumar, David Ng (2011), The study uses new measures of attention to news, tax awareness, and fund-level familiarity bias, along with behavioral and demographic factors from other studies, to assess the impact of behavioral biases on the mutual fund decisions of a sizable sample of US discount brokerage investors. Investors that are behaviorally biased frequently choose unwisely when it comes to fund type, costs, frequency of trades, and timing, which has a negative impact on performance. Furthermore, rather than objectively extrapolating managerial talent from past performance, trend chasing seems to be linked to behavioral biases. According to factor analysis, biased investors frequently fit the following stereotypes: Gambler, Smart, Overconfident, Narrow Framer, and Mature.

Marta Vidal, Javier Vidal-García, Hooi Hooi Lean and Gazi Salah Uddin (2015), In order to investigate the relationship between mutual fund fees and return predictability, we offer and test a methodological approach. The perplexing reality that funds with worse before-fee performance charge greater fees was brought up by Gil-Bazo and Ruiz-Verdu (2009). We add to the body of knowledge regarding the market for equities mutual funds by identifying compelling evidence of the predictability of mutual fund fees. Strong evidence of a negative return predictability for fees is present in funds with both positive and negative

relationships with fees. Our results hold up well to different estimating techniques and conditionally heteroskedastic stock return assumptions. Our findings also demonstrate the value of conditioning information, such as dividend yield, t-bill yield, default spread, and term spread, in helping investors choose funds that perform well.

Nithya D (2017), Individual investors differ from other investors in a number of ways, including their demographics, knowledge of mutual fund investing, access to investment information, level of risk tolerance, and outlook on risk. Investing in mutual funds. These factors are influencing their decision-making. The most important decision they must make is an investing one; although they operate rationally, they frequently vary on the side of instinct and emotional bias. When making financial decisions, investors often rely on market trends and even on their gut feelings. Early investment decisions sometimes involved making irrational choices, which caused a discrepancy between predicted and actual returns. Investors realized the impact of their errors by realizing how to avoid them for the best investing judgments.

Sara Jonsson, Inga-Lill Söderberg and Mats Wilhelmsson (2017), We look into the characteristics of household investors who say they would buy more shares in a mutual fund if the fund had a poor performance history. Therefore, we look into the traits of investors who act like light contrarians. We investigate the effects of risk tolerance, perceived competence, and knowledge on families' contrarian behaviour using a survey approach. We put our theory to the test in three scenarios: (1) one without taking market conditions into account; (2) one during a bull market; and (3) one during a down market. Results demonstrate that a contrarian buying behaviour is influenced by risk tolerance and perceived ability. The findings demonstrate that these effects are significant in both bull and bear markets, demonstrating the stability of these traits.

Fernando M. Linardi (2017), In this essay, I look at how Brazilian mutual funds performed during the financial crisis as well as how they allocated their portfolios. First, I demonstrate that the increasing risk aversion following Lehman's failure in 2008 caused considerable outflows from mutual funds that were exposed to deposits and securities issued by local banks. The profits on investments that were exposed to tiny banks suffered as well. When term deposit coverage limitations were lifted, funds expanded their risk-taking while lowering their exposure to deposits from small banks. Small bank difficulty also had a detrimental knock-on effect on banks' portfolio management operations, which resulted in fewer investors. The findings highlight possible threats to financial stability in as much as links among.

Jinglin Jiang, Li Liao, Zhengwei Wang and Hongyu Xiang (2020), This study investigates the association between retail mutual fund investors' financial literacy and the performance of their investments. The study discover that women exhibit significantly lower financial literacy than males using a unique dataset on Chinese mutual fund retail investors that includes a question on financial literacy. Financial literacy is higher in investors with more education and investment expertise. A one standard deviation gain in advanced financial literacy is linked to a 1.940 percentage point, or more than 13% of the sample average, reduction in the likelihood that an individual investor will experience a severe loss. In terms of fee-related issues, highly educated investors also exhibit greater sophistication: they are more likely to be aware of investing fees, to avoid high-fee funds offered by intermediaries, and to trade less.

Gabriele Ciminelli, John Rogers and Wenbin Wu (2022), This research shows how American monetary policy affects investments in foreign mutual funds. To break down reported U.S. monetary policy surprises into pure monetary policy shock and information news shock components, they use a novel variation of the shock identification approach from Bu et al. (2021). Emerging markets (EMs) and, to a lesser extent, global funds experience significant and long-lasting outflows of capital when interest rates rise as a result of a pure monetary policy shock. On the other hand, increases in interest rates brought on by positive information news shocks (i) do not result in capital withdrawals from EM funds and (ii) cause investors to reinvest their money into growth-sensitive U.S. and international stock funds rather than safe U.S. bond funds.

Amira Hammouda, Asif Saeed, Marta Vidal and Javier Vidal-García (2023), The performance of mutual funds over the short term has been persistent across the major European markets between January 1990 and December 2022, as examined in this article. Due to the convergence of its markets, the mutual fund business in Europe has seen tremendous expansion in recent years. In contrast to the US business, the European mutual fund sector is still an untapped area of research with few noteworthy studies. We find statistically substantial persistence in the post-ranking quarter across various performance models for all nations using a sample of daily survivorship bias-free data on the five most prominent European mutual fund countries, which comprises 2734 mutual funds across all countries. All deciles, including the top-decile and bottom-decile mutual, show this evidence.

III. OBJECTIVES OF THE STUDY

- To gain insight knowledge into the investment behavior of different age groups. Exploring different factors that influence investment decisions, such as risk tolerance, investment, knowledge about mutual funds and the role of financial advisors.

- To know how much the investors are aware about the key concepts related to mutual fund i.e, diversification of risk and risk- return trade off. How many investors are risk averse and risk takers and to what extent risk they are willing to take and which mutual fund house they prefer the most.

IV. METHODOLOGY

1.Primary Data-: In our study - while we were collecting our data's in the primary mode, by creating a structured questionnaire based on our topic and our objectives of the project distributed to various sectors of investors/people on which our research is based on i.e. "Mutual fund Investment Decision by Individual Investors based on Asansol city : Behavioral Perspectives". It was a through a study about Mutual Funds and how they invest. We circulated the questionnaire through google forms and asked the people to fill the forms for our project purpose.

2. Secondary Data-: While our whole topic was based on Mutual funds, so for that purpose we have collected some data from different newspapers (Times of India, Hindustan times, The Telegraph, etc), journals, mutual fund houses (from their official websites) and from many other sources of internet like money control. Com. They were not directly linked with our project work, but from those sources we have gained a lot of knowledge that there are how many mutual fund houses, not only that, we went through some other questionnaires how they have prepared, therefore it helped us a lot, for our research about different types of mutual funds, and through this we came across many new different terms of mutual funds which helped while performing survey.

V. DATA ANALYSIS

Analysis is based on different Age groups and we have focused on the some of the areas though tables and Pie-Chart presentation. Age groups are given below-:

I. Below 30 -:
Table-1

How did you get to know about Mutual Funds	Responses
1. Advertisement and Newspapers	9
2. Family and Relatives	9

3. Brokers	8
4. Demat a/c	6
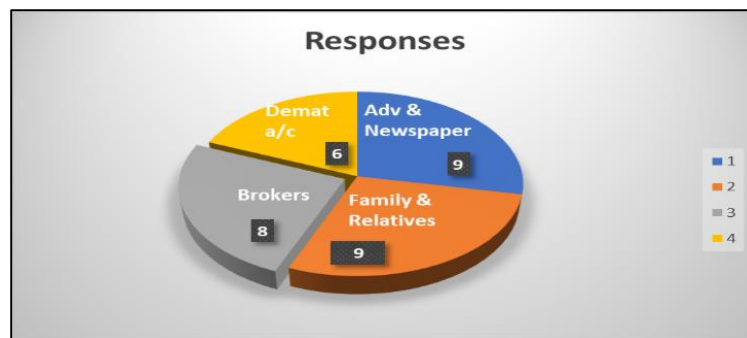
Figure-1

Comment on the basis of analysis-: Most of the investors prefer advertisements & newspapers as compared to others.

Table - 2

How did you invest in mutual funds	Responses
1.Agents and Brokers	14
2.Direct	10
3.Demat a/c	8
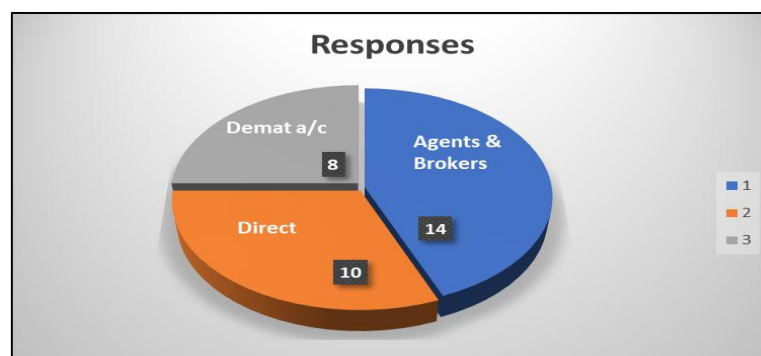
Figure-2

Comment on the basis of analysis-: It has been that they mostly invest through agents & brokers, and among this some of them invest directly to save time , as compared to those investors who invest through Demat a/c.

Table-3

What are your reasons for investing in mutual funds	Responses
1.High Return	14
2.Liquidity	7
3. Low Risk	6
4. Portfolio Management	5
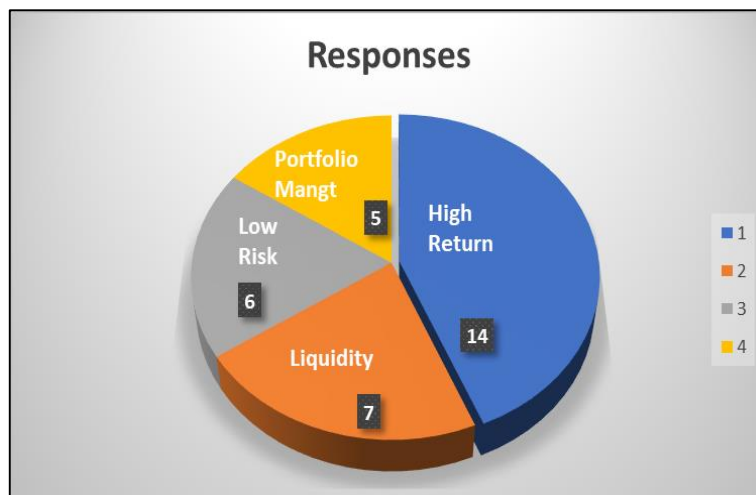
Figure-3

Comment on the basis of analysis-: It has been observed while perfoming this research that most of the investors who belong to this city of this age group they invest in mutual fund for high return and a small percentage of this group invest for liquidity, low risk and portfolio management.(And the reason for investing in high return may be because of their age)

Table-4

To what extent of risk you feel while investing in mutual funds	Responses
1. High Risk	6
2. Low Risk	11
3. Mid Risk	15
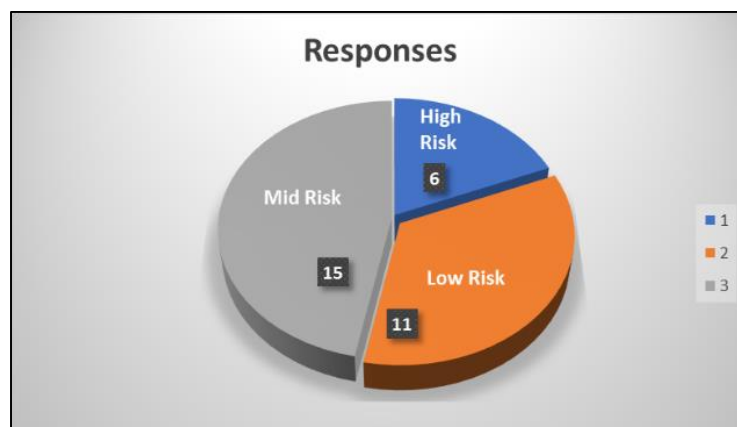
Figure-4

Comment on the basis of analysis-: It has been observed that most the investors who invest in mutual funds those funds generally have Mid-risk and low risk as compared to high risk.

Table-5

How much return you expect while investing in Mutual funds	Responses
1. High Return	13
2. Low Return	8
3. Moderate Return	11
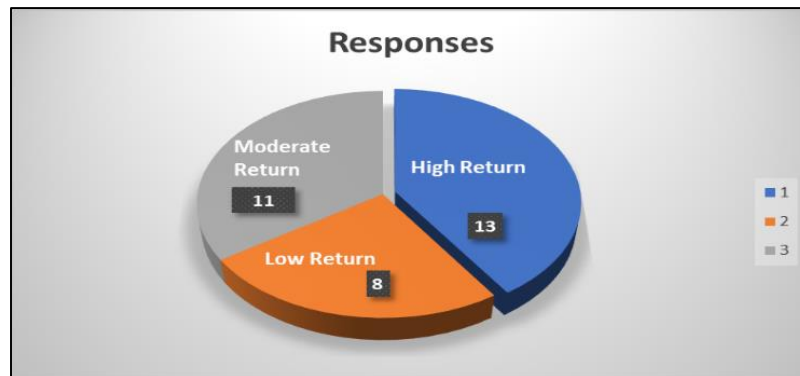
Figure-5

Comment on the basis of analysis-: Most of the investors of this age group they expext high to moderate return from their preferable mutual funds, and a small amont of investors get low return as compared to high and moderate return.

II.Age Group : 31-45-:

Table-6

How did you get to know about mutual funds	Responses
1. Advertisement and Newspaper	7
2. Friends and Relatives	6
3. Brokers	14
4. Demat a/c	6
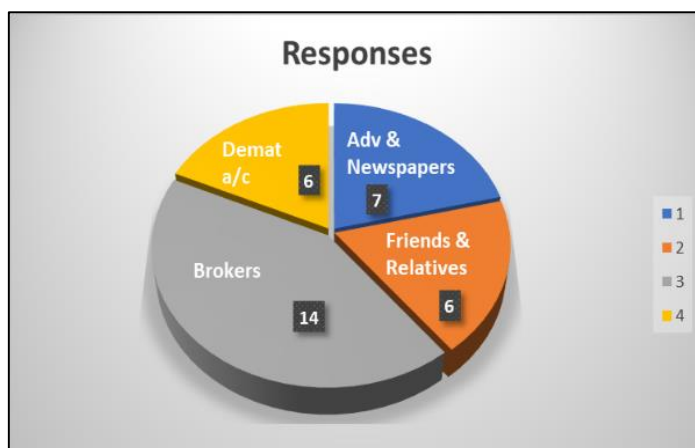
Figure-6

Comment on the basis of analysis-: It has been observed that investors who belong to this age group they generally get information from brokers and a small amount get information from other sources as given above in the table.

Table-7

How did you invest in mutual funds	Responses
1. Agents and Brokers	16
2. Demat a/c	6
3. Direct	11
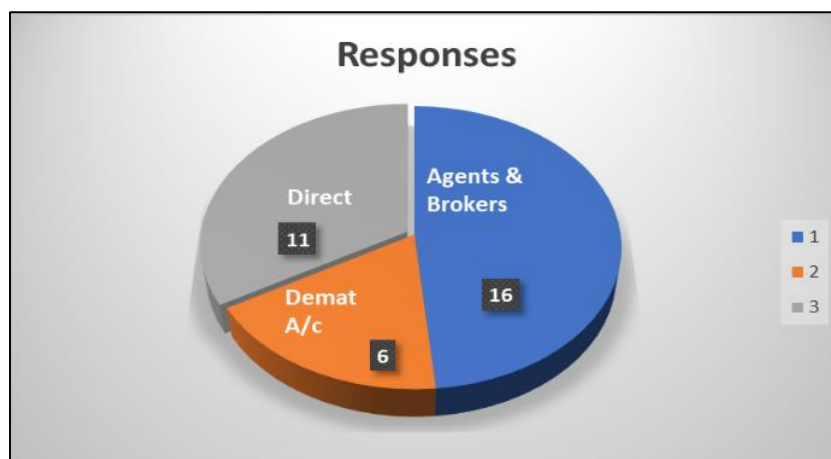
Figure-7

Comment on the basis of analysis-: It has been observed that generally investors of this age group they invest through agents & brokers and invest through directly as compared to investors who invest through Demat a/c.

Table-8

What are your reasons for investing in mutual funds	Responses
1. High Return	10
2.Liquidity	7

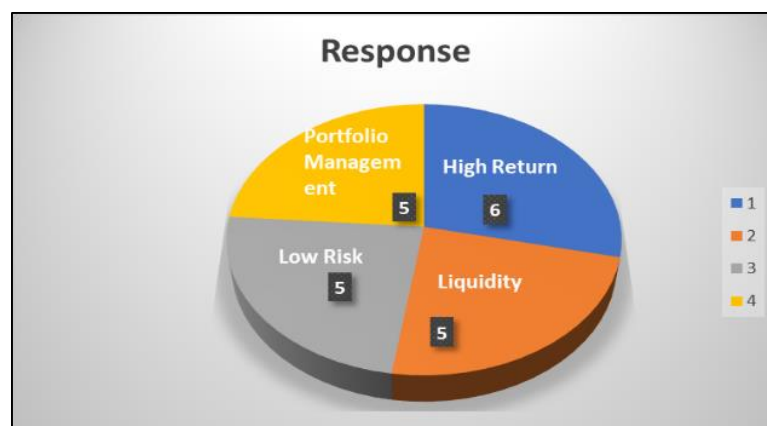| 3. Low Risk	9
4. Portfolio Management	7

Figure-8

Comment on the basis of analysis-: While performing the survey it has been observed that investors of this age group invest in mutual funds to get high return as compared to the other reasons given above in the table.

Table-9

| To what extent of risk you feel while investing in mutual funds	Responses
1. High Risk	11
2. Low Risk	13
3. Mid Risk	9
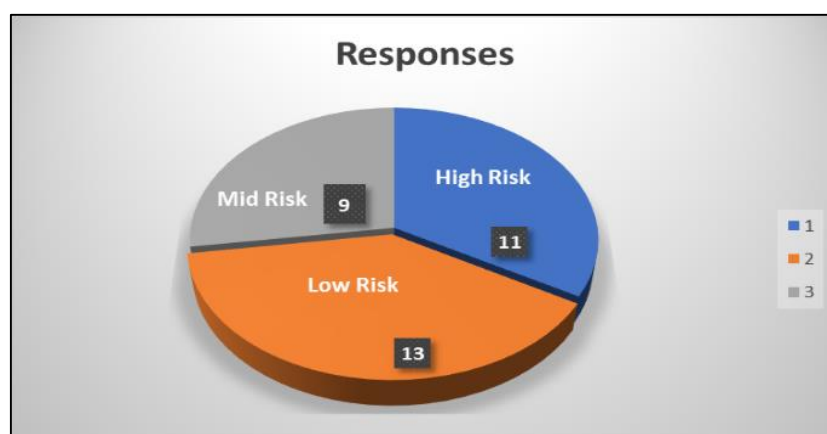
Figure-9

Comment on the basis of analysis-: Generally, investors of this age group they take risk between low to high as compared to those investors who take mid risk.

Table-10

| How much return you expect while investing in Mutual funds	Responses
1. High Return	13
2. Low Return	9
3. Moderate Return	11
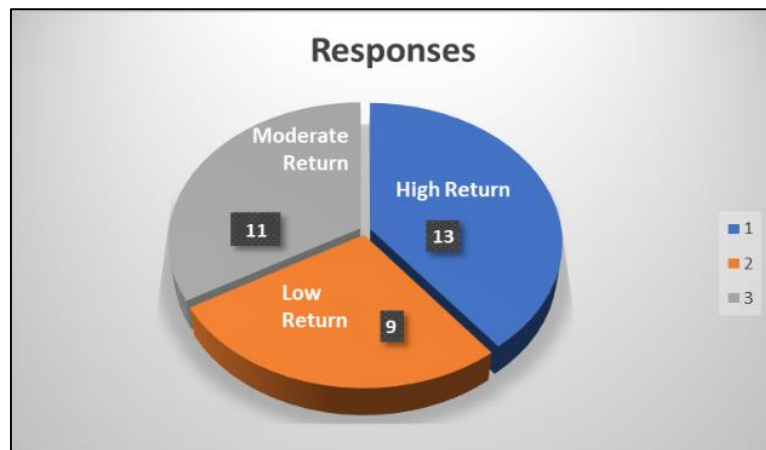
Figure-10

Comment on the basis of analysis-: It has been observed that most of the investors they expect high return in whichever mutual fund, they do invest as compared to other investors who expect from moderate- low return.

Table-11

How did you get to know about mutual funds	Responses
1.Advertisement, Magazine and Newspapers	6
2. Relatives	6
3. Brokers	7
4. Demat a/c	6
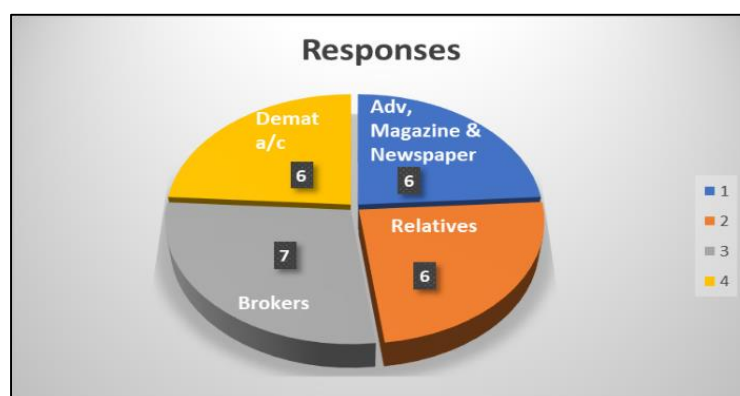
Figure-11

Comment on the basis of analysis-: Investors of this age group they generally get to know through brokers but a mixed amount of investors preferer other sources.

III. Age Group: 46 -60-:

Table-12

How did you invest in mutual funds	Responses
1. Agents and Brokers	9
2. Demat a/c	8
3. Direct	8
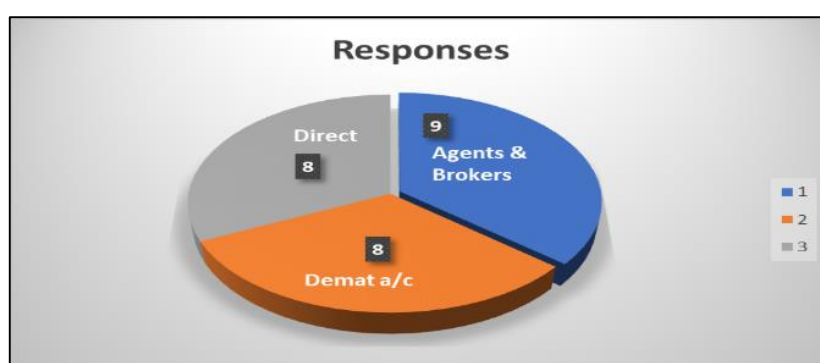
Figure-12

Comment on the basis of analysis-: Investors of this age group they prefer through agents & brokers and rest of the investors invest directly or through Demat a/c.

Table-13

What are your reasons for investing in mutual funds	Responses
1. High Return	7
2. Liquidity	7
3. Low Risk	6
4. Portfolio Management	5
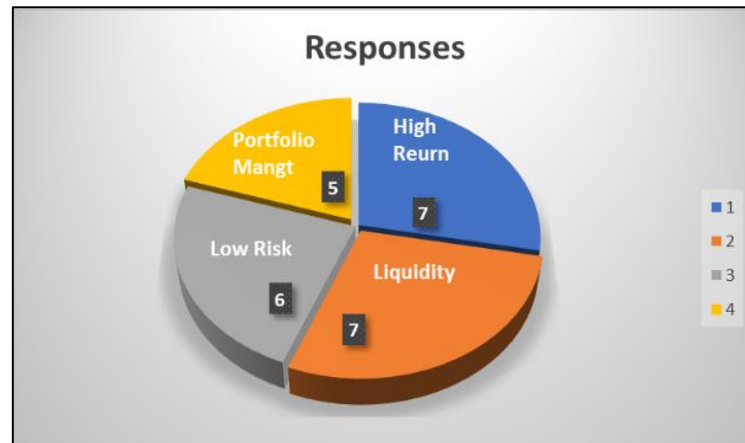
Figure-13

Comment on the basis of analysis-: Most the investors of this age group their main reasons to invest is to get high return and liquidity as compared to others.

Table-14

To what extent of risk you feel while investing in mutual funds	Responses
1. High Risk	9
2. Low Risk	9
3. Mid Risk	7
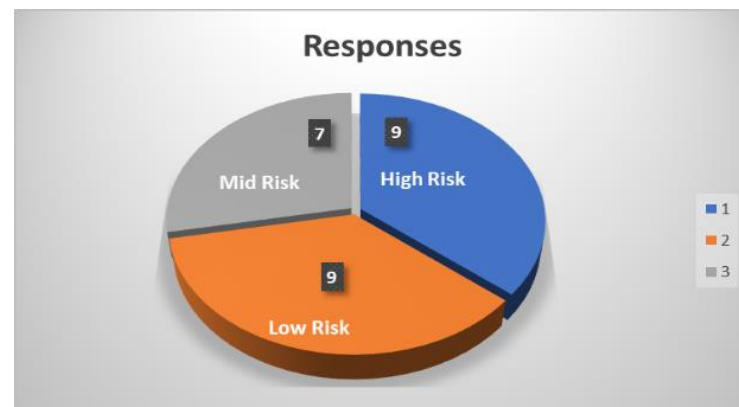
Figure-14

Comment on the basis of analysis-: Generally, investors of this group they prefer high to low risk and a small amount of ratio takes mid amount of risk.

Table-15

How much return you expect while investing in Mutual funds	Responses
1. High Return	11
2. Low Return	6
3. Moderate Return	8
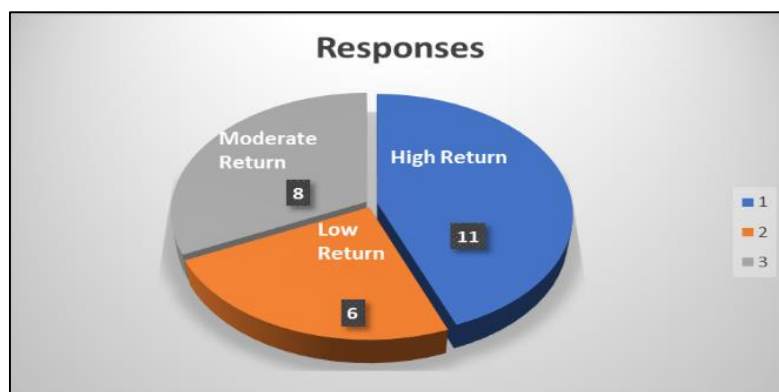
Figure-15

Comment on the basis of analysis-: It has been observed that most of the investors they expect high return in whichever mutual fund, they do invest as compared to other investors who expect from moderate- low return.

III. Age Group: Above 60-:
Table-16

How did you get to know about mutual funds	Responses
1. Advertisement, Magazines and Newspapers	6
2. Relatives	5
3. Brokers	5
4. Demat a/c	5
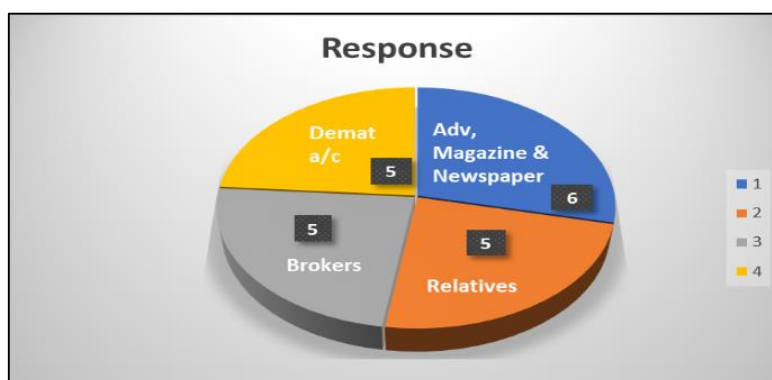
Figure-16

Comment on the basis of analysis-: It has been observed that investors of this age generally prefer the sources like advertisement, magazines & newspapers as compared to other sources given above.

Table-17

How did you invest in mutual funds	Responses
1. Brokers	6
2. Demat a/c	7
3. Direct	8
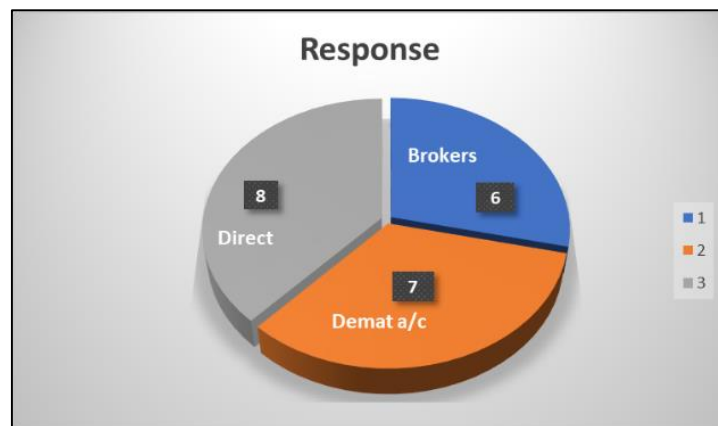
Figure-17

Comment on the basis of analysis-: Investors of this age group they generally invest directly as compared to those investors who invest through Demat a/c and brokers.

Table-18

What are your reasons for investing in mutual funds	Responses
1. High Return	6
2. Liquidity	5
3. Low Risk	5
4. Portfolio Management	5

Figure-18

Comment on the basis of analysis-: It has been observed that their main reasons is to get high return and a small group of people in invest to get liquidity, low risk & portfolio management.

Table-19

To what extent of risk you feel while investing in mutual funds	Responses
1. High Risk	7
2. Low Risk	6
3. Mid Risk	8
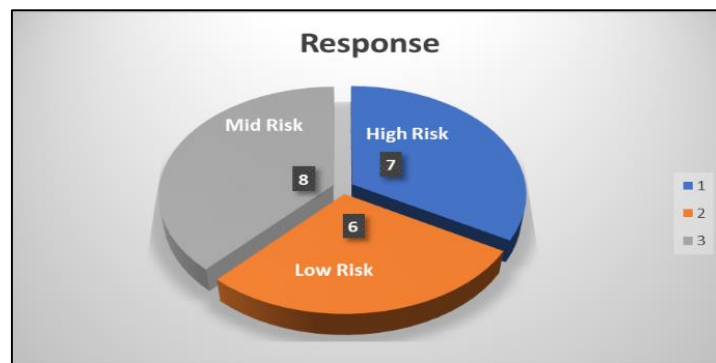
Figure-19

Comment on the basis of analysis-: Most of the investors invest, but they generally prefer to take mid risk and rest some of the investors prefer high to low risk.

Table-20

How much return you expect while investing in Mutual funds	Responses
1. High Return	7
2. Low Return	6
3. Moderate Return	8
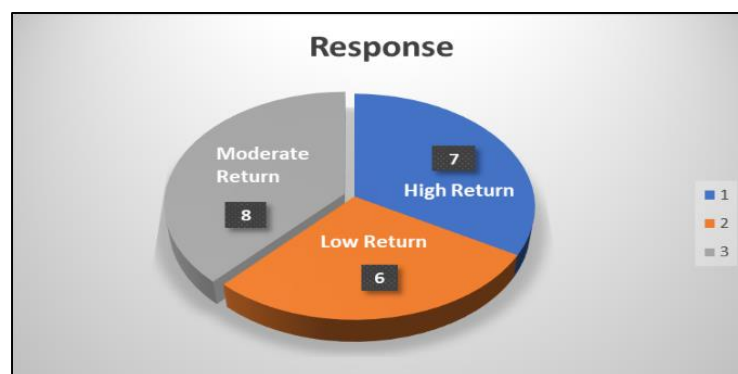
Figure-20

Comment on the basis of analysis-: In this age group investors generally expect moderate return and a very less percentage of investors expect high- low return.

VI. FINDINGS

- In the first age group which is below 30, out of 32 responses, it has been observed that most the investors they get knowledge about mutual funds from advertisement & newspapers and family and relatives, and investors generally invest through agents and brokers and their reasons and expectation is to get high return to moderate return and this, investors they generally take mid -low risk.

- In the second age group which is from 31-45, out of 33 responses and the third age group which is from 46-60, out of 25 responses it has been observed that most the investors they get knowledge about mutual funds from Brokers and they most of the time invest through

agents and brokers their main reason and expectation is to get high return and they take risk from high to low.

- In the fourth age group which is above 60, out of 21 responses, it has been observed that most the investors they get knowledge about mutual funds advertisement & newspapers and invest directly their main reason and expectation is to get high to moderate return and they take mid-risk.

VII. CONCLUSION

The study was based on selected individual investors and initiated to gain a deeper understanding of decision- making process with the influence of behavioral finance. The study established the fact that the investment decision making of the investors are largely influenced by the demographic background of the investor's. Investor's are well aware about the return and risk component, and return calculation in mutual funds. The study was based on selected individual investors and initiated to gain a deeper understanding of decision- making process with the influence of behavioral finance. The study established the fact that the investment decision making of the investors are largely influenced by the demographic background of the investor's. Investor's are well aware about the return and risk component, and return calculation in mutual funds. The study was based on selected individual investors and initiated to gain a deeper understanding of decision.

REFERENCES

Books

1. I.M Pandey- Financial Management (10th Edition, 2010)
2. Dr.Prasanna Chandra- Financial Management- Theory & Practice (2022)
3. Dr. S.K Sharma and Dr. Rachan Sareen – Fundamental of Financial management (2019)
4. E.Gordon and K. Natarajan- Financial Markets and Services (2016)

Articles

1. Jinglin Jiang, Li Liao, Zhengwei Wang and Hongyu Xiang (2020) *Financial literacy and retail investors' financial welfare: Evidence from mutual fund investment outcomes in China*
2. Gabriele Ciminelli, John Rogers and Wenbin Wu (2022), *The effects of U.S. monetary policy on international mutual fund investment*
3. Nithya D,(2017) *mutual fund investment decision by individual investors- behavioural perspectives.*
4. Warren Bailey, Alok Kumar, David Ng (2011), *Behavioral biases of mutual fund investors*
5. Amira Hammouda, Asif Saeed, Marta Vidal and Javier Vidal-García (2023) *On the short term persistence of Mutual Fund performance in Europe.*

6. Sara Jonsson, Inga-Lill Söderberg and Mats Wilhelmsson (2017), *Households and mutual fund investments: Individual characteristics of investors behaving like contrarians.*

7. Fernando M. Linardi (2017)**,***Investors' behavior and mutual fund portfolio allocations in Brazil during the global financial crisis*

8. Zoran Ivković and Scott Weisbenner (2009), *Individual investor mutual fund flows*

9. Marta Vidal, Javier Vidal-García, Hooi Hooi Lean and Gazi Salah Uddin (2015**),** *The relation between fees and return predictability in the mutual fund industry*

A REVIEW ON CONSUMER ONLINE BUYING BEHAVIOUR

Sapna
Research Scholar
Department of Commerce and Management, Chaudhary Ranbir Singh University
Jind, Haryana

_____

ABSTRACT

Emergence of mobile phones and latest technologies had led to the evolution of online shopping, especially during the Covid times, when people were forced to stay inside due to lockdown everywhere. Shopping has changed from mere routine activity to hedonic activity, where people enjoy doing shopping. Managing and utilizing this change in consumer behaviour has turn into a topic of research, as populace's living standards improve, their consumption expenditure continues to enlarge, and consumer demand for convenience shopping rises. The e- shoppers are totally different from the traditional marketing shoppers in their shopping motivation, shopping needs, psychological characteristics, behavioral characteristics, price perception and risk perception. The main objective of the study was to evaluate the various literatures available on the consumer behaviour to study their perception towards online buying and unearthing the diverse factors affecting the purchase intention and the buying behaviour of the consumers towards online buying. Consumer buying behaviour of customers who shop online as well as offline was studied to deepen our understanding of consumer behaviour. The proposed review paper was based upon various kind of literature available in online and offline mode. The study highlighted the positives and the negatives of online shopping, the elements that contributes the most and the least were highlighted. The study documented that the analysis of consumer buying behaviour can add towards a better grasping of consumer online buying behaviour.

Keywords: O*nline consumers, shoppers' behaviour and their psychology, and online marketing.*

I. INTRODUCTION

Buying Behaviour, it involves process and acts which helps people in their buying decision making. It aids in understanding the concepts that why consumers always buy the particular product? Why consumer buys what he buys? What are the factors that stimulates consumer buying behaviour? As there are numerous factors, specificities and characteristics that stimulates the individual character in what he is and the consumer in his purchasing behaviour, shopping habits, decision-making process, the brands he buys or the retailers he

goes. Each factor plays a unique role in the purchase decision process. Apart from them cultural and societal factors also play a measure role in the decision-making process, as an individual and a consumer is guided by his culture, his subculture, his psychological factors, his personality, his family, his membership groups, his social class, etc. Consumer behavior is a process by which a consumer selects, purchase and consume the goods and services, to satisfy his needs and wants. The diverse processes involved in the consumer behavior process are - the problem identification, i.e., identification of the commodities he would like to consume, then information search for identifying those commodities which offers a higher utility, then evaluation of alternatives, next the purchase decision, and lastly the post purchase behaviour.

Types of Consumer Buying Behavior

1. Routine Response/Programmed Buying Behavior— shown in case of goods which requires less involvement, purchased automatically and frequently, low-cost price, requires minute search and decision effort, include milk, snacks, soft drinks, etc.
2. Limited Decision Making— applicable to goods like clothes, shoes, kitchen appliances etc, which are purchased less frequently than the above-mentioned goods, a reasonable amount of time is required for the purchase of such goods, as some information is required for their purchase.
3. Extensive/ Complex Decision Making - involves expensive goods which requires extensive research, high involvement and has a high degree of psychological/ performance/ economic risk. Example house, education, cars, and computers, etc.
4. Impulse buying – spot buying, no advance planning, involves daily use products such as toothpaste, soaps etc.

Online Buying Behavior

Online browsers are those who surf websites, online retail stores for knowledge about products and services. Online buyers are those who actually purchase from these online retail stores and a combination of these online buyers and online browsers is known as online shoppers. Therefore, online buying behaviour denotes to the process of shopping goods and services using internet from the online channels, such as Amazon, Flipkart, Myntra, Nykaa, ordering food from Zomato and Swiggy, online booking of tickets etc. With each passing year online shopping is rising due to the convenience, and ease of shopping online, along with the

rising number of Internet users. Globally, India with its 250 million Internet patrons is ranked 3rd in internet usage. That is why, the Internet revolution is prospering in India.

Online shopping has its own pros and cons, it is direct and annoyance free, if a customer who shops online knows exactly what they want to shop, but it becomes a tedious task, if they are not 100% sure, of what they want, as they require some additional help for shopping.

The main reason why consumer prefers 'online shopping' then the traditional 'brick and mortar' system is the convenience i.e., the ability to shop anytime, anywhere, ease of shopping - as all the info about the products is easily accessible, huge discounts, ability to find more personalised products, gifts, and freebies, offer, etc.

II. REVIEW OF LITERATURE

The existing literature was reviewed to comprehend the consumers perception and attitude towards online buying. The reason behind selection of this research area is the growing acceptance of online shopping among the masses.

Singh and Singh (2018) evaluated online purchase behaviour of urban and rural consumer, using a sample of 250 respondents from Punjab. Data was evaluated using factor analysis, Pearson's correlation and stepwise multiple regression and the results documented that rural customers were more satisfied with online shopping than their urban counterparts.

Singh (2014) studied the elements influencing the customer preferences and their satisfaction level towards different telecom services providers in Punjab, data was collected from a sample of 200 respondents from urban and rural sectors, representing three districts. The data was evaluated with the help of chi-square and exploratory factor analysis and concluded that there was a noteworthy difference in the satisfaction levels of urban and rural customers, as the customers of rural areas were more satisfied than their urban counterparts. Because the rural customers were less aware, than the urban consumers, therefore they were less demanding than the urban customers.

Bhatt and Bhatt (2012) studied the elements influencing customers perception towards online shopping in Ahmedabad, data was evaluated using the factor and ANOVA analysis. Results documented that website security, attractiveness, and service quality of website, along with ease to use, are the dominant factors.

Hooda and Aggarwal (2012) explored the Consumer behaviour towards e-marketing of Jaipur consumers, by collecting data from a sample of 75 respondents embracing business professionals, students, and other educated people. For analysis of the data, SPSS and chi square test were used and concluded that majority of respondents preferred traditional shopping as compared to the online shopping due to people's traditional mindset and safety issue regarding the privacy of the personal information. Another important concern was about the authenticity of product and services presented online.

Kanwal (2012) studied Customer's perception towards online shopping in the state of Punjab, information was collected from 400 respondents and was probed using factor and chi-square analysis. Results documented the reasons why consumers preferred online shopping, which were heavy discounts on selected products, ease of shopping, convenience, reliable and trustworthy website.

Rashtogi (2010) surveyed a total of 200 online customers from India, and found that ratio of male consumers was high in online shopping. The factors that boosted online shopping were easy buying procedures, wide variety of products, lower price of the products, various modes of payments.

Prasad and Aryasri (2009) examined the causes of shopper behaviour in e-tailing by collecting information from a sample of 135 respondents from five leading software companies in Hyderabad. Data was explored using mean, standard deviation, multiple correlations, multiple regressions, t-test, and ANOVA and summoned that following were the factors that manipulated consumer behaviour towards online shopping online store enjoyment, convenience, web store environment, and customer service.

Erda (2008) conducted a comparative study in Jamnagar Gujarat district on rural and urban consumers, out of 400 respondents, 200 were selected from each area. Results documented that there were no significant differences regarding price and style, but for quality, brand, and function there were significant differences in the purchase of mobile phones in rural and urban consumers.

Chen and Barnes (2007) examined how customers built their trust in online shopping environment, from the perspective of Taiwanese students, information was collected from online bookstores, by collecting a sample of 103 post graduate and under graduate students. Regression and factor analysis results showed that perceived privacy, security, good reputation, usefulness, and willingness to customize were the major factors that leads to

initial online trust. And this online initial trust and familiarity with online shopping procedure had a positive effect on customers purchase intention.

Ying (2006) examined online shopping behaviour of consumers across multiple shopping sessions, by investigating forsook shopping carts in an online grocery shopping. A combined model for the cart, order, and purchase quantity decisions was specifically made and the interdependence between the three decisions was captured by using the correlations between the error terms. The results documented that not all forsook shopping carts result in lost sales, because when need arises, customers pick up the forsook carts and accomplished their final orders.

Gupta et al. (2004) examined risk perceptions and their influence on online shopping using modelling of consumers as risk neutral and risk averse. Results documented that risk neutral customers were more likely to shift to online shopping than risk averse consumers, but once risk averse consumers started using online shopping site, they continue using that site unlike risk neutral consumers. Price was a key element for the development of loyalty towards a site.

Khalifa and Limayem (2003) evaluated the drivers of internet shopping by applying well-established behavioral theories to Internet consumer behavior. A longitudinal survey was organised to identify key elements influencing purchasing on the Web and the results summarised that the intentions of Internet customers were significantly affected by the perceived consequences of online shopping, social influence, and the customers' attitudes towards it.

Kim and Park (2003) studied the key elements affecting online consumer purchase behavior, and the relationship between numerous features of online shopping and consumer purchase behavior. An online survey of 602 Korean customers of online bookstores was conducted and indicated that security perception, information quality, and user interface quality, affects the information satisfaction and relational benefit, which in turn were connected to each consumer's site commitment and actual purchase behaviour.

Hanson (1999) highlighted the importance of online shopping over the traditional shopping, online shopping offers 24 – hour accessibility from any corner of the world, makes it easier for the customer to buy as per his convenience, and offers low-cost products.

Margherio (1998) summoned that as competed to the traditional approach, online shopping was much better option as Internet and WWW had made shopping more accessible and convenient for businesses of all sizes and consumers.

Wyckoff (1997) documented the prominence of Internet, as it eliminates the gap between producers and consumers, because now they can make their purchases directly from the producers, middle man such as retailers, wholesalers, and distributors, were no longer involved.

III. CONCLUSION

In this study, literature associated to the online buying behaviour of consumers was studied, to found out what were the elements that affects the online buying behavior of consumers. Both positive and negative factors were identified, like financial risk and non-delivery risk has undesirable effect on attitude toward online shopping behavior, which means that online sellers should work towards making their websites safe, and user friendly, and assure the customers of the delivery of the final products. Attitude towards online shopping and subjective norms have constructive effect on shopping behavior, as a consequence of which, the more people suggesting e-buying to each other, the more this buying method will rise among people. That is why the use of word-of-mouth marketing was necessary for e-retailers. Other elements that lead to the boom of online shopping were ease of shopping, variety of products, accessibility, shopping at your pace and comfort, easy return and exchange policies, more discounted products, easy availability of information. Apart from these benefits of online shopping, there were some drawbacks as well, which results in lack of trust towards online shopping, which were privacy issue, lack of knowledge, preference towards traditional brick and mortar system.

REFERENCES

1. Bhatt, S., & Bhatt, A. (2012). Factors Influencing Online Shopping: An Empirical Study in Ahmedabad. IUP Journal of Marketing Management. http://search.proquest.com/assets/r20151.3.2-

2. Chen, Y. H., & Barnes, S. (2007). Initial Trust and Online Buyer Behaviour. Industrial Management and Data Systems, 107(1), 21–36.

3. Erda, C. (2008). Marketing of Rural Consumers Understanding and Tapping the Rural Market Potential. IIMK3,4,5.

4. Gupta, A., Bo, C. S., & Zhiping, W. (2004). Risk Profile and Consumer Shopping Behavior in Electronic and Traditional Channels. Decision Support Systems, 38 (3), 347–67.

5. Hooda, S., & Aggarwal, S. (2012). Consumer Behaviour Towards E-marketing: A Study of Jaipur Consumers. Researchers World – Journal of Arts, Science and Commerce, III, 2(2), 107-118.

6. Kanwal, G. (2012). Consumer's Perception Towards Online Shopping- The Case of Punjab. International Journal of Management and Information Technology, 1(1),1-6.

7. Khalifa, M., & Limayem, M. (2003). Drivers of Internet Shopping. Communications of the ACM, 46(12), 233-239. http://dx.doi.org/10.1145/953460.953505

8. Kim, Y., & Park, C. (2003). Identifying Key Factors Affecting Consumer Purchase Behavior in an Online Shopping Context. International Journal of Retail and Distribution Management, 31(1), 16-29. http://dx.doi.org/10.1108/09590550310457818

9. Malhotra, N. K. (2001). Marketing Research – An Applied Orientation Pearson Education Asia.

10. Prasad, J. S., & Aryasri, A. R. (2009). Determinants of Shopper Behaviour in E-tailing: An Empirical Analysis. Paradigm, 3(1), 73-83.

11. Rastogi, A.K. (2010). A Study of Indian Online Consumers & Their Buying Behaviour. International Research Journal,1(10), 80-82.

12. Singh, A., & Singh, P. (2018). Factors Determining online Purchase behaviour of The Consumers in Punjab (A study of Urban and Rural Consumers). Asian Journal of Management, 9(1),133-139. DOI: 10.5958/2321-5763.2018.00020.3.

13. Singh, K. G. (2014). Factors Influencing the Customer's Purchase Decision for Various Telecom Services - The Case of Select Districts of Punjab. International Journal of Advances in Management and Economics, 1(3),1-9.

14. Ying, Y. (2006). Essay on modelling consumer behavior in online shopping environments. Doctoral dissertation, University of Michigan, USA.

CUSTOMER RELATIONSHIP MANAGEMENT AND IT'S IMPACT

Ayan Chattoraj
Assistant Professor, NSHM Knowledge Ccampus, Durgapur

_____

ABSTRACT

CRM is an essential tool for businesses to manage customer communications and interactions. It enables direct communication, billing help, maintenance, marketing planning, and collaboration with other companies and partners by allowing staff from many departments to access and enter data about current and potential clients. To create focused marketing efforts, create business plans, and evaluate the success of CRM activities, key CRM data can be analysed. Front and back office functions are made possible by the external network, and analytical CRM analyses customer data for focused marketing campaigns, client acquisition, cross-selling, and upselling. Collaborative CRM makes use of data from many departments to raise the calibre of services provided by the company, while operational CRM supplies customer data for a variety of uses. Convenience sampling was employed in a study of the hotel business. a sample size of 150 participants, with descriptive statistics and main data collection carried out utilising questionnaires and structural equation modelling (SEM). The findings demonstrated that CRM strongly affects customer loyalty and satisfaction, with satisfaction serving as a lone mediator between CRM and loyalty. CRM makes use of departmentspecific data to raise the calibre of services the company provi des.

Keywords: *Customer Satisfaction, Customer Loyalty, Collaborative CRM, Hotel industry, SEM*

I. INTRODUCTION

The study focuses on low customer satisfaction in the hotel industry, possibly due to a lack of concern for building mutual relationships through customer relationship management (CRM). CRM focuses on customer value rather than products or services. Companies aim to establish communication and good relationships with customers through CRM. The authors aim to conduct an empirical study on the impact of CRM on customer loyalty in the hotel industry.

II. STATEMENT OF THE PROBLEM

Customer relationship management (CRM) is a management strategy that helps businesses to find, entice, and keep more profitable consumers by strengthening existing bonds. But effective customer relationship management places the customer's requirements and wishes at the centre of the company's operations by fusing them with its strategy, workforce, IT

infrastructure, and operational procedures. The Indian hotel business occasionally has a significant growth tendency, however there is little emphasis on customer relationship management. and unless suitable steps are done as soon as possible, this causes the client to be unsatisfied with the company. The question then becomes how we can foster and enable the sector to have a close link and empathetic engagement with customers.

III. OBJECTIVE OF THE STUDY

The study investigates the impact of Customer Relationship Management (CRM) on hotel industry satisfaction and loyalty, as well as its indirect effect through customer satisfaction. It identifies CRM components, Relationship Quality and Organizational Capital, and examines whether organizational capital is an antecedent to CRM applications. The investigation also investigates the effect of CRM applications on relationship quality and overall customer satisfaction.

IV. CONCEPTUAL FRAMEWORK

After studying the literature on IT, CRM, and relationship marketing, a conceptual framework was created. The paradigm contends that CRM Applications (CRMA) directly enhance relationship results and relationship quality. The relationship between a business and its distributors is represented by Relationship Quality (RQ) in the framework of CRM Applications (CRMA), the CRM technology. CRM Applications are predicted by organisational capital, which provide motivation for a successful rollout. Relationship Quality is the primary dependent variable, and the framework relates the influence of Relationship Quality to Relationship Outcomes, making Relationship Outcome a secondary dependent variable. The purpose of the CRM Applications (CRMA)-Relationship Quality (RQ) conceptual framework is to investigate how CRM Applications enable businesses to establish, preserve, and improve customer relationships.

V. HYPOTHESIS

H1: Direct Effect CRM initiatives have a favourable and considerable impact on hotel business patron satisfaction.

H2: Customer relationship management programmes have a favourable and considerable impact on hotel sector patron loyalty.

H3: Customer satisfaction has a favourable and considerable impact on hotel business client loyalty.

H4: The indirect effect of customer relationship management programmes is good and considerable, and it is mediated through hotel industry customer satisfaction.

VI. RESEARCH METHOD

In the hotel sector, this research was done. Customer happiness, loyalty, and relationship management with regard to customers make up the research's factors. Lack of responses from hotel guests is the study's main drawback.

Number of people and Sample All guests of the hotels operating in India make up the research population. For this investigation, convenience random sampling was used. There have been 250 respondents to the study's sample.

VII. QUESTIONNAIRE DESIGN

Questionnaire designed for measuring client relationship, customer satisfaction, customer loyalty & their interdepartmental relationship.

VIII. FINDING AND DISCUSSION

The validity and reliability of the questionnaire for the "Pilot Project" were tested using 150 respondents. Results showed that all items, including customer relationship management and satisfaction and customer loyalty, were valid for all variables in the hotel industry. The correlation value was greater than 0.2012, indicating that the items were valid for all variables.

Reliability

The test results of the research instrument in terms of reliability of the item-total statistics of the 150 respondents as indicated in the following table:

Output of Reliability Testing

Table1

Variable/sub variable	Cronbach alpha	Reliability
X Customer Relationship Management	0.933	Reliable
Y Customer Satisfaction	0.956	Reliable
Z Customer Loyalty	0.880	Reliable

Output of SPSS

Table 2: Analysis of Measurement Model

X^2	X^2/df	GFI	TLI	CFI	RMSEA

94.833	2.313	.936	.966	.975	.073

Table 3: Fit indices of Structured Equation modelling

Fit indices	X^2	X^2/df	GFI	TLI	CFI	RMSEA
	94.833	2.313	.936	.966	.975	.073

Testing Hypothesis of Direct Effect

A structural equation model, which analyses the direct impact of customer relationship management, satisfaction, and loyalty, defines the goal of the study. The effects of both directions are considerable, supporting hypotheses 1, 2, and 3.

Hypothesis Testing of Indirect Effect

By include satisfaction as a mediating variable, as recommended by Kelloway (1995), the hypothesis will be tested and the indirect impact, which is shown in the following table, will be explained.

The indirect effect of structural equation modelling. Standardised Indirect Effect Output as Source It appears that there is a direct correlation between significant and positive customer relationship management and customer loyalty, according to the previous results, which show a direct impact of the significant predictors (customer relationship management) on customer satisfaction (p> 0.05).

Table 4: Relationship among Constructs

		Estimate	SE	CRM	P	Level
Customer satisfaction-CRM		.811	.061	13.898	0	Par_9
Customer Loyalty-CRM		.646	.124	5.290	0	Par_10
Customer Loyalty-Customer Satisfaction		.252	.126	1.990	.046	Par_11

Table 5: Indirect Effect of Structured Equation Modelling

Constructs	CRM
Customer Satisfaction	.000
Customer Loyalty	.181

IX. CONCLUSION AND FUTURE RESEARCH PLANNING

According to this study's empirical findings, the hotel industry's customer satisfaction and loyalty are both impacted by the aspect of customer relationship management that is integrated into the research model. Additionally, this aspect has been shown to have a considerable impact on both customer loyalty and customer satisfaction. client relationship management and client loyalty are partially mediated by the customer satisfaction component.

X. RECOMMENDATION

Managers should improve relationship management to boost client loyalty in the hotel business.

XI. FUTURE RESEARCH PLANNING

There are also some recommendations that might be made, particularly for organising future research because the study had a number of limitations. So that a better model may be created, research must be repeated while creating new factors.

XII. CONCLUSION

By gaining greater understanding of the requirements for a successful CRM deployment and its effects on business relationships, this study is said to have helped academics and business practitioners alike. The suggested theoretical CRM-RQ framework was verified in the context of the present-day nation and industry. This study has sought to explore the whole process by which CRM technology pave the way for higher company performance and has recognised the enabling function of CRM technology in relationship marketing process via the development and validation of the CRM-RQ framework. Structural Equation Modelling and factor analysis results, both exploratory and confirmatory, supported the empirical validity of the framework and hence supported the findings of prior research.

XIII. LIMITATION OF THE STUDY

Despite offering some helpful insights into the main research issues, this study must be seen in light of some limitations, just like any other scientific research study. Every scientific survey research naturally has limits relating to general research principles, such as research

design, data collecting techniques, common method variance, etc. However, some of these constraints are especially relevant to the setting of this study. The fact that the survey data was gathered from the most important respondents in the hotel sectors that operate in India is one of the study's possible weaknesses. The final analysis was conducted using the self-reported data. The information gathered from distributor-company data might produce even more precise outcomes.

XIV. RECOMMENDATION FOR FUTURE RESEARCH

This study demonstrates how organizations can enhance customer relationships in the Indian hotel industry by using CRM applications. It validates the CRM-Relationship Marketing framework in developing economies like India, suggesting that CRM technology as a marketing tool will provide an advantage in the coming times, as CRM technology is still in its pioneering stage in developing countries.

REFERENCES

Agrawal, M. L., 2004. Customer Relationship Management (CRM) & Corporate Renaissance. Journal of Service Research, 3(2), 149-167.

Anderson, J.C., & Gerbing, D.W., 1988. Structural Equation Modelling in practice: a review and recommended two-step approach. Psychological Bulletin, Vol. 103 (3), pp. 411-423.

Ardiyhanto, D, 2011. Analisis Pengaruh Customer Relationship terhadap Loyalitas Pelanggan dalam Pembelian Sepeda Motor Yamaha pada PT. Megatama Motor di Makasar. Unpublished Undergraduate Thesis,

Makasar. Cheng, E.W.L., 2007. SEM being more effective than multiple regression in parsimonious development research, Journal of Management Development, Vol. 20 (7/8), pp.650-667.

Garver, M.S., & Mentzer, J.T., 1999. Logistic research method: employing structural modelling to test for construct validity, Journal of Business Logistics, Vol. 20 (1), pp. 33-57. Gordon, I., 2002. Best practices: Customer relationship management, Ivey Business Journal, No.67, Vol.1, p.1– 5.

Hair, J. F., Anderson, R., E., Tatham, R.L., & Black, W.C., 2013. Multivariate data analysis, 7/E, Prentice Hall, Pearson Educational International.

Indah & Devi., 2013. Analisa Pengaruh Customer Relationship Management terhadap Keunggulan Bersaing dan Kinerja Perusahaan, Business Accounting Review, Vol. 1, No. 2, pp. 50-60.

Kalakota, R. dan Robinson, M., 2010. E-Business 2.0 Roadmap for Success, Massachusetts: Addsion Wesley Longman Inc, Kelloway, E.K., 1995. Structural Equation Modelling in perspective. Journal of Organizational Behavior, Vol.16, p. 215-224

. Kotler, P., & Armstrong, G., 2011. Principles of Marketing (14th ed.). New Jersey: Prentice Hall.

ONLINE BUYING BEHAVIOUR TOWARDS COSMETIC PRODUCT

[1]Suchismita Roy, [2]Ankita Paul

[1,2]MBA 2nd Semester students, International School of Management Studies (ISMS), Pune.

_____

ABSTRACT

Everyone wishes to be attractive & presentable. It is a reality that everyone wants to look like the magazine models, both men and women, with great skin and a perfect body for a wonderful life. Some ladies cannot imagine going through the day without makeup. Along with makeup, people like to do skincare also for the nourishment of the skin. Both men and women of 21st century are frequently reminded of what is deemed beautiful and handsome. Shopping online has become an important hobby for everyone in the modern day. Cosmetics and Skincare products are drastically being sold on online platforms. A few years ago, no one would consider buying cosmetics online since it is regarded vital to test out such goods in person to assess the color, texture, and so on but now a lot of firms entirely rely on internet portals to sell cosmetics. This study aims to better understand the factors of consumer behavior that impact online cosmetic purchases. The study is totally dependent upon consumer's attitude towards cosmetic items in South Kolkata by administering a questionnaire to collate responses from 170 respondents spanning to different age groups. The findings suggest that pricing, marketing & discounts impact consumer purchasing behavior when purchasing cosmetics online.

Keywords: *Online Shopping, Consumer Behavior, Cosmetics Industry, Skin Care products*

I. INTRODUCTION

Consumer behavior, in its initial phases of progress, was commonly known as buyer behavior, with a strong focus on the interaction between consumers and producers during the purchase. Marketers have come to recognize that consumer behavior extends beyond the mere act of a transaction, incorporating a continuous process. This process entails much more than the specific instance when a consumer exchanges funds or utilizes a credit card to acquire a product or service. Buying behavior is focused towards the needs of individual, group and organization. In 2017, the Indian cosmetic business, which encompasses skin, hair, color, and dental care, was valued at 30 billion Indian rupees. With the liberalization of the 1990s came the crowning of numerous Indian women in beauty contests, including two Miss Universe crowns (1994 and

2000) and four Miss World crowns (1994, 1997, 1999, 2000). As a result, thorough knowledge of the relevance of those demands to consumer purchasing behavior is required. To understand consumer purchasing behavior, it is critical to know the interaction of the customer towards the marketing mix. The reason is, each individual's psychology towards items and services varies depending on culture, attitude, prior learning, and perception. Consumers then decide whether or not to buy the product and where to get it. Consumer buying behavior is the sum of a consumer's attitudes, interests, intentions, and decisions surrounding the consumer's marketplace activity while buying a product, good or service. Consumer behavior research focuses on the social science disciplines of anthropology, psychology, sociology, and economics. If a marketer wants good positioning, the initial stepping path is to determine the customer's purchasing behavior, after which the marketer will be in a better position to target those items and services to the consumer. As a result, proper comprehension relationship of those demands with customer purchasing behavior is required. To understand consumer purchasing behavior, it is difficult to establish the consumer's contact with the marketing mix. Consumers then decide whether they should buy the product or not and where to get it.

II. LITERATURE REVIEW

Consumer concern about their look and beauty drives the demand for cosmetic and beauty items in the market. The cosmetics used by customers are determined by factors such as gram mage, consistency, brand name, brand loyalty, and labeling.

Singh J.D. (1981) done a survey on "A study of Brand loyalty in India". A recent investigation has confirmed that Indian customers are showcasing a growing proclivity towards brand allegiance. Depending on the attributes of the merchandise, they demonstrate either sole or multiple brand loyalty. Elements that contribute to this steadfastness encompass the product's excellence, habitual utilization, and sustained accessibility in the marketplace.1986).

Understanding consumers' attitudes towards marketing is crucial for devising effective strategies for companies and developing regulations by government agencies to protect consumers' interests. Previous studies have examined consumers' overall attitudes towards marketing as well as specific marketing activities like advertising and pricing (Nwachukwu et al., 1991; Webster, 1991). The primary focus of researchers has been on investigating the underlying factors that cause variations in consumers' attitudes towards marketing activities.

Webster (1991) discovered significant variations in consumer attitudes towards various marketing practices such as product quality, pricing, advertising, and retailing or selling. Even after considering the influence of social class and income, numerous variations between the groups were still evident.

Consumer's perception play an important role in making their mindsets towards marketing tactics. Therefore, comprehending consumers' opinions about marketing has been used to predict economic trends and has shown correlations with significant macroeconomic indicators (Chopin and Darrat, 2000).

In India, users of cosmetics exhibit an intriguing trend, according to Briney (2004). While many nations across the world are adopting conventional Indian herbal and ayurvedic beauty treatments, Indian consumers are showing a rising preference towards foreign personal care goods as a way to improve their lifestyle standards. Using international labels is thought that indicates sophistication and a higher social status, which is what has sparked this movement.

Indian consumers want to experience beauty, and to be beautiful - whole industries are built on these needs (Kun, 2005). According to the French writer Anatole France, "beauty is the greatest power in this world".

In a 2007 study led by Dr. Vinith Kumar Nair and Dr. Prakash Pillai R, it was found that men generally have a preference for independently selecting and buying cosmetic brands. The quality of the product is the key factor that influences their purchasing decisions. Additionally, men tend to favor the convenience of buying all their cosmetic items from a single store.

According to a (2012) study by Debiprasad Mukherjee titled "Impact of celebrity endorsement on Brand Image," consumers have a strong emotional connection towards a business or a brand when it has an image that is similar to that of a celebrity whom they admire and aspire to be like. When the celebrity and the brand have complementary images, this association is more visible.

Dr. Maithili Ganjoo 2020) describes advertising has a significant impact on consumer purchasing decisions. Using various advertising appeals, firms may raise knowledge about their products and would also construct impressions about them that touch the consumer's heart or reason.

II. OBJECTIVES OF THE STUDY

- To investigate the sample respondents' **demographic** characteristics.
- To investigate the elements that influence **purchasing decisions**.
- To investigate the purchasing of **cosmetic items**.
- The study talks about the impact of media communication on **purchasing behavior**.

III. RESEARCH METHODOLOGY

Principle elements indentified for the study includes

- Factors affecting Purchase Decision, Spending Behavior,
- Sampling Area – South Kolkata
- Sample Size:170

Methods used for data collection

Primary Data - primary data is essential to understand customer's purchasing trends for cosmetics. Primary data has been gathered by using a prepared questionnaire.

Secondary Data - all pertinent secondary data is gathered from a variety of sources, including books, magazines, the internet, and articles, among others.

Tools for analysis and statistics

The data is gathered through the use of a standardized questionnaire. The greatest tool for gathering trustworthy data is considered to be a questionnaire. To fulfill the goal of the research, the questionnaire consists of multiple-choice questions. The data were analyzed using **MS Excel 2010.**

DEMOGRAPHY:

RESPONDENT'S GENDER PROFILE

FEMALE	87	170	51%
MALE	83	170	49%
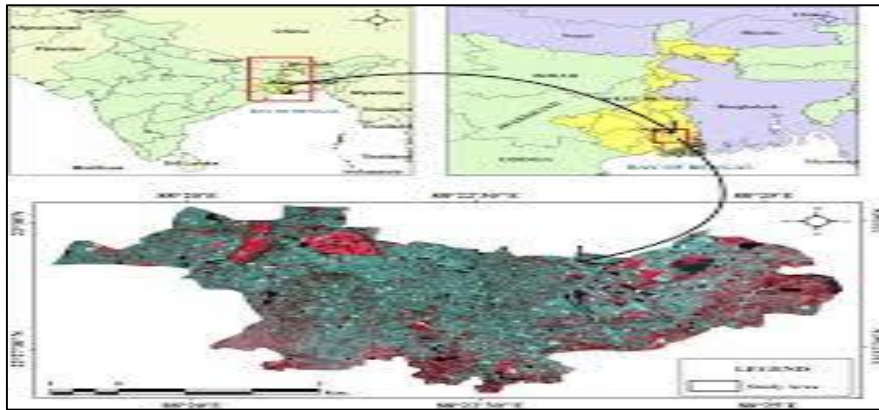
Source ResearchGate, **Fig.I, SOUTH KOLKATA**

I.   AGE

Youth (17-29 Years)	114	170	67%
Middle age (30-49 Years)	38	170	22%
Upper middle age (50 and above)	18	170	11%

Source: Primary data

II.   OCCUPATION

STUDENT	65	170	38%
SELF EMPLOYED	5	170	3%
JOB	70	170	41%
BUSINESSMAN	9	170	5%
DOCTORS	13	170	8%
HOUSEWIFE	2	170	1%

III.   USAGE OF COSMETICS

YES	123	170	72%
NO	30	170	18%
MAY BE	17	170	10%

Source: Primary data

We been shown, **10%** of people might use cosmetics, **18%** might not use cosmetics, and **70%** might use cosmetics. Depending on personal preferences, the exact proportion of persons who use or do not use cosmetics can vary widely.

IV.   BUYING PATTERN

SEARCH OFFLINE,BUY ONLINE	26	170	15%
SEARCH ONLINE,BUY ONLINE	102	170	60%
SEARCH ONLINE,BUY OFFLINE	43	170	25%

Source: Primary data

As can be see, almost **60%** of the consumers are going for the option *Search online and buy online.* It has become a preference for the consumers. People find it affordable and convenient at the same time. **25%** of the consumers nowadays search online and then buy according to their usual offline way. They basically see the shades, variety of product options online and choose from their and ultimately buy the selected product from the offline stores. Whereas **15%** of the consumers search offline and compare the prices online and ultimately purchase the products from online stores

V.   MOTIVATION TOWARDS BUYING COSMETIC PRODUCTS ONLINE

OFFERS	33	170	19%
EASE OF PURCHASE	34	170	20%
PRICE	8	170	5%
POSITIVE CUSTOMER REVIEW	64	170	38%
WIDE RANGE	31	170	18%

Source: Primary data

As seen in the chart, **38%** of the consumers, buy cosmetics online on the basis on positive customer review. People influence people to shop online. About **20%** of the consumers find it traditional shop to get the product. **19%** of the consumers get influenced by the offers which the various online cosmetic sites provide. Whereas **18%** of the customers shop cosmetics online due to wide range of availability of products. Only **5%** of the consumers give importance to the price, while buying cosmetics online.

VI.   SPENDING PATTERN

<500	62	170	36%
500-1000	80	170	47%
1000-2000	23	170	14%
20000>	5	170	3%

As we can see, **47%** of the consumers spend between Rs 500-1000 monthly on cosmetics. **36%** of the consumers spend below Rs.500 on cosmetics. This is the range where both high class, middle class group and lower middle class group can afford cosmetic products. Due to offers in the online platform, it has become way more easier to buy cosmetic products online. **14%** of the consumers spend Rs. 1000-2000 monthly on cosmetics, here the percentage is comparatively low. Whereas only   of the consumers spend Rs2000 and above monthly. It's crucial to remember that using cosmetics is a personal decision, and people should be content with how they look naturally. Although the importance of cosmetics may vary from person to person, they can generally offer a number of advantages in terms of boosting one's overall wellbeing and allowing for greater self-expression and confidence.

VII.   CONCERNS WHILE BUYING COSMETICS ONLINE

PRODUCT AUTHENTICITY	50	170	29%
PRODUCT QUALITY	68	170	40%
DIFFICULTY IN MATCHING SHADES	39	170	23%
DIFFICULTY IN EXCHANGE/RETURNS	8	170	5%
OTHERS	5	170	3%

You may improve your online cosmetic shopping experience and reduce the hazards involved in making purchases without first personally inspecting or testing them by being aware of these worries and taking the required safeguards.

VIII. NECESSITY OF SAMPLES WHILE BUYING COSMETIC PRODUCTS

YES	123	170	72%
NO	47	170	28%

You can make better selections about which cosmetic items are worthwhile investing in by trying out samples, decreasing the likelihood that you'll buy something that doesn't live up to your expectations or has negative effects on your skin.

IX. PAYMENT METHOD

UPI	83	170	49%
CASH ON DELIVERY	51	170	30%
CREDIT CARD/DERBIT CARD	27	170	16%
BUY NOW PAY LATER	8	170	5%

As we can see, **49%** of the consumers are using UPI payments, almost **30%** of the consumers use cash on delivery payment method. **16%** of the consumers are inclined towards the Credit or Debit Card payment method. Buy now pay later is still an alien think foe many Indian consumers, this is why only **5%** of the consumers are using BNPL.

X. RECOMMENDATIONS

YES	110	170	65%
NO	16	170	9%
MAYBE	44	170	26%

65% of consumers appear to be in favour of recommending others purchase cosmetics online. Furthermore, **26%** of customers are unsure or undecided about suggesting online cosmetic products, while **9%** would not.

PREFERRED PLACE TO BUY COSMETIC PRODUCTS FROM

ONLINE	106	170	62%
MOM&POP STORE	23	170	14%
MALL	41	170	24%

Online buying for cosmetics has become more and more popular with the growth of e-commerce. **62%** of the consumers are relying on online platforms. Online shoppers can explore and buy goods from a variety of stores, including specialized beauty websites, official brand websites, and general e-commerce platforms like Amazon. Convenience, a large selection, and the capability to read reviews and compare costs are all features of online buying. In the end, consumers have a wide variety of tastes, and their decisions may differ based on individualized requirements, practicality, and product accessibility. **24%** of the consumers are preferring the malls for shopping cosmetics. Depending on their preferences and purchasing requirements, some customers might potentially favor a combination of these choices. Only **14%** of the people are still sticking to the traditional stores.

XI.   PERCENTAGE OF THE INFLUENCING FACTORS WHICH ARE IMPORTANT FOR MALE WHILE BUYING COSMETICS ONLINE
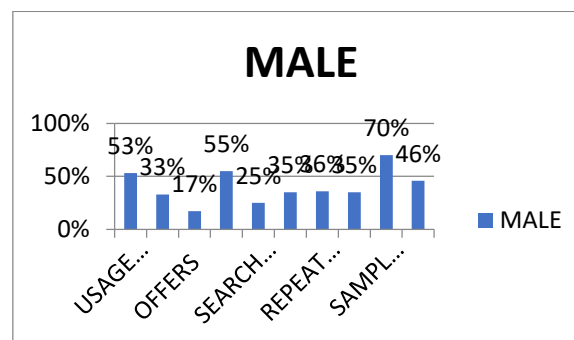
Fig.2

XII.   PERCENTAGE OF THE INFLUENCING FACTORS THAT ARE IMPORTANT FOR FEMALE WHILE BUYING COSMETICS ONLINE
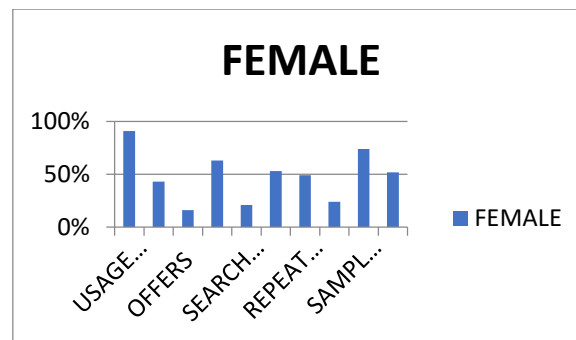
Fig.3

XIII.   COMPARATIVE ANALYSIS OF THE FACTORS
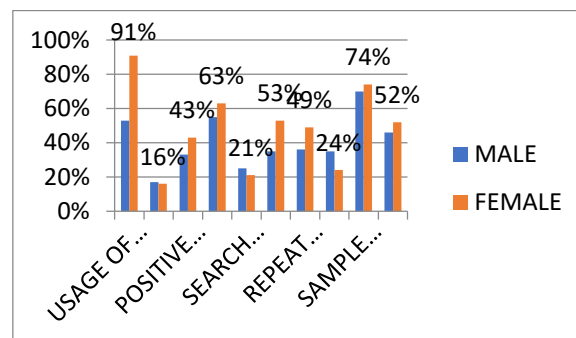
Source: Primary data, ***Fig.4***

IV. FINDINGS

I.   The way that society views gender and self-expression has changed noticeably over the past several years. Males who may have previously felt societal pressure to conform to traditional masculine ideals are now more accepting of and interested in cosmetics. This changing trend may lead to an increase in male use of cosmetics.

II.   According to the research, there are marginally more offers (**16%**) directed at men than at women **(17%).** This may indicate a rising trend among cosmetics companies to acknowledge the potential market among male clients. The nearly equal distribution of male and female offers suggests that cosmetics companies are beginning to understand how important it is to appeal to both sexes.

III.   Given that the bulk of the products are promoted largely to women, the larger proportion of female reviews may be understandable. It will assist in gaining

understanding of any observable patterns, preferences, or disparities between the two sexes, supplying crucial data for decision-making and marketing tactics.

IV. In comparison to men, women are way more attracted towards cosmetic items online. In addition to that, females who tend to conduct internet searches, go on to make purchases as compared to men. In contrast to their male colleagues, this somehow proves that females may be more likely to study and buy cosmetic online.

V. Due to cultural beauty standards and preferences for high-end brands, women may be more ready to spend money on expensive, high-end cosmetic goods. Males, on the other hand, could be more cost-conscious and favor affordable choices.

VI. Based on this analysis, we observe that females have a higher repeat purchase rate.

VII. Cost factors are typically significant for consumers. Customers of all sexes could look for cosmetics that provide them with good value for their money. To help them decide wisely, they may evaluate costs, special offers, and discounts.

VIII. It's important to note that differences in gender-based demographics can affect whether online payment options are required. Age, income, and cultural preferences are just a few variables that could be involved. Younger people, regardless of gender, for instance, have a tendency towards being more tech-savvy and more ease with online transactions.

REFERENCES

I. Singh J.D. (1981). "A study of Brand loyalty in India".28th May. Last accessed.

II. Gaski, John F. and Michael J. Etzel (1986), "The Index of Consumer Sentiment Toward Marketing," 29th May Last accesed.

III. Chopin, Marc C. and Ali F. Darrat (2000), "Can Consumer Attitudes Forecast the Macroeconomy,". **30th May accessed .**

IV. Debiprasad Mukherjee (2012). " Impact of celebrity endorsement on Brand Image". **1st June Last accessed**.

V. Pushpak Singhal, D. P. (2018). A Study on Consumer Behaviour towards Online Shopping In. IOSR Journal of Business and Management , 91-102.**3rd June Last accessed.**

VI. Kazmi,S and Batra,S, 2009, Advertising and Sales Promotion, Excel Books, New Delhi .**4th June Last accessed**.

IMPACT OF PRICING STRATEGY IN MARKETING IN WEST BENGAL: A STUDY WITH SPECIAL REFERENCE TO FMCG PRODUCTS

Aniketh Choudhary[1], Mouli Pal[2], Dibyendu Saha[3], Pamela Chatterjee[4], Priyojit Chatterjee[5]

Dr. Sudip Basu[6]

[1,2,3,4,5] *BBA 6th Semester, Management Studies Department, Asansol Engineering College, Paschim Bardhaman, West Bengal, India*
[6]*Assistant Professor, Management Studies Department, Asansol Engineering* College, *Paschim Bardhhaman, West Bengal, India*

ABSTRACT

This research was done in West Bengal and analyzed the impact of pricing strategy on consumer behaviour in the fast-moving consumer goods (FMCG) market. West Bengal consumers were proven to be highly price-sensitive, often gravitating towards products offered at reduced cost points. However, the study also revealed that consumers were willing to spend more money on products that offered superior quality and value.

Research Methodology: For this study, we gathered the information in primary mode by creating a structured Questionnaire based on our objectives and distributing it to the sector on which our research is based. Additionally, we have gathered secondary data from several journals, literature reviews, and questionnaires from various online sources.

A sample size of 125 has been suggested for a study on the impact of pricing strategy in FMCG products.

Results: From our study, we got the following results based on how often they purchase the FMCG products, how important is the pricing of FMCG products when you make a purchase decision, online retailers offer better pricing for FMCG products compared to physical retailers in West Bengal, promotional pricing strategies, such as buy one get one free, are effective in driving sales, discounts and offers influence purchasing habits, among other things.

Conclusion: Several suggestions for FMCG businesses operating in West Bengal were put out based on the study's findings. Firstly, It was recommended that businesses adopt a dynamic pricing strategy that adapts to shifting customer tastes and market conditions. By closely monitoring these factors, companies can optimize their pricing to remain competitive and appealing to consumers.

Keywords: *Pricing, FMCG, West Bengal, Products, Consumer, Pricing strategy.*

I. INTRODUCTION

Pricing strategy is more than setting a price. It influences revenue, profitability, customer perception and market position, and a little research can help you find the price that will help balance market strategy.

Pricing strategy and market strategy have an interactive relationship. So, while price strategy can have an impact on market strategy, it's more accurate to say that pricing strategy and market strategy work together for success.

Perhaps the most effective marketing strategy is pricing, so the result of its use is worth the effort. The conducted research indicates that a methodological approach is needed aiming at optimizing price policy. Such an approach can be applied to the price planning process.

FMCG Products

Consumer products that sell quickly and for a low price are known as fast-moving goods. Consumer packaged goods are another name for these items. Because of high consumer demand (such as for soft drinks and confections) or because they are perishable (such as for meat, dairy products, and baked goods), FMCGs have a short shelf life. These products are often purchased, quickly consumed, affordably priced, and widely dispersed. When they are on the store's shelf, they also experience a high rate of turnover.

Types of Fast-Moving Consumer Goods

FMCGs can be categorised into a number of distinct groups, including:

- **Processed foods**: Boxed pasta, cereals, and dairy items.
- **Prepared meals**: Ready-to-eat food.
- **Beverages**: Juices, energy beverages, and bottled water.
- **Baked goods**: Bagels, croissants, and cookies.
- **Fresh foods, frozen foods, and dry goods**: fruits, vegetables, peas and carrots in the frozen state, raisins, and nuts.
- **Medicines**: Aspirin, painkillers, and other medications are available over the counter.
- **Cleaning products**: Oven cleaner, baking soda, and window and glass cleaner.
- **Cosmetics and toiletries**: Toothpaste, soap, concealers, and hair care items.
- **Office supplies**: Pens, pencils, and markers.

II. REVIEW OF LITERATURE

Chamberlin (1933), in his book "The Theory of Monopolistic Competition" Chamberlin proposed that firms should add a markup to their production costs to control the selling price.

Nagle and Holden (1995), in their book "The Strategy and Tactics of Pricing", proposed that pricing ought to be founded on the value that a good or service provides to the customer.

Schindler and Kibarian (1996), in a research article, perceived the effectiveness of different types of retail price promotions." They found that odd-numbered prices, such as $9.99, were more effective than round-numbered prices in influencing consumer behaviour.

Gupta, and Mittal (2002), in their article, got the result that the Indian economy, the Fast Moving Consumer Goods (FMCG) sector is crucial. The Indian Fast Moving Consumer Goods (FMCG) business started to take shape during the past fifty or so years, and this sector affects every element of it.

Behura & Panda (2011) discovered that the FMCG industry is a pillar of the Indian economy in their research article. Every area of human life is impacted by this industry. The organised sector and the unorganised sector of the Indian FMCG market have long been separated. Similar to other countries, India's FMCG industry has had success selling goods to lower- and middle-income consumers.

Sethuraman, Tellis, and Briesch (2011) in their own article, found the effectiveness of competitive pricing strategies in the grocery industry. They found that offering lower prices than competitors can increase market share, but it can also reduce profitability.

Venkat Ram Raj Thumiki , **Md. Abbas Ali, and Naseer Ahmed Khan (2012),** in their research article, found that FMCG has become a significant product segment for rural consumers. Businesses that sell FMCG to customers in rural areas cannot simply apply their typical marketing methods to those markets. Instead, they must develop solutions specifically for rural areas. They must comprehend critical difficulties with rural consumer behaviour and, more especially, issues connected to various geographic parts of the nation during this procedure.

Jain and Sharma (2012), in a research article on. FMCGs touch on many facets of human life, it is an integral part of a consumer-dominated market and also one of the pillars of the Indian economy. FFMCGs give ample opportunity to the marketer to give choices and comparative advantage to the consumers in addition their own venture.

Dr. M. Rifaya Meera, R. Mahalakshmi, R. Padmaja (2017), in their research article they Processed foods, baked goods, and dairy are thought to be long-term growth industries in both rural and urban locations. The key driver of this sector's growth will be the increasing propensity of people in rural and semi-urban areas to purchase FMCG goods, which will force manufacturers to sharpen their focus in order to increase sales. Moreover, FMCG products that sold quickly are relatively low-cost. The shelf life of fast-moving consumer goods is limited. Because of this, the researcher has tried to focus on Rajapalayam Town's market in order to examine customer behaviour towards FMCG.

Nagarajan & Khaja (2013), in their research article, found that Fast-moving consumer goods (FMCG) are goods that are packaged, sold or consumed often and in tiny quantities. The pricing of

FMCG items generally lower, and the profits from such sales are more volume-based. A novel idea in India, organised FMCG retailing is quickly catching on in urban and semi-urban areas.

III. OBJECTIVES OF THE STUDY

- To scrutinize the various pricing strategies used by FMCG companies in West Bengal.

- To analyse the impression of pricing strategy on buyer purchasing behaviour in West Bengal.

- To identify the factors that stimulate the pricing strategy of FMCG firms in West Bengal.

- To suggest suitable pricing strategies for FMCG companies operating in West Bengal based on the study findings.

IV. RESEARCH METHODOLOGY

Research Methodology comprises of sources of Data Assortment like Primary and Secondary Data Collection Methods.

1. **Primary Data Collection:** In our study, we have composed the data in primary mode by creating a structured Questionnaire based on our topic and our objectives and distributing it to the sector on which our research is based, i.e. "Impact of Pricing Strategy in Marketing in West Bengal: A Study with Special Reference to FMCG Products". We circulated the questionnaires through Google Forms and asked the people to fill out this questionnaire for our academic purpose.

2. Secondary Data Collection: We have collected different journals, literature reviews, and questionnaires from various sources on the internet for our study. study. They were not directly connected or related to our research or study, research but guided us with the process of the research and its presentation. Gave us the knowledge of how to prepare our questionnaire and the way to ask questions in it based on our objectives and to record the raw data and analyse it and preserve it for the future.

Sample Size

In general, a trial size of 125 participants is recommended for a study on the effects of pricing strategy in FMCG products.

However, The ideal sample size will be determined by the specific research question, research design, population size, level of precision desired, statistical analysis, and budget and time constraints.

It is important to consult with a statistician or research expert to determine the appropriate sample scope for a given study.

V. RESULT & ANALYSIS

Table 1: Age of the Respondents					
Age	**Under 18**	**18-27**	**28-37**	**38-47**	**Above 48**
No of Responders	6	103	8	3	5
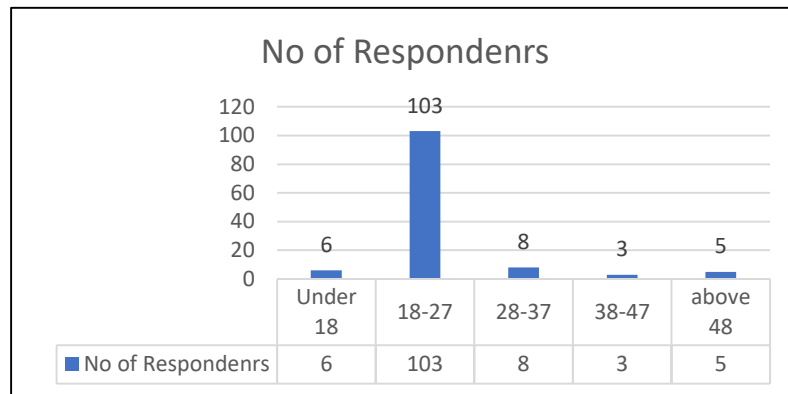
Figure 1: Age of the Respondents

Interpretation: From the table 1 figure 1, we can conclude that out of 125 respondents, 6 respondents (4.8%) are below 18 years, 103 respondents (82.4%) are between 18-27 years, 8 respondents (6.4%) are between 28-37 years, 3 respondents (2.4%) are between 38-47 years and 5 respondents (4%) are above 48 years.

Table 2: Gender of the Respondents		
Gender	**Male**	**Female**
No of respondents	73	52
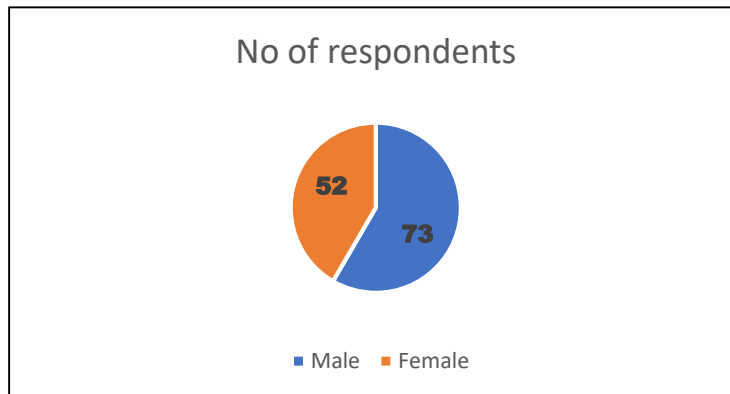
Figure 2: Gender of the Respondents

Interpretation: From Table 2 and Figure 2, we can conclude that out of 125 respondents, 73 respondents (58.4%) are male and remining 52 respondents (41.6%) are female.

Table 3: Education Level of the Respondents					
Education level	**High School or less**	**College**	**Bachelor's Degree**	**Master's Degree**	**Others**
No of respondents	9	48	47	19	2
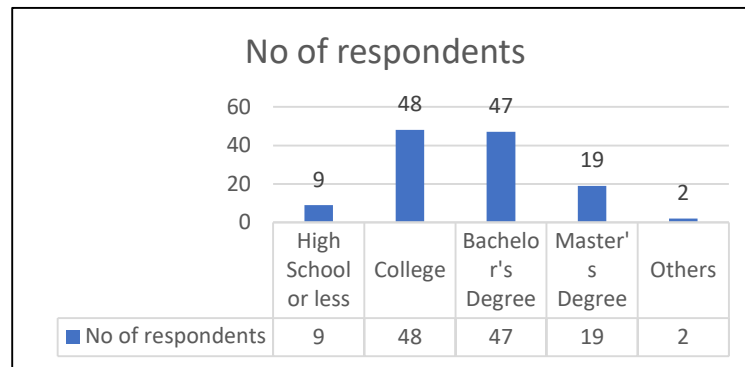
Figure 3: Education Level of the respondents

Interpretation: From Table 3 and Figure 3, we can conclude that out of 125 respondents, 9 respondents (7.2%) are in High School or less, 48 respondents (38.4%) are in college, 47 respondents (37.6%) are in Bachelor's Degree, 19 respondents (15.2%) are in Master's Degree and 2 respondents (1.6%) are in others.

Table 4: Occupation of the Respondents					
Occupation	Student	Employed	Self-employed	Retired	Others
No of respondents	92	25	6	0	2
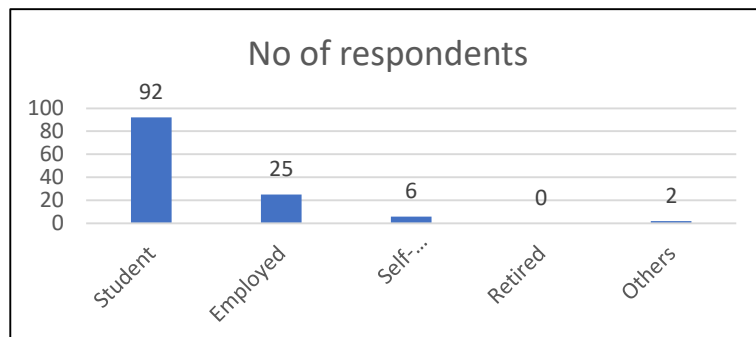
Figure 4: Occupation of the respondents

Interpretation: From Table 4 and Figure 4, we can conclude that out of 125 respondents, 92 respondents (73.6%) are students, 25 respondents (20%) are employed, 6 respondents (4.8%) are self-employed, 0 respondents are retired and 2 respondents are others.

Table 5: FMCG Products purchased frequently in West Bengal					
Products	Processed foods & beverages	Cosmetics & Toiletories	Fresh food	Medicines	All of these
No of respondents	31	2	8	3	81
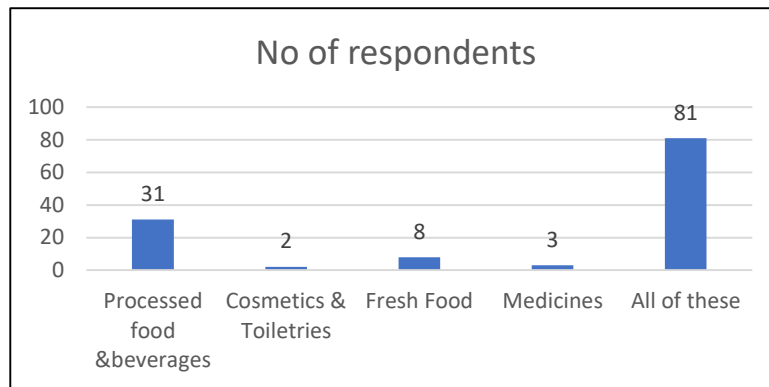
Figure 5: FMCG products purchased frequently in West Bengal

Interpretation: From Table 5 and Figure 5, we can conclude that out of 125 respondents, 31 respondents (24.8%) purchase processed food frequently, 2 respondents (1.6%) purchase cosmetics & toiletries frequently, 8 respondents (6.4%) purchase fresh food frequently, 3 respondents (2.4%) purchase medicines frequently and 81 respondents (64.8%) purchase all of these frequently.

Table 6: Purchase Period for FMCG Products					
Purchase period	Daily	Weekly	Monthly	Occasionally	Never
No of respondent	28	46	30	21	0
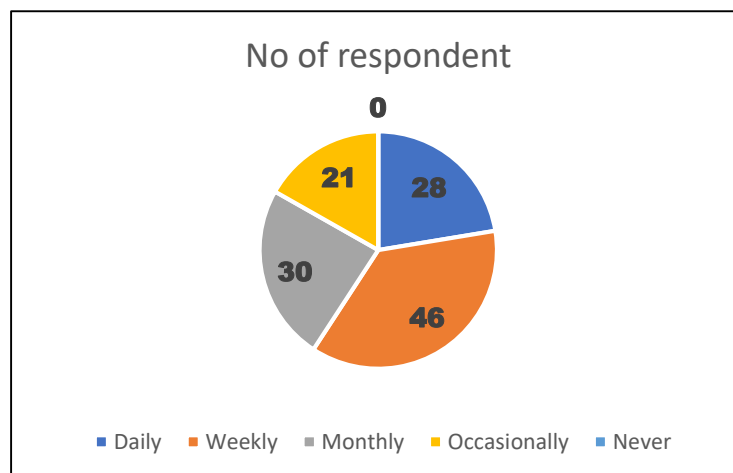
Figure 6: Purchase Period for FMCG Products

Interpretation: From Table 6 and Figure 6, we can conclude that out of 125 respondents, 28 respondents (22.4%) purchase it daily, 46 respondents (36.8%) purchase it weekly, 30 respondents

(24%) purchase it monthly, 21 respondents (16.8%) purchase it occasionally and 0 respondents purchase it never.
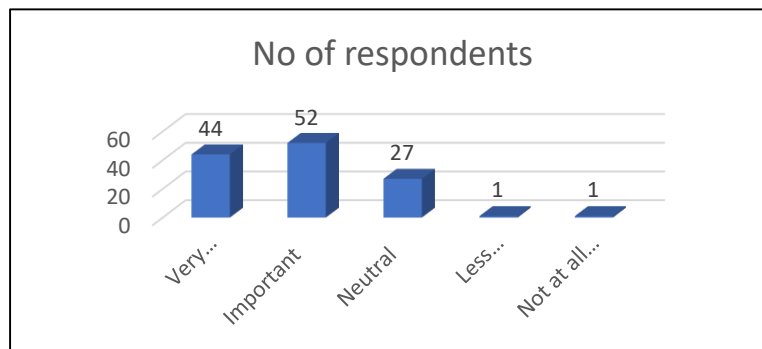
Figure 7: Importance of pricing of FMCG

Interpretation: From Table 7 and Figure 7, we can conclude that out of 125 respondents, 44 respondents (35.2%) find the pricing very important, 52 respondents (41.6%) find it important, 27 respondents (21.6%) are neutral, 1 respondent (0.8%) finds it less important and 1 respondent (0.8%) finds it not at all important.

Table 8. Price of FMCG products reasonable					
Reasonable	**Strongly agree**	**Agree**	**Neutral**	**Disagree**	**Strongly disagree**
No of respondents	11	39	62	13	0
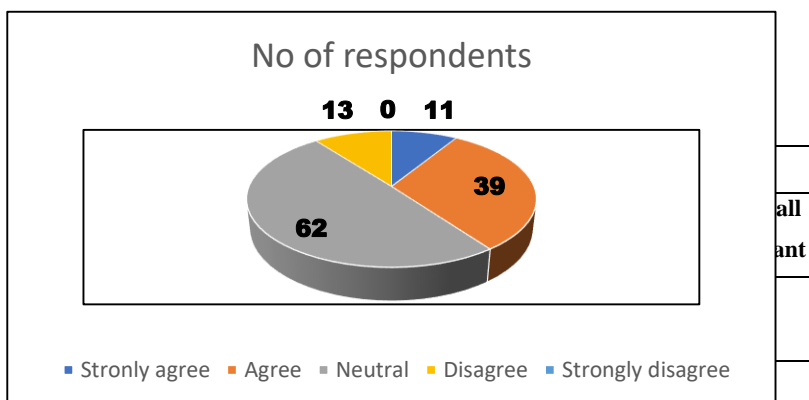
Figure 8: Price of FMCG products reasonable

Interpretation: From Table 8 and Figure 8, we can conclude that out of 125 respondents, 11 respondents (8.8%) strongly agree for the price reasonability, 39 respondents (31.2%) agree of it, 62

respondents (49.6%) are neutral, 13 respondents (10.4%) disagree and 0 respondents strongly disagree.

Table 9: Online retailers offer better pricing for FMCG products

Response	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
No of respondents	18	63	35	8	1
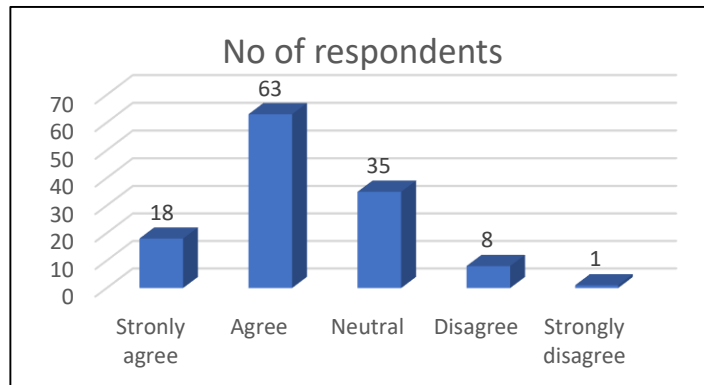
Figure 9: Online retailers offer better pricing for FMCG products

Interpretation: From Table 9 and Figure 9, we can conclude that out of 125 respondents, 18 respondents (14.4%) strongly agreed that Online retailers offer better pricing for FMCG products, 63 respondents (50.4%) agree, 35 respondents (28%) are neutral, 8 respondents (6.4%) disagree and 1 respondent (0.8%) strongly disagrees.

Table 10: Promotional strategies are effective in driving sales

Response	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
No of respondents	42	58	22	3	0
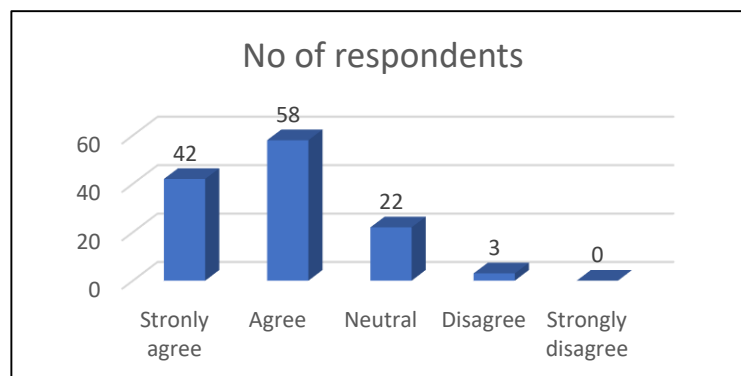
Figure 10: Promotional strategies are effective in driving sales

Interpretation: From Table 10 and Figure 10, we can conclude that out of 125 respondents, 42 respondents (33.6%) strongly agree, 58 respondents (46.4%) agree, 22 respondents (17.6%) are neutral, 3 respondents (2.4%) disagree and 0 respondent strongly disagrees.

Table 11: Discounts and offers influencing buying behaviour					
Response	**Strongly agree**	**Agree**	**Neutral**	**Disagree**	**Strongly disagree**
No of respondents	56	52	17	0	0
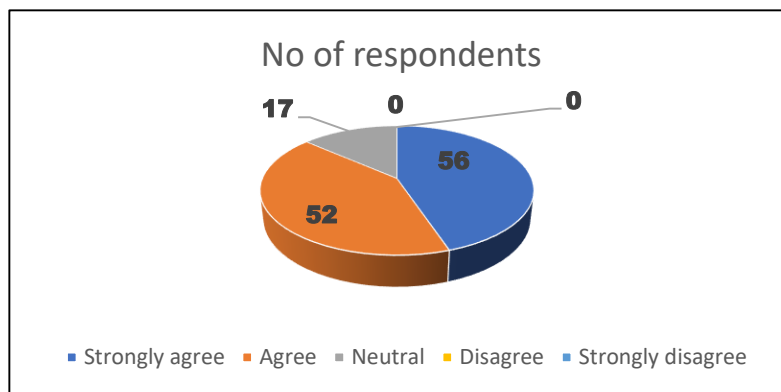
Figure 11: Discounts and offers influencing buying behaviour

Interpretation: From Table 11 and Figure 11, we can conclude that out of 125 respondents, 56 respondents (44.8%) strongly agree, 52 respondents (41.6%) agree, 17 respondents (13.6%) are neutral, 0 respondents disagree and 0 respondent strongly disagrees.

Table 12: FMCG companies consider the income level of consumers when setting prices					
Response	**Strongly agree**	**Agree**	**Neutral**	**Disagree**	**Strongly disagree**
No of respondents	13	45	53	11	3
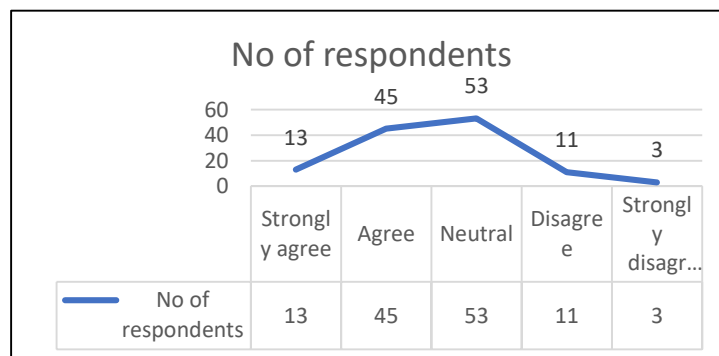
Figure 12: FMCG companies consider the income level of consumers when setting prices

Interpretation: From Table 12 and Figure 12, we can conclude that out of 125 respondents, 13 respondents (10.4%) strongly agree, 45 respondents (36%) agree, 53 respondents (42.4%) are neutral, 11 respondents (8.8%) disagree and 3 respondents (2.4%) strongly disagrees.

| Table 13: Most effective pricing strategy					
Response	**Premium Pricing**	**Discount Pricing**	**Penetrating Pricing**	**Price Skimming**	**Buy 1 get 1**
No of respondents	6	68	8	10	33
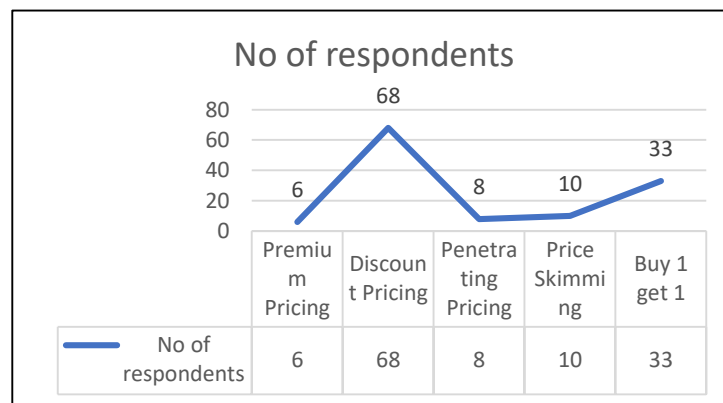
Figure 13: Most effective pricing strategy

Interpretation: From Table 13 and Figure 13, we can conclude that out of 125 respondents, 6 respondents (4.8%) find premium pricing more effective, 68 respondents (54.4%) find discount pricing more effective, 8 respondents (6.4%) find penetrating pricing more effective, 10 respondents (8%) find price skimming more effective and 33 respondents (26.4%) find buy 1 get 1 more effective.

Table 14: People willing to pay for branded FMCG products					
Response	**Much more**	**Slightly more**	**Same**	**Slightly less**	**Much less**
No of respondents	19	61	36	2	7
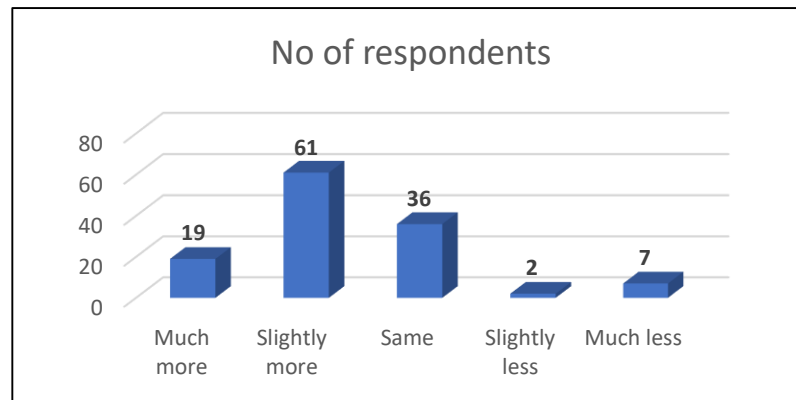
Figure 14: People willing to pay for branded FMCG products

Interpretation: From Table 14 and Figure 14, we can conclude that out of 125 respondents, 19 respondents (15.2%) would pay much more for branded FMCG products, 61 respondents (48.8%) would pay slightly more for branded FMCG products, 36 respondents (28.8%) would pay same for branded FMCG products, 2 respondents (1.6%) would pay slightly less for branded FMCG products and 7 respondents (5.6%) would pay much less for branded FMCG products.

Table 15: FMCG companies differentiate prices based on geographic location					
Response	**Strongly agree**	**Agree**	**Neutral**	**Disagree**	**Strongly disagree**
No of respondents	13	50	47	10	5
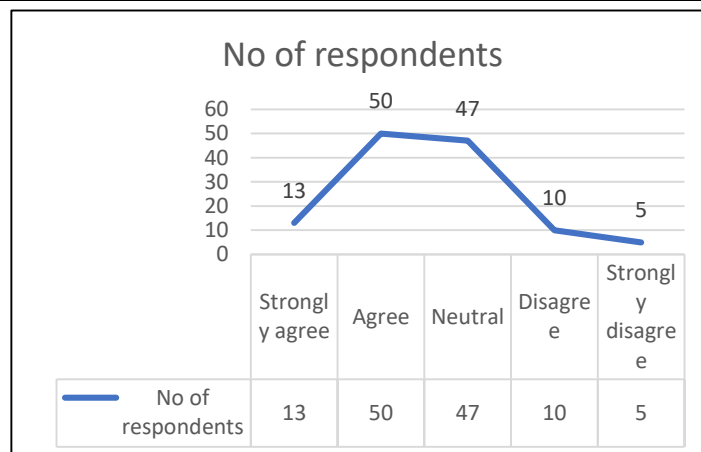
Figure 15: FMCG companies differentiate prices based on geographic location

Interpretation: From Table 15 and Figure 15, we can conclude that out of 125 respondents, 13 respondents (10.4%) strongly agree, 50 respondents (40%) agree, 47 respondents (37.6%) are neutral, 10 respondents (8%) disagree and 5 respondents (4%) strongly disagrees.

Table 16: Brand image impacts the pricing strategy					
Response	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
No of respondents	22	64	33	3	3

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
■ No of respondents	22	64	33	3	3
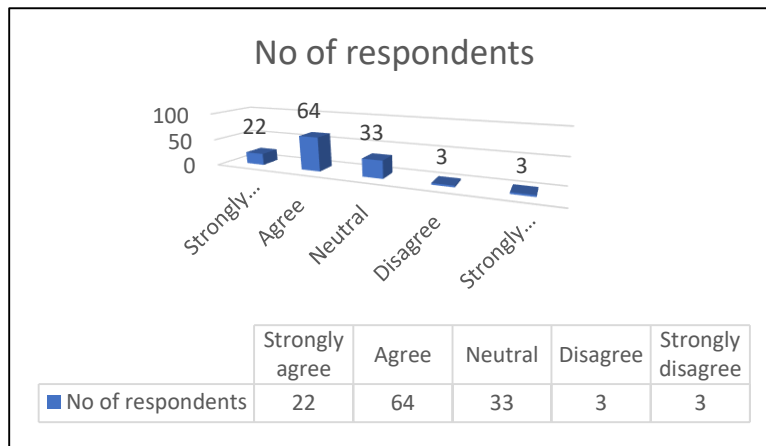
Figure 16: Brand image impacts the pricing strategy

Interpretation: From Table 16 and Figure 16, we can conclude that out of 125 respondents, 22 respondents (17.6%) strongly agree, 64 respondents (51.2%) agree, 33 respondents (26.4%) are neutral, 3 respondents (2.4%) disagree and 3 respondents (2.4%) strongly disagrees.

VI. FINDINGS OF THE STUDY

From our study we got the following results:

- Out of 125 respondents, 103 respondents (82.4%) were between the age of 18-27 years.
- out of 125 respondents, 73 respondents (58.4%) are male and remining 52 respondents (41.6%) are female.
- out of 125 respondents, 48 respondents (38.4%) are in college.
- out of 125 respondents, 92 respondents (73.6%) are students.
- out of 125 respondents, majority of them i.e. 81 respondents (64.8%) purchase all the types of FMCG products frequently.
- out of 125 respondents, majority of them i.e. 46 respondents (36.8%) purchase the FMCG products monthly.

- out of 125 respondents, majority of them i.e. 52 respondents (41.6%) find the price of the FMCG products important while purchasing.
- out of 125 respondents, majority of them i.e. 62 respondents (49.6%) find it neutral that the price of FMCG products are reasonable in West Bengal.
- out of 125 respondents, majority of them i.e. 63 respondents (50.4%) agree on the topic that online retailers offer better pricing for FMCG products compared to physical retailers in West Bengal.
- out of 125 respondents, majority of them agree i.e. 58 respondents (46.4%) think promotional pricing strategies, such as buy one get one free, are effective in driving sales
- out of 125 respondents, majority of them i.e. 56 respondents (44.8%) agree that discounts and offers influence buying behaviour.
- out of 125 respondents, majority of them i.e. 53 respondents (42.4%) find it neutral that FMCG companies consider the income level of consumers when setting prices.
- out of 125 respondents, the majority of them i.e. 68 respondents (54.4%) find discounting pricing as the most effective pricing strategy.
- out of 125 respondents, the majority of them i.e. 61 respondents (48.8%) would pay slightly more for branded FMCG products
- out of 125 respondents, the majority of them i.e. 50 respondents (40%) agree that FMCG companies differentiate prices based on geographic location.
- out of 125 respondents, the majority of them i.e. 64 respondents (51.2%) agree that brand image impacts the pricing strategy

VII. SUGGESTIONS AND RECOMMENDATIONS

Based on the study's findings, several recommendations were proposed for FMCG companies operating in West Bengal. Firstly, it was suggested that companies should adopt a dynamic pricing strategy that adapts to changing market conditions, consumer preferences, and competition. By closely monitoring these factors, companies can optimize their pricing to remain competitive and appealing to consumers. Additionally, the study emphasized the importance of product innovation and quality improvement. FMCG companies should focus on developing innovative products that meet consumer demands and expectations. Improving the quality of existing products can also help justify premium pricing and attract discerning customers who prioritize value which will help them to maximize their profits and align with the business's objectives.

VIII. MANAGERIAL IMPLICATIONS OF THE STUDY

The study on the impact of pricing strategy in marketing FMCG products in West Bengal has several managerial implications for companies operating in this industry the study highlights the significance of pricing decisions in the FMCG sector in West Bengal. Managers should carefully evaluate the pricing strategies adopted by their competitors and consider pricing as a key tool for market positioning. It provides insights into consumer behaviour related to pricing. Managers can leverage this information to understand how price sensitivity varies across different consumer segments. The study emphasizes the importance of monitoring and analyzing competitor pricing strategies. Managers should conduct regular market research to stay updated on pricing trends, promotional offers, and discounts in the FMCG industry in West Bengal. Pricing strategies can be used as a means of product differentiation. Managers can explore opportunities to position their products as superior in quality and charge a higher price accordingly. Alternatively, they may consider adopting a penetration pricing strategy to gain market share by offering products at lower prices. The study suggests that consumers in West Bengal are sensitive to promotional offers and discounts. Managers can leverage this insight to design effective promotional campaigns and sales strategies.

IX. FUTURE PERSPECT OF THE STUDY

Future studies can compare the pricing strategies and their effectiveness across different regions in India or even in other countries. This would provide a broader perspective on how pricing strategies vary across markets and the factors influencing their success. With the cumulative adoption of e-commerce and digital platforms, that would be interesting to assess the effect of digitalization on pricing strategies in the FMCG sector in West Bengal. Future research can go further into understanding the price elasticity of demand for FMCG products in West Bengal. This technique can be used to assess customer sensitivity to price changes and assist managers while determining prices to maximize revenue and profitability. Examining how pricing strategies vary across different consumer segments in West Bengal can provide valued visions for market segmentation and targeted marketing.

REFERENCES

Books

1. Pricing Strategy: Setting Price Levels, Managing Price Discounts, and Establishing Price Structures" by Tim J. Smith
2. The Theory of Monopolistic Competition" by Chamberlin
3. "The Strategy and Tactics of Pricing" by Nagle and Holden
4. "Pricing Strategy: How to Price a Product" by Jeff Simon
5. Kotlar Philip and Armstrong Gary: Principles of Marketing, Pearson. 2.

6. Arun Kumar: Marketing Management, Vikas Publishing House.

Journals

1. Schindler, R. M., & Kibarian, T. M. (1996). Increased consumer sales response through use of 99-ending prices. *Journal of Retailing*

2. Gupta, Mittal (2002) Fast Moving Consumer Goods Industry in Rural Market of India: A Case of Mutual Reinvigoration

3. <u>Venkat Ram Raj Thumiki</u> , <u>Md. Abbas Ali</u> , <u>Naseer Ahmed Khan</u> (2012). Factors Influencing Purchase of FMCG by Rural Consumers in South India: An Empirical Study.

4. Jain and Shama (2012). The Effect of Demographic Factors on Consumer Purchase Intention in Buying Television Set in Kathmandu Valley: An Empirical Study

5. Nagarajan & Khaja (2013): Emerging Challenges and Prospects of FMCG Product Developing in India.

6. Dr. M. Rifaya Meera[1*], R. Mahalakshmi[2], R. Padmaja (2017). Consumer Behaviour towards FMCG Products: A Study with Special Reference to Rajapalayam.

7. Huang and Chen (2019): They conducted a systematic literature review on dynamic pricing

8. Sethuraman, R., Tellis, G. J., & Briesch, R. A. (2011). How well does advertising work? Generalizations from meta-analysis of brand advertising elasticities. *Journal of Marketing Research, 48*(3), 457–471.

Web Links

- http://www.scribd.com/doc/5302676/1/Consumers
- http://www.limahd.ernet.in/publications/data/2005-09-08preeta.pdf
- http://www.citehr.com/research.php?q=FMCG-sales-promotion
- http://en.wikipedia.org/wiki/Sales
- https://business.mapsofindia.com/fmcg/west-bengal.html
- https://www.researchgate.net/publication/328202339_Product_Strategies_of_Companies_in_the_FMCG_Industry_A_Review_of_the_Literature
- https://www.pricebeam.com/consumer-goods-pricing

PSYCHOLOGICAL BONDING AND BRANDING THROUGH CUSTOMER: A MULTIDISCIPLINARY APPROACH

[1]Archisman Khanra, [2]Itu Chowdhury Gupta, [3]Hiranmoy Samanta

[1,2,3]*Gargi Memorial Institute of Technology*

ABSTRACT

Consumer behaviour involves the psychological processes that consumers go through in recognizing needs, finding ways to solve these needs, making purchase decisions (e.g., whether or not to purchase a product and, if so, which brand and where), interpret information, make plans, and implement these plans. A person have chosen to Admission in a Engineering College segment. five senses, cognition, Emotional factors can affect a hotel's brand reputation. The Attachment-Aversion (AA) relationship model provides a unified model of customer-brand relationships. To further develop this as a relevant consumer psychology model, future research should investigate three key factors. How does brand perception differ from personal perception? The role of brand experience as a determinant of customer-brand relationships and how the AA relationship model fits into other brand frameworks. The authors provide insights and suggestions for accomplishing these three tasks.

Keywords: *Psychological Branding, Customer need.*

I. INTRODUCTION

With the goal of building lasting connection, brands offer tangible advantage that can overshadow their touchable benefits. The explosion of communication technology makes it increasingly difficult for people to stay connected and updated. The emergence of branding has historically been attested by the explosion of branding categories that apply to both manufacturing and industry. A trademark is a logo, symbol, name or design that make a brand unique through goods or services (15). Building a strong business provides value that may seem simple from the customer's perspective, but is highly profitable for a company to survive in a fiercely competitive marketplace. A brand is an important factor for a quality product, especially in a saturated market. Therefore, a trusted brand must not only meet the needs of its customers, but must also be able to provide superior quality, low cost of quality, total cost leadership and efficient positioning in the features that matter to them. (6) This paper lauds the questions raised by (14):

• What is a strong brand?
• How can I build a strong brand?

• How do strong brands increase moneymaking and build extended relationships? These questions have prompted researchers to delve into the field of branding and somehow arrive at different interpretations. As evidence of this, several prominent brands in his category have emerged, such as: B. Brand Image, Brand Equity, Brand Association, Brand Loyalty. This is consistent with the statement by (13) that says the pace of branding efforts in the service industry does not match the rapid growth of the industry itself.

However, the rise of branding literature in the hospitality industry shows that there is always an opportunity to create new etching aspects. So far, brands thrive when they cater to human traits, lifestyles and preferences. The success of this combination has been achieved through Starbucks' remarkable efforts to understand the human psychology and incorporate it into its brand strategy. (11).

In brand management literature, certain researchers focused on how brand consumer relationship quality, attachment, and self-congruence with a brand relate with consumer well-being (Schnebelen and Bruhn, 2018). Past research on brand-consumer relationship literature has focused on variables such as brand love, referred to as consumers' strong positive feelings for a particular brand (23). Marketing literature outlines the importance of brand love because of its strongly established empirical associations with other relatively favourable outcomes, i.e., loyalty (24), word of mouth (24), willingness to pay more and self-disclosure (24).

This article proposes three components that make up the psychological dimension: sensation, cognition, and emotion. As derived, sensory perception consists of her four human senses: touch, taste, vision and hearing. Cognitive skills generally refer to the ability to think, while emotional refers to feelings about things and situations.

Five-star hotel indeed having the character of sensory in which guest come to the hotel to see and feel the luxurious service, smell the delicate fragrance, taste the appetizing food, and get touched or pampered by the glamorous services.

Psychology

(21) described Psychology as human behaviour and attribute. An attitude or reaction to something. values and perspectives. motivation and determination. Methods of communication and interaction between humans, animals and nature. Consumer psychology studies consumer perceptions, beliefs, emotions, and thoughts, and considers them all when studying purchasing actions. We also take into account the social beliefs and motivations of third parties in their purchasing decisions, such as through mass-market and advertising. In the marketing field, psychology concepts are used to exploit people's perceptions amongst good logo design, colourful pattern selection, price distinction, packaging, and product

bundling. Human needs motivation to respond and the psychological elements drive the cognitive and affective mechanism in human to react. Consumer psychology studies consumer perceptions, beliefs, emotions, and thoughts, and considers them all when studying purchasing behaviour. This is in line with (20). The human sensation described has a pronounced effect on human behaviour.

Sensory

Sensory are the most powerful approach of the human being that affects the consumer's awareness and experience of buying process. Sensory marketing uses all five senses to influence perception, memory and learning processes with the aim of manipulating consumer encouragement, desires and actions. (10) notes sensory experience as an individual's thoughts about goods and services are processed amongst the mind and senses. Sensor technology will enable people to distinguish between product, shopping and customer service experiences. According to (15) all human lives and experiences in the world depend on the connection between the senses and the mind. Senses have been shown to influence people to be calm, relaxed, stress-free, energetic and in a good mood, which in turn influences later decision-making and manipulates spending behaviour. (20).

Sense of vision

Like other senses, vision interacts with other parts of the brain to store memories, regulate emotions, make decisions and Signals come and go in the area to initiate action. (9) Noting that lighting is an influential factor in creating a room's ambience, it proves that the right light, reflections and room conditions can create an atmosphere. A strong sense of playfulness, gratitude, kindness and relaxation. Types of lighting influences guest's moods in a way that elevate self-confidence, enthusiasm, energy (bright light), sociability, relaxation (warm light), friendliness, happiness and enjoyment (colourful lighting).

Sense of touch

The taste is felt by using the tongue. Tastes are classified into four categories: sweet, sour, salty, and bitter, and tastes that are not classified are boring. Taste buds are formed by clusters of taste receptor cells with hair-like projections projecting into the central pore of the taste bud. People are ready to pay more and travel farther for the same amount of food and drink if it tastes great. People would be frustrated if they were not permitted to touch the product (5).

Sense of hearing

Hearing is an automatic sense. It translates physical movements into electrical signals that make up the vocabulary of the brain, and translates those vibrations into what we experience

as the world of sounds. People are stimulated to stay in certain places, especially rooms, because sound influences our mood to relax and unwind. (7) stated that people favour soft, slow music in quiet, quiet places as it evokes relaxation, calmness and enjoyment. From observation, hospitality establishments like fine-dining restaurant and five-star hotel prefer to play instrumental music to influence guest's moods and feeling of relaxing and comfortable.

Sense of smell

Let's take an example if there is any brand that sells perfume, then consumers use his smelling sense to identify which brand perfume is good. the feeling of

Smells help humans remember specific events, especially events that involve feelings and emotions (10). A person with a well-developed sense of smell may be able to visualize a smell that evokes a particular memory. The scent of blossoming orchards brings back memories of childhood picnics. In five-star hotel segment, the use of scent has started to get attention by the industry players as reported by (3). Branding is Sheraton Hotels & Resorts with embrace warmness, a blend of fig, jasmine and freesia. Westin Hotels and Resorts distribute white teas that provide a "Zen Retreat" experience. Mandarin Oriental, Miami uses Meeting Sense in its meeting rooms to hyper- productivity.

Cognitive

In the truest sense of the word, cognition is defined as thinking. Technically, cognition refers to the intellectual building and evolution convoluted in convention and clarify mind. Cognitively, it is defined as the information, meanings, and faith that humans hold in their minds and process to understand motivations and events, remember the past, form evaluations, and make purchasing decisions (18). Cognitive psychology plays a big role in understanding the processes of memory, attention and learning (1). It also provides insight into cognitive states that affect people's functioning. A cognitive role in the purchasing process becomes dominant when the product represents the corresponding self-image.

Affective

Affective can be simply defined as feeling. (18) outline emotions as feelings of like or dislike, including satisfaction/dissatisfaction and intense emotions. (19) define that there are two modes of emotional refining in time series: constructive processing and motivational processing. Constructive processing is a situation in which people process both emotional and non-emotional facts with broad and unrestricted consequences. Motivated processing, on the other hand, is a more controlled and purposeful information processing arrangement in which biased effects dissolve or reverse as people turn conscious of their emotional experiences.

Sensory, cognitive and affective connection

The biggest distinction between humans and machines is emotion. Emotions play a forceful role in human life, particularly when it comes to expressing emotions. Emotional loyalty is part of brand-consuming psychological preferences, is associated with positive feelings and emotional attachment to continue to purchase brands, and is associated with cognitive stated by (8).

Brand loyalty

Brand loyalty is when customers persist to buy from the same brand even though contestant offer similar products and services. Likely a brand loyalty factor influence future consumer behavior such as referrals, word of mouth, and customer intent willingness to look for the equal product or service in the future (2). It builds on (4), who state that consumers remain loyal and are willing to pay a higher price if the product or service matches their tastes and attitudes. Moreover, behavioural intentions are intrinsically motivating and not long-term.
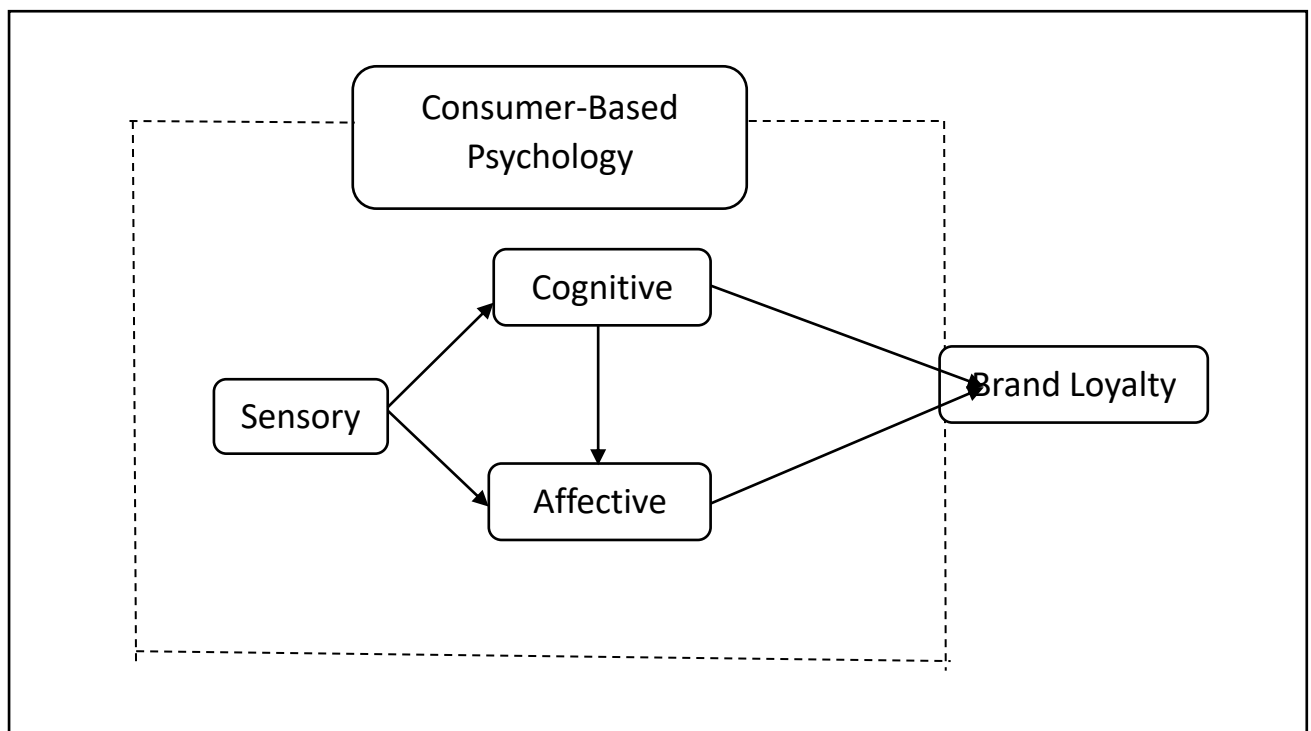
Figure 1: Theoretical Structure

II. METHODOLOGY

Consumer psychologists repeatedly conduct research to learn more about buyer behaviour. Standard examination approach used by these professionals include experiments, focus groups, direct observation, and questionnaires. This post-recession trend has led to the

finding of a variety of examination approaches that can be usable to consumer psychology. The **theoretical structure** suggest for this study is shown in Figure 1. The competition for five-star hotels is fierce, and the fact that all stakeholders have to improvise and strategize over time has provided an opportunity to generate very insightful ideas for this study bottom. Interviews revealed that some managers were not even aware that their facilities were providing services that fell within the previously suggested range. The suggest dimensions were then optimized through the theoretical structure shown in Table 1. We collected real-world opinions and feedback from our customers using self-assessment surveys. His 15 hotels with similar features and privileges were selected to assure the responsiveness and trustworthiness of the data collected. The study used a convenient slice method in which interviewees who participated in the survey had stayed at the hotels listed in the survey.

Customer satisfaction dimensions	Meaning of each dimension	Examples of content
Cognitive Dimension	Extrinsic factors of customer satisfaction.	Personal experience, culture, customs, privacy; business reputation, etc.
Emotional Dimension	Emotion or psychological feelings that promote or hinder the transactions.	The expectation and perception quality of E-Commerce transactions, trust, and the psychological satisfaction after E-Commerce transactions.
Behavior Dimension	Behavior of customer after consumption whether to continue buying.	Customer complaints and customer loyalty.

Table-1: Customer Satisfactory Dimensions
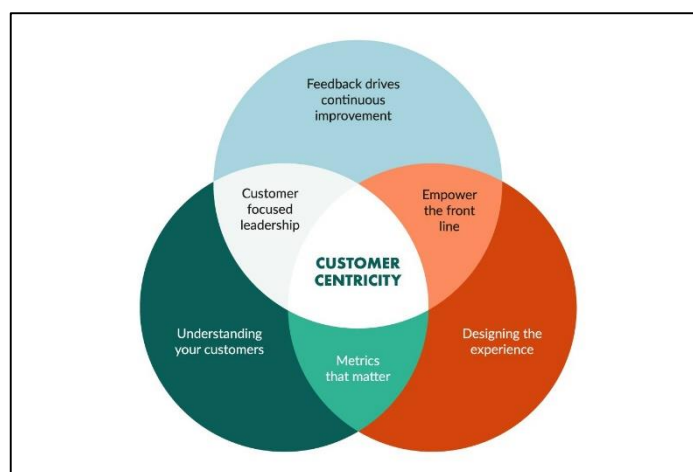
Figure 2: Customer based model of brands

III. FINDINGS AND DISCUSSIONS

A detailed breakdown was performed to assess customer exposure in terms of customer base

Measurement	M	S. D	95% Confidence Interval	
			LL	UL
Sensory				
• Vision	5.90	0.890	5.82	6.04
• Touch	5.84	0.789	5.75	6.00
• Taste	5.93	0.865	5.87	5.99
• Sound	5.72	0.973	5.60	5.70
• Smell	5.65	0.983	5.51	5.77
Cognitive	5.91	0.792	5.79	6.03
Affective	5.86	0.843	5.77	5.95

Table 2: Descriptive statistics based on studies conducted to measure psychology

psychometrics. Table 2 recap the descriptive statistics of the measurements reported in the studies. In terms of sensory perception, vision has the highest score (M=5.90, S.D. 0.890). For a 5-star hotel this is not surprising. Because the image that matches the status and price paid for staying in a hotel is very important. In addition, guests usually make an impression of the hotel when entering the hotel facilities or browsing the website. Her second highest score for the senses is taste (M = 5.83, S.D. 0.865). High quality and delicious food is very important for a 5 star hotel as guests generally remember the taste of the food even if they have eaten similar food in other place. Touch is (M=5.84, S.D.=0.789). The sense of touch is very important, and a gentle touch against the skin creates a feeling of calmness and well-being. Of the items listed sensitive, odour receives the smallest rating (M=5.64, S.D. 0.983). A chart of **customer-based model of brands** is given in Figure 2. While not ignored by industry insiders, it is still important to supplement the privileges supplied during a stay at these hotels.

Measurement	1	2	3	4
1. Sensory	-	-	-	-
2. Cognitive	.412*	.417**	.347**	
3. Affective	.335*	.386**		
4. Brand Loyalty	.424*			

Table 3. Coefficient of correlation considering Customer Base Psychological Analysis

In the coming part of the demonstration, we assessed the strength of the association between the listed measurement across the customer base psychological branding framework. Table 3 shows the coefficient of correlation analysis results for this purpose. Of the three measures used to determine brand loyalty, the sensory measure is the most important (r=.427, p<.01). Moods and emotions are all generated by the environment's ability to influence the senses, so sensory experience is undoubtedly a key ingredient to a great brand. Cognitive score (r=.386, p<.01).

Affective (r=386, p<0.01) is important in the total structure.

IV. CONCLUSION AND FUTURE STUDY

It is concluded that sensation plays an influential role in promoting five-star hotel brands. Sight, touch, taste, hearing and smell all affect a hotel's brand reputation. In fact, the holistic framework of customer base psychology may provide a new foundation for brand excellence in the future.

REFERENCES

1.Ariffin, H.F., Abdullah, R.P.S.R., & Bibon, M.F. (2012). Assessing service quality: from the perspective of people who perform

prayers. *Journal of Asian Behavioural Studies*, 2(4), 11-20.

2.Bagozzi, R.P. (1992). The self-regulation of attitudes, intentions, and behaviour. *Social Psychology Quarterly*, 55(2), 178 204.

3.Bloomberg Business Week. (2010). Scent Branding Sweeps the Fragrance Industry *Retrieved on 1st May, 2013 from*

http://www.businessweek.com/magazine/content/10_26/b4184085987358.htm

4.Chaudhuri, A. and Holbrook, M.B. (2001). The chain of effects from brand trust and brand affect to brand performance: the role of

brand loyalty. *Journal of Marketing*, 65(2), 81-93.

5.Citrin, A. V., Stem Jr, D. E., Spangenberg, E. R., & Clark, M. J. (2003). Consumer need for tactile input: an internet retailing

challenge. *Journal of Business Research*, 56(11), 915-922.

6.Gale, B. T. (1994). *Managing customer value: creating quality and service that customers can see*. The Free Press, NY. (Chapter 1).

7.Garlin, F. V., & Owen, K. (2006). Setting the tone with the tune: A meta-analytic review of the effects of background music in retail

settings. *Journal of Business Research*, 59(6), 755-764.

8. Härtel, C. E., & Russell-Bennett, R. (2010). Heart versus mind: The functions of emotional and cognitive loyalty. *Australasian*

Marketing Journal (AMJ), 18(1), 1-7.

9. Heide, M., & Grønhaug, K. (2006). Atmosphere: conceptual issues and implications for hospitality management. *Scandinavian*

Journal of hospitality and Tourism, 6(4), 271-286.

10. Hultén, B. (2012). Sensory cues and shoppers' touching behaviour: the case of IKEA. *International Journal of Retail & Distribution*

Management, 40(4), 273-289.

11. Jamaluddin, M.R., Hanafiah, M.H.M., & Hashim, R. (2011a) Preserving in five-star hotel segment. *The 12th International Research*

Symposium on Service Excellence in Management, 607-616.

12. Jamaluddin, M.R., Hanafiah, M.H.M., & Hashim, R. (2011b) Service failure and service recovery in three-star hotel. *The 12th*

International Research Symposium on Service Excellence in Management, 617-626.

13. Kay, M.J. (2005). Strong brands and corporate brands. *European Journal of Marketing*, 40(7/8), 742-760.

14. Keller, K.L. (1993). Conceptualizing, measuring, and managing customer-based brand equity. *Journal of Marketing*, 57(1), 1-22.

15. Kotler, P. (2003). *Marketing management* (Eleventh ed.). Delhi, India: Pearson Education (Singapore) Pte. Ltd. (Chapter 1).

15. Lindstrom, M. (2005). Broad sensory branding. *Journal of Product & Brand Management*, 14(2), 84-87.

16. Mayhew, S. D., Hylands-White, N., Porcaro, C., Derbyshire, S. W., & Bagshaw, A. P. (2013). Intrinsic variability in the human

response to pain is assembled from multiple, dynamic brain processes. *NeuroImage*, 75, 68-78

17. Paulus, P. (2009). Mental health backbone of the soul. *Health Education*,109(4), 289-298.

18. Peter, J.P. & Olson, J.C. (2005). *Consumer Behaviour and Marketing* (Seventh ed.). McGraw-Hill Companies. (Chapter 2).

19. Seo, M-G. & Barrett, L.F. (2007). Being emotional during making good or bad? An empirical investigation. *Academy Management*

Journal, 58 (4), 923-940

20. Soars, B. (2009). Driving sales through shoppers' sense of sound, sight, smell and touch. International *Journal of Retail &*

*Distribution Manage*ment, 37(3), 286-298.

21. Ullah, P. (1991). The psychology of total quality management. Managing Service Quality, 1(2), 79-81.

22. Van der Geer, J., Hanraads, J. A. J., & Lupton R. A. (2000). The art of writing a scientific article. *Journal of Scientific*

Communications, 163, 51 - 59.

23. Aaron Chaim Ahuvia, Barbara A. Carroll (2006). Some antecedents and outcomes of brand love. *Marketing Letters*, 17(2), 79-89.

24. Cristela Bairrada, Filipe Coelho (2018). Antecedents and outcomes of brand love: utilitarian and symbolic brand qualities. *European Journal of Marketing*, 52(3/4), 656-682.

CUSTOMER SATISFACTION TOWARDS ONLINE SHOPPING: A STUDY ON PASCHIM BARDHAMAN DISTRICT

[1]Pratim Banerjee, [2]Eshita Mukherjee, [3]Rimmi Soren, [4]Homa Shamim, [5]Dr. Sudip Basu

[1,2,3,4] BBA 6th Semester, Management Studies Department, Asansol Engineering College, Paschim Bardhaman, West Bengal, India

[5]Assistant Professor, Management Studies Department, Asansol Engineering College, Paschim Bardhhaman, West Bengal, India

---

ABSTRACT

Online shopping has gained popularity as a substitute for conventional brick-and-mortar retailers. Customers are drawn to online shopping for a variety of reasons, including the ease of doing their shopping from the comfort of their homes, 24/7 accessibility, and the availability of a large selection of goods. The objectives of the study were to examine the factors impacting the consumer's online purchasing habit, to determine the customer's current needs and preferences, to determine the issues with internet buying and to determine the degree of customer satisfaction with online purchases.

Research Methodology: The sample size of the study is 50. The data was collected through primary and secondary sources. A well-structured questionnaire was created to collect primary data. The questionnaire made was distributed to the residents of Paschim Bardhaman District. The collected data was analysed and interpreted and ultimately a report is made with the help of journals and other research papers.

Results and Conclusion: The study reveals that the residents of Paschim Bardhaman are overall satisfied. The sample comprises of young people mostly. The respondents shop occasionally. To meet the objectives, two influencing factors are chosen, which are "social media and advertisements" and "friends and family". These two factors sometimes influence people to shop online. People of Paschim Bardhaman district faces return or refund related problem mostly. To increase satisfaction level of customers, customer support should show high concern over customer's problem. Proper guidance should be provided when customers want a refund or want to return the product.

Keywords: *Satisfaction, Online Shopping, Customer, Paschim Bardhaman*

I. INTRODUCTION

Online shopping has gained popularity due to its convenience, ease of use, and numerous features, including wide product availability, discounts, payment options, low prices, and attractive web design. With a vast product category, online shopping offers easy access to a wide range of items, including clothes, jewelry, shoes, groceries, and perishables. Online shopping sites also serve as platforms for small retailers, allowing them to sell products on the web, with e-tailers performing similar tasks as traditional retailers.

Customer satisfaction is crucial for businesses to maintain customer loyalty. It is a subjective evaluation of products and services, determining customer conversion and retention. Understanding customer satisfaction levels is essential for better and sustainable online business.

II. REVIEW OF LITERATURE

T. Shenbaga Vadivu (2015), research conducted on "A Study on Customer Satisfaction Towards Online Shopping" stated that online shopping has gained popularity due to the World Wide Web, influencing customers worldwide through variety, quick service, and reduced prices. Convenience is the top motivating element for online shopping.

Joswin Binoj Mascarenhas (2018) in his study, "Customer Satisfaction in Online Shopping- Retail Industry" he claimed that customer satisfaction is crucial for businesses, especially in online shopping, as it ensures healthy relationships with potential customers. Failure to satisfy customers can negatively impact business opportunities and lead to total loss.

Parvathy. R. Nair (2019) in his study "A Study on the Customer Satisfaction Towards Online Shopping in Pandalam Locality" stated that understanding customer satisfaction and improving factors influencing online shopping can help marketers gain a competitive edge, but the online system may take time to become regular practice for most people.

Anand Sengupta, Rama Raman Pandey (2022) stated that online shopping is an alternative to traditional shopping when busy schedules pressure consumers. Addressing payment concerns and product availability can improve customer satisfaction, but unavailability and delivery issues remain the most common issues.

Prabhan Puzari, Riddhi Thummar, Ibrahim Saduwala (2023) conducted study on the topic "Study on Customer Satisfaction towards Online Shopping". It was found that 90% of respondents

are aware of online transactions, indicating growing customer acceptance due to lower prices and sales and discounts.

III. RESEARCH GAP

Existing research on customer satisfaction in online shopping in Paschim Bardhaman District is limited. The study aims to explore the preferences and factors influencing online shopping among residents. It also focuses on customer support, a crucial aspect for online shopping owners, which is missing in most of the studies.

IV. OBJECTIVES OF THE STUDY

1. To examine the factors impacting the consumer's online purchasing habit.

2. To determine the customer's current needs and preferences.

3. To determine the issues with internet buying.

4. To determine the degree of customer satisfaction with online purchases

V. RESEARCH METHODOLOGY

Sources of Data Collection

1. Primary Data Source

Primary data consists of original information gathered from sample size of 50 respondents residing in Paschim Bardhaman District through well - structured questionnaire.

2. Secondary Data Source

For the study the data collected from secondary sources are; Internet, Websites, Journals, Articles, Books, Existing research and scholarly work, etc.

Sample Size

The sample size used for the study was 50.

VI. RESULT & ANALYSIS

Q1. What is your gender?

Table 1: Gender of the Respondents		
Gender	Male	Female
No. of Responses	25	25
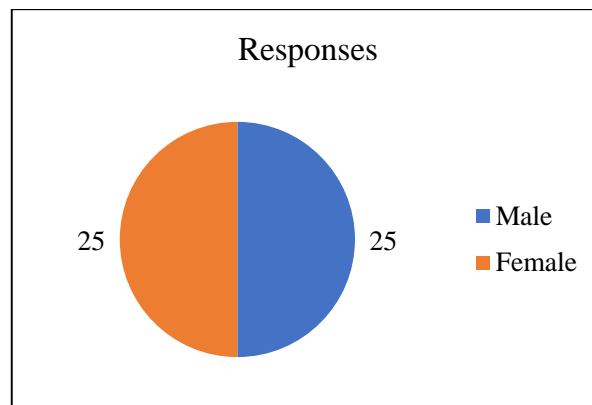
Figure 1: Gender of the Respondents

Interpretation: From Table 1 and Figure 1, we can conclude that out of all respondents, 25 respondents **(50%)** are **Male** and 25 respondents **(50%)** are **Female**.

Q2. What is your age group?

Table 2: Age Group of the Respondents					
Age Groups	Below 20	21-30	31-40	41-50	51 and above
No. of Responses	10	36	2	1	1
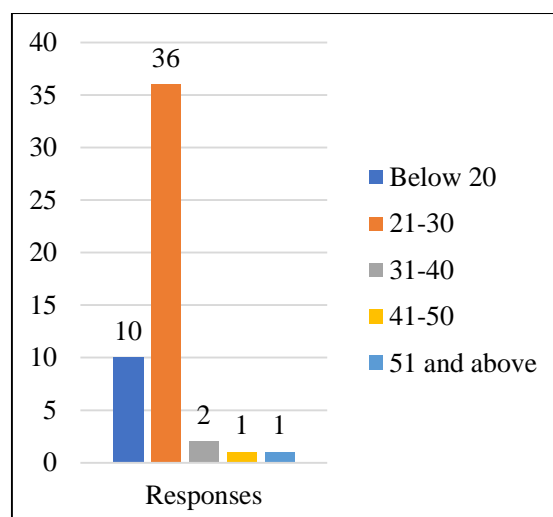
Figure 2: Age Groups of the Respondents

Interpretation: From Table 2 and Figure 2, we can conclude that 36 respondents **(72%)** are in the age group of **21-30**. 10 respondents **(20%)** are **below 20**. 2 respondents **(4%)** are in the ages between **31-40**. 1 respondent **(2%)** is in the age group of **41-50** and 1 respondent **(2%)** is **51 and above**.

Q3. What is your occupation?

Table 3: Occupation of the Respondents					
Factors	Student	Government Job	Private Job	Business	Not Working
No. of Responses	38	2	9	0	1
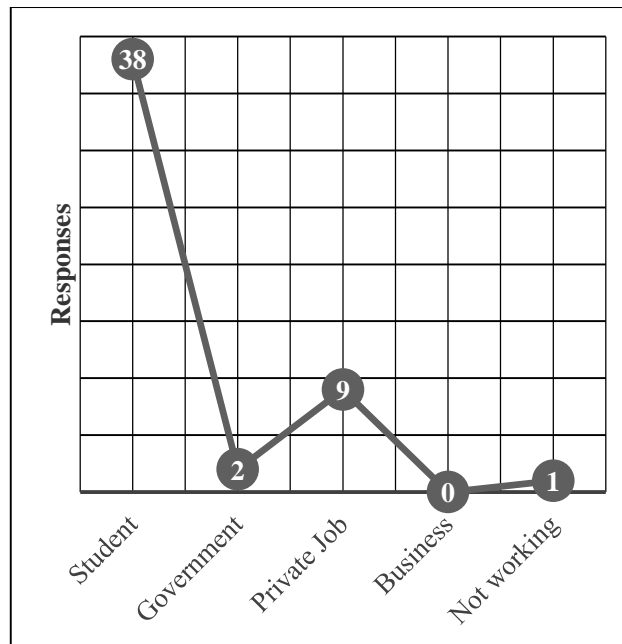
Figure 3: Occupation of the Respondents

Interpretation: From Table 3 and Figure 3, we can conclude that 38 respondents **(76%)** are **students**. 9 respondents **(18%)** have **Government Job**. 2 respondents **(4%)** have **Private Job** and 1 respondent **(2%)** is **not working**.

Q4. How often do you shop online?

Table 4: How often the respondents shop online?				
Periodicals	Daily	Weekly	Monthly	Occasionally	Frequently
No. of Responses	0	7	19	21	3
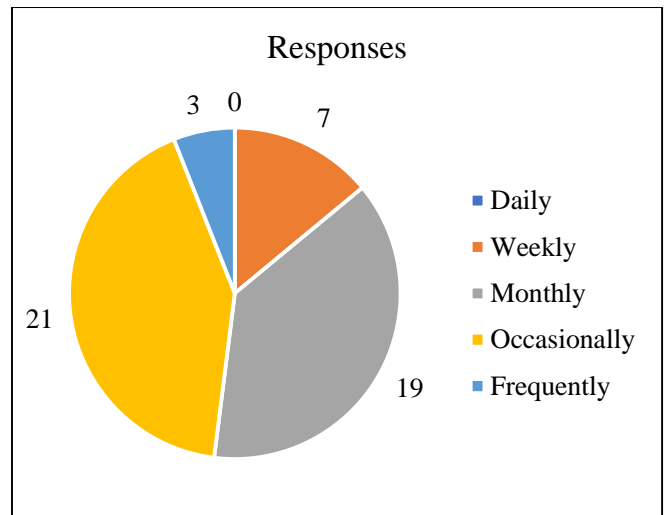
Figure 4: Number of times respondents shop online

Interpretation: From Table 4 and Figure 4, we can conclude that 21 respondents **(42%)** do online shopping **occasionally**. 19 respondents **(38%)** do online shopping **monthly**. 7 respondents **(14%)** do online shopping **weekly** and 3 respondents **(6%)** do online shopping **frequently**.

Q5. What factors attract you the most to shop online?

Table 5: Factors that attract the most to shop online					
Factors	Time saving and juggle free	Convenience and ease	Home delivery system	Price and variety of the products	Attractive discounts
No. of Responses	7	7	17	17	2
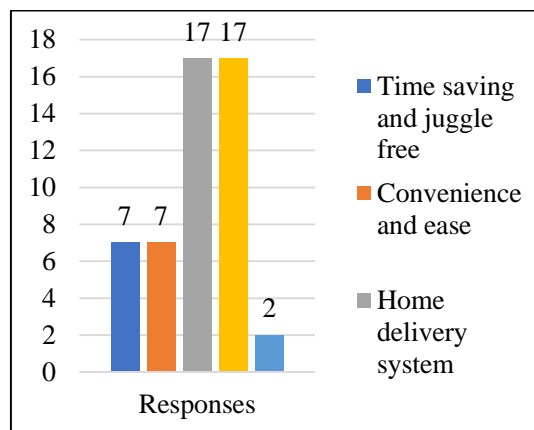
Figure 5: Factors that attract the most to shop online

Interpretation: From Table 5 and Figure 5, we can conclude that 17 respondents **(34%)** find **"Home delivery system"** as the most attractive factor to shop online. Other 17 respondents **(34%)** find **"Price and variety of the products"** as the most attractive factor. 7 respondents **(14%)** find **"Time saving and juggle free"** as the most attractive factor. Other 7 respondents **(14%)** find **"Convenience and ease"** as the most attractive factor and only 2 respondents **(4%)** find **"Attractive discounts"** as the most attractive factor to shop online.

Q6. How much does "social media and advertisements" influence you for online shopping?

Table 6: How much does "social media and advertisements" influence the respondents for online shopping?					
Factors	Always	Often	Sometimes	Rarely	Never
No. of Responses	12	12	21	4	1
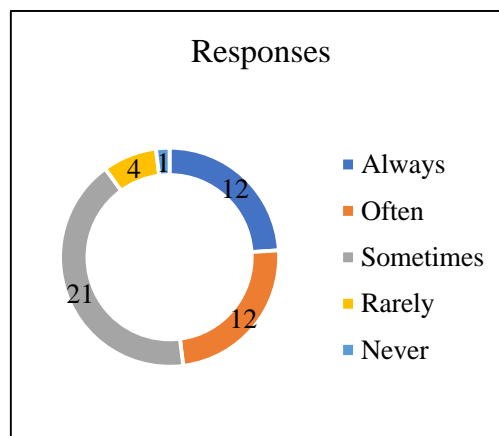
Figure 6: Social media and advertisements" influence the respondents for online shopping

Interpretation: From Table 6 and Figure 6, we can conclude that 21 respondents **(42%)** are **sometimes** influenced by social media and advertisements for online shopping. 12 respondents **(24%)** are **always** get influenced. Other 12 respondents **(24%)** are **often** get influenced. 4 respondents **(8%) rarely** get influenced and only 1 respondent **(2%)** is **never** influenced by social media and advertisement.

Q7. How much are you influenced by "friends and family" for online shopping?

Table 7: How much does "friends and family"

influence respondents for online shopping?					
Factors	Always	Often	Sometimes	Rarely	Never
No. of Responses	10	9	20	9	2
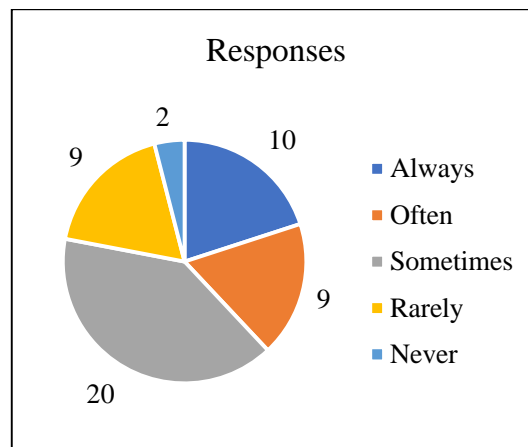
Figure 7: How much does "friends and family" influence respondents for online shopping?

Interpretation: From Table 7 and Figure 7, we can conclude that 20 respondents **(40%)** are **sometimes** influenced by friends and family for online shopping. 10 respondents **(20%)** are **always** influenced by friends and family. 9 respondents **(18%) often** get influenced. Other 9 respondents **(18%) rarely** get influenced and 2 respondents **(4%) never** get influenced.

Q8. How much would you rate the popularity of online shopping in Paschim Bardhaman district?

Table 8: Level of popularity of online shopping in Paschim Bardhaman district as per the respondents					
Factors	Very high	High	Neutral	Low	Very low
No. of Responses	7	18	22	2	1
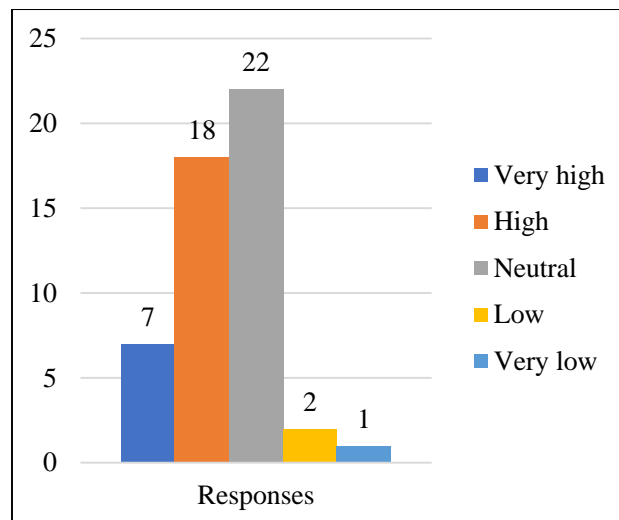
Figure 8: Level of popularity of online shopping in Paschim Bardhaman district as per the respondents

Interpretation: From Table 8 and Figure 8, we can conclude that 22 respondents **(44%)** rate the popularity of online shopping in Bardhaman district **neutral**. 18 respondents **(36%)** have rated it **high**. **Very high** rating is given by 7 respondents **(14%)**. 2 respondents **(4%)** rate it **low** and 1 respondent **(2%)** rate the popularity of online shopping as **very low**.

Q9. Which mode of payment you prefer most when shopping online?

<table>
<tr><td colspan="6">Table 9: Mode of payments most preferred by the respondents</td></tr>
<tr><td>Mode of payments</td><td>Cash on delivery (CoD)</td><td>Debit card</td><td>Credit card</td><td>Internet banking</td><td>Others (UPI)</td></tr>
<tr><td>No. of Responses</td><td>28</td><td>5</td><td>2</td><td>10</td><td>5</td></tr>
</table>
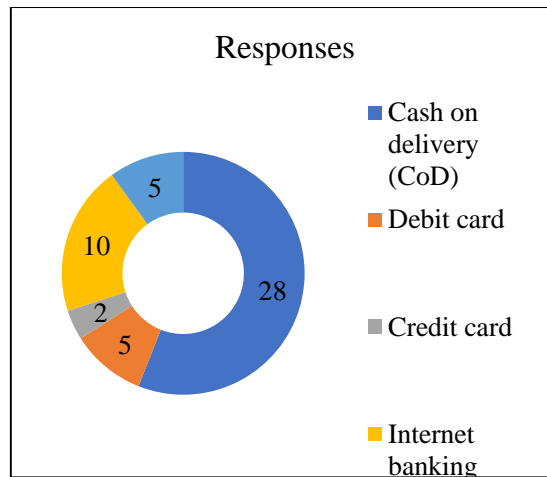
Figure 9: Mode of payments most preferred by the respondents

Interpretation: From Table 9 and Figure 9, we can conclude that 28 respondents **(56%)** prefer **Cash on delivery (CoD)** for online transactions. 10 respondents **(20%)** prefer **Internet banking**. 5 respondents **(10%)** prefer **Debit card**. Other 5 respondents **(10%)** prefer **UPI** and 2 respondents **(4%)** prefer **Credit card**.

Q10. How much would you rate your trust/reliability on online shopping?

Table 10: Level of trust/reliability on online shopping of the respondents on a scale of 1-5					
Factors	1	2	3	4	5
No. of Responses	2	2	12	25	9
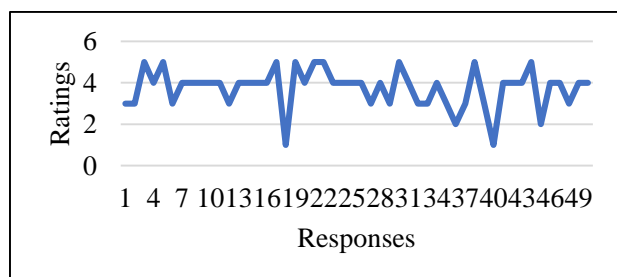
Figure 10: Level of trust/reliability on online shopping of the respondents on a scale of 1-5

Interpretation: From Table 10 and Figure 10, we can conclude that 25 respondents **(50%)** have rated the level of trust as **4**. 12 respondents **(24%)** have rated it as **3**. 9 respondents **(18%)** have rated **5**. 2 respondents **(4%)** have rated **2** and other 2 respondents **(4%)** have rated it **1**.

Q11. What kind of products you mostly buy online?

Table 11: Type of products mostly purchased online by the respondents				
Types of products	Daily use products	Apparel and beauty products	Educational products	Food and fitness products	Electronic products
No. of Responses	17	12	5	5	11
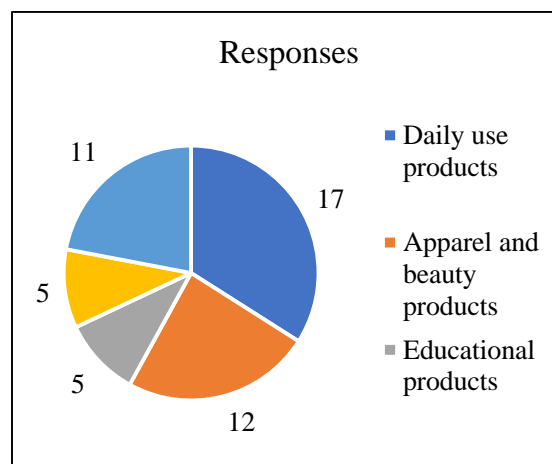
Figure 11: Type of products mostly purchased online by the respondents

Interpretation: From Table 11 and Figure 11, we can conclude that 17 respondents **(34%)** mostly buy **daily use products** online. 12 respondents **(24%)** mostly buy **apparel and beauty products**. 11 respondents **(22%)** mostly buy **electronic products**. 5 respondents **(10%)** mostly buy **educational products** and other 5 respondents **(10%)** mostly buy **food and fitness products**.

Q12. What is the level of your satisfaction towards "quality and variety of products" available online?

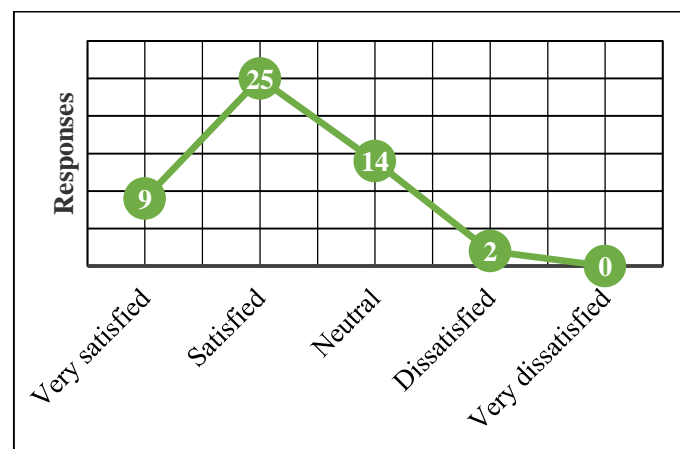| Table 12: Level of satisfaction of the respondents towards "quality and variety of products" available online					
Factors	Very satisfied	Satisfied	Neutral	Dissatisfied	Very dissatisfied
No. of Responses	9	25	14	2	0

Figure 12: Level of satisfaction of the respondents towards "quality and variety of products" available online

Interpretation: From Table 12 and Figure 12, we can conclude that 25 respondents **(50%)** are **satisfied** with the quality and variety of products available online. 14 respondents **(28%)** are **neutral**. 9 respondents **(18%)** are **very satisfied** and 2 respondents **(4%)** are **dissatisfied**. Q13. What is your level of likeliness towards "pricing and discounting system" on products available online?

Table 13: Level of likeliness of the respondents towards "pricing and discounting system" on products available online				
Factors	Very likely	Likely	Neutral	Unlikely	Very unlikely
No. of Responses	4	33	13	0	0
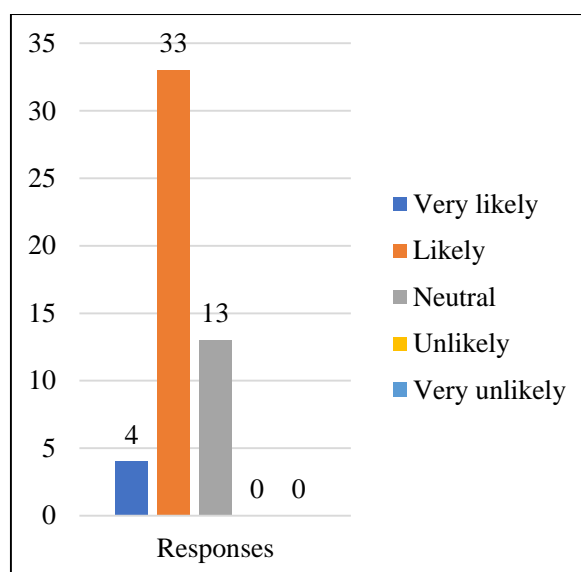
Figure 13: Level of likeliness of the respondents towards "pricing and discounting system" on products available online

Interpretation: From the Table 13 and Figure 13, we can conclude that 33 respondents **(66%)** are **likely** with the pricing and discounting system of products available online. 13 respondents **(26%)** are **neutral**. 4 respondents **(8%)** are **very likely**.

Q14. What type of problems you faced during online shopping?

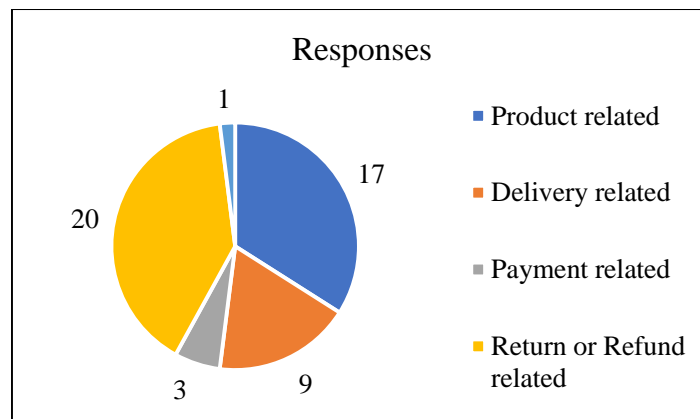| Table 14: Type of problems faced by the respondents during online shopping				
Type of problems	Product related	Delivery related	Payment related	Return or Refund related	Others
No. of Responses	17	9	3	20	1

Figure 14: Type of problems faced by the respondents during online shopping

Interpretation: From Table 14 and Figure 14, we can conclude that 20 respondents **(40%)** have faced **return or refund related** problems during online shopping. 17 respondents **(34%)** have faced **product related** problems. 9 respondents **(18%)** have faced **delivery related** problems. 3 respondents **(6%)** have faced **payment related** problems and 1 respondent **(2%) has not faced any problem**.

Q15. What is the frequency of problems faced by you?

Table 15: Frequency of the problems faced by the respondents					
Frequency	Very frequently	Frequently	Occasionally	Only once	Never
No. of Responses	3	9	25	11	2
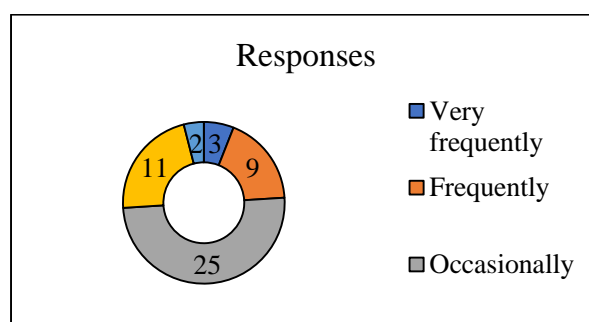
Figure 15: Frequency of the problems faced by the respondents

Interpretation: From Table 15 and Figure 15, we can conclude that 25 respondents **(50%)** have faced problems **occasionally** during online shopping. 11 respondents **(22%)** have faced problems **only once**. 9 respondents **(18%)** have faced problems **frequently**. 3 respondents **(6%)** have faced problems **very frequently** and 2 respondents **(4%)** have **never** faced problems.

Q16. What was the level of concern of customer service providers regarding your problems towards online shopping?

Table 16: Level of concern respondents found by the customer service providers regarding their problems				
Factors	Very concerned	Concerned	Neutral	Unconcerned	Very unconcerned
No. of Responses	7	14	25	4	0
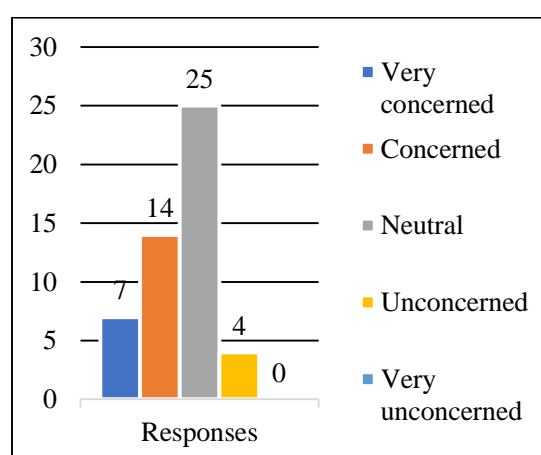
Figure 16: Level of concern respondents found by the customer service providers regarding their problems

Interpretation: From Table 16 and Figure 16, we can conclude that 25 respondents **(50%)** have found customer service providers to be **neutral** regarding their problems. 14 respondents **(28%)** have found customer service providers to be **concerned**. 7 respondents **(14%)** have found customer service providers to be **very concerned** and 4 respondents **(8%)** have found customer service providers to be **unconcerned**.

Q17. How much would you agree with the delivery related problems in Paschim Bardhaman district?

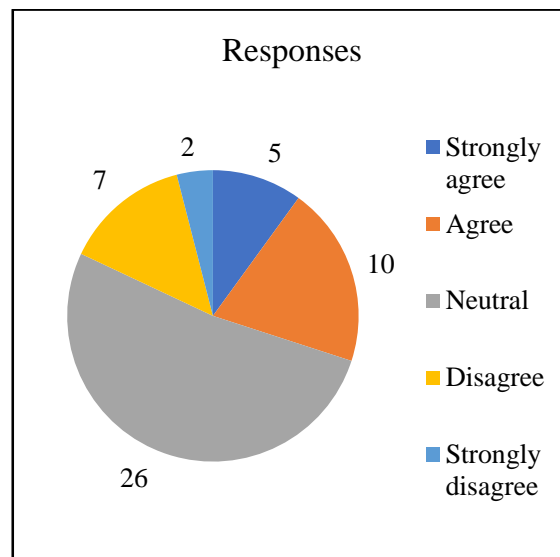| Table 17: No. of respondents agreeing with delivery problems in Paschim Bardhaman district				
Factors	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
No. of Responses	5	10	26	7	2

Figure 17: No. of respondents agreeing with delivery problems in Paschim Bardhaman district

Interpretation: From Table 17 and Figure 17, we can conclude that 26 respondents **(52%)** are **neutral** to delivery related problems in Paschim Bardhaman district. 10 respondents **(20%) agree** to delivery problems. 7 respondents **(14%) disagree**. 5 respondents **(10%) strongly agree** and 2 respondents **(4%) strongly disagree**.

Q18. How much is your overall satisfaction level towards online shopping?

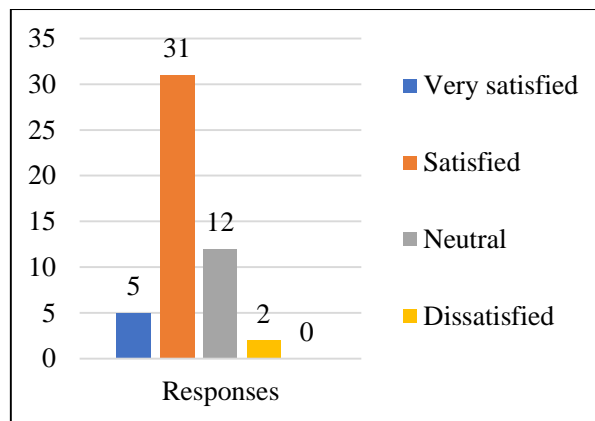| **Table 18: Overall satisfaction level of the respondents towards online shopping**				
Factors	Very satisfied	Satisfied	Neutral	Dissatisfied	Very dissatisfied
No. of Responses	5	31	12	2	0

Figure 18: Overall satisfaction level of the respondents towards online shopping

Interpretation: From Table 18 and Figure 18, we can conclude that 31 respondents **(62%)** are overall **satisfied** towards online shopping. 12 respondents **(24%)** are overall **neutral**. 5 respondents **(10%)** are overall **very satisfied** and 2 respondents **(4%)** are overall **dissatisfied**.

Q19. On a scale of 1-5 how much would you rate your experience on online shopping sites till now?

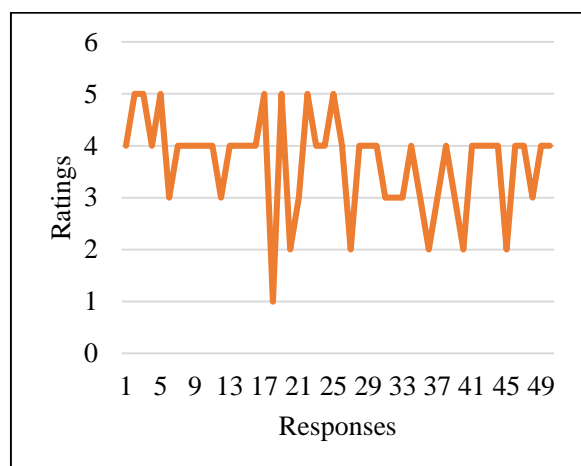| Table 19: Experience of the respondents on online shopping sites on a scale of 1-5					
Factors	1	2	3	4	5
No. of Responses	1	5	10	27	7

Figure 19: Experience of the respondents on online shopping sites on a scale of 1-5

Interpretation: From Table 19 and Figure 19, we can conclude that 27 respondents **(54%)** have rated **4** for the experience on online shopping sites. 10 respondents **(20%)** have rated **3**. 7

respondents **(14%)** have rated **5**. 5 respondents **(10%)** have rated the experience on online shopping sites as **2** and 1 respondents **(2%)** has rated the experience as **1**.

VII. FINDINGS OF THE STUDY

1. For respondents online shopping is an occasional activity.
2. "Home delivery system" and "Price and variety of products" are deemed as the most attractive factors to shop online.
3. Majority of the respondents are sometimes influenced by the factor "social media and advertisements" for online shopping.
4. Majority of the respondents are sometimes influenced by the factor "friends and family" for online shopping.
5. Respondents consider level of popularity of online shopping in Paschim Bardhaman district as neutral.
6. Cash on Delivery is the most preferred mode of payment in online shopping.
7. On a scale of 1-5, respondents have rated level of trust on online shopping as 4.
8. Daily use products are mostly purchased by the respondents.
9. Most respondents are satisfied with the "quality and variety of products" available online.
10. Most respondents are satisfied with the "pricing and discounting system on products" available online.
11. Return or refund related problems are mostly faced by the people.
12. Respondents occasionally face problems in online shopping.
13. The level of concern shown by the customer support is neutral according to the respondents.
14. Respondents neither agree nor disagree to delivery related problems in Paschim Bardhaman District.
15. Most respondents are overall satisfied towards online shopping.
16. On a scale of 1-5, most respondents have rated their online shopping experience as 4.

VIII. SUGGESTIONS AND RECOMMENDATIONS

1. Logistics should pledge to deliver goods on time without upsetting the consumer.
2. To turn customers into brand advocate, online retailers and logisticians should make every effort to please every customer in regards to every area of online purchasing.
3. Online sites should take accountability for any security flaws to increase trust.
4. Customer service providers should take utmost care for any issue, no matter how minor it is.
5. Customer service should offer proper guidance on product returns.
6. Online retailers should concentrate primarily on advertising and social media marketing.

7. Online retailers should offer good post-purchase support.

IX. MANAGERIAL IMPLICATIONS OF THE STUDY

The study suggests optimizing business operations by focusing on customer satisfaction. Managers should focus on excellent customer service, seamless online buying experiences, and regularly checking satisfaction levels. They should encourage positive interactions on social media, reviews, and testimonials, and foster long-lasting relationships by providing tailored services, maintaining product quality, and providing quick service.

X. FUTURE PROSPECT OF THE STUDY

The study could expand to West Bengal districts, regions, or Indian states to analyze customer satisfaction trends and geographical variations in online shopping. Researchers could explore the impact of AI, AR, and VR on online buying experiences, considering demographic and cultural backgrounds. Customized offerings, recommendations, and targeted marketing methods could be included in the future study.

XI. CONCLUSION

Online shopping in India has gained popularity due to low-cost data packs and curiosity. Online shoppers prefer cash payments for online shopping, but are hesitant towards other options. Despite this, online shopping sites have high trust and potential growth. Paschim Bardhaman residents are overall satisfied with the online shopping, indicating that the present scenario for e-commerce is favorable.

REFERENCES

1. Anand Sengupta, Rama Raman Pandey (2022). A study on customer satisfaction towards online shopping in Gorakhpur.

2. Mascarenhas, J. B. (2018). Customer Satisfaction in Online Shopping- Retail Industry. International Journal of Pure and Applied Mathematics, 118(20), 2171-2178.

3. Parvathy. R. Nair. (2019). A Study on the Customer Satisfaction towards Online Shopping in Pandalam Locality. International Journal of Recent Technology and Engineering (IJRTE), 8(3), 1688-1693.

4. Puzari, P., Thummar, R., & Saduwala, I. (2023). Study on Customer Satisfaction towards Online Shopping. Journal of Marketing and Consumer Research, 44(1), 15-22.

5. Shenbaga Vadivu, T. (2015). A Study on Customer Satisfaction Towards Online Shopping. International Journal of Emerging Research in Management & Technology, 4(5), 1-6.

6. Thorat, P. L. Kumar, V. Tawde, S. & et al. (2022). Study of customer satisfaction towards online shopping. International Journal of Engineering Research and Advanced technology, 8(3), 97-101.

7. V. Dhayalan, R. Chitraa, N. Lakshmi Narasimhan & S. Tharini. (2020). A study on customer Satisfaction Towards Online Shopping in Retail Industry. International journal of Advanced science and Technology, 29(6), 4282-4288.

8.Vaisakh, N. S. (2022). A Study on Customer Satisfaction towards Online Shopping. International Journal of research and analytical reviews, 9(2), 1121-1126.

9.Pratima Merugu & vaddadi krishna Mohan. (2020). Customer Satisfaction Towards Online shopping with referrence to Jalandhar city. International journal of management, Technology, and social sciences (IJMTS), 5(1), 1-11.

11.A, Rooba. (2019). A Study on customer Satisfaction Towards Online Shopping in Tirunelveli District. International journal of Pure and Applied Mathematics, 121(2), 389-395.

12.Adarsh sasi, Aravind A Nair, Ajmi P sazi et al(2021) . A Study on Customer Satisfaction Towards Online Shopping with Special reference to Mavelikara Thaluk.

13.Fundamentals of Management And Organizational Behaviour. (R.K.Singla)

MANAGING MARKETING PROBLEMS OF MICRO AND SMALL MANUFACTURING ENTERPRISES - A STUDY WITH REFERENCE TO DELHI NCR

Dr Sunil Kumar Bharti
Guest Faculty, A. N. College Patna.

ABSTRACT

The goal of the study, "Managing Marketing Problems of Micro and Small Manufacturing Enterprises - A Study with Reference to Delhi NCR," was to look at the marketing issues that SMEs face and how these affect their profit margin and sales volume. With particular reference to the chosen "small and medium firm operators in Delhi-NCR, India," the study looks into the management of marketing strategy on business performance. The study showed that marketing-related issues significantly influenced SME sales volume and profit performance. It has been noticed that most of these problems result from SME managers' general ignorance of marketing ideas and tactics. As a result, it is recommended that managers of SMEs have the necessary training in both the theory and practice of marketing. Additionally, depending on the situation, a qualified marketing specialist should assume the position of marketer or marketing manager. This will reduce the risks connected with certain marketing decisions and enhance SMEs' commercial performance. Numerous Indian economic sectors can make use of the study's conclusions.

Keywords: *Micro and Small Manufacturing Enterprises; MSMEs; Marketing; Advertising; Marketing Problems; Delhi-NCR.*

I. INTRODUCTION

Although businesses had mostly concentrated on ideas linked to production and sales, marketing's significance is now more widely acknowledged in the literature (Kotler et al. 2009). The ability of businesses to comprehend client wants, whose fulfillment is essential to their ability to make money in the market, has made marketing a hot issue. In the past, businesses could sell the products they made, and their sales methods were frequently effective enough to boost their revenues. However, since the traditional "create and sell" method has been displaced, these techniques are becoming increasingly ineffective.

Companies today see expanding their operations internationally as a way to stay competitive in the modern globalized market. A company's marketing plan is now vital for

surviving and expanding in a cutthroat industry worldwide. Strategy is a pattern of resource allocation decisions made across a company, according to Aremu and Lawal (2012). This covers planned results and opinions on the desirable and, more crucially, the unacceptable means of achieving them.

In the opinion of Aremu and Lawal (2012), strategy comprises a study of the market and its surroundings, consumer purchasing trends, competitive activities, and the requirement and capabilities of marketing intermediaries. Consequently, a marketing strategy may be considered a company's attempt to connect with its target audiences. Market research, which assesses customer desires, attitudes, and rival products, is the first stage in a marketing plan. The strategy then shifts to marketing, promotion, and distribution, as well as customer service, packaging, sales, and distribution, if appropriate. The primary objective of marketing strategy must be to provide customers and the firm with more value at a lower cost (Chiliyaet al, 2009).

According to Owomoyela et al. (2013), marketing strategy is also a means of delivering customers a high-quality product that meets their wants, as well as reasonable costs, greater distribution, and strong marketing tactics. A sound marketing plan is a crucial precondition for an industry to increase its market share and lessen the influence of rivals. The world's economies are supported by small and medium-sized enterprises (SMEs), including India. SMEs are the most practical and reliable method for self-sustaining industrial growth because of their very nature (Oyebamiji, Kareem and Ayeni. 2013). In a context of fierce local and international competition, SMEs in emerging nations like India struggle to thrive.

According to Oyebamiji, Kareem, and Ayeni (2013), Indian SMEs have not performed admirably, which has prevented them from making the kind of major contribution to Nigeria's economic growth and prosperity anticipated. They notice that the condition has prompted huge anxiety among the public, company owners, professionals, and the government.

A marketing strategy that is deemed ineffective and harms the business's accomplishment, merchandise excellence, consumer satisfaction, and effectiveness may be the cause of these challenges. "Small and medium-sized enterprises (SMEs)" operators must deliver a high-quality merchandise with attractive wrapping that satisfies purchaser needs,

offer a competitive charge, expand their delivery, and backing their efforts with an efficient promotion plan to survive the pressure of the competitive environment of the global market.

1.1   Description of Micro and Small Enterprises

Small enterprises, also known as small and medium-sized businesses or SMBs, are a varied group of companies that frequently work in the retail, production, business, and service sectors. They include a variety of enterprises with diverse degrees of sophistication and competence, including small machine shops, software development firms, and artisanal handicraft studios in rural areas. Others are "creative, enthusiastic, and growth-oriented, while some are happy to remain small and maybe family-owned." Small businesses typically function in the conventional segment of the market and primarily utilize wage earners. The size of a small business is frequently determined by its staff count and asset worth. The size categorization varies across and within regions and countries depending on the size of the economy and its resources. It is crucial to keep in mind that Small firms have a minimum and maximum size (Lukács, 2005). Overall, it is possible to describe and categorize small businesses by considering "quantitative and qualitative" criteria.

"Quantitative criteria" are more frequently employed to define small businesses since they clearly distinguish between many small businesses, such as micro-entities, small businesses, and medium-sized businesses. "The number of workers, turnover, total balance sheet, or a mix of the last two" are the most widely used quantitative criteria for categorizing small businesses. Other factors include net assets, starting capital, return on investment, industrial classification and personnel count, the total amount produced, the value of that production, added value, etc.; however, they are seldom employed (Buculescu, 2013).

Ownership and (inter)dependence concerns are embodied in qualitative criteria. Being a small company owner entails adjusting to (and relishing) great degrees of autonomy: being independent and bearing full responsibility for all aspects of business operations. Personal connections and individual traits are more significant within the company than conventional hierarchies and advancement schemes. Due to the firm's limited resources, there is also a heavy reliance on suppliers, banks, accountants, etc., as well as on suitable, supporting laws. Owner managers must be near their clients because if they don't sell, they can't survive.

1.2   Features of Micro and Small Enterprises

Smith's 19th-century economy was governed by a different set of rules than the economies of the 20th and 21st centuries. The new philosophy of neo-liberalism and globalization, in particular in emerging nations, highlights the relevance of small businesses as proponents of a favorable business climate, economic efficiency, and power for economic advancement. Small businesses are becoming increasingly significant in emerging economies instead of big ones. They are beneficial because they can adapt quickly, use less capital but more intensive labor, and have minimal managerial costs, which leads to inexpensive output. Despite certain flaws, small businesses are less impacted by economic crises because of their adaptability and capacity to cope with shifting circumstances. According to Keskn et al. (2010), small businesses have a critical role in fostering innovation, competitiveness, and entrepreneurship and developing successful innovation systems for emerging nations.

Small businesses are more flexible than large ones in production, marketing, and service because they actively monitor the market, comprehend client needs, and have tight relationships with their staff. Small businesses can deal with numerous problems more easily and with less effort, thanks to their flexibility, allowing them to adapt to environmental changes in time and locally (Keskn et al. 2010). Small businesses can be identified by their size or degree of independence (family or small group). The most well-liked benefits of small businesses are that they create jobs, are simple to start and operate, are more adaptable than large businesses, and have a more personal connection to their clients (Iordache, 2014).

Table 1: Features of Micro, Small and Medium Enterprises

Features	Advantages	Disadvantages
"The dependence on a limited number of people (often owners and managers are the same)."	"• Looking forward, they need long-term thinking • Stability • No pressure for short-term success • Stable managerial culture • Greater commitment."	"• Static thinking limited to the experience and knowledge of the owner(s) • Difficulties in adapting to corporate culture to new situations and challenges • Potential conflicts between company objectives and personal objectives of the owner."

"Strong relationships with customers and business partners"	"• Stable Base for business • The ability to cooperate successfully to achieve a mutual benefit • Ability and the desire to enter into partnerships."	"•The risk of focusing too much on existing business."
"Simple structures"	"• The large flexibility and adaptability • Short reaction times •Inter-functional communication and cooperation within the organization"	"• In many cases, they are not appropriate for complex planning and implementation of international activities •decreased desire to enter more complex structures."
"Small-sized"	"The base of specialization, often successful with niche strategies"	"• The limited resources (in terms of finance and employment) • The limited funds for financing the investments and the initial operating losses to activate other's new • The costs of research and market entry tend to take a much larger proportion of total expenditure in Small enterprises than in larger companies • The limited number of staff to take some additional tasks • The lack of employees with international experience."

Source: Gebreyohannes, Y. (2015). Assessment of the Challenges of Micro and Small Scale Enterprises to Contribute to Sustainable Development: the case of Manufacturing Enterprises in Addis Ababa. Addis Ababa University, Ethiopia.

1.3 Marketing and Small and Medium Enterprises

Marketing is every company's primary objective. Marketing and innovation are a company's two main responsibilities, according to Drucker (1985), because acquiring and retaining customers is its main objective. The main goal of marketing is to gain and maintain customers while earning a profit. Marketing improves the exchange process by providing various marketing activities that benefit customers and other stakeholders. It entails modifying a company's whole operation to meet the demands of its stakeholders and customers.

A key component of the marketing business strategy is the emphasis on customer demands, their interpretation for the joint advantage of the marketer and the customer, the provision of desire-satisfying products and services, and ongoing efforts to assure customer satisfaction. Creating value to satisfy client wants and maintaining connections between the marketer and his target audiences are both aspects of marketing (Ebitu, 2012).

The core of modern marketing is establishing connections with customers and ensuring their pleasure (Kotler and Armstrong, 2004). As a result, marketing is defined as a group of processes and actions in charge of determining consumer demands, developing, communicating, providing, and exchanging better values, and fostering relationships with customers and other stakeholders that are mutually beneficial (Ebitu, 2012).

Small and medium-sized businesses are innovating and developing new businesses, goods, services, and ideas for the benefit of society. Entrepreneurs (those who own and operate SMEs and big enterprises) must succeed in their effort to please their target audiences and generate profits, and marketing has a significant role to play in this process. The responsibility to attract clients, let them know that the company's products and services are available, and then really persuade them to do so is what marketing is all about for SMEs.

Before beginning production, the entrepreneur can determine the products and services that the market requires, according to Onah and Allison (2007). The use of marketing aids the entrepreneur in estimating the market size, segmenting it, and selecting the target markets for whom to develop strategies. Marketing informs the company about market possibilities and associated dangers. Based on the organization's strengths and limitations, strategic measures are implemented to take advantage of the opportunities and counteract the threats in the company's environment.

II. REVIEW OF LITERATURE

Asrat, B. (2022) analyzed the impact of business development services on the performance of MSEs, specifically focusing on that. The study's findings also indicated that it has a good, considerable impact on the sector's performance. Market access, working conditions and infrastructure, and working capital management predicted variables that had a greater impact on business success than the other variables in the research region. To improve MSEs' performance, the research suggests that the government business development service offices maintain various benefit programs, including training, better working environment infrastructure, increased access to financing, and increased working capital management. To improve their performance, the MSE members should establish sound plans and programs considering their internal and external environments.

Dewi M. U. et al. (2020) stated that integrating the domestic economy into a free-trade-based economic framework characterizes the globalization stage. Any policy directives that restrict globalization players, particularly transnational corporations (TNCs), from engaging in production, market, and investment expansion are changed to facilitate integration. The foundation of free trade is the presumption that the supremacy of free markets and individual liberty will lead to economic prosperity in a nation. People can see how openly and easily commodities, industries, and services from one country invade the borders of other countries in the period of economic globalization. Therefore, technical and cultural barriers that each nation has implemented to safeguard its economy must be repressed and reduced to a minimum.

Vaikunthavasan S. et al. (2019) highlighted the issues and difficulties SMEs in the Northern Province faced in the years following the conflict. The phenomenon of precarious SMEs in the Northern Province was investigated using a qualitative exploratory study. Employing the purposive sample strategy, focus groups and interviews with SME owners and officers in the Northern Province were undertaken as the major data-gathering methods. The key takeaway is that the study unequivocally identifies the issues and difficulties faced by SMEs in the post-World War II economy. It may aid SME owners in finding solutions to these issues and government officials in understanding how to support the SME sector.

Patnaik, B. C. M. et al. (2016) attempted to comprehend the many MSME-related difficulties in India. MSMEs' difficulties include credit facility issues, equity capital concerns, infrastructural issues, and government issues. Support, tech-related issues, and

skill-gap-related concerns. The researchers visited several MSME units to gather information for the study and comprehend the situation on the ground and information gathered from secondary sources.

Ebitu E. T. et al. (2015) looked at "the performance of a few small and medium-sized enterprises" in Cross River State's southern senatorial region concerning marketing issues. The study examined how small and medium-sized businesses' marketing issues affect their profit margin and sales volume. There was a survey design used. According to the study's key results, SMEs' marketing challenges and the growth in their profit margin and sales volume are significantly correlated. The study suggested that managers of SMEs should receive proper training in marketing theory and practice. Additionally, it would be safer for some marketing decisions to be made if a competent marketing professional held the role of marketer or marketing manager, as the case may be.

Sánchez, P. E., & Benito-Hernández, S. (2015) examined empirical data on initiatives to help "Spanish micro and small manufacturing enterprises" increase worker productivity by creating the cornerstones of their corporate social responsibility (CSR) strategies. the study aimed to create new perspectives on work from an ethical, values-based, and CSR perspective. It demonstrated how internal CSR aspects, like relationships with employees and accountability for processes and product quality, can enhance labor productivity and efficiency, which in turn helps create a better society. It was not possible to demonstrate experimentally in the study how CSR policies connected to external issues, such as relationships with stakeholders and environmental concerns, affected labor productivity.

Vettriselvan R. et al. (2014) focused on four districts in India overall and Tamil Nadu specifically. The study used 460 samples drawn randomly from bottom-level employees to investigate HRM practices. It was discovered that there is no formal HRM practice in the research region for hiring, selecting, training, performance reviews, or labor relations. It advised developing an appropriate HRM model to improve the working conditions for employees who work for MSMEs. The formalization of processes is crucial since HRM is practiced informally and flexibly. Additionally, it creates new opportunities for scholars to study MSMEs to raise the status and productivity of workers who are the main drivers of the Indian economy.

Jaswal, S. S. (2014) found that "Micro, Small, and Medium-Sized Enterprises (MSMEs)" significantly contribute to the nation's manufacturing output, employment, and exports.

MSMEs are widely regarded as an important tool for advancing equitable development as well as an engine of economic growth. The scale of the businesses, the range of goods and services, and the technological sophistication of the MSME sector in India are all very varied. Industry is essential in minimizing "regional imbalances, ensuring a fairer distribution of national revenue and wealth, and creating job possibilities at capital costs" that are comparably lower than those of big enterprises. Additionally, the MSME sector has endured and triumphed in the post-liberalization age of local and international competitiveness. In a nutshell, micro, small, and medium-sized companies (MSMEs) play a key role in fostering fair regional development, maintaining livelihoods, and accelerating economic progress.

GbolagadeAdewale, A., & Oyewale, I. O. (2013) examined how marketing strategy affects the performance of businesses, paying particular attention to the chosen SMEs in Ibadan, Nigeria's Oluyole local government region. The findings demonstrated that the independent variables "the products, promotions, places, prices, packaging, and after-sales services" were highly effective joint predictors of company success in terms of profitability, market share, return on investment, and growth. "The independent factors jointly explained 46.5% of the variance in company performance. SMEs were advised to make high-quality goods, charge competitive pricing, position themselves effectively, utilize appealing packaging, offer after-sale services," and offer additional unique functional benefits to customers.

Panigrahi, C. M. A. (2012) aimed to better understand how small and medium-sized businesses in India manage risk. The owner managers' attitudes and understanding of risks are key factors in how hazards are systematically addressed. Risk management draws attention to the notion that a company's ability to foresee change and prepare for it, as opposed to waiting for it and responding to it, is crucial to its existence. It should be understood that risk management's goal is not to forbid or avoid taking risks but rather to make sure that they are taken voluntarily and with full information and awareness so that they can be quantified to aid in mitigation.

Upadhye N. et al. (2010) discussed that MSMEs are critical connections in the supply chain in the age of outsourcing, enhancing their effectiveness and efficiency. MSMEs are crucial to the Indian economy, and despite the enormous obstacles brought on by liberalization, they are still strong due to the competitiveness of their goods on the global market. Shorter product development and production lead times, team-based work structures, quick setup and changeover times, multifunctional employees, and JIT delivery from a select group of

dependable suppliers are characteristics of lean manufacturing systems (LMS). MSMEs already have the framework needed to build a lean manufacturing system. To illustrate the improvements made in a manufacturing facility for mid-sized auto components in India after the installation of LMS, the study analyzed the problems facing MSMEs.

Bowen M. et al. (2009) stated that small and micro enterprises (SMEs) are crucial to many nations' economies. Because three out of every five SMEs fail within the first few months, they face the prospect of failure despite their significance. In Kenya, for instance, the SME sector generated more than 50% of the new employment produced in 2005. The study aimed to comprehend how SMEs handle the difficulties they encounter. Business success is positively correlated with relevant training or education. Fair pricing, discounts, special offers, a wide range of services and goods, first-rate customer service, and consistently raising the bar on service quality are some of the techniques used by SMEs to meet problems. The study concludes that adopting various tactics is necessary for corporate success.

III. DISCUSSION

The study shows that the selection of a product affects a company's "profitability, market share, return on investment, expansion, etc." Consumers carefully consider product characteristics, including quality, features, design, and style.

There is a considerable, albeit unfavorable, "correlation between consideration for promotion and corporate performance." This might be due to consumers' perceptions that items that receive a lot of advertising are more likely to be problematic goods, such as subpar goods with protracted expiry dates or products from clearance inventories. Customers in the low-cost part of the customer marketplace may get disenchanted if they believe that stronger promotions imply that the items are sold at greater costs.

Another aspect that is thought to affect company performance is place consideration. It simply means that commercial organizations need to pay close attention to their distribution methods, location, and accessibility. The study also shows that taking into account pricing has a considerable favorable effect on business success. This is because many Indian consumers are driven to purchase goods at lesser costs. The low-cost consumer sector

in India has a sizable client base. These customers in the low-cost market are continually searching for items that provide good value.

The study also demonstrates that packaging enhances corporate effectiveness. This is consistent with the idea that packaging may boost sales by actions geared at promotions, such as providing smaller or bigger quantities, more multipacks, better product images, examples of "the product in use, and more effective use of color." The performance of the firm and after-sales service are found to be positively correlated. This implies that buyers are encouraged to purchase goods with installation and delivery guarantees.

However, it is generally agreed that a "marketing strategy offers a way for a business to use its resources to achieve its stated goals and objectives." Promotion approach is the appropriate resource allocation for businesses to gain a competitive advantage in a certain market sector. According to Goi (2005), "a company's marketing strategy is the collection of marketing instruments it employs to accomplish its marketing objectives in the target market. This idea was first put out by (Gronroos, 1999, and Osuagwu, 2006)."

Establishing "the kind, strength, direction, and interaction between the marketing mix's constituent parts" and external influences in a specific situation is the goal of marketing strategy. The purpose of creating a company's marketing strategy, according to Owomoyela et al. (2013), is to establish, safeguard, and maintain its competitive edge. Managerial discretion is essential for handling ambiguity and uncertainty in the external environment in strategic marketing.

Marketing strategies can be categorized into four groups, "according to Long-Yi and Ya-Huei (2012), who cite Lin (1993)." (1) "Dual-oriented marketing strategy: using a product name that appeals to both the intellect and the heart, is easy to remember, and uses pricing that considers the cost of service and quality orientation, psychological considerations, and rival's prices." (2) Using functional requirements from a logical standpoint, rational marketing strategies consider variables such as "after-sales service, warranties, shipping, and installation connected to the product." (3) "Emotional marketing strategy": using terms that evoke emotions in the consumer to make it easier for them to remember, emphasizing physical product shape, color design, and labeling. (4) Consumers care more about price and quality than most other factors. Thus, it is not appropriate to utilize many marketing strategies. Manufacturers can enhance product packaging and labeling, offer a memorable brand, and consider the quality position and rival pricing when setting prices.

IV. CONCLUSION

The study looks specifically at the selected small and medium firm operators in Delhi-NCR, India, to analyze the management of marketing strategy on business performance. According to the study, company success might be strongly predicted by marketing techniques (product, size, pricing, packaging, and after-sales service). However, the study found that promotion had no substantial positive impact on corporate performance. Therefore, SMEs should make high-quality goods, set fair prices, position themselves effectively, utilize appealing packaging, offer after-sale services, and give customers additional functional advantages.

Small and medium-sized businesses are a typical aspect of the Indian economy. SMEs are thought to play a significant part in the nation's economic progress, which has even been confirmed. However, SMEs in Delhi-NCR encounter a wide range of issues that impact their ability to conduct business.

The study indicated that marketing challenges significantly influenced SMEs' profitability and sales volume. It has been highlighted that most of these problems are caused by SME managers' ignorance of the principles and practices of marketing. Therefore, it is recommended that managers of SMEs have a strong background in marketing theory and practice. Additionally, depending on the situation, a qualified marketing specialist should assume the position of marketer or marketing manager. This will reduce the risks connected with certain marketing decisions and enhance SMEs' commercial performance. Numerous Indian economic sectors can make use of the study's conclusions. As a result, more research may be conducted to expand the study's scope to include SMEs and multinational firms throughout India and the Delhi-MCR.

REFERENCES

1. Aremu M.A And Lawal A.T, (2012). Exploring Marketing Strategy As A Catalyst For Performance In Nigerian Telecommunication Industry. IJMBS 2 (4), 65 – 71.
2. Asrat, B. (2022). *Effects Of Business Development Service On The Performance Of Micro And Small Manufacturing Enterprises In Addis Ababa, The Case Of Nefas Silk-Lafto Sub-City* (Doctoral Dissertation, ST. MARY'S UNIVERSITY).
3. Bowen, M., Morara, M., & Mureithi, M. (2009). Management Of Business Challenges Among Small And Micro Enterprises In Nairobi-Kenya. *KCA Journal Of Business Management*, *2*(1).

4. Buculescu, M. M .(2013) Harmonization Pr Ocess I N De Fining S Mall And M Edium – Sized Enterprises, Arguments For A Quantitative Definition Versus A Qualitative One, Theoretical And Applied Economics, Vol. 20, No.9

5. Chiliya .N, Herbst. G, And Roberts- Combard. M (2009). The Impact Of Marketing Strategies On Profitability Of Small Grocery Shops In South African Townships. African Journal Of Business Management 3 (3), 70 – 79.

6. Dewi, M. U., Mekaniwati, A., Nurendah, Y., Cakranegara, P., & Arief, A. S. (2020). Globalization Challenges Of Micro Small And Medium Enterprises. *Eur. J. Mol. Clin. Med*, *7*(11), 1909-1915.

7. Drucker, P. F. (1985). Innovation And Entrepreneurship Practice And Principles London, Heinennen. *Business Review*, *23*(11), 62-1164.

8. Ebitu, E. T. (2012) Marketing Communications: An Integrated Approach. Calabar: UNICAL Printing Press.

9. Ebitu, E. T., Ufot, J. A., & Olom, P. A. (2015). Marketing Problems And The Performance Of Selected Small And Medium Enterprises (Smes) In Southern Senatorial District Of Cross River State, Nigeria. *American International Journal Of Contemporary Research*, *5*(5), 70-76.

10. Gbolagadeadewale, A., & Oyewale, I. O. (2013). Impact Of Marketing Strategy On Business Performance A Study Of Selected Small And Medium Enterprises (Smes) In Oluyole Local Government, Ibadan, Nigeria. *Ibadan, Nigeria*, *11*(4), 59-66.

11. Goi, C. L. (2005). Marketing Mix: A Review Of „P‟. Journal Of Internet Banking And Commence, 10.

12. Grönroos, C. (1999). From Marketing Mix To Relationship Marketing: Towards A Paradigm shift In Marketing Management Decision, 32(2), 4-20

13. Iordache, M. C. (2014). The Role Of SME In The Context To The Country‗ Socio Economy Development. *Communication, Context, Inter Disciplinary, Studies And Articles*, *3*.

14. Jaswal, S. S. (2014). Problems And Prospects Of Micro, Small & Medium Enterprises (MSME's) In India. *International Journal Of Innovative Research & Studies*, *3*(5), 140-161.

15. Keskġn, H., Ġentürk, C., Sungur, O., & Kġrġġ, H. M. (2010, June). The Importance Of Smes In Developing Economies. In *2nd International Symposium On Sustainable Development* (Pp. 183-192).

16. Kotler, P. And Armstrong, G. (2004) Principles Of Marketing. New York: Pearson Educational International.

17. Kotler, P., Keller, K. L., Brady, M., Goodman, M., & Hansen, T. (2009). Marketing Management. Harlow, England.

18. Lin, Lin-Hung (1993), "Consumer Product Classification, Innovation Type And New Product Marketing Strategy." National Cheng Chi University Department Of Business Administration Of PhD Thesis.

19. Long- Yi .L And Ya-Huei.C (2012).The Impact Of New Product Marketing Strategy On New Product Performance: The Moderating Effects Of Competitive Intensity And Product

20. Lukács, E. (2005), The Economic Role Of Smes In World Economy, Especially In Europe, Institute Of Business Sciences, University Of Miskolc, Hungary.

21. Onah, J. O. And Allison, P. U. (2007) Marketing And Entrepreneurial Development. The Academy Of Marketing Journal. September 1(1) 122-130

22. Osuagwu, Linus. (2006). Market Orientations In Nigerian Companies, Intelligence And Planning, 24, (6), 67-73.

23. Owomoyela S.K, Oyeniyi K.O And Ola O.S, (2013).Investigating The Impact Of Marketing Mix Elements On Consumer Loyalty: An Empirical Study On Nigerian Breweries Plc. Interdisciplinary Journal Of Contemporary Research In Business. 4 (11), 485 –496.

24. Oyebamiji F.F, Kareem T. S And Ayeni G.O, (2013).Impact Of Job Satisfaction Dimensions On Job Performance In A Small And Medium Enterprise In Ibadan, Southwestern, Nigeria. Interdisciplinary Journal Of Contemporary Research In Business. 4 (11), 509 – 521

25. Panigrahi, C. M. A. (2012). Risk Management In Micro, Small And Medium Enterprises (Msmes) In India: A Critical Appraisal. *Asia Pacific Journal Of Marketing & Management Review*, *1*(4).

26. Patnaik, B. C. M., Satpathy, I., & Rachayeeta, P. (2016). Issues Of Micro, Small And Medium Enterprises (MSME) In India. *International Journal Of Innovative Research And Development*, *5*(6), 1-5.

27. Sánchez, P. E., & Benito-Hernández, S. (2015). CSR Policies: Effects On Labour Productivity In Spanish Micro And Small Manufacturing Companies. *Journal Of Business Ethics*, *128*(4), 705-724.

28. Sánchez, P. E., & Benito-Hernández, S. (2015). CSR policies: effects on labor productivity in Spanish micro and small manufacturing companies. Journal of Business Ethics, 128(4), 705-724.

29. Upadhye, N., Deshmukh, S. G., & Garg, S. (2010). Lean Manufacturing System For Medium Size Manufacturing Enterprises: An Indian Case. *International Journal Of Management Science And Engineering Management*, *5*(5), 362-375.

30. Vaikunthavasan, S., Velnampy, T., & Rajumesh, S. (2019). Exploring The Problems And Challenges Of Micro Small And Medium Enterprises In Northern Province. *Business And Management Horizons*, *7*(1), 89-104.

31. Vettriselvan, R., Sathya, M., & Balakrishnan, A. (2014). Human Resource Management Issues In Micro, Small And Medium Enterprises In Tamil Nadu. *International Research Journal Of Business* And Management (IRJBM), 7(12), 35-40.

A COMMERCIAL SUPPORT BY CUSTOMER FOCUSED ECOMMERCE SITE WITH THE HELP OF AI BOT

Sumanta Karmakar[1], Anish Deb[2], Azizul Islam[3], Papri Rudra[4], Chandrima Koner[5]

[1] *Assistant Professor, Department of Electronics and Communication Engineering, Asansol Engineering College*
[2]*Assistant Professor, Department of Mechanical Engineering, Asansol Engineering College*
[3]*Students, Department of Electrical Engineering, Asansol Engineering College*
[4,5]*Students, Department of Electronics and Communication Engineering, Asansol Engineering College*

_____

ABSTRACT

In this paper, we present AI Bot a Customer Support Chatbot. This paper discusses on the topic that with over 80% of global consumers trying online shopping at least once, the greatest opportunity for e-commerce companies is to build a long-lasting and profitable relationship with this already existing audience. Such a strong relationship requires utmost focus on the customer as a whole and making sense of a flood of real-time information that goes well beyond demographics or shopping behavior. That solves customer queries and if the customer asks about any particular type of books, the chatbot shows multiple books of that type. Customers can also ask the chatbot about the delivery period, product refund policy, product return policy, about the particular product. In this case, the chatbot shows the product name, ratings, and type of product. User can select the desired product and view its details and add to cart if he/she wishes to buy the product. User can also ask queries to AI bot regarding any product details and the AI bot will return the query result in form of text to speech. After selecting the product, user can do payment for the particular product online. Users can view their order history of their purchased product.

Keywords: *AI Bot, E-commerce website with a chatbot, Chatbot in PHP, E-commerce website, Chatbot.*

I. INTRODUCTION

With over 80% of global consumers trying online shopping at least once, the greatest opportunity for e-commerce companies is to build a long-lasting and profitable relationship with this already existing audience. Such a strong relationship requires utmost focus on the customer as a whole and making sense of a flood of real-time information that goes well beyond demographics or shopping behavior. There are two entities who will have the access to the system. One is the admin and another one will be the registered user. Admin will add

the product with its details such as product name, description, features, warranty, add on product and delivery date. Admin can also view and edit the product information whenever required. Admin can view all the order details and can also view the sales of the products. User need to register with basic registration details to generate a valid username and password. After login, user can view all the recommended products on the homepage compiled by system based on users information. User can select the desired product and view its details and add to cart if he/she wishes to buy the product. User can also ask queries to AI bot regarding any product details and the AI bot will return the query result in form of text to speech. After selecting the product, user can do payment for the particular product online. Users can view their order history of their purchased product.

ADVANTAGES

- This system is very easy to understand and user friendly.
- Teacher, Student, Librarian are connected with each other on one system.
- This system is saving the time for student and teacher too.
- In this system user can connect any time whenever he/she wants.
- This system is secure.

DISADVANTAGES

- Active internet connection required to access this system.
- Student has to login his account daily. Notification facility not allowed.

BLOCK DIAGRAM
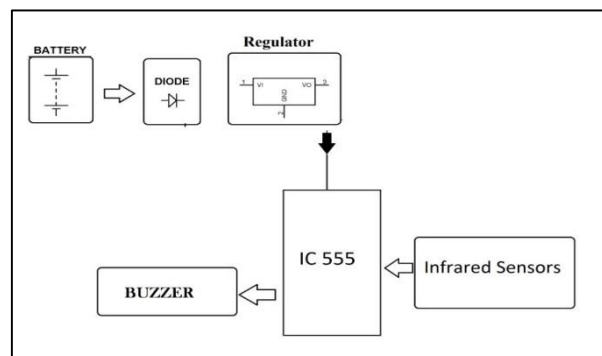
ALGORITHM

Algorithm for AI Bot (Customer Support):

This algorithm is based on a customer support AI bot. In this algorithm, we explain the procedure of the AI bot i.e., how the AI bot work, how they fetch data from the database, how the customer's query is checked with a database query, how the customers get the reply from the AI bot.

When the customer opens the customer support page, the first message will display to the customer is "Hello, I'm your Support Assistant" after this message customers can ask the query, which they want to ask the system.

Input: User Query
Output: Result Query
Query=read ();
If (search db (query))
Display Result
Else
Display error

II. RESULTS

(LEAD GENERATION)

If customers are already interacting with chatbots to ask questions or order an item, why not take it one step further, and let chatbots present useful links to product pages, special deals, or coupons?

Especially when using an AI chatbot, the bot will be able to understand much better what customers are looking for—and offer them the best incentive to shop.

The Dutch e-bike company VanMoof, for example, uses an AI chatbot designed by Chatlayer by Sinch that can not only answer customer inquiries 24/7, it will also guide customers, based on their questions, to the most suitable e-bike models.
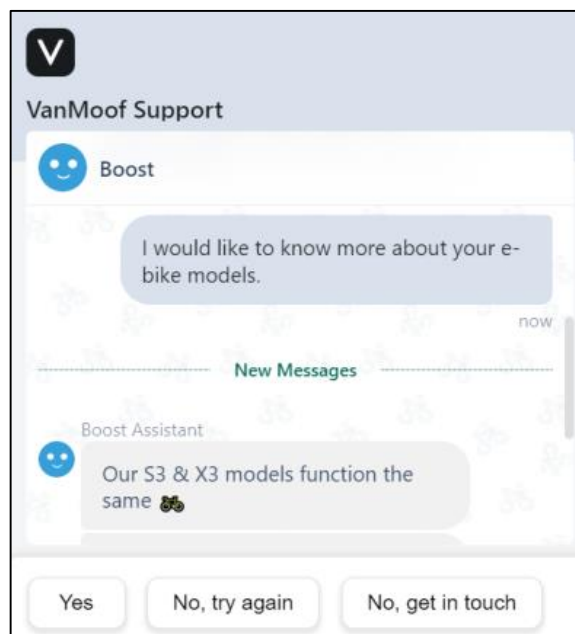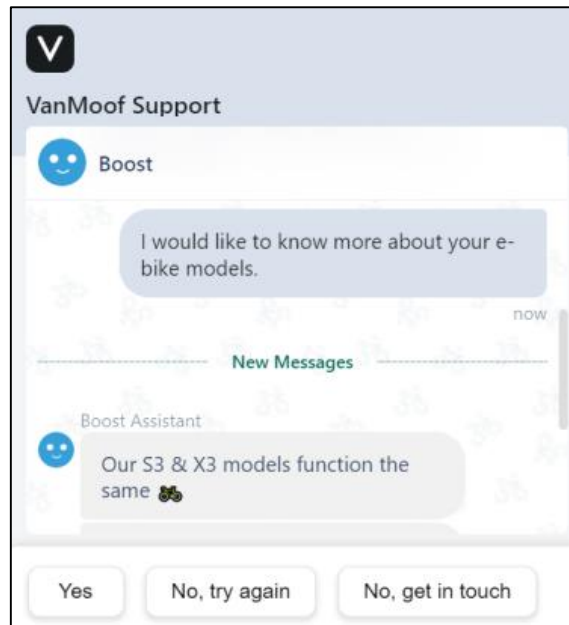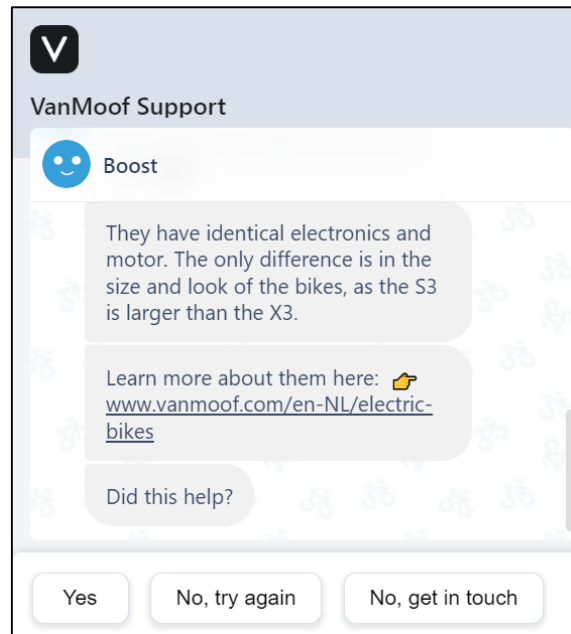
RESULTS

(SCHEDULE CONSULTATION)

Depending on what you sell, there might be a need to schedule consultations before buying a product or maintenance appointments post-purchase. This is also a process that can be easily automated with chatbots.

The Belgian e-bike seller, Bizbike, for example, uses an AI chatbot to help their customers schedule test rides and service appointments.

III. CONCLUSION

We have developed a Customer-focused e-commerce website with an AI bot, an AI bot that solves the customer's query. When customers want to buy any product, they always have queries in mind. i.e., customers want to know any particular type of products, a particular product, about the refund policy, if they want to know about these things, they have to be chat with the AI bot and solve their queries. These all the things we have developed using PHP programming language. In the future, we can add more functionalities to make this AI chatbot is the best chatbot.

REFERENCES

[1] A Study On Artificial Intelligence In E-Commerce Shyna Kakkar Assistant Professor Dev Samaj College for e-ISSN: 2582-5208 International Research Journal of Modernization in Engineering Technology and Science Volume:03/Issue:05/May-2021 Impact Factor- 5.354 www.irjmets.com www.irjmets.com @International Research Journal of Modernization in Engineering, Technology and Science [2596] Women, Ferozepur, Punjab, India Vishal Monga Assistant Professor Ferozepur Institute of Management, Ferozeshah, Punjab, India.M. Young, The Technical Writer's Handbook. Mill Valley, CA: University Science, 1989.

[2] Integration of Artificial Intelligence Technology Towards E-Services Among Online Clothing Websites Sharon Sophia. J, J. Clement Sudhahar.

[3] KBot: A Knowledge Graph Based ChatBot for Natural Language Understanding Over Linked Data ADDI AITMLOUK AND LILI JIANG Department of Computing Science, Umeå University, 901 87 Umeå, Sweden Corresponding author: Lili Jiang (lili.jiang@umu.se).

[4] An E-Commerce Website based Chatbot Siddharth Gupta, Deep Borkar, Chevelyn De Mello, Saurabh Patil Department of Computer Engineering Xavier institute of Engineering, Mumbai, India.

[5] SuperAgent: A Customer Service Chatbot for E-commerce Websites Lei Cui, Shaohan Huang, Furu Wei, Chuanqi Tan, Chaoqun Duan, and Ming Zhou Microsoft Research Asia {lecu,shaohanh,fuwei,v-chutan,vchadu,mingzhou}@microsoft.com.

A SUPPLY CHAIN RISK MANAGEMENT IN MANUFACTURING PLANNING AND CONTROL: A PSEUDO-DYNAMIC CAPABILITY PERSPECTIVE

[1]Samir Ojha, [2]Soumyodeep Mukherjee, [3]Joydip Paul, [4]Hiranmoy Samanta

[1,2,3,4]Department of Mechanical Engineering, Gargi Memorial Institute of Technology

_____

ABSTRACT

This paper describes dynamic capacity view to theorize the role of production planning and control (MPC) activities and supply chain risk management (SCRM) functions in organizational operational performance. The study anticipates that companies are stepping up their MPC activities to address supply chain uncertainty (SCU) and achieve their SCRM, which positively impacts operational performance. Data from different manufacturing companies in developing countries and regions drawn from the 6th edition of the Global Manufacturing Strategies Survey will be used to empirically test the hypothetical model. The results show that MPC activity effectively responds to his SCU and serves as an enabler for preventative and reactive SCRM. Furthermore, the paper states that MPC activities improve operational performance through effective SCRM. The results also suggest that proactive risk management practices impact operational performance only through reactive risk management. Finally, this paper enriches the literature by identifying and discussing the theoretical and business significance of the role of his MPC activities in the context of SCU, risk management practices, and organizational performance.

I. INTRODUCTION

In today's globalized economy, manufacturing firms are increasingly reliant on complex supply chains to deliver products to customers. This reliance on supply chains makes firms vulnerable to a variety of risks, such as disruptions to transportation, natural disasters, and political instability. Management of supply chain risk is essential to the success of industrial businesses. Manufacturers encounter several difficulties in controlling risks that might have an influence on their manufacturing processes and, ultimately, their bottom line as a result of the growing complexity of global supply networks. This study intends to investigate the essential elements of supply chain risk control in manufacturing planning and control. This article will specifically look at how manufacturers may identify, evaluate, and reduce supply chain risks. In addition, this study will explore how a pseudo-dynamic capacity perspective might be used to manage supply chain risks. This research study examines these issues in an effort to offer insights that will aid manufacturing organisations in being more resilient and competitive in the face of supply chain hazards. Manufacturing planning and control include the crucial task of managing supply chain risk. It entails a methodical approach to the identification, evaluation, quantification, and mitigation of any supply chain component-related hazards [1]. The procedure also entails creating plans

or mitigation strategies for the efficient handling and prevention of risks [1]. For businesses with significant global operations, supply chain risk management is essential since it can contribute to the development of a strong consumer brand [2]. Controlling manufacturing processes is one of the essential elements of supply chain risk management. This can raise product quality while lowering the possibility of recalls and legal action [2]. Controls over shipping processes also help prevent expensive shortages and times when inventory is overstocked [2]. Another essential element of supply chain risk management is supplier risk management. In order to find potential risk factors and evaluate how they might affect operations, it requires auditing, screening, and scoring suppliers. An essential factor in supplier risk management is the strategic value that suppliers contribute to operations [3]. The supplier risk matrix ought to list potential risk factors, evaluate how they can affect operations, and give a strategy for dealing with and reducing any possible supplier hazards [3]. In industrial planning and control, a thorough supplier risk matrix is a crucial part of supply chain risk management [3]. Each organisation may have its own unique risk management approach, and a thorough plan is required to take into account the data gathered from earlier processes [1]. Supply chain risk management (SCRM) is the process of identifying, assessing, and mitigating these risks. Manufacturing planning and control (MPC) is the process of managing the flow of materials and information through a manufacturing system. MPC activities include demand forecasting, inventory management, production scheduling, and capacity planning. MPC plays a critical role in SCRM by helping firms to identify and respond to disruptions in their supply chains. Finally, prioritizing mitigation efforts and focusing on areas with the largest impact is crucial for effective supply chain risk management [3].

II. LITERATURE REVIEW

The SCRM procedure' first stage is risk identification. Identification of risk kinds, factors, or both, is required. The first group of researchers created conceptual models (Trkman and McCormack 2009), supply chain vulnerability maps (Blos et al. 2009), the analytic hierarchy process (AHP) method (Tsai, Liao, and Han 2008), and other qualitative or quantitative techniques for identifying potential supply chain risks. Another set of researchers concentrated on hazard and operability analysis and the identification of risk factors utilizing the AHP (Gaudenzi and Borghesi 2006; Adhitya, Srinivasan, and Karimi 2009). A supply chain risk identification system based on a knowledge-based system approach was proposed by Kayis and Karningsih (2012), as were a qualitative value-focused process engineering methodology (Neiger, Rotaru, and Churilov, 2009) and other academics have also proposed qualitative tools to identify both risk types and risk factors.

The majority of the papers as mentioned earlier (Adhitya, Srinivasan, and Karimi 2009; Blos et al. 2009; Neiger, Rotaru, and Churilov 2009; Trkman and McCormack 2009; Kayis and Karningsih 2012) used

qualitative methodologies for risk identification. The negative effects of risk kinds or risk factors were not prioritized or quantified.

According to Harland, Brenchley, and Walker (2003), risk assessment takes into account both the likelihood that an event will occur and the importance of its repercussions. Several risk assessment techniques have arisen in the last ten years, particularly for supply risk assessment. We categorize them based on the risk types covered in the conceptual framework, including macro- and micro-risk assessments, due to the abundance of published studies in this field.

Ji and Zhu (2012) used the extension technique to assess the extent to which the afflicted sites in a devastating earthquake were salvageable. To distribute supplies to the identified impacted region sets, they created a bi-objective optimization model with the urgent relief demand time-varying fill rate maximization and distribution time-varying window minimization. A fictitious numerical example was used to demonstrate the process. (Ballou and Burnetas 2003; Cachon 2004; Talluri, Cetin, and Gardner 2004; Betts and Johnston 2005; Sodhi 2005; Xiao and Yang 2008; Radke and Tseng 2012) Several researchers have examined the effect of demand fluctuation on inventory management. Some of them offered insightful information regarding safety stock reduction. Ballou and Burnetas (2003) compared a conventional method to inventory planning with one that relies on cross-filling, or meeting customer demand from any one of many stocking locations while taking demand dispersion among stocking locations into account. Cross-filling can aid in decreasing safety stocks, it was discovered. Talluri, Cetin, and Gardner (2004) created a safety stock model and compared it to other models already in use for managing make-to-stock inventories with fluctuating demand and supply. The recommended safety stock model fared well in terms of cost savings, according to a case study at an over-the-counter pharmaceutical company. The multi-item constrained inventory model was introduced by Betts and Johnston (2005) to evaluate just-in-time (JIT) replenishment with component substitution under stochastic demand. Due to smaller investments in safety stock, the analysis revealed that JIT replenishment is more efficient than component substitution.

The effectiveness of the supply chain was examined by some other academics in relation to demand visibility and the bullwhip effect. A partial increase in demand visibility can increase production and inventory control efficiency, as demonstrated by Smaros et al. (2003) using a discrete-event simulation model. A dynamic model was created by Reiner and Fichtinger (2009) to assess supply chain process enhancements while taking various forecasting techniques into account. They noted that while the bullwhip effect and average on-hand inventory are reduced when order variability is dampened, the problem of a declining service level arises. Sucky (2009) hypothesized that when orders go up the supply chain from retailers to wholesalers to manufacturers to suppliers, their unpredictability rises. He came to

the conclusion that if a straightforward supply chain is assumed and risk pooling effects are present, the bullwhip impact is overstated.

The majority of the proposed methods in the aforementioned articles (Ballou and Burnetas 2003; Smaros et al. 2003; Cachon 2004; Betts and Johnston 2005; Sodhi 2005; Xiao and Yang 2008; Reiner and Fichtinger 2009; Sucky 2009; Radke and Tseng 2012) were not used in actual industrial trial cases. This is a common limitation of the aforementioned works. The lack of actual implementation and verification would cause potential users to have doubts about the suggested methods' efficacy and efficiency. Additionally, several of the aforementioned papers (Ballou and Burnetas 2003; Smaros et al. 2003; Cachon 2004) simplified the researched issues with stylized supply networks.

1. The Dynamic Capability View of SCRM

The dynamic capability view of SCRM argues that firms can develop the ability to manage supply chain risks by continuously adapting their MPC activities to the changing environment. This view is based on the concept of dynamic capabilities, which are the firm's ability to integrate, build, and reconfigure internal and external resources to address rapidly changing environments. In the context of SCRM, dynamic capabilities allow firms to do the following:
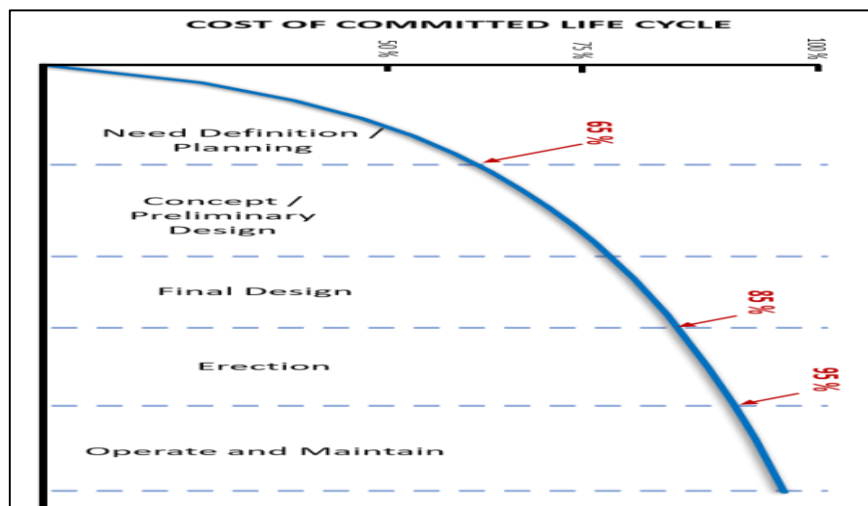
a) Identify and assess supply chain risks - Firms need to be able to identify and assess the risks that could disrupt their supply chains. This requires the ability to collect and analyze data on a variety of factors, such as supplier performance, transportation disruptions, and political instability. Manufacturers must have a thorough strategy in order to detect, evaluate, and reduce supply chain risks. This entails carrying out routine risk analyses to determine the categories of risks connected to each supplier or supplier segment [4]. Manufacturers must take into account a variety of risks, including breakdowns in information systems, geopolitical risks, unfavourable occurrences, "black swan" events, contract risks, non-compliance risks, and reputational risks. [4]. Based on the kinds of associated risks and the findings of the evaluation, producers must develop appropriate management and mitigation methods [4]. The method of risk assessment needs to be adaptable and not just rely on direct supplier interaction [4].

b) Develop mitigation strategies. Once firms have identified and assessed the risks, they need to develop mitigation strategies. These strategies may include diversifying suppliers, building buffer inventory, and using risk transfer mechanisms such as insurance. When assessing supply chain risks, it's crucial for manufacturers to take into account the kind of suppliers they work with and how significant they are [4]. Supplier risks should be evaluated from a variety of angles, including those related to purchasing, logistics, quality assurance, legal compliance, product development, and finances [4]. To help detect supply chain risks and make sure that risks are

eliminated as soon as possible, manufacturers should set up continuous monitoring methods and metrics [4]. In order to be ready for disastrous repercussions, manufacturers must also identify internal risks in their supply chain and evaluate and reevaluate such risks.Finally, it's critical for manufacturers to document the areas of the supply chain where there are no data and additional research is needed [5].

c) Respond to disruptions. When disruptions do occur, firms need to be able to respond quickly and effectively. This requires the ability to communicate with suppliers and customers, make changes
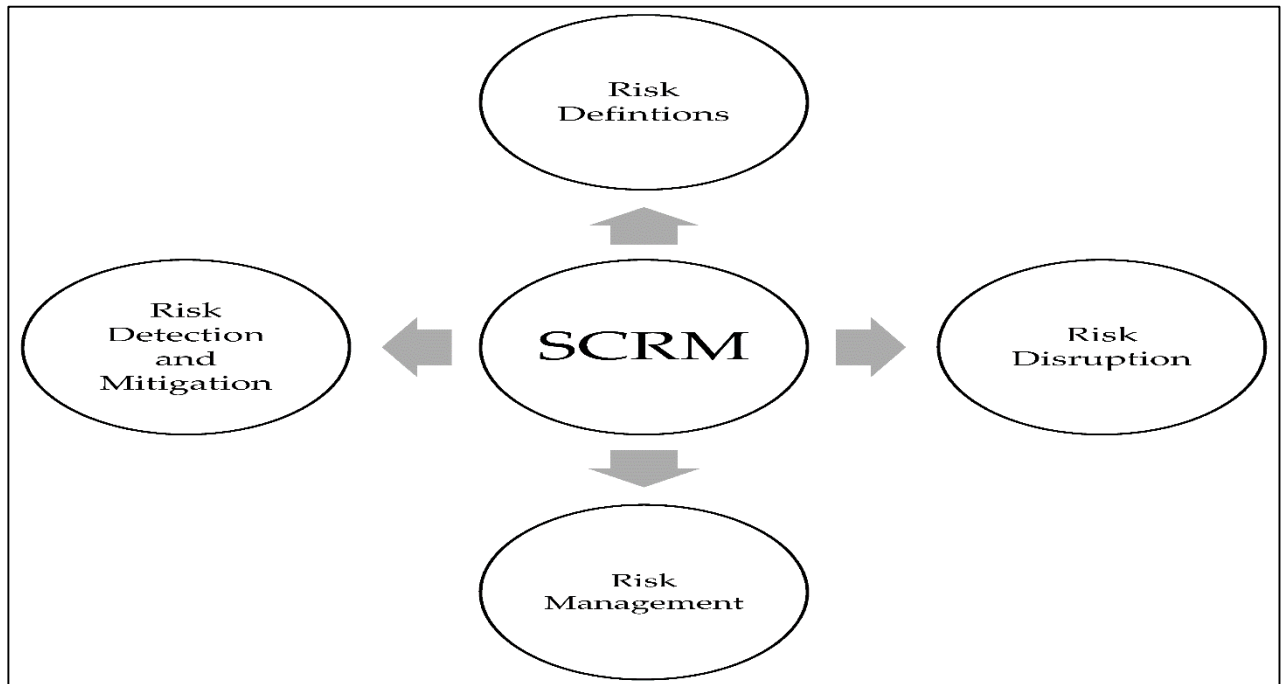
to production schedules, and reallocate resources. By following a risk-intelligent approach and proactively identifying and mitigating risks, manufacturers can improve their supply chain risk management and protect against monetary and reputational losses. [4]

2. The Role of MPC in SCRM

MPC plays a critical role in the dynamic capability view of SCRM. MPC activities provide the information and tools that firms need to identify, assess, and mitigate supply chain risks. The pseudo-dynamic capability perspective is an extension of the dynamic capability view and can help manage supply chain risks. The perspective theorizes that effective manufacturing planning and control (MPC) activities and supply chain risk management (SCRM) capabilities can improve a company's operational performance [6]. A study found that MPC activities drive operational performance by enabling effective SCRM to mitigate supply chain uncertainty (SCU) [6]. MPC activities act as an enabler of preventive and reactive SCRM and effectively respond to SCU, leading to positive impacts on operational performance [6]. Based on this, the study hypothesizes that companies can enhance their MPC activities to respond to SCU, enabling effective SCRM that positively impacts operational performance [6]. By identifying the role of MPC activities in the association between SCU, risk management practices, and firm performance, the pseudo-dynamic capability perspective enriches the literature and highlights its theoretical and managerial significance [6]. Overall, the perspective can be useful for manufacturers in identifying and managing supply chain risks to improve their operational performance. For example, demand forecasting can help firms to identify potential shortages, inventory management can help firms to build buffer inventory, and production scheduling can help firms to reallocate resources in the event of a disruption. [7,8] In addition to providing information and tools, MPC activities also help firms to develop the organizational capabilities that are necessary for dynamic SCRM. For example, MPC activities can help firms to develop a culture of risk awareness, a process for continuous improvement, and a team of cross-functional experts. [9,10]

III. CONCLUSION

The dynamic capability view of SCRM provides a framework for understanding the role of MPC in managing supply chain risks. MPC activities provide the information and tools that firms need to identify, assess, and mitigate supply chain risks. In addition, MPC activities can help firms to develop the organizational capabilities that are necessary for dynamic SCRM. By adopting a dynamic capability approach to SCRM, firms can improve their ability to respond to disruptions in their supply chains. This can help firms to improve their operational performance, reduce costs, and increase customer satisfaction.

REFERENCES

1. A Guide to Supply Chain Risk Management. (n.d.) Retrieved June 12, 2023, from safetyculture.com

2. Supply Chain Management (SCM): How It Works and Why It Is Important. (n.d.) Retrieved June 12, 2023, from www.investopedia.com/terms/s/scm.asp

3. Supply Chain Risk Management 101: Everything You'll Ever Need to Know. (n.d.) Retrieved June 12, 2023, from www.jaggaer.com/blog/supply-chain-risk-management/

4. Five strategies to manage risks of supplier failure in manufacturing. (n.d.) Retrieved June 12, 2023, from manufacturingdigital.com

5. A practical approach to supply-chain risk management. (n.d.) Retrieved June 12, 2023, from www.mckinsey.com

6. Manufacturing planning and control driven supply chain risk management: A dynamic capability perspective. (n.d.) Retrieved June 12, 2023, from ideas.repec.org

7. Attique ur Rehman, Muhammad Shakeel Sadiq Jajja, and Sami Farooq. "Manufacturing planning and control driven supply chain risk management: A dynamic capability perspective." Transportation Research Part E: Logistics and Transportation Review 167 (2022): 102933.

8. Christopher, Martin. Logistics and supply chain management: Strategies for reducing costs and improving performance. Financial Times Prentice Hall, 2013.

9. Gunasekaran, Anand, and Roger J. van Weele. Supply chain management: A complete guide. Pearson Education India, 2015.

10. Lee, Hau L., and Seungjin Whang. "Managing supply chain risk with quick response capability." Production and Operations Management 13.1 (2004): 54-68.

IMPORTS OF AIR GUN IN INDIA

[1]Prashant Mandal, [2]Dr. Samriti Mahajan

[1]Student, [2]HOD & Associate Professor
[1, 2] Department of School of Commerce and Management, Lingaya's Vidyapeeth

ABSTRACT

The importation of airsoft guns in India is an issue that has received a great deal of attention in recent years. As airsoft became more popular among Indian sports enthusiasts and amateur athletes, its imports increased significantly.

Air guns are classified as firearms under the Indian Firearms Act and are subject to strict regulations. However, air guns are treated differently from conventional firearms, and imports are permitted for non-lethal purposes such as sports shooting and pest control.

The demand for air guns has increased significantly in recent years in India due to growing interest in shooting sports and the availability of international quality air guns. This has increased the number of Indian airsoft importers importing a wide range of airsoft guns from different countries.

However, importing airsoft guns into India is not without its challenges. This process can be lengthy and complicated, and importers must comply with strict government regulations and requirements. In addition, concerns have been raised about the illegal importation of air guns and their possible misuse by criminals.

Overall, the importation of airsoft guns into India is a significant issue that needs to be carefully considered and regulated. As interest in airsoft guns for sporting and recreational purposes grows, it is important to ensure that their importation is controlled and controlled to prevent possible misuse.

Keywords: *Importation, firearms, imports, importers, India guns, misuse, regulations, airsoft, shooting*

I. INTRODUCTION

Air guns have gained significant popularity among sports enthusiasts and hobbyists in India over the past few years. These guns are considered to be non-lethal firearms and are primarily used for sports shooting and pest control. However, the import of air guns in India is subject to strict regulations under the Indian Arms Act.

In recent years, there has been a significant increase in the import of air guns into India, owing to the growing demand for high-quality air guns among shooting enthusiasts. This has led to a rise in the number of air gun importers in India, who are importing a variety of air guns from different countries.

The import of air guns in India is not without its challenges. Importers must comply with strict regulations and requirements set by the government, and the process can be lengthy and complicated. Additionally, concerns have been raised over the potential misuse of air guns by criminals, which has led to increased scrutiny of the import of air guns in India.

Given the growing interest in air guns for sports and recreational purposes, it is essential to understand the regulations governing their import in India and the potential challenges associated with their import. Therefore, this research paper will explore the import of air guns in India, including its regulatory framework, the challenges faced by importers, and the potential implications of their import for public safety and security.

Overall, the import of air guns in India is an important issue that requires careful consideration and regulation. While there is a growing interest in air guns for sports and recreational purposes, it is crucial to ensure that their import is managed and controlled to prevent any potential misuse.

In the beginning, guns were only meant to kill or cause to cause damage to the opponent and also to the hunt. The design of these guns can have changed over the years, but the principles are the same.

In terms of manufacturing methods, airguns have structural aspects similar to firearms.

Usage, mechanism, appearance. This is the only difference between airguns and firearms. Do not use propellants to propel projectiles.

Airguns are now produced relying on air instead. Enough kinetic energy to propel the projectile. How

this kinetic energy exists Depending on the type of air pistol, the scope of delivery may vary from air pistol to air pistol. In India, under the Armament Act 1959 (as amended 2016), all air forces apply. It can produce more than 20 joules of energy or an initial velocity of more than 20 joules. Gun license now required for sizes over 1000 ft/sec or .177 caliber,2016 Airguns of any type (rifle or pistol) are not permitted.

Anything below the statutory limit is considered a firearm under the 2016 Amendments to the Firearms Act. This change was and still is considered a major controversy by many airsoft enthusiasts.

According to the dictionary, an airgun is technically not a firearm, so the maker and the maker meaning. Airguns are used to hunt small game and in some cases can also hunt large game.

Shooting practice such as competition shooting and printing by hobbyists and enthusiasts. But airguns are very powerful and accurate weapons and easy to use. Is malicious or intended to defraud. More on this in the literature.

GLOBAL AIR GUN MARKET

The APAC air gun market is divided into the following regions: Australia, India, China, Japan, South Korea, and the Rest of APAC. As tensions and conflicts rise in countries like as India, China, and Pakistan, the military's strategic purchase of significant quantities of air rifles and air guns has aided the region's air gun market growth. In diverse countries, certain government rules and restrictions are in place for the buyer.

In Australia, the government announced various laws for the acquisition of air guns such as ai les that are classified as Class A firearms to be used for legal purposes, ai pistol shooters should have a membership and sufficient attendance as a member of an authorised pistol club for six months before becoming an owner of the ai pistol. Similarly, China's air gun law is often considered to be the most stringent in the world. Individuals' increased interest in hunting and shooting has prompted the Chinese government to make various changes in order to assist the younger generation in advancing and expanding their hobbies. The economies of Asia are primarily emerging and fragmented, and they face challenges such as growing inflation, cost pressures, market rivalry, and market volatility. To address these issues, manufacturers and suppliers are eagerly awaiting the arrival of the air gun, which will maximise and improve the user's visibility in acquiring these weapon.

AIR GUN MARKET SEGMENTS

The air gun market is divided into product, ammunition type, accessories, and geographical segments. The air gun market is divided into two product categories: rifle and pistol. The air gun market is divided into airgun pellets, airgun BBs, huge bore pellets, hunting pellets, cleaning pellets, and others based on ammunition type. The air gun industry is divided into

accessories such as scopes, sights, mounts, binoculars, compressors, and others. Geographically, the air gun market is divided into North America, Europe, Asia Pacific (APAC), the Middle East & Africa (MEA), and South America (SAM).

According to the air gun market analysis, some of the market's leading players include Airforce Airguns, Velocity Outdoor Inc., Daisy Outdoor Products Inc., Feinwerkbau GmbH, GAMO Outdoor, S.L.U, Morini Competition Arm SA, Smith & Wesson, Carl Walther GmbH, Sport Manufacturing Group Inc., and STURM, RUGER & COMPANY, INC.

INDIAN AIR GUN MARKET

During the anticipated period, the India Air Gun Market is expected to expand. The growing popularity of shooting sports and the rise in disposable money have both contributed to the rapid growth of the air gun business in India in recent years. Numerous activities, including plinking, target practise, pest management, and small game hunting, include the use of air weapons.

In India, the pistol is the most often used air gun type, followed by the rifle. Air guns' widespread availability, the expanding popularity of shooting sports, and increased disposable income are all key market drivers. However, the ownership and use of air weapons are subject to stringent government controls, which to some extent are limiting industry expansion.

According to 6Wresearch, the India Air Gun Market is expected to grow during 2022-2028. India air gun market is currently in its developing stage with majority of the demand. The major factor driving the growth of air gun market in India is the rising popularity of shooting sports. In addition, growing disposable income and awareness about different types of air guns are also fuelling the growth of this market. However, high

cost of some premium products and strict government regulations regarding import/export of air guns are restraining the growth of this market.

The Indian air gun business is expanding, catering to shooting enthusiasts and hunters searching for a less expensive and less risky alternative to traditional guns. Air weapons, which come in a number of types such as rifles, pistols and shotguns, use compressed air or gas to drive pellets or BBs towards a target.

The growing popularity of shooting sports in India is one of the primary reasons driving the growth of the Indian air gun market. The market for air weapons has increased as more

individuals get interested in competitive and leisure shooting. Air guns are also extensively used for pest control on farms and other estates, which adds to their appeal.

The Indian air gun market is highly competitive, with a range of domestic and international brands offering different types of air guns. Some of the popular Indian brands include Precihole, Gamo India, and SDB. International brands such as Crosman, Hatsan, and Diana are also available in the Indian market.

One of the challenges facing the Indian air gun market is regulation. Buyers are required to obtain a license to purchase an air gun, and there are restrictions on the caliber and velocity of air guns that can be sold in the country. However, these regulations are in place to ensure the safe use of air guns and prevent misuse.

Despite the challenges, the Indian air gun market is poised for continued growth in the coming years. The affordability and versatility of air guns make them an attractive option for shooting enthusiasts and hunters, and the increasing popularity of shooting sports is expected to drive demand for air guns in India.

Air guns have gained significant popularity among sports enthusiasts and hobbyists in India over the past few years.

These guns are considered to be non-lethal firearms and are primarily used for sports shooting and pest control. However, the import of air guns in India is subject to strict regulations under the Indian Arms Act.

In recent years, there has been a significant increase in the import of air guns into India, owing to the growing demand for high-quality air guns among shooting enthusiasts. This has led to a rise in the number of air gun importers in India, who are importing a variety of air guns from different countries.

The import of air guns in India is not without its challenges. Importers must comply with

strict regulations and requirements set by the government, and the process can be lengthy and complicated. Additionally, concerns have been raised over the potential misuse of air guns by criminals, which has led to increased scrutiny of the import of air guns in India.

Given the growing interest in air guns for sports and recreational purposes, it is essential to understand the regulations governing their import in India and the potential challenges associated with their import. Therefore, this research paper will explore the import of air guns

in India, including its regulatory framework, the challenges faced by importers, and the potential implications of their import for public safety and security

ANALYSIS OF IMPORTS OF-AIR GUN

Total Value & Volume of Imports in India	
Total Value $64,150	Total Quantity 3,728,302
Average price per unit$0.02	Average value per shipment$957

Top Suppliers	Top Ports of Discharge
Germany$37,296	Delhi Air Cargo$24,750
China$20,966	Hyderabad$20,966
Netherlands$5,802	Bombay Air Cargo$10,559

Port	Value (INR Million)
PUNE-TALEGOAN ICD	5.815
TUGHLAKABAD	1.71
BOMBAY AIR CARGO	1.548
BANGLORE AIR CARGO	0.959
NHAVA SHEVA SEA	0.564
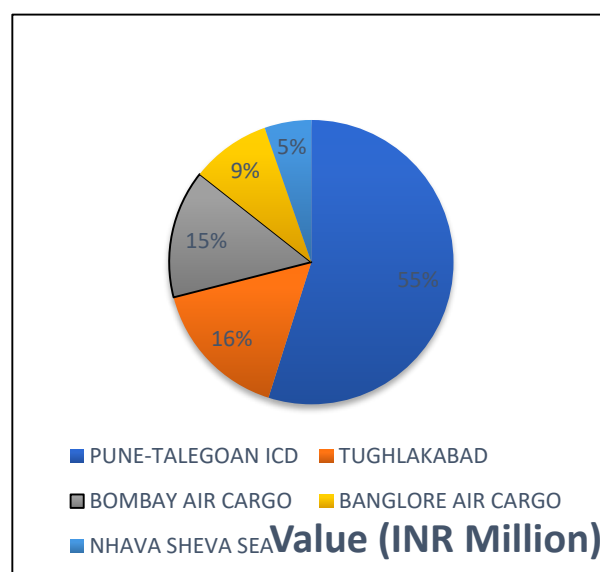
(IMPORTS OF AIR GUN PORT WISE)

IMPORT PROCEDURE OF AIR GUNS

The majority of air guns have a "power limitation" even though they are generally excluded from the Arms Act's regulations (see Indian Arms Act GSR 991, 1959, ii) 1(3)). The antiquated "transaction log test" is used to determine this capacity limit. A pellet is shot into a 1" thick piece of soft wood (often spruce or pine) during the test from a distance of 5 feet. The air pistol is deemed to have failed the test if the pellet enters the 1" block and escapes from the other side. and MUST be mentioned with other guns on the firearms licence.

Now let's talk about air weapon imports. There are essentially JUST TWO legal methods to import air weapons into India, as you might have inferred from the links in the two discussions above. COMMERCIAL IMPORTS ARE NOT ALLOWED HERE and importation is only authorised for PERSONAL USE in any scenario.

1 - IMPORT VIA COURIER/ POST

The Department of Commerce, Ministry of Commerce & Industry, Government of India ALLOWED the import of.177 calibre air guns/air-pistols by shooters registered with Rifle Clubs or District/State/National Rifle Association(s) in its Notification No. 12 (RE-2005)/2004-09 dated July 4, 2005. A scanned copy of this notification and a copy of the regulation exempting the imposition of any import duties are both attached to this post.

Please be aware of the requirements for importing using this route:

1. The importer MUST be an active participant in the aforementioned rifle club or shooting association.

2. Only.177 calibre air pistols and air rifles may be imported.

3. As of now, an import duty of around 35% was levied on the CIF (Cost + Insurance + Freight) value of the imported items. However, this responsibility is now NADA. However, customs authorities are likely to hold off on waiving import charges on these products until they receive official notification (perhaps early next month). The zero duty regime is currently in effect. It goes without saying that the imported air pistols and firearms must be able to pass the aforementioned deal wood test.

2 IMPORT AS PERSONAL BAGGAGE

Anyone returning from abroad is allowed to bring an air pistol or air rifle with them. The following circumstances would be true:

1. Since there are no restrictions on calibre utilising this approach, importance of.Air weapons of calibre 22 shouldn't be an issue.

2. Membership in a rifle club or shooting association is NOT REQUIRED of the returning passenger.

3. The tax assessed should be no more than 35%, but the interpretation of the customs officer on duty is quite important; I've heard of a situation where someone was assessed 100% import duty!

4. The baggage regulations provide the on-duty customs officer a lot of leeway to use his or her judgement. Therefore, even if a club membership is not necessary, having one in some situations may benefit you.

5. The way things turn out varies greatly; in some instances, the customs officer assesses duty on the airgun and promptly releases the luggage. In other situations, the airgun is confiscated and must be validated as an airgun (and not a weapon) by the local police guns branch before it may be released. Therefore, it is not a good idea to have an immediate onward connection; allow yourself at least one day to account for any customs issues.

6. PLEASE confirm the regulations for checking an air gun in your luggage with your airline well before your travel. Some airlines go out of their way to be helpful. All airlines classify air rifles as "dangerous goods," so if you need more information, get in touch with the airline's "dangerous goods" department. Depending on where you would be travelling, there could be extra criteria (such packing it in a TSA certified gun box). To avoid any last-minute delays brought on by the inconvenience of checking in the air gun, please go to the airport early.

7. Each returning passenger is allowed to bring back 2000 pellets, although this is not often strictly enforced, and the customs officer may seize more or even less than this amount. Everything depends on your luck.

Import policy of arms and ammunition for specified sportspersons / sport bodies

S.O.(E) The Central Government hereby amends the Schedule (Imports) of the ITC (HS) Classifications of Export and Import Items in accordance with the authority granted by

Section 5 of the Foreign Trade (Development and Regulation) Act, 1992 read in conjunction with Paragraph 2.1 of the Foreign Trade Policy, 2009-2014:

2. Below is an excerpt from the previous Import Licencing Note (1) in Chapter 93 of the ITC (HS) Classifications of Export and Import Items:

On the advice of the Department of Youth Affairs and Sports, Government of India, the import of guns is authorised for famous shooters and rifle clubs for their personal use under the condition that they get a licence. However, shooters who are members of rifle clubs or the district/state/national rifle association will not be charged for the importation of 0.177 bore air rifles and air pistols. The National Rifle Association of India (NRAI) would also be permitted to import 0.177 bore air guns and air pistols for free in order to offer the same to the qualified State Rifle Associations / Clubs and qualified shooters. The NRAI must maintain an accurate record of the imported firearms.

3. The Import Licencing Note (1) would be amended to read as follows: "Import of arms (including parts thereof) & ammunition is permitted freely to the following sports persons/sports bodies: Renowned shooters (as defined in Import Licencing Note 3); National Rifle Association of India (NRAI) for its own use and for transfer to its State/district affiliates by proper certification by Sports Authority of India." The appropriate recommending or certifying bodies will keep the necessary records.
4. Note (4) is inserted as follows: "Note (4) - Policy for import of 'Air Gun Pellets' is free." This note follows the current Import Licencing Note (3) in Chapter 93 of ITC HS) Classifications of Export and Import Items.

5. This Notification's impact is:The process for issuing import licences or authorizations for the entry of guns and ammunition by designated athletes or athletic organisations has been abandoned.For their own purposes or those of their affiliates, NRAI, SAI, and SSCB are free to import weapons and ammunition. For personal usage, Renowned Shooter is free to import weapons and ammo. The "free" import policy regime for "Air Gun Pellets" is still in place.

This notification just modifies the Arms Act, 1959's rules, not exempts the listed sportspersons or sports organisations from them.

II. CONCLUSION

In conclusion, the Indian air gun market is a growing industry that is attracting both domestic and international brands. While there are challenges associated with regulation and licensing, the increasing popularity of shooting sports and pest control applications is driving demand for air guns in the country.

Imports of air guns into India have also been on the rise, with countries such as China and Turkey being major exporters. Indian importers are drawn to these countries due to the affordability and quality of their air guns. However, it is important to note that imports of air guns are subject to regulation and require an import license.

Research on the Indian air gun market can shed light on the factors driving its growth and help identify opportunities for market players. In particular, understanding consumer preferences and identifying unmet needs can help businesses develop more targeted and effective strategies to reach their target audience.

Overall, the Indian air gun market is a promising industry with significant growth potential, and imports are likely to play an important role in meeting the demand for air guns in the country.

REFERENCES

. Warlow, T. (2016). Firearms, the law, and forensic ballistics. CRC Press. 2. Bratton, S. L., Dowd, M. D., Brogan, T. V., & Hegenbarth, M. A. (1997)

ITC (HS), 2017 SCHEDULE 1 – IMPORT POLICY Section XIX Chapter-93 829 SECTION XIX

(Anup K. Pujari)

Director General of Foreign Trade

E-mail: dgft@nic.in

[Issued from F. No. 01/93/180/M-46/AM-05/PC-2(A)]

TO BE PUBLISHED IN THE GAZETTE OF INDIA EXTRAORDINARY

PART-II, SECTION-3, SUB SECTION (ii)

GOVERNMENT OF INDIA

MINISTRY OF COMMERCE & INDUSTRY

DEPARTMENT OF COMMERCE

NOTIFICATION No. 52 (RE-2007)/2004-09

https://www.6wresearch.com/industry-report/india-air-gun-market-outlook

https://gunowners.in/

https://www.theinsightpartners.com/reports/airgun-market

https://www.seair.co.in/air-rifle-hs-code.aspx

https://www.volza.com/p/air-guns/import/import-in-india/

BARRIERS TO INTERCULTURAL COMMUNICATION AMONG STUDENTS OF RURAL AREA: AN ANALYTICAL STUDY THROUGH STATISTICAL SIMULATION

Rituparna Das

Assistant Professor, BSH Department, ABACUS Institute and Engineering & Management

_____

ABSTRACT

Globalization has merged the globe into a global village eliminating the concept of geographical boundaries. As a result of globalization, institutions have been emerging as multicultural organizations and assembling more varied teams, and people are emigrating from one society to another as society has become increasingly global. Still cultural difference has been there as a stern divider. People hailing from multiple cultural backgrounds carry the complexity of their cultures within them and these motley cultures result in cross-culturalism. A variety of components, such as culturally distinct values, conventions, behaviors, lifestyles, ethics, and beliefs construct cross-cultural context that hinders effective communication causing intercultural barriers among people from diverse cultures. To work efficiently and fruitfully in a multicultural group, it has become essential for the participants to develop their cultural competences and overcome cultural obstacles. This research article is an analytical study that strives to fathom the existing barriers of intercultural communication among the school students of rural area of our country through statistical simulation and seek solutions for same.

Keywords: *Multicultural work environments, Intercultural communication (ICC) barriers, ICC obstacles management, High context and low context cultures, Intercultural participants.*

I. INTRODUCTION

Cultural awareness has become crucial for everyone living in multicultural environments in the current competitive world, including all participants (leaders and followers), in multicultural organizations. Leaders and followers in multicultural teams must exchange ideas and behaviors to work towards their shared objectives, but owing to intercultural difficulties, they are unable to maintain a good focus on it. It is essential for participants to understand each other's mental models and behaviors to work in a multi cultural group where everyone may possess different ways of thinking and acting. Intercultural communication barriers are increasingly becoming a broad topic. It is necessary to overcome the ICC barriers to derive a substantial impact from the performance of a multi-cultural group. The decision to

focus on intercultural communication (ICC) obstacles among prospective school students was made after we entered a rural classroom. There we found that even at a rural classroom we had more than 15 different castes, which translates to more than 07 different clans and tribes. It is more accurate to state that our class included students from more than 10 different cultures. We were astounded on seeing that everyone was acting strangely towards one another and nobody wanted to step beyond their comfort zone, and nobody was just acting in the same manner as we did in our classes back in our schooldays. And we agreed that even in our professional days we experience the same difficulties to some extent while working in a multicultural group. We strive to seek the answer, how do participants from High context and Low context cultures experience intercultural communication barriers while participating in multicultural settings? How can participants effectively manage intercultural communication challenges and barriers? Until we probed into intercultural communication, cultural similarities and differences mixed with intercultural barriers during our "Intercultural communication" course, we were unaware of and unable to determine the answers to these issues. This ICC course helped in some ways to solve our issue. We learned how to deal with intercultural obstacles and put that knowledge into practice while working on various group assignments both inside and outside the classroom. We started accepting cultural differences and similarities as well as new beliefs, rules, and restrictions. In order to prevent future students, leaders, and followers from facing the same difficulties we had and to help them learn better right away to maintain their pace in this global village, we decided to study on "Intercultural Communication Barriers." This is the rationale for our choice of using students of multiple castes and creeds as a method of data gathering. Despite having residents from a variety of societies and cultures it can be said that individuals from other cultures have assimilated yet to a less extent and formed an unknown typical culture. Because of this, not only in schools or workplaces but also in daily life, people of different cultures need to interact more. Keeping in mind the issues like lack of cultural awareness and understanding, limited access to information and resources, lack of infrastructure and an upper hand of prejudices, stereotyping, traditional beliefs & practices, power imbalance we decided to choose rural area as an ice breaker of our study.

II. IN DEPTH ANALYSIS OF ICC BARRIERS THROUGH LITERATURE REVIEW

Schmidt defines Intercultural communication et al. (2007) [1], a process that requires individuals to comprehend the cultural preferences of others in order to achieve their shared objectives while residing in various cultures. Intercultural communication, according to Samovar and Porter (1993) [2], entails cooperation with distinctive individuals who identify themselves as being from a different culture as well as information sharing among representatives of other cultures. Schmidt interprets intercultural communication is working with people of various cultural backgrounds and this differs from regular communication. Due to some intercultural communication difficulties People from several cultures occasionally struggle to convey their points of view to others and that leads to misunderstandings. As an alternative, Erin Meyer's 2014 book [3], the "Cultural Map" analyses "Cultural Differences" in terms of high and low context culture. She emphasizes that cultural differences are built on a variety of unique and comparable behaviors, such as communicating, persuading, trusting, evaluating, disputing, deciding, leading, and scheduling, among others. The "High context versus Low-Context Theory" by Edward Hall (1976)[4] offers another perspective on cross-cultural interactions. Working with multicultural individuals from both high and low cultural backgrounds, leaders and followers experience difficulties. They must deal with hurdles between high and low context cultures as well as the challenges functioning in a multicultural setting. On the other hand in 1997 Samovar and Porters examined that Language obstacles, cultural disparities, ethnocentrism issues, cultural competition, miscommunication, religious differences, etc. are just a few of the intercultural barriers that leaders and followers from different cultures must deal with in multicultural work environments. It shows that there is a persistent risk of misunderstanding where there are cultural variations. Therefore, it is difficult to understand cross-cultural communication when dealing with an unfamiliar person for any business, governmental, or administrative reason. However, intercultural communication is evident in groups that work to maintain equality, and when people interact; they need to take culture into account. As language is a common activity and individuals need it to express themselves, language is one of the most crucial components in intercultural communication. When varied people interact, certain words have similar sounds in speech but have different cultural connotations, which alter the conversation's overall subject. As a result, their results could be unsuccessful, and miscommunication may occur. According to Adler, Gundersen Dixon &Ohara, (2012) [5], when communication occurs, the expected importance of the source and the decoded meaning of the collector should be the same. There needs to be mutual clarity on what is meant by the expected meaning. There will be fewer misunderstandings if people interact in

their common languages, like English, or if they speak English as a second language, but there is still a chance that the meanings could change. According to (Mauranen, 2006) [6], if the common language is not employed, miscommunication occurs in this linguistic environment. Organizations are becoming multicultural businesses and establishing more diverse teams in this age of globalization. Because people carry the complicated nature of mixed cultures with them, cross-culturalism has been challenging the nations with rising immigrant rates (Hellerstein & Neumark, 2002; Selmer et al., 2013)[7] . Uncertainty avoidance, according to Hofstede et al. (2010), focuses on how threatened or anxious a cultural sense feels by unclear or ambiguous situations [8]. Intercultural variety in teams is defined by differences in conventions, norms, habits, beliefs, and values in the context of cross-culturalism (Gibson & Gibbs, 2006; Rodriguez, 1998) [9] [10]. According to Eringa et al., 2017 [11], the best way to define culture is to identify its primary components as symbols, heroes, rituals, and values. Comparing the ideals that are prevalent among citizens of other nations is the greatest way to evaluate how different people's mental programmes differ from one another. On the other hand, Leadership, communication and human experience have a deep relationship among each other which was examined by the researcher Caputo and Heater et.al. (2012) [12]. War. Fang (2003) focuses on the fifth dimension (short-term orientation and long-term orientation) because he discovered a logical fault underpinning this dimension's assumptions because the short-term oriented values are labeled as negative and the long-term values are extraordinarily positive[13]. The main reason behind the misunderstanding related to communication is beautifully described by the researcher Lu et al., (2018) [14] who said that "Beyond the issue of linguistic fluency misunderstandings arise from differing tacit cultural assumptions" which is very closely related to our research work. According to Suen et al. (2019), intercultural communication is a guide that offers the readers an effective theory and ways to communicate across cultures by recognizing ICC barriers. It is sometimes said that ICC depends on the individual's message, behavior, and culture. ICC is a phenomenon, a study, or a body of knowledge about numerous different cultures that aids in figuring out how individuals of various origins and cultures interact with one another and in recognizing the differences between various cultural groupings [15]. Intercultural communication may be broken down into two primary parts, each of which has a wide range of meanings. A researcher can do in-depth research on each of these issues individually. Communication and Culture are combined to form Intercultural, Communication, and Barriers. A thorough description of these phenomena has been illustrated in his research work. The most important part of miscommunication had been observed by three researchers.

According to them Communication is a crucial process between followers and leaders when they work in teams, according to communication specialists (Connaughton and Daly, 2005; Chaleff, 2009; Rosenbach et al., 2012) [16- 18]. Prince et al., suggests that "Stay in an uncomfortable atmosphere, feel it, and learn from it. When working with or communicating with people from different cultures, compare these uncomfortable and unexpected behaviors with your own behaviors and knowledge."[19].The process of symbolic interchange wherein members of two (or more) diverse cultural communities bargain for shared meaning in a dialogical setting. This concept is first introduced by the researcher Toomey, S et.al, which is very crucial point in the view of barriers of communication [20]. On the other hand, gaining acceptance and the expanding cross-culturalism, globalization, and economic internationalization was described by the researcher Tung et al. [21]. According to Richardson and Smith (2007), people reflect direct exchange and clear signals in low-context cultures while they employ indirect messaging in high-context cultures to communicate their opinions [22] [23]. A leader's interpersonal communication behaviors are unique and focused on maximizing hierarchical relationships in order to achieve certain group or individual objectives. This theory was established by the researcher R. E. de Vries [24] which is frequently used in our data collection process. Triangulation, review by inquiring participants, expert audit review, theory triangulation, sampling techniques, bias acknowledgment and credibility of researcher (researcher as instrument), coding schemes, analysis framework, or audit trail are all methods for finding alternative explanations (determining best fit). This is told by Patton, M. Q which is very essential for our research work and we maintained this throughout the research [25. Some primary ethical considerations while conducting a research like privacy, taking information by consent etc [26] was also maintained in this research. All intercultural communication classes frequently incorporate Hall's (1976) High-context and Low-context approach, in particular (Fantini & Smith, 1997) [27]. Despite being applied to countless locations, Hall's (1976) model is also criticized by other academicians. Hence, we developed a primitive model with proper simulation which is given in this article.

III. MAIN OBJECTIVES OF THIS RESEARCH WORK

Every research project addresses a specific goal that the researcher hopes to achieve. The researcher's intention is to provide the readers with some benefits so that they can gain

knowledge from it and apply the knowledge for the betterment. These objectives were formed by researcher's experiences and observations. These following research aims guide our study.

1) To examine participants' experiences with participation-related intercultural communication difficulties.

2) To determine how to minimize intercultural communication difficulties.

3) To examine the significance of comprehending the obstacles to intercultural communication in heterogeneous work environments.

4) To find some ways to manage these obstacles for the advantage of the people living at village.

The goal of our study is to aid multicultural work environments to improve their ability to work with various types of people from diverse cultures, such as high context and low context cultures. On the other hand, this aims to assist participants from various cultural backgrounds in an impoverished hamlet in India in recognizing and overcoming barriers to intercultural dialogue. Additionally, this research has offered some potential approaches or actions to handle ICC obstacles in cross-cultural teams and boost output.

IV. METHODOLOGIES USED IN THIS RESEARCH

In order to extract the key themes from the data that was gathered before it was analyzed to create a thorough picture of the cultural problems and disparities in the poor village of India, we chose a qualitative research methodology for this study. Descriptive and exploratory research methods were thus employed, with a focus on *increasing* clarity of the studied phenomenon. These methods were appropriate to apply since, queries that began with the words "What," "When," "Where," "Who," "Why," or "How" would result in answers that were either entirely or partially descriptive (Saunders et al., 2016). Additionally, questions that began with "How" or "What" made it easier to do exploratory research than explanatory research (Saunders et al., 2016). In this qualitative study, we felt that it was important to use both research methodologies in order to answer the questions of "What, Why, and How." For us, this culture study called for the application of the inductive approach. Inductive approach is a blend of inductive and deductive thinking, which is founded on both theory and actual experience. Researchers can understand empirical data in relation to the theory using an inductive approach (Saunder et al., 2016). In order to explain and investigate the patterns and develop a deeper understanding of a phenomenon, it also enables researchers to go back and forth between theory and actual results.
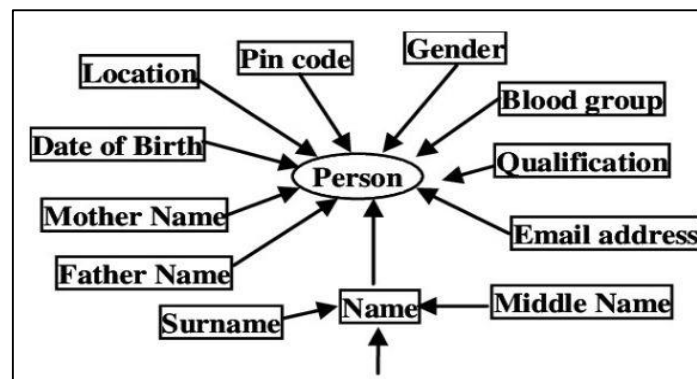
Figure 1: Attributes of "Personal Profile Characteristics" from social networks

Additionally, it enables researchers to switch back and forth between theories and actual data to study and explain the patterns and get a better knowledge of a phenomenon. The above figure 1 is describing the basic attributes of a particular person when we were collecting our data from different school. An Excel Sheet has been maintained for this purpose but not given in this article.

V. COLLECTIVISM VERSUS INDIVIDUALISM

People in individualistic cultures prefer to maintain privacies and enjoy living their own lives since they place a lot of emphasis on the individual type of person (Hofstede et al., 2010). Individuals are prioritized over the entire group in individualistic cultures, which can sometimes put more emphasis on personal goals and devalue community goals. Comparatively speaking, collectivistic culture prioritizes the goals of groups or societies over those of the individual (Ibid). According to Hofstede et al. (2010), collectivism is the degree to which people are assimilated into communities and everyone is expected and willing to care for their families. Our entire research is related to collectivism rather individualism.

VI. EMPIRICAL FINDINGS

The information gathered during the interview sessions for our research is depicted in this section. We obtained our information from 17 Schools in INDIA, and we have presented only five as Alpha, Beta, Gamma, Delta and Zetta institutions to ensure their privacy. This section primarily tries to represent the collective perspectives of participants, some of which may differ or be similar to one other and are not our own personal opinions. Although we did not ask the interviewees if they were from HC or LC, we categorized them based on our anticipation. Our thoughts are not provided because all the information discussed was

obtained via interviewees. Whatever the case, our interviewees agreed on the stories we would describe. All the participants emphasized the importance of language, citing their own experiences regarding the barriers of intercultural communication and all of them noted that despite knowing mother tongue, they still have language difficulties, which made them realize how crucial language is to any society. A particular female persona said in her interview that whereas they tend to be more focused on their studies, the parents focus on both their personal lives and income of the family, which can sometimes be destructive to them. She also agreed that the students from different cultures had a helping nature and were always welcome to them. Students from other schools made distinctions between their cultures based on social structures and work-life balance, and they supported the significance of that culture in an individual's life. It implies that each person has a unique way of life and a unique personal situation.

VII. ANALYSIS OF THE "COLLECTED DATA" THROUGH SIMULATION

A research plan and study design must include authentic data collection. Interviews are a vital component of qualitative data collection. Academic literature, interview information from respondents, and papers serve as the primary sources of data for this study. Data collecting is always a useful option of content that is crucial for the study. We choose a sample for data collecting so that the research may be processed at later stages. Sample is always chosen by our research team, but in consideration of the study's topic and the resources' viability, time frame etc. Sometime we collected data through video call as we were involved with an institution and considerably good work load. Our Sample size for this research was bounded within 17 schools from Birbhum District, West Bengal, INDIA.

Participants came from both high- and low-context cultures.

The sample was chosen while taking time and resource viability into consideration.

A short description of our data sample (Considering 5 Schools) is tabulated below

Name of the School	No. of Participant	Gender (M / F)	High Context (HC) / Low Context Culture(LC)
Alfa	5	4 (M) 1(F)	High Context(3) Low Context(2)
Betta	4	4 (M) 0(F)	High Context(3) Low Context(1)
Gamma	4	4 (M) 0(F)	High Context(2) Low Context(2)

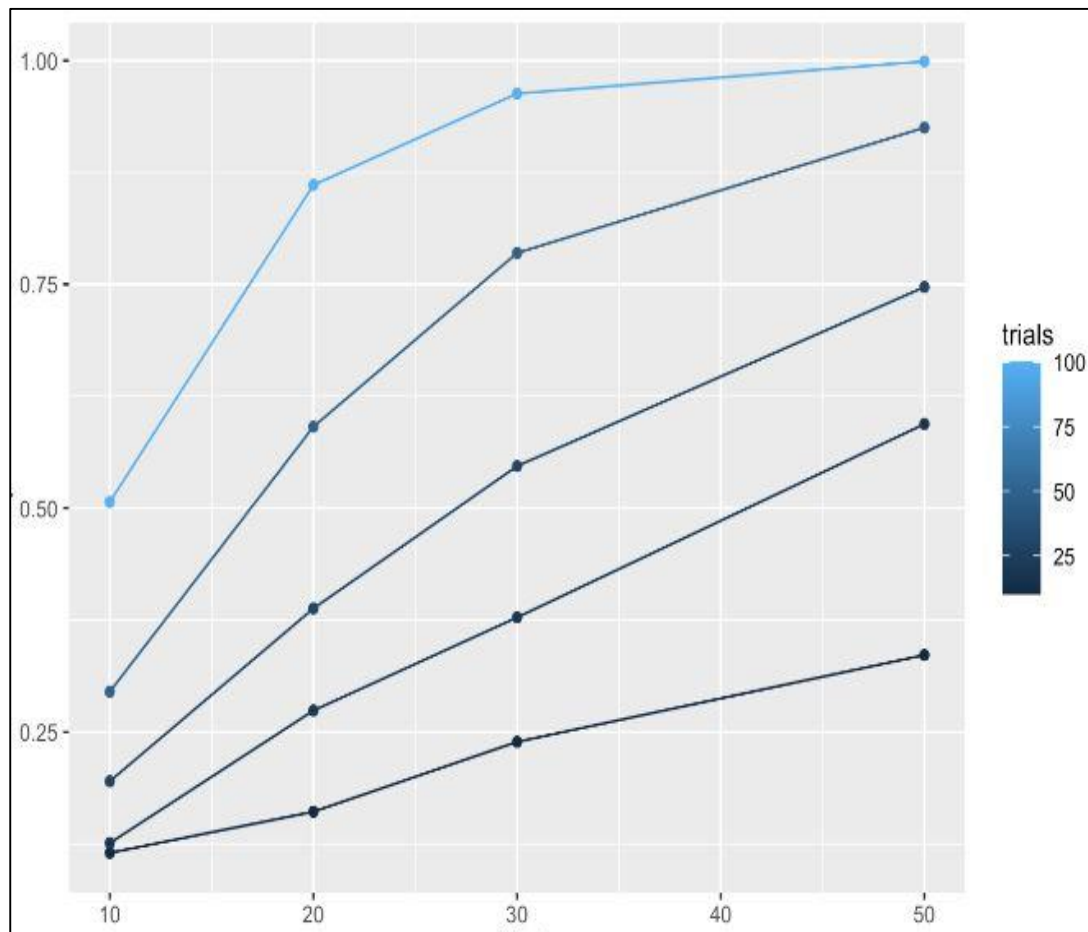| Delta	5	4 (M)	High Context(2) Low Context(2)
		1(F)	
Zitta	3	2 (M)	High Context(3) Low Context(2)
		1(F)	

Table 1: Collected data through Interview method

Figure 2: Plot of "Time Duration" Versus "Barriers of Intercultural Study"

The plot given above is simulated using the software Origin 6.0, where 'X axis' represents the time duration and 'Y axis' denotes the barriers of intercultural communication. It is clear from the figure that the barrier of intercultural communication increases linearly whatever may be the number of sample size. So it is our duty to minimize the barriers as soon as possible even much delay can make an institution closed forever.
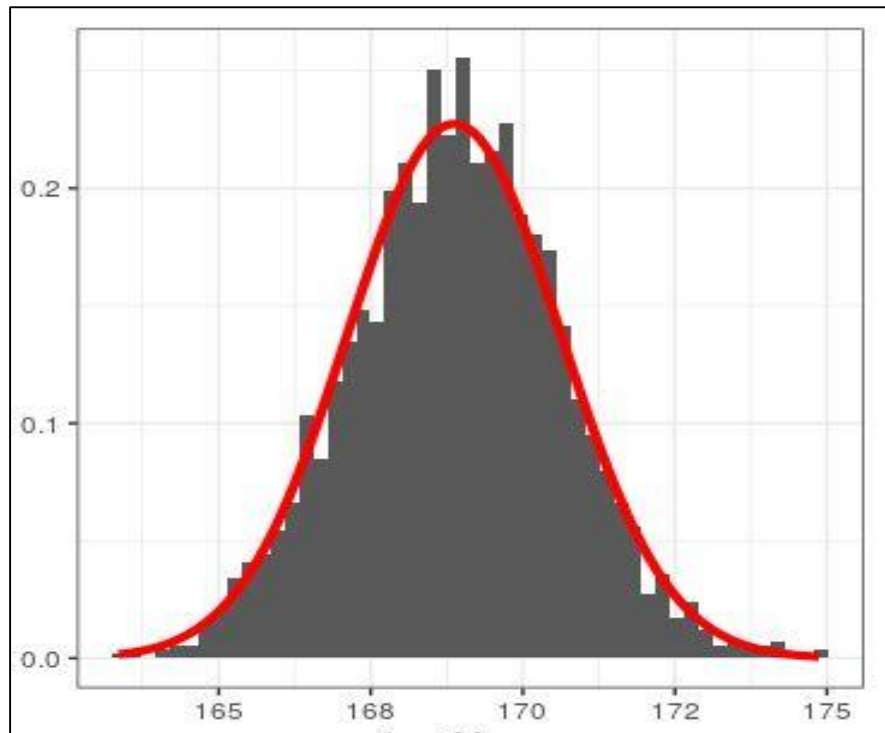
Figure 3: Plot of Standard Deviation with respect to Number of Sample

The normal distribution, sometimes referred to as the bell curve, is a typical sort of distribution for a variable. Since the figure 3 used to represent a normal distribution, it has a symmetrical bell-shaped. All other potential occurrences are symmetrically dispersed around the mean, resulting in a downward-sloping curve on either side of the peak, while the highest point on the curve, or the top of the bell, symbolizes the most probable event in a set of data (its mean, mode, and median in this case). The standard deviation of the bell curve serves as a measure of its width. The 'X axis' represents the probability and 'Y axis' denotes the probability. Hence it is clear from the graph that most miscommunication or intercultural barrier will become maximum if the number of samples is average or here it is 169.

VIII. OUR PROPOSED PREDICTIVE MODEL BASED ON CULTURAL IMPACT

After conducting the entire study, conducting interviews, and reviewing the available ICC literature, we have developed several predictive models that are successful in multicultural contexts and can be used to manage ICC barriers. Our proposed model is given in Figure 4.
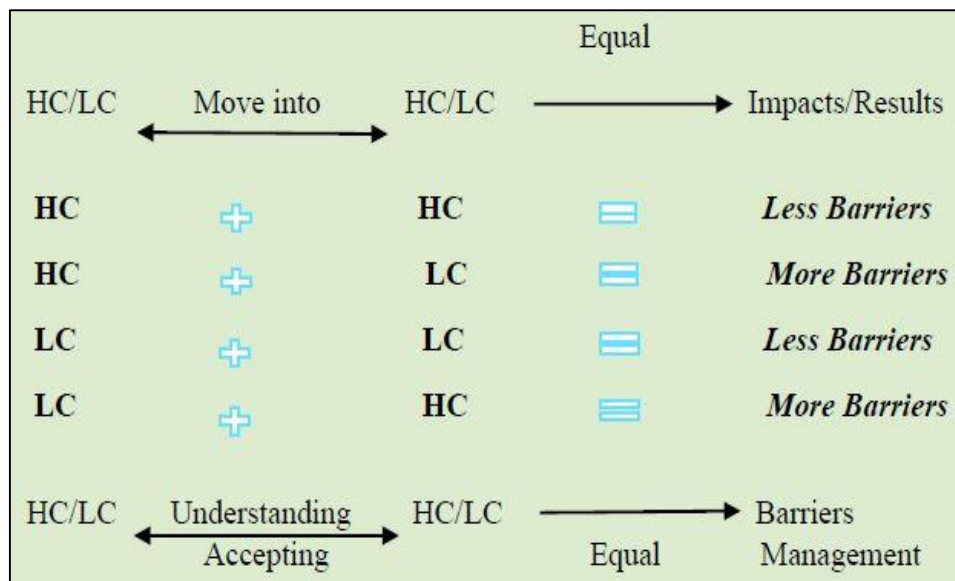
Figure 4: An Illustration showing the effects of various and similar cultures on one another

The above model may be working with high efficiency if we follow the following points:

i) Examine your own actions in comparison to those of other individuals from various cultures to try to establish a middle ground.

ii) If you feel irritated by another person's behavior, actively listen to them and resist the want to respond right away.

iii) Instead of passing judgment on the ways people appear and behave, attempt to comprehend the motivations behind each positive and negative cultural practice.

iv)Be patient while interacting with individuals from other cultures.

v) Put yourself in a mode that is different from your own culture's and attempting to put yourself in the receiver's shoes, but remain genuine and avoid being artificial at the same time.

vi) Instead of rejecting cultural differences, attempt to be empathetic and assimilate into new societies and to appreciate what you have learned there.

We acknowledge that these obstacles cannot be totally eradicate, but we also acknowledge that there are some proposed ways that we might at least lessen them. As a result, the actions above can assist individuals participating in multicultural environments in resolving disagreements and improving performance.

IX. CONCLUSION

Eventually, we finally concluded our research. Both of our research questions, for which the entire study was done, will be addressed in this section for final remarks. Our first research question is, "How do participants from High context and Low context cultures experience intercultural communication barriers while participating in multicultural settings?" This study's first goal is to provide a response to that question. On the basis of the literature that already exists and the various HC and LC themes—academic differences, social systems, direct vs. indirect communication, individualism vs. collectivism, and the significance of language—as well as some recommended next steps that are drawn from empirical information gathered through interviews, the question has been be answered by us. All participants who operate in multicultural environments must possess intercultural communication skills. HC and LC, as well as future leaders and followers who hope to work in multicultural workplaces, must also comprehend this concept. Even if LC transfers to HC or HC moves to LC, our participants, who come from both LC and HC, relocate to a new culture and both faces roughly the little number of obstacles. Academic/organizational cultural distinctions are regarded as one of the fundamental components of a culture since they have an impact on a person's education, creativity, mental capacity, personal grooming, and ability to perceive things from a variety of perspectives, among other things. Additionally, learning patterns and the poverty are the main factors that make a person's knowledge and personality. Our second query, how to manage these obstacles and encourage people to do better. Therefore, the question is: "How can participants effectively manage intercultural communication challenges and barriers?" This has completely been described by our proposed model which is given above.

X. LIMITATION &FUTURE SCOPE OF THIS RESEARCH ARTICLE

We accept that there is still a gap in the identification of ICC obstacles due to the time constraints and small sample size. First of all, it is an opening for upcoming researchers to conduct studies on ICC obstacles and their management in multicultural work contexts using a larger sample size that includes all different types of demographics. As only 17 schools are chosen for this study, there is now a chance for more research to include other schools or institutions in this study. The study could also focus on teaching and non-teaching staffs of the schools who are actually acting as leaders and followers in those institutions because they have firsthand experience working in multicultural settings and have actually encountered ICC barriers and challenges. This would be another trajectory for future research. Furthermore, those teaching and non-teaching staffs will have actual knowledge and

experience, and they will have matured to a point where they can distinguish between cultures based on a variety of other factors. In addition, as our study is qualitative, conclusions are reached by extrapolating the information gathered from interview data. Therefore, there is a chance to carry out a quantitative analysis of ICC barriers, which will provide more detailed responses to the research questions. Last but not least, future researchers have the chance to expand the scope of this study, which will make it easier to detect other challenges faced by participants working in multicultural environments. This investigation could be carried out quantitatively to produce more reliable results. Future research should be done on all populations, including those with high and low levels of education, employees and executives, males and females, students and teachers, etc.

REFERENCES

[1] Schmidt, W., Conaway, R., Easton, S. and Wardrope, W., 2007. "Communication Globally". 1st ed. Los Angeles [etc.]: Sage.

[2] Samovar, L. and Porter, R., (1993). "Intercultural Communication". 6th ed. Belmont: Wadsworth Publishing Company.

[3] Meyer, E. (2014). "The Culture Map: Breaking Through the Invisible Boundaries of Global Business". New York: Public Affairs.

[4] Hall. E. T., (1976), General and Theoretical: "Beyond Culture". Garden City, N.Y.: Anchor Press. VL, 80.

[5] Adler, N. J., &Gundersen, A. (2007). "International dimensions of organizational behavior" (5th ed.). Mason, OH: South-Western College.

[6] Mauranen, A., (2006). "Signaling and preventing misunderstanding in English as lingua franca communication". International Journal of the Sociology of Language, 2006(177), pp.123-150.

[7] Hellerstein, J. K., &Neumark, D. (2002). "Ethnicity, language, and workplace segregation: Evidence from a new matched employer-employee data set" (Working paper No. 9037). Cambridge, MA: National Bureau of Economic Research.

[8] Hofstede, G.J., and Minkov, M. (2010). "Cultures and Organizations: Software of the Mind". 3rd edition, USA: McGraw-Hill Companies.

[9] Gibson, C. B., & Gibbs, J. L. (2006). "Unpacking the concept of virtuality: The effects of geographic dispersion, electronic dependence, dynamic structure, and national diversity on team innovation". Administrative Science Quarterly, 51, 451–495.

[10] Rodriguez, R. A. (1998). "Challenging demographic reductionism: A pilot study investigating diversity in group composition". Small Group Research, 29, 744–759.

[11] Eringa, K. Caudron, L. N. Rieck, K. Xie, F & Gerhardt, T. (2017). "How relevant are Hofstede's dimensions for inter-cultural studies?" -A replication of Hofstede's research among current international business students.

[12] John S. Caputo & Heater M. (2012), "The intercultural communication cultural immersion experience: Preparing leaders for a global future", Journal of Leadership Studies, Volume 6, University of Phoenix.

[13] Fang, T. (2003). "A critique of Hofstede's fifth national culture dimension". International Journal of Cross Cultural Management, 3(3), 347–368.

[14] Lu L., Li F., Kwok L., Krishna S., Michael W. M. (2018), "When can culturally diverse teams be more creative? The role of leaders' benevolent paternalism", Shaanxi: John Wiley & Sons, Ltd.

[15] Suen, E. and Suen, B., (2019). "Intercultural Communication". 1st ed. Toronto: Canadian Scholars.

[16] Stacey L. Connaughton& John A. Daly (2005) "Leadership in the New Millennium: Communicating Beyond Temporal, Spatial, and Geographical Boundaries, Annals of the International Communication Association", 29:1, 187-213.

[17] Chaleff, Ira. (2009). "The Courageous Follower: Standing up to and for Our Leaders", Berrett-Koehler Publishers.

[18] Rosenbach, E., R (2012). "Courageous followers, courageous leaders: New relationships for learning and performance". In W.L. Taylor, & M. A. Youndt (Eds.).

[19] Prince,D. ,Hoppe,M., (2007). "Communicating Across Cultures. Center for Creative Leadership", Greensboro, United States.

[20] Toomey, S., 1999. "Communicating Across Cultures". 2nd ed. New York: Guilford Press, p.16.

[21] Tung, R., Verbeke, A. Beyond Hofstede and GLOBE (2010): "Improving the quality of cross cultural research". J Int Bus Stud 41, 1259–1274.

[22] Richardson, R.; (2007). International Journal of Intercultural Relations, Vol.31(4), pp.479-501

[23] Smith, M. O. and Steward, J. F. (1995), "Communication for a Global Economy". Business Education Forum, v49 n4 p25-28.

[24] Vries, A, R. E. de. Pieper,B. , (2009). "Leadership = Communication? , The Relations of Leaders' Communication Styles with Leadership Styles, Knowledge Sharing and Leadership Outcomes". University of Amsterdam, Amsterdam.

[25] Patton, M. Q. (2002). "Qualitative research & evaluation methods" (3rd ed.). Thousand Oaks, CA: Sage

[26] Diener, E. and Crandall, R. (1978). "Ethics in social and behavioral research". Chicago: University of Chicago Publisher.

[27] Fantini, A. E., & Smith, E. M. (1997). "A survey of intercultural communication courses. International Journal of Intercultural Relations", 21, 125-148.

PROCESSING ISSUES IN DATA MANAGEMENT ON HEALTH DATA SCIENCE (HDS) UNDER HEALTHCARE SYSTEM: A CASE STUDY

Vinay Bhatt[1], Dr. Mayank Kumar[2]

Research Scholar[1], Associate Professor[2]

Department of Computer Science and Engineering, Asian International University, Imphal West, Manipur, India [1,2]

_____

ABSTRACT

Health data science (HDS) is a branch of data science used for handle the large amount of healthcare data for improves the services of healthcare system. Health data science (HDS) provides standard quality, accuracy and proper visualization of healthcare data to healthcare system. As we know that data management is an important part in health data science. Data management is the managerial process of health data science using different process like data collection, data storage, data security and high level of data access. In this article, proposed the case study of different issues in data management process on health data science (HDS) for healthcare system. In this case study, focus on the main issues of large amounts of data collection by hospitals, proper data storage, proper data security and systematic analysis of data using suitable data handling algorithms for proper visualization of healthcare data in healthcare system. In this article, presents the data life cycle of health data science, process of data management regarding to health data science for handle the large amount of structure and unstructured healthcare data and issues of data management process in healthcare system. The future scope of this article is focus on the issues of data management in form of challenges.

Keywords: *Data science, Health data science, Healthcare system, Data collection, Data storage, Data management, Data visualization*

I. INTRODUCTION

In modern science, data is an important part of every factual information based system. All system is observed by its related data. In healthcare system, observed the health related data by using smart wearable devices and conducting interviews with healthcare staff. After the collection of healthcare data, process with other science areas of computation called data science with its stages. The data science is multidisciplinary area of science for hold the different category of data and process with accuracy. In medical science, data science is used for handle the medical data with accuracy under the prediction of diseases. In this paper, the

different stages of data science in healthcare system for manage the healthcare data under the observation of diseases. The process of data science is start after the collection of healthcare data with proper manage, analysis and proper visualization with accuracy. In this article, discuss the processing issues of data management due to data process in healthcare system with different cases.

II. LITERATURE SURVEY

This section is indicating the review of literature on behalf of previous related research for next research directions as show in table 1:

Author's	Research Contributions	Research Gaps
Ravindra, H., & Sreevalsan-Nair, J. (2023)	Proposed the survey of integrating population health under low and middle countries (LMIC) with national survey for high economic cost under high population density. This survey presents the large scale population survey using the methods of proof of concepts for stakeholders [1].	Focus on data collection responsibility between local and national level strategies.
Sutradhar, S. et. al., (2023).	Proposed the new algorithm for design the intelligent system and suitable protocol as energy efficient routing protocol (EERP) in internet of medical things (IoMT) system with quality of services as high speed network, proper treatment to patient and privacy of patient data in healthcare system [2].	Focus on new approaches for QoS optimization in healthcare with security.
Combi, C., et al., (2023)	In this article, proposed the issues of health informatics in COVID-19 pandemic with focus on three important levels in health informatics as healthcare, individual care and view of populations [3].	Focus on policy of social implications in biomedical and health informatics community.
Isola, M., & Krive, J. (2022)	Proposed the rapid infusion approaches in health data science (HDS) for active learning to students. In this approaches, the	Focus on innovations of small life science.

	active learning includes three preparations as creativity, agility and flexibility in health informatics [4].	
Sukmana, R. et al., (2022)	Proposed the renew features of healthcare in terms of human resources , finance coordination and collaboration, basic healthcare inefficiency and legal issues, accountability and sustainability, infrastructure, data and digitization [5].	Focus on big data in social health solutions with challenges healthcare system.

Table 1: Literature review

III. DATA SCIENCE IN HEALTHCARE SYSTEM

Data science is an interdisciplinary area of healthcare system that design with other different advance concepts as statistics, algorithm of machine learning, mathematical based component model with unstructured and structured data [6]. In healthcare system, data science is used for supervise the bulk amount of patient data for provide the accuracy due to disease detection in report [7]. When patient data is not clear in report then consider the proper visualization in data visualization phase in data science. The different stages of data science as data collection, data processing, data storage, data management, and data analysis and data visualization are used in healthcare system for handle the healthcare data [8]. An every stages of data science are used in healthcare system, also known as health data science (HDS).

IV. HEALTH DATA SCIENCE (HDS)

Health data science (HDS) is a part of data science that design for improve the public healthcare system with merges to different multidisciplinary areas as statistics, epidemiology, mathematics and information technology [8][9]. HDS provide the service for pattern recognition, risk and trends in bulk and different datasets from medical based electronic devices, health records in clinical trials and healthcare systems. We design the policies for quality of life and health equity promotions using the help of HDS. In health data science (HDS) use the different phases of data science as machine learning, data management, statistics analysis and natural language processing for handle the healthcare data in healthcare system [10]. When HDS handles the large amount of patient datasets under healthcare system also use the different process of HDS life cycle. The HDS lifecycle model is show in figure 1 as:
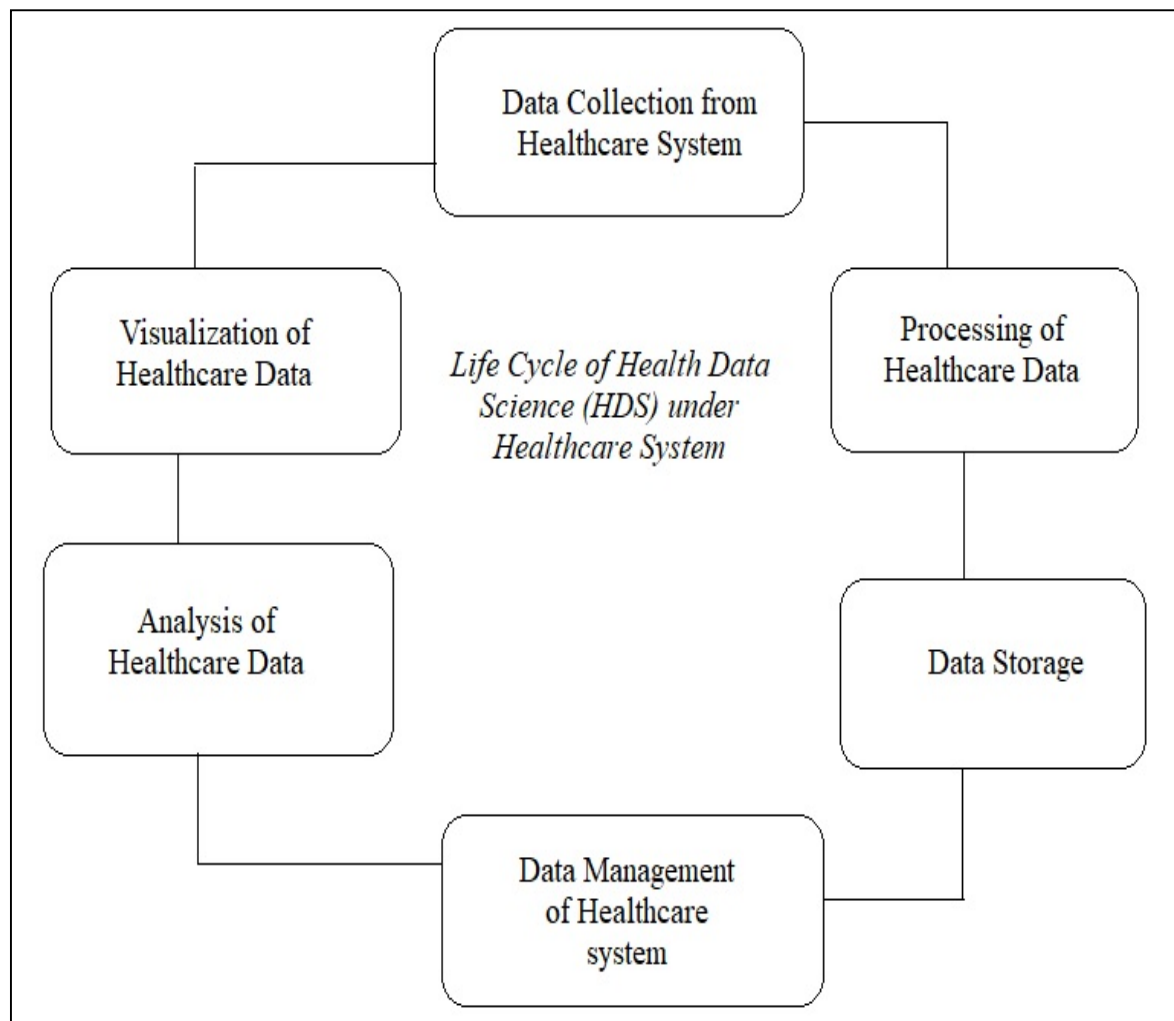
Figure 1. Life cycle of health data science (HDS) under healthcare system

The difference stages of HDS life cycle as:

Stage 1: Data collection from healthcare system: In this stage, collect the healthcare data from different sources of healthcare like web forms, survey, and interview conducted with medical staff and direct observation in hospitals.

Stage 2: Processing of healthcare data: This stage propose the process of healthcare data in terms of data cleaning, data integration, data compression and data privacy in healthcare system.

Stage 3: Data storage: In this stage, store the healthcare data in virtual as cloud based server and physical drive as DVD, CD and hard drive with security.

Stage 4: Data Management in Healthcare System: In this stage, manage the healthcare data in terms of proper data organization, proper process, secure data storage and access the data with security.

Stage 5: Analysis of healthcare data: This stage presents the data analysis of healthcare data using different strategies and tools with including algorithms and statistical model of machine learning.

Stage 6: Visualization of healthcare data: In this stage, presents the graphical representation of information after data analysis.

V. DATA MANAGEMENT IN HEALTH DATA SCIENCE (HDS)

Data management is an administrative process of health data science (HDS) that provides the different strategies of data handling as collection of health data, proper organize the healthcare data, data storage with strong security and easily use of data by authentic user in healthcare system [11]. This management provides the disciplines for proper organize the data with high quality.

VI. PROCESSING ISSUES IN DATA MANAGEMENT

When handling the bulky amount of healthcare data in health data science then the different problems or issues faced by health data scientist in different cases. The different issues in different cases in health data management as follows:

Case 1: Data collection issues: The limited data sources for data collection.

Case 2: Time duration issues: The data processing in HDS takes more than time.

Case 3: Data storage issues: Store the patient data in cloud and physical drives with proper security.

Case 4: Tools based issues: Difficult the proper arrangement of tool for data analysis.

Case 5: Result based issues: This is the difficult task for find the accuracy of diseases in healthcare system.

VII. CONCLUSION AND FUTURE SCOPE

Data science is an advance technology that working is based on machine learning, statistics and mathematical modeling. This technology is work on healthcare system for handle the patient data for accuracy. In this paper, implement the process of data science in healthcare system and propose the new approach also known as health data science (HDS). The data management is an essential part of health data science that manages the data in healthcare system. This paper proposed the managerial issues of data management with different cases. The future scope of this paper is focus on challenges presents in review section of this paper in terms of research gaps.

REFERENCES

[1]   Ravindra, H., & Sreevalsan-Nair, J. (2023). A Methodology for Integrating Population Health Surveys Using Spatial Statistics and Visualizations for Cross-Sectional Analysis. SN Computer Science, 4(3), 224.

[2]   Sutradhar, S., Karforma, S., Bose, R., & Roy, S. (2023). A Dynamic Step-wise Tiny Encryption Algorithm with Fruit Fly Optimization for Quality of Service improvement in healthcare. Healthcare Analytics, 3, 100177.

[3]   Combi, C., Facelli, J. C., Haddawy, P., Holmes, J. H., Koch, S., Liu, H., ... & Yang, C. C. (2023). The IHI Rochester Report 2022 on Healthcare Informatics Research: Resuming After the CoViD-19. Journal of Healthcare Informatics Research, 1-34.

[4]   Isola, M., & Krive, J. (2022). Innovation of health data science curricula. JAMIA open, 5(3), ooac073.

[5]   Sukmana, R., Ratnasari, R. T., & Widiastuti, T. (2022). Issues and challenges of waqf in providing healthcare resources. Islamic Economic Studies, (ahead-of-print).

[6]   Gupta, A., & Singh, A. (2022). An intelligent healthcare cyber physical framework for encephalitis diagnosis based on information fusion and soft-computing techniques. New Generation Computing, 1-31.

[7]   Bhandari, A., Cohen, A., Fung, M., Panch, T., Aronov, A., & Michaud, N. (2022). A Landscape Analysis of the Recent Rise of Healthcare Data Science Degree Programs. medRxiv, 2022-12.

[8]   Benila, S. (2022). Fog Managed Data Model for IoT based Healthcare Systems. Journal of Internet Technology, 23(2), 217-226.

[9]   Omitaomu, O. A., Klasky, H. B., Olama, M., Ozmen, O., Pullum, L., Thakur, A. M., ... & Nebeker, J. R. (2021). A new methodological framework for hazard detection models in health information technology systems. Journal of Biomedical Informatics, 124, 103937.

[10]   Ismail, L., Materwala, H., Karduck, A. P., & Adem, A. (2020). Requirements of health data management systems for biomedical care and research: scoping review. Journal of medical Internet research, 22(7), e17508.

[11]   Bhavnani, S. P., Muñoz, D., & Bagai, A. (2016). Data science in healthcare: implications for early career investigators. Circulation: Cardiovascular Quality and Outcomes, 9(6), 683-687.

AUTOMATIC DOORBELL USING ULTRASONIC SENSOR HC-SR04

[1]Suryadeep Sen, [2]Soumen Sen
[1]Student, CSE Dept, Asansol Engineering College, Asansol, West Bengal, India
[2]Assistant Professor, ECE Dept, Asansol Engineering College, Asansol, West Bengal, India

_____

ABSTRACT

This project work presents the development of an automatic doorbell system using an HC-SR04 ultrasonic sensor. The sensor detects the presence of a person approaching the door, triggering a doorbell sound. The system provides convenience and enhanced security by eliminating the need for manual doorbell pressing and ensuring prompt visitor alerts.

Keywords: *Ultrasonic sensor HC-SR04, a buzzer, a breadboard, male-to-male jumper wires, and an Arduino Uno board.*

I. INTRODUCTION

The Automatic Doorbell system using an HC-SR04 ultrasonic sensor is a project designed to enhance convenience and security at home or any other premises. Traditionally, doorbells require manual pressing, which can be inconvenient, especially when hands are occupied or mobility is limited. This project aims to automate the doorbell process by utilizing an ultrasonic sensor to detect the presence of a person approaching the door and trigger a doorbell sound.

The HC-SR04 ultrasonic sensor is a popular choice for proximity sensing applications due to its simplicity and reliability. It emits ultrasonic waves and measures the time taken for the waves to bounce back after hitting an obstacle, allowing the calculation of the distance between the sensor and the object. In this project, the sensor is placed near the entrance, facing outward.

When someone approaches the door, their presence is detected by the ultrasonic sensor. The sensor sends a signal to a microcontroller, such as Arduino, which is programmed to interpret the signal and activate a doorbell sound. This can be achieved by connecting a buzzer or a speaker to the microcontroller, which emits the desired doorbell sound when triggered.

The automatic doorbell system offers several advantages. It eliminates the need for manual doorbell pressing, providing convenience for individuals with busy hands or limited mobility. Additionally, it ensures prompt visitor alerts, as the doorbell sound is triggered immediately

upon detecting someone's presence. This enhances security by reducing the chances of missing a visitor or potential intruder.

II. COMPONENTS

1. <u>HC-SR04 Ultrasonic Sensor</u>: This sensor has four pins - V_{CC} (5V power supply), GND (ground), TRIG (trigger), and ECHO (echo).
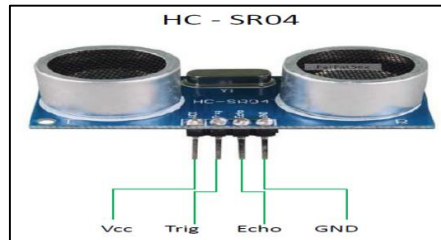

Figure 1: Ultrasonic Sensor

2. <u>Arduino or Microcontroller</u>: Need a microcontroller board like Arduino to read the sensor data and control the doorbell sound.
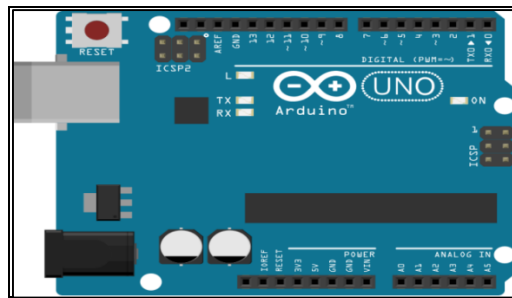

Figure 2: Arduino Uno

3. <u>Buzzer or Speaker</u>: Connect a buzzer or speaker to the microcontroller to emit the doorbell sound.

Figure 3: Buzzer

4. <u>Jumper Wires</u>: To establish connections between different components
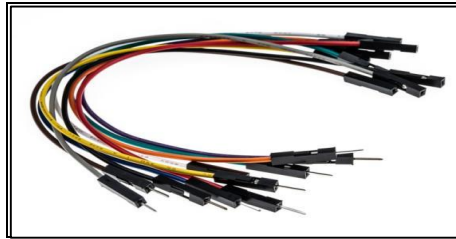
Figure 4: Jumper Wires

5. <u>Power Supply</u>: Provide a suitable power supply, typically 5 Volt, for the microcontroller, ultrasonic sensor, and buzzer/speaker.

III. CIRCUIT CONNECTIONS

The circuit connections can be made as follows:

1. Connect the V_{CC} pin of the ultrasonic sensor to the 5 Volt power supply and the GND pin to the ground.
2. Connect the TRIG pin of the ultrasonic sensor to any digital pin of the microcontroller.
3. Connect the ECHO pin of the ultrasonic sensor to another digital pin of the microcontroller.
4. Connect the positive terminal of the buzzer/speaker to a digital pin of the microcontroller and the negative terminal to the ground.
5. Connect the power supply to the microcontroller, providing the required voltage.
6. Upload the appropriate code to the microcontroller, which reads the ultrasonic sensor data, detects motion, and triggers the doorbell sound using the buzzer/speaker.
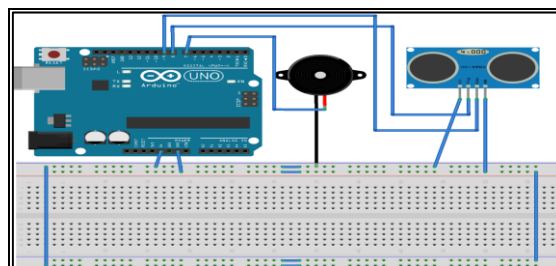
Figure 5: Circuit Diagram of Automatic Doorbell

IV. RESULTS AND DISCUSSION

The results of implementing the Automatic Doorbell system using an HC-SR04 ultrasonic sensor were highly satisfactory. The system demonstrated accurate motion detection,

promptly activating the doorbell sound upon detecting someone approaching the door. This ensured immediate visitor alerts and eliminated the need for manual doorbell pressing.

The integration of the HC-SR04 ultrasonic sensor with a microcontroller, such as Arduino, proved to be seamless and efficient. The sensor's output pins connected easily to the digital pins of the microcontroller, allowing for straightforward data reading and doorbell sound triggering.

One notable advantage of the system was its adjustable sensing range. By modifying the code and configuring the sensor parameters, the sensing range could be customized according to specific requirements. This adaptability made the system suitable for different premises and environments.

Overall, the Automatic Doorbell system provided enhanced convenience and security. It significantly reduced the chances of missing visitors or potential intruders by ensuring timely alerts. The successful implementation and positive results of this project demonstrate its practicality and effectiveness in automating doorbell processes.

V. CONCLUSION

In conclusion, the Automatic Doorbell system utilizing an HC-SR04 ultrasonic sensor offers a convenient and secure solution. The system accurately detects motion, promptly activates the doorbell sound, and can be easily integrated with a microcontroller. It enhances convenience and security in residential and commercial settings.

REFERENCES

1. Boxall John (2013) "Arduino Workshop: A Hands-On Introduction with 65 Projects".
2. Banzi   Mazzimo   (2008).   "Getting   Started   with   Arduino"

FAILURE STUDY OF DIESEL LOCOMOTIVES IN INDIAN RAILWAY

Ayandeep Sarkar[1], Swattik Das[1], Soumyajyoti Ghanti[1], Annesha Dubey[2], Anamitra Upadhyay[3], Gopinath Maji[4], Debashis Sarkar[5],

[1] B.Tech 3rd Year, ME Department, Asansol Engineering College, India
[2] B.Tech 2nd Year, CSE Department, Asansol Engineering College, India
[3] B.Tech 1st Year, CSE Department, Asansol Engineering College, India
[4] B.Tech 2nd Year, ME Department, Asansol Engineering College, India
[5]Associate Professor, ME Department, Asansol Engineering College, India

_____

ABSTRACT

In recent time, around 2,200 numbers of diesel locomotives are in operation across the country run by Indian Rail (IR). Significantly 37% of the total operations are carried by diesel and 63% by electric locomotives. IR using mostly diesel locomotives of 4,000 HP, 4,500 HP and 6,000 HP in its system. Diesel locomotives are frequently used remote areas in hilly areas, industrial area like steel, power plant, green field site of industry, terminal stations and junctions' stations. Breakdown of these locomotives may lead to disruption in production, passenger and goods transport. In this paper different causes of the diesel locomotive failure and their effect have been studied in details. Finally, a Fish-bone diagram has been prepared to represent causes of failure and its effect for diesel locomotives.

Keywords: *Diesel locomotives, Fish-bone diagram, Breakdown, Mechanical Adjustment.*

I. INTRODUCTION

Indian Railway (IR) started its journey on 16th April, 1853 by rolling passenger train of 34 Km. between Bombay to Thane. Since then IR covers 7,349 stations over 64,600 km track length, runs 13,169 passenger trains and 8,479 freight trains, attends 23 million passengers and 3 million tons of freight daily. Out of 64,600 km track length 58,812 km is electrified. All passenger trains and goods trains are pulled by different types of locomotives. In IR locomotives are classified on the basis of track gauge, motive power, the work they are suited for and their power. Track gauges are Broad gauge (W), Metre gauge (Y), Narrow gauge (2.5 ft) (Z) and Narrow gauge (2 ft)(N), various locomotive powers are used in IR like, Diesel powered (D), DC electric powered (C), AC electric powered (A), Both DC and AC ('CA'), Battery Electric (B). Same way as per type of work locomotives are used they, Goods (G), Passenger (P), Mixed; both goods and

passenger (M), Shunters (S), Electric Multiple Units (E), Railcars (R). For example WDM3D locomotives indicates, broad gauge, diesel powered, used for both passenger and goods and 3300Hp capacity.

The failure of diesel locomotive engine results interruption in the functioning of the railway system and also increases the cost of maintenance, thus effects smooth functioning and operations of IR [1]. As per Ministry of Railway report [2] (reference no-2015/M(L)/467/1, dated 26/08/2026) the major failures of diesel locomotives are (i) Engine shutdown, (ii) Non responding of Load meter and (iii) Ground Relay tripping. In this study priority has been given to failure due to Engine shutdown. It is reported that total of 212 times engine shutdown held during that instance. The major components of a diesel locomotives are shown in following Fig-1. [3].
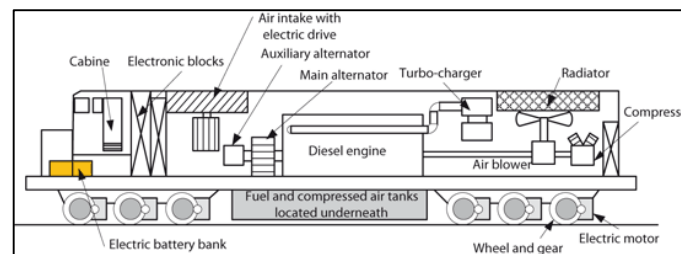
Fig-1. Components of Diesel locomotives [3].

of high-speed, heavy-

duty high-power diesel locomotives

of high-speed, heavy-

duty high-power diesel locomotives

Cooling system plays a vital role of high-speed, heavy duty high-power diesel locomotives [4], and its fail due to insufficient coolant, damage in hose pipe, internal water leakages and faulty thermostat. The cooling system fails due to the faulty thermostat which is unable to sense the rise in temperature and as a result the temperature and pressure of the fluid increases, which is flowing through several hose pipes thus leading to the leakage of the pipe and it fails to deliver the cooling water from inlet manifold to the cylinder liner. The locomotive system is designed in such a way that if the cooling system fails the entire system ceases and shuts down [5].

The most frequently breakdown occurring by Mechanical means, its fail due to valve leakage, damaged main or rod bearings, faulty damper and broken worm piston rings and thus mechanical adjustments are required to avoid that.

Further, use of low quality fuel, struck drain valve & due to out of fuel, restricted fuel line may cause the diesel locomotive failure.

The availability of sufficient fresh air in proper ratio is essential for the burning of fuel from which the diesel engine derives it's heat energy and converts to mechanical energy. The availability of poor quantity of air with less density limits the burning of fuel due to which the mechanical energy produced by the engine reduces.

To avail a greater quantity of fresh air for increasing the HP produced by the engine we use Turbo super chargers where air from the air compartment is passed through filters, however if the turbo filter is dirty it fails to purify the air, hence clean air does not reach to the combustion chamber that may cause failure of engine.

It is further observed that worker inefficiency, overloaded car pulling, degradation due to age of the system components are major contributing factors for the failures of Railway Diesel Locomotive Engine [6].

Failures are the most important aspect of diesel locomotives and this can be minimized by scientific management of maintenance, hence systematic approach of failure study and its representation is essential. In this study the author finally represented Cause and Effect diagram of Diesel locomotive shutdown [7].

II. METHODOLOGY & OUTCOMES

A survey was carried out for knowing the several reasons of failure of a Diesel Locomotive Engine. Regarding this the following industrial regions: Andal Diesel Loco Shade, Diesel loco maintenance shade of a steel plant and Asansol Diesel loco scheduling personnel were chosen. From the feedbacks received from the maintenance engineer and personnel of plant and railways and several discussion sessions with the researchers and academicians, the major causes of failure of a Diesel Locomotive Engine as inferred are due to the failures of the following factors present in the locomotive engine:

i. Air System, ii. Fuel System, iii. Lubricating System, iv. Cooling System, v. Mechanical Adjustments, vi. Operation and Maintenance Practice.

The sub causes for each of the above factors are illustrated through a Fish-Bone diagram, commonly known as Cause and Effect diagram and as per inventor Ishikawa diagrams [7] prepared below:
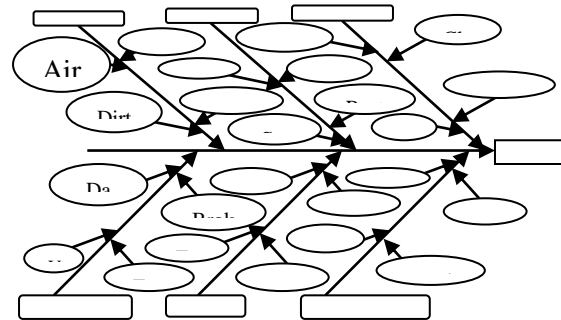

Fig. 2: Cause and Effect diagram for the breakdown of Diesel Locomotive

III. CONCLUSION

In this paper a details study on failure of Diesel Locomotive which is very important component of Indian Railway has carried out. It is found that there are six main causes of breakdown of diesel locomotives and every main causes have several sub-causes. This diagram will help maintainer and inspector to predict and identify the cause of failure quickly. Further this study will help to predict and calculate the availability, maintainability, reliability and safety of the diesel locomotives.

REFERENCES

[1] Bhardwaj S., Kumar V., Bhardwaj N.," Reliability Analysis of Diesel Locomotive Engine", International Journal for Research in Engineering Application & Management (IJREAM) ISSN: 2454-9150 Vol-04(04), pp-565-571, (2020).

[2]https://indianrailways.gov.in/railwayboard/uploads/directorate/mec_engg/downloads/Traction/2016/Failure_Analysis_260816.pdf

[3]https://www.google.com/search?rlz=1C1RLNS_enIN968IN968&q=components+of+a +diesel+locomotive&tbm=isch&sa=X&ved=2ahUKEwiX-qSj0s7_AhXkSmwGHYI5CKEQ0pQJegQIDBAB&biw=1366&bih=657&dpr=1#imgrc= acjzAKHiw4T5rM

[4] Qiu W.,Q Yu Q., Zhao J., "Research and Analysis of Cooling System for Diesel Locomotive", Journal of Progress of Electrical and Electronic Engineering, vol-1, (2018), DOI 10.18063/peee.v111.552.

[5] Sabarinathan PS, Surender P, "Failure Analysis of Cooling Water Pipe in Diesel Locomotive", International Advanced Research Journal in Science, Engineering and Technology, Vol. 3(9), pp.71-75, (2016).

[6] Bose D., Ghosh G., Mandal K., Sau S.P. and Kunar S., "Measurement and Evaluation of Reliability, Availability and Maintainability of a Diesel Locomotive Engine", International Journal of Engineering Research and Technology. ISSN 0974-3154 Volume 6, Number 4, pp. 515-534. (2013).

[7] Ishikawa K., "Guide to Quality Control. Asian Productivity Organization", Nordica International Limited, Hong Kong, (1985).

PERFORMANCE ANALYSIS OF MACHINE LEARNING ALGORITHMS FOR PREDICTIONOF BRAIN STROKE

Pintu Pal[1], [1]Shilpi Kumari, [1]Ratna Kushwaha, [1]Moumita Goswami, [1]Farah Ghazala,
[1]Ayan Jawaid, [1]Vaishali Kumari, [2]Sandip Haldar

[1]Department of Computer Application, Asansol Engineering College, Asansol
[2]Department of Basic Science and Humanities, Asansol Engineering College, Asansol

---

ABSTRACT

Predicting stroke is an important and ongoing area of research that aims to develop models and advanced methods to identify people who may be at risk of stroke. Machine learning techniques, along with advanced clinical data analysis, have shown great promise in identifying and analyzing risk factors associated with stroke. In general, brain prediction research focuses on using the power of machine learning, data analysis, and comprehensive patient information to identify individuals at risk of stroke. By using these predictive models, health care providers can provide targeted interventions and individualized care plans to reduce the incidence and impact of strokes, improve the quality of life of at-risk populations and to save lives.

To focus on different machine learning algorithms for predicting stroke, Decision Tree, K-Nearest Neighbor (KNN), XGBoost, Random Forest, and Logistic Regression methods are applied in this work. Performance analyses of different methods are studied and a comparative analysis has been stated in this research work. Based on these outcomes, the Random Forest version appears to be the maximum accurate and dependable for stroke prediction, with an accuracy of 0.99. However, it's essential to be aware that these results are particular to the dataset used for assessment and may range with distinct datasets or evaluation criteria.

Keywords: *Machine learning algorithms, Predicting stroke, Decision Tree, K-Nearest Neighbour (KNN), XGBoost, Random Forest, Logistic regression.*

I. INTRODUCTION

Predicting stroke is an important and ongoing area of research that aims to develop models and advanced methods to identify people who may be at risk of stroke. A stroke, often called a cerebrovascular accident, occurs when blood flow is blocked to the brain, causing damage or death to brain cells. Early recognition and prediction of stroke risk can play an important role in initiating preventive measures, providing appropriate interventions, and reducing the likelihood of having a stroke or its severity. In [2], stroke prediction has been made from the different post of social media. In their work, the authors have introduced the DRFS strategy to find the various symptoms associated with stroke disease. In their work [3], the authors have performed the task of stroke prediction by using an improvised random forest algorithm. This was used to analyze the levels of risks obtained with the strokes. In [4], the prediction of stroke prediction was made on Cardiovascular Health Study (CHS) dataset using five machine learning techniques. In [5], it is observed that the model was trained using Decision Tree, Random Forest, and Multi-layer perceptron for stock prediction. In [6], it is observed that the implementation of machine learning model was used to predict heart stroke. They used various machine learning techniques like Decision tree, Naïve Bayes, SVM to build the model and later compared their performance.

Machine learning techniques and advanced clinical data analysis have shown great promise in identifying and analyzing risk factors associated with stroke. These risk factors may include gender, age, smoking, heart disease, type of work, marital status, diabetes, body mass index (BMI), and other related medical conditions. By using large databases and using advanced diagnostic techniques, predictive models can be trained to assess a person's risk of stroke.

The development of accurate stroke prediction models has great potential in the healthcare industry. Using these models, healthcare professionals can identify people at high risk of stroke and provide individualized care plans to reduce those risks. This may include life style changes, medication management, blood pressure control, cholesterol control, and education to recognize the early signs of stroke.

This powerful stroke prediction method improves the accuracy and effectiveness of prevention strategies, ultimately leading to improved patient outcomes and reducing the overall burden of stroke on individuals and the healthcare system.

In general, brain prediction research uses machine learning, data analysis, and

comprehensive patient information to identify individuals at risk of stroke. By using these predictive models, healthcare providers can provide targeted interventions and individualized care plans to reduce the incidence and impact of strokes, improve the quality of life of at-risk populations, and save lives.

II. PROJECT OBJECTIVE

A stroke prediction challenge aims to broadena strong device or algorithm which could as it should be verify a man or woman's hazard of experiencing a stroke in the future. The task commonly entails collecting an extensive range of information from various resostatistics, clinical imaging, laboratory effects, lifestyle questionnaires, and demographic information urces, together with digital fitness. The accumulated facts are then analyzed with the use of superiors artistically techniques and System getting-to-know algorithms. The algorithms are trained on ancient information on stroke cases, in which the connection between chance elements and stroke occurrence is diagnosed. The version is then exceptional-tuned and established with the use of additional datasets to ensure its accuracy and reliability.

The predictive model considers several risk factors associated with stroke. These may include factors such as age and gender, medical history including previous strokes, presence of chronic conditions like hypertension, lifestyle choices such as smoking, and physical activity levels, as well as clinical measurements including hypertension, heart disease, and body mass index (BMI).

Once the model is developed and tested, It may be deployed in scientific settings. Health care experts can enter amanor woman's records into the gadget to assess their stroke risk. intervention scan be encouraged.

For individuals identified as excessive-chance, healthcare companies may additionally advise lifestyle change to deal with modifiable hazard elements. This can include presenting guidance on adopting a healthier weight loss plan, increasing physical pastimes, and quitting smoking. Medications can be prescribed to govern high blood pressure and manage other underlying fitness conditions.

Furthermore, high-risk individuals can advantage from close tracking and everyday screenings. This lets healthcare professionals stumble on an yearly warning signs and symptoms or modifications in health repute that may indicate an increased hazard of stroke. Timely interventions, including adjusting medicine dosages or extra preventive measures, can be applied to minimize the risk.

This assignment contributes to enhancing stroke prevention techniques and patient care by accurately predicting stroke risk. It permits health care professional stop erceive individuals at a higher threat of stroke, interfere early, and enforce personalized preventive measures. Ultimately, the goal is to lessen the occurrence of strokes, decrease these verities of their impact, and decorate typical patient effects.

III. METHODOLOGY

Data Collection:

We have taken the data from Kaggle [1]. The dataset consists of 5110 rows and 12 columns. In the columns have 'id', 'gender', 'age', 'hypertension', heart_disease', 'ever married', 'work_type', 'residence_type', 'avg_glucose_level', 'bmi', 'smoking_status' and 'stroke' as the main attributes. The output column 'stroke' has the value as either '1' or '0'. The value '0' means no stroke risk detected, whereas '1' means a possible risk of stroke.

Data Pre-processing:

Clean and pre-process the collected data to ensure its quality and suitability for analysis. This may involve handling missing values, removing outliers, normalizing, or scaling numerical features, and encoding categorical variables.
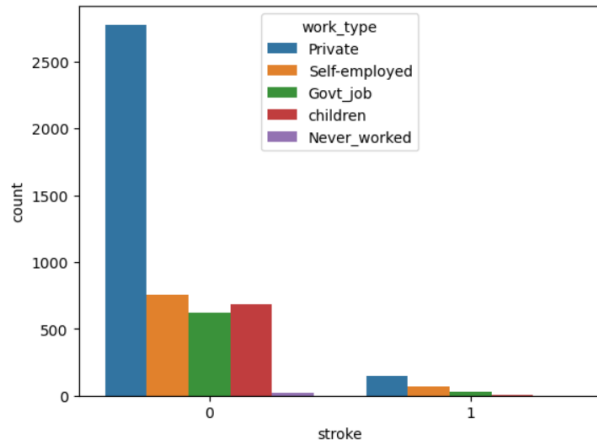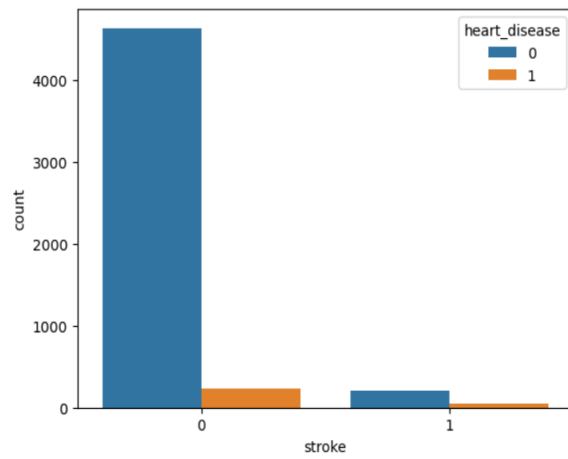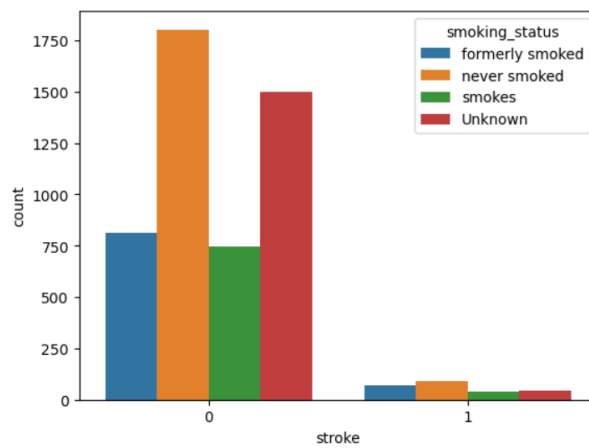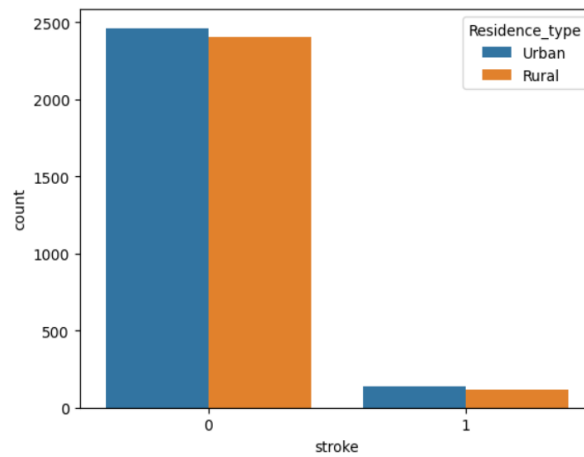
Figure: 1

Figure: 2

Figure: 3

Figure: 4

Feature Selection:

Identify the most informative features from the pre-processed data that are highly correlated with stroke risk. This step aims to reduce the dimensionality of the data and improve the model's interpretability and performance. Techniques such as statistical tests, correlation analysis, or feature importance ranking can be employed for feature selection.

Model Selection:

Choose an appropriate machine learning algorithm or ensemble of algorithms for stroke prediction. Commonly used algorithms include logistic regression, KNN, decision trees, random forests, and xgboost the choice of the model depends on the nature of the data and the specific goals of the prediction task.

Model Training:

Split the pre-processed data into training and testing sets. Train the selected machine learning model(s) on the training set, using the informative features as inputs and the stroke outcome as the target variable. The model learns the patterns and relationships within the data to make accurate predictions. Add test option.

Model Evaluation:

Evaluate the trained model's performance using the testing set. Common evaluation metrics for stroke prediction include accuracy, precision, recall, F1-score, and area under the receiver operating characteristic curve (AUC-ROC). These metrics measure how well the model predicts stroke cases and non-stroke cases.

IV. IMPLEMENTATION

The implementation phase is where the detailed design is converted into working code. The goal of the step is to convert the design into the best solution in an appropriate programming language. This study covers the implementation aspects of the project, providing details of the programming language and development environment used. It also provides an overview of the main project modules with their step-by-step flow. The implementation phase requires the following tasks.

• Careful planning.

• Investigation of the system and constraints.

• Design methods to achieve the changeover.

• Evaluation of the changeover method.

• Correct decisions regarding the selection of the platform.

• Appropriate selection of the language for application development.

Pre-Processing clean the missing values for each schooling and testing statistics in real international are not often easy and homogeneous. Typically, they tend to be incomplete, noisy, and inconsistent and it's a vital task of a Data scientist to prepossess the data by way of filling in lacking values. Growing a characteristic to eliminate outliers some outliers, constitute herbal variations in the population, and they need to be left as is in your dataset. These a   Known as true outliers. Other outliers are elaborate and have to be removed because they constitute dimension errors, statistical entry or processing mistakes, or terrible. Sampling defer move outliers (data). This project mainly implements algorithms. This section discusses the codeused to implement each algorithm.Here each algorithm is treated as an individual module. Therefore, the implementation of these modules is described.

- **Decision Tree**
  - **Random Forest**
  - **XGBoost**
  - **Logistic Regression**
  - **KNN**

V. COMPARATIVE STUDY

To focus on different machine learning algorithms for predicting stroke, we will analyze Decision Tree, K-Nearest Neighbor (KNN), XGBoost, Random Forest, and Logistic Regression. Each group of rules has its strengths and weaknesses, so let's talk about how they work in terms of predicting a stroke:

Confusion matrix – We have used a confusion matrix to predict the performance of the model. In this, we have four values which are:

Figure: 5

TP (TRUE POSITIVE): In this, the model is predicted correctly.

FP (FALSE POSITIVE): In this, the model is predicted incorrectly as a person has a stroke, but it predicts that the person does not have a stroke.

TN (TRUE NEGATIVE): In this, the model predicted correctly that a person has a stroke.

FN (FALSE NEGATIVE): In this, the model

Predicted incorrectly that a person has a stroke but he has not.

Decision Tree:

Decision trees are easy to interpret and visualize, making them useful for understanding the importance of components. They can deal with both numerical and categorical aspects. Decision trees tend to be highly redundant, which means that they may not be able to cover the facts that are not seen without proper routines.
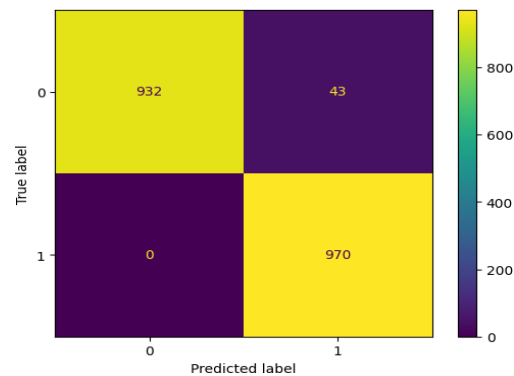
Confusion Matrix:

Figure: 6

In Figure 6, it is observed that the overall accurate prediction is 1902 and the total number of erroneous predictions is 43.

K-Nearest Neighbor (KNN):

KNN is a non-parametric algorithm that makes predictions based on the similarity of close training samples to a given test sample. KNN can handle multi-class problems. It is expensive in terms of prediction time, especially when dealing with large databases or high-resolution areas.
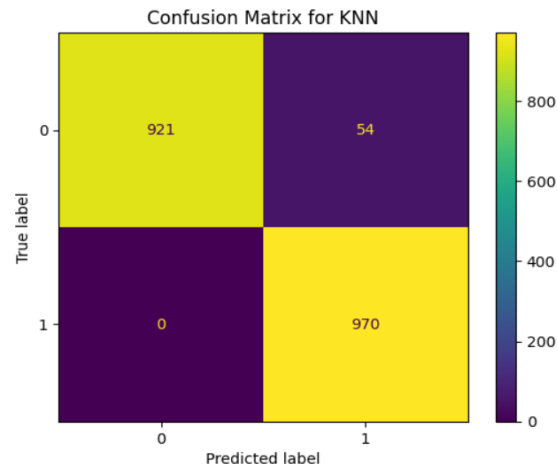
Confusion Matrix:

Figure:7

In Figure 7, it is observed that the overall accurate predictionis1891and the total number of erroneous predictions is 54.

XGBoost:

XGBoost is an ensemble algorithm that combines multiple sparse learners (decision trees) to create a powerful predictive model. It has high predictive power and works well in differentareas. XG Boostre quires careful parameter tuning and can be sensitive to data brokers.
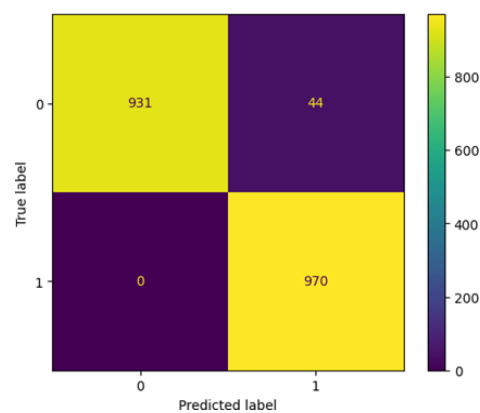
Confusion Matrix:

Figure:8

In Figure 8, it is observed that the overall accurate prediction is 1901 and the total number of erroneous predictions is 44.

Random Forest:

Random Forest is another clustering algorithm that builds multiple decision trees and combines their estimates. It can handle large datasets with high features and provides a measure of feature importance. Random Forests may tend to overshoot if the number of trees is too high, or the individual trees are too deep.
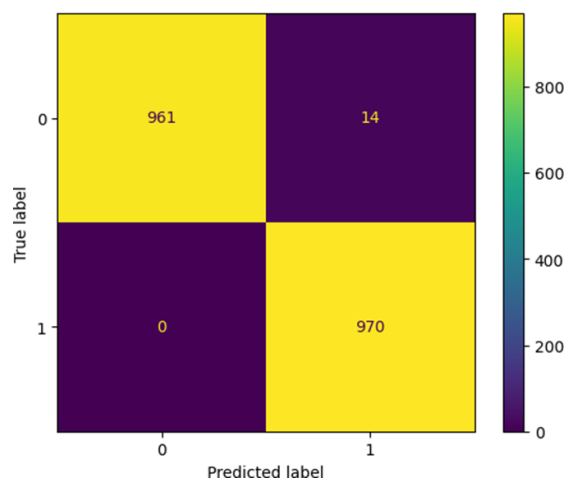
Confusion Matrix:

Figure:9

Here we can see that the overall accurate prediction is1931and the total number of erroneous predictions is 14.

Logistic Regression:

Logistic Regression is a linear regression that shows the probability of an event occurring. It provides interpretable coefficients that represent the influence of the predicted components.

Logistic Regression assumes a linear relationship between factors and the outcome, which can reduce its

Predictive power if the relationship is unstable.

Confusion Matrix:

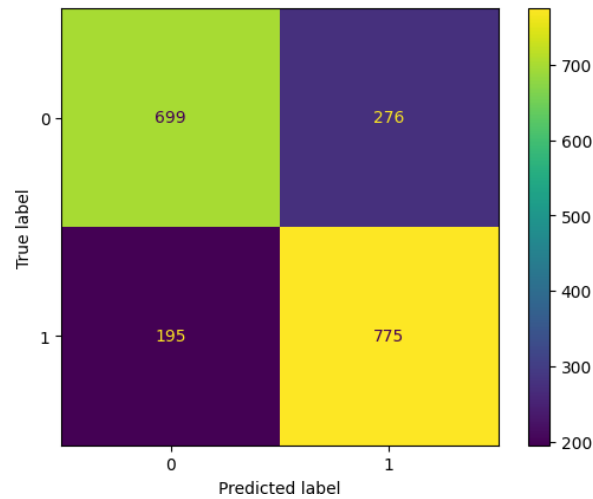| Model	Accuracy %
Decision Tree	0.97
KNN	0.97
XGBoost	0.97
Random Forest	0.99
Logistic Regression	0.77

Figure: 10

Here we can see that the overall accurate prediction is 1474 and the total number of erroneous predictions is 471.

ACCURACY GRAPH
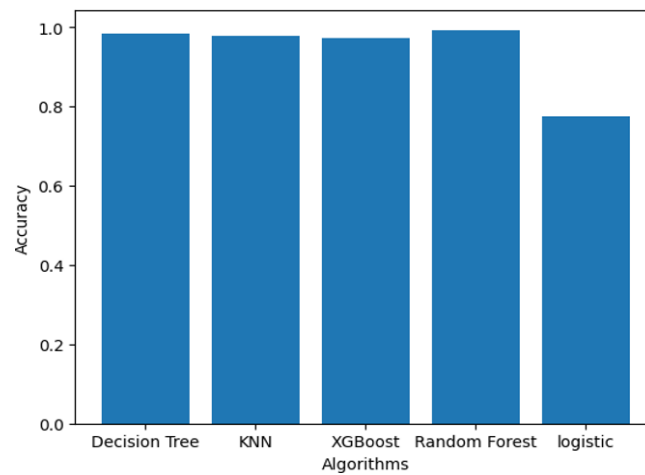
Figure:11

Accuracy Graph Table

VI. RESULT

According to the assessment results, the performance of different machine studying fashions for stroke prediction is as follows:

DecisionTree:

The Decision Tree version performance accuracy of 0.97, indicating an excessive stage of accuracy in predicting stroke cases. Decision Trees are intuitive and can capture complicated relationships within the information, making them suitable for stroke prediction

tasks.

K-Nearest Neighbor (KNN): The KNN model also had an accuracy of 0.97, demonstrating its effectiveness in figuring out people prone to stroke. KNN works by classifying facts and factors primarily based on the bulk vote of its k nearest neighbor, making it a suitable set of rules for figuring out styles in stroke statistics.

XGBoost: The XGBoost version performance accuracy of 0.97 as well, indicating its capability to make accurate predictions instroke instances. XGBoost is an ensemble mastering algorithm that combines the predictions of multiple weak fashions to enhance universal overall performance and is thought for its performance and scalability.

Random Forest: The Random Forest version out performed the alternative models with an accuracy of 0.99, suggesting its high accuracy and robustness in stroke prediction. Random Forest combines a couple of selection bushes and aggregates their predictions, ensuing in a powerful version that could deal with complex

Records relationships and provide correct predictions.

Logistic Regression: The Logistic Regression version performed an accuracy of 0.77, that's quite lower as compared to the alternative models. Logistic Regression models the connection between the based variable (stroke) and independent variables using a logistic feature, making it suitable for binary class duties. However, in this context, the model's accuracy might not be as high as the other models evaluated.

Based on these outcomes, the Random Forest version appears to be the maximum accurate and dependable for stroke prediction, with an accuracy of 0.99. However, it's essential to be aware that these results are particular to the dataset used for assessment and may range with distinct data sets or evaluation criteria.

REFERENCES

[1]   Dataset named 'Stroke Prediction Dataset' from Kaggle: https://www.kaggle.com/fedesoriano/stroke-prediction-dataset.

[2]   Pradeepa, S., Manjula, K. R., Vimal, S., Khan, M. S., Chilamkurti, N., & Luhach, A. K.: DRFS: Detecting Risk Factor of Stroke Disease from Social Media Using Machine Learning Techniques. In Springer (2020).

[3] Vamsi   Bandi, Debnath   Bhattacharyya, Divya Midhunchakkravarthy: Prediction of Brain Stroke Severity Using 4.

[4] Singh, M.S., Choudhary, P., Thongam, K.: A comparative analysis for various stroke prediction techniques. In: Springer, Singapore (2020).

[5] Nwosu, C. S., Dev, S., Bhardwaj, P., Veeravalli, B., John, D.: Predicting stroke from electronic health records. In: 41st Annual International Conference of the IEEE Engineering in Medicine and Biology Society IEEE (2019).

[6]   Fahd Saleh Alotaibi: Implementation of Machine Learning Model to Predict Heart Failure Disease. In: International Journal of Advanced Computer Science and Applications (IJACSA) (2019).

AVAILABILITY ANALYSIS OF DIESEL LOCOMOTIVES; A CASE OF STEEL PLANT

Ayandeep Sarkar[1], Sayan Talapatra[2], T.T. Lahiri[3], Debashis Sarkar[4], S.C Panja[5]

[1] *B.Tech 3rd Year, ME Department, Asansol Engineering College, India*
[2]*Alumni, SBM, Narsee Monjee Institute of Management Studies, India*
[3]*Ex. SAIL-ISP, Burnpur, India*
[4]*Associate. Professor, ME Department, Asansol Engineering College, India*
[5]*Professor, ME Department, Jadavpur University, Kolkata, India*

_____

ABSTRACT

The modernization of the steel plants is essential to sustain in this competitive market. This can be achieved by incorporating modern and updated equipment's and systems. It is worth mentioned that the productivity of the organization may be enhanced by proper utilization of various systems. One such system can be referred to as DIESEL LOCOMOTIVES. The locomotives are basically used as material handling equipment's within the plant. Thus, its proper functioning is the utmost important issue to produce the designed output of steel. In this context, the failure these systems hampers the productivity of the organization. Keeping these in mind, it observed that the availability analysis is a critical aspect and it needs to be studied.

The present case study deals with the determination of availability of Diesel Locomotives that are one of major component in a Steel Plant. In order to evaluate the availability of these components, a details studies has been carried out to collect accurate information suitable to meet the availability analysis.

Keywords: *Availability, Diesel locomotives, MTBF, MTTR, MDT, MTBM.*

I. INTRODUCTION

The growth trend of steel industry across the globe is upward and in India also moving forward with the same pace of globe, thus India has emerged as the fourth largest producer of steel in the world and the second largest producer of crude steel where production reached 28.52 million tons (MT) per annum. India's steel industry has some benefits due to its adequate availability of raw materials, quality iron-ore, skill manpower and an increasing market place with large population.

Major steel plant produces structural steel to railway lines, wheels and many others special types of steels and recent production raises around 53 million tonnes annually. It is assessed

that construction sector consumes practically 45% of the total products. Stainless steel holds for only 3% of the country's total steel production and about 70% finds application in food production and its allied industry like, kitchenware, biscuits, hotels, chemical processing and the rest in other industries. The demand for flat steel products will increase with increasing production of automobiles as automobile sales have ascended an annual 15%. The present index of basic metal and alloy recorded an 8.55% growth rate. Production of bars and rods recorded 19.67% growth rate and steel wires recorded 11.11% growth rate. India's steel production has surpassed the domestic requirement on 2011-2012, casing pressure on price of the alloy. End users sector like auto, consumer durables, construction and electricity have all shown steady growth in recent years and Indian steel import figure further provides evidence of strong domestic demand.

Major companies in the steel sectors are Steel Authority of India (SAIL), RINL, Tata Steel, JSW Steel, Essar Steel, Bhushan Steel. Jindal Saw, Usha Martin, Uttam Galva, Ajmera Realty, etc.

The production of steel is associated with complex and very extensive transport processes. The steel industries in India are strongly committed to the particularly sustainable carriers-railways and roadways.

Over 80% of transport volumes are forwarded by rail and almost 20% via roadways. The steel industry has been able to maintain this environmentally friendly transport structure for decades in its own wide-ranging rail networks. The railway transport exploits its strengths especially in the supply of raw materials. Road transport is indispensable for the delivery of finished products, for example to customers without a rail connection. Rail transport is responsible for roughly half of both the incoming and outgoing transport volumes. As a result of its high transport intensity, the steel industry is highly dependent on efficient and powerful railway carriers known as the diesel locomotives.

Availability is an effectiveness index for systems that can be repaired. In other way availability designates reliability and maintainability properties of a system. It is defined as the probability that the system is operating appropriately at any instance of time when in use or enduring repair action when it needs to be used [1]. Availability may be of three type's inherent availability, achieved availability and operational availability. Truely mechanical systems are employed in numerous applications, such as power plant, steel plant, railway, aviation and manufacturing. These demands higher availability for various socio-economic

considerations. The analysis of availability guides practicing engineers in selecting an appropriate maintenance strategy and in improving performance of the system [2]. Kumar et al. [3] developed condition-based maintenance model of mechanical systems steady-state availability analysis using semi-Markov process (SMP). Cause & Effect (CE); diagram also refer to as Ishikawa [4] or fishbone diagram is a pictorial representation the relationship between a given effect and its possible causes. It is an effective tool that allows the managers and researchers to easily perceive the relationship between the factors to study processes, situations and for planning. Not only CE diagrams are used to simple linear systems but also it can be used to very complex one, considering feedback loop [5]. Panja & Ray [6] pointed out different causes of railway signaling failure and described importance of reliability and availability analysis [7, 8].

II. METHODOLOGY

Failure data, repair time and down time of diesel locomotives have been collected from steel plant. On the basis of these data computation of different availability term is completed as per following definitions.

Availability is the chance that the system or the item will be available when required, or as the proportion of the total time that the system is available for use. Availability depends on reliability and maintainability of the component or system. Therefore the availability of a repairable item is a function of its failure rate λ, and of its repair or replacement rate μ. The proportions of total time that the item is available is the steady state availability. For a simple unit, with a constant failure rate μ where, μ = (MTTR)$^{-1}$ the steady state availability is equal to,

$$A = \frac{\mu}{\mu + \lambda} = \frac{MTBF}{MTBF + MTTR}$$

Where, MTBF is the mean time to failure, MTTR is the mean time to repair.

For a repairable system there are various time elements such as, mean time to repair, mean time to repair, mean down time. Depending on the time elements, availability may be inherent, achieved and operational types.

Inherent Availability

At any point of time if the system or component can perform as per stated conditions and specified environmental condition then it is said performance is satisfactory. And inherent

availability which is the common availability measure and a probability that a system or equipment shall operate satisfactorily without reflection of any planned or preventive maintenance time. Mathematically it is expressed as,

$$A(inherent) = \frac{\text{MTBF}}{\text{MTBF} + \text{MTTR}} ------(1)$$

Achieved Availability

Industry mainly interested in actual maintenance time and the equipment's failure activity for the benefit of departmental performance. Achieved availability may be stated as the ratio of MTBM to sum of MTBM and MDT,

$$A(achieved) = \frac{\text{MTBM}}{\text{MTBM} + \text{MDT}} ------(2)$$

Where, MTBM is the mean active-maintenance down time resulting from both preventive corrective maintenance and MDT is the mean downtime.

Operational Availability

Operational availability is the realistic availability, it mean in real operation, one cannot avoid administrative down time and supply downtime and bring it to zero value. A delay will always be there in time elements and considering this time operational availability may be calculated. It may be articulated as

$$A(operational) = \frac{\text{MTBF}}{\text{MTBF} + \text{MDT}} ------(3)$$

III. RESULTS AND DISCUSSIONS

Following observations are made for the diesel locomotives and the availability were calculated according to the formulas,

Inherent Availability calculation;

Sl No.	Locomotives no.	MTBF (hr.)	MTTR (hr.)	A(inherent) (%)
1	WD-05	2050	8	99.61127
2	WD-06	1800	6	99.66777
3	WD-07	1920	5.5	99.71436

4	WD-08	2000	6.3	99.68599
5	WD-09	2300	5.9	99.74413
6	WD-10	2550	8	99.68726
7	WD-11	2600	10	99.61686
8	WD-12	2100	7.5	99.64413
9	WD-13	2900	6.3	99.78323
10	BHEL-51	2250	7	99.68985
11	BHEL-55	3200	6.5	99.79729
12	BHEL-56	3600	7.5	99.7921
13	BHEL-57	2850	9.5	99.66777
14	BHEL-58	2960	5.5	99.81453
15	**BHEL-59**	2450	4.5	**99.81666**

Table. 1. Inherent availability of Diesel locomotives

From the above calculations (Equation-1), as shown in the Table 1, it is found that the inherent availability of all the locomotives is greater than 99%. The highest inherent availability is shown by the Locomotives No. BHEL-59.

Achieved Availability calculation;

Sl No.	Locomotives no.	MTBM (hr.)	MDT (hr.)	A(inherent) (%)
1	WD-05	550	8	98.56631
2	WD-06	650	8.5	98.70919
3	WD-07	630	7.5	98.82353
4	WD-08	610	9	98.54604
5	WD-09	530	8	98.51301
6	**WD-10**	650	7	**98.93455**
7	WD-11	560	8	98.59155
8	WD-12	620	9	98.56916
9	WD-13	650	8.5	98.70919
10	BHEL-51	480	7.5	98.46154
11	BHEL-55	520	7	98.67173
12	BHEL-56	500	6.5	98.71668
13	BHEL-57	450	6	98.68421
14	BHEL-58	460	8	98.2906
15	BHEL-59	490	8	98.39357

Table. 2. Achieved availability of Diesel locomotives

The Table 2. is used to describe the achieved availability of the locomotives. It is observed

that The achieved availability lies in between 98% and 99%. The highest achieved availability is performed by the Loco No, WD-10.

Operational Availability calculation;

Sl No.	Locomotives no.	MTBF (hr.)	MDT (hr.)	A(inherent) (%)
1	WD-05	2050	8	99.61127
2	WD-06	1800	8.5	99.53

3	WD-07	1920	7.5	99.61089
4	WD-08	2000	9	99.55202
5	WD-09	2300	8	99.65338
6	WD-10	2550	7	99.672624
7	WD-11	2600	8	99.69325
8	WD-12	2100	9	99.57326
9	WD-13	2900	8.5	99.70775
10	BHEL-51	2250	7.5	99.66777
11	BHEL-55	3200	7	99.78173
12	**BHEL-56**	3600	6.5	**99.81977**
13	BHEL-57	2850	6	99.78992
14	BHEL-58	2960	8	99.73046
15	BHEL-59	2450	8	99.67453

Table. 3. Operational availability of Diesel locomotives

From the above Table 3, it is found that the operational availability of the locomotives it greater than 99%. The highest operational availability is shown by the Loco No, BHEL-56.

If the whole availability is taken into account then it is seen that the percentage availability is nearly 99% which is a very good value. It can be inferred that there are minimum losses due to less number of occurrence of failures of diesel locomotives.

IV. CONCLUSION

This study has engrossed mainly on the estimation of the availability of an unambiguous and one of the most important parts of the steel industry, called Diesel Locomotive Engine. Initially, causes of failures of the diesel locomotives are studied. For this purpose, the failure register for last few years were considered and analysed. It is observed from the past data that there are twenty-four causes responsible for the failure of the locomotives. In case of availability, three types of availability analyses, such as inherent availability, achieved availability and operational availability are estimated it is observed that all these locomotives have more than 99% of availability. This suggests that the locomotives are performing up to the desired level and hence, productivity of the organization acceptable.

Furthermore, the reliability analysis may be studied. Also, analysis on overall equipment effectiveness (OEE) can be taken into consideration in future to identify areas of improvement.

REFERENCES

[1] Bhadury B and Basu S.K., Tero-technology: Reliability Engineering and Maintenance Management-Asian Book Private Limited, Edition-I, (2003).

[2] Kumar S, Tewari PC, Kumar S, "Performance evaluation and availability analysis of ammonia synthesis unit in a fertilizer plant". J Ind Eng Int 5(9):pp.17-26. (2009).

[3] Kumar G., Jain V., Gandhi O. P., "Availability analysis of mechanical systems with condition-based maintenance using semi-Markov and evaluation of optimal condition monitoring interval", Journal of Industrial Engineering International, pp 1-13, (2017).

[4] Ishikawa K., "Guide to Quality Control. Asian Productivity Organization". Nordica International Limited, Hong Kong. (1985).

[5] Turner R. E.. "Cause-and-Effect Diagrams Alone Don't Tell the Whole Story".Quality Progress, Vol. 30(1), pp. 53-56 (1997).

[6] Panja S.C., Ray P.K., "Failure Mode and Effect Analysis of Indian Railway Signaling System", International Journal of Performability Engineering Vol. 5(2), pp. 131-141,(2009).

[7] Bose D., Ghosh G., Mandal K., Sau S.P. and Kunar S., "Measurement and Evaluation of Reliability, Availability and Maintainability of a Diesel Locomotive Engine", International Journal of Engineering Research and Technology. ISSN 0974-3154 Volume -6(4) pp. 515-534, (2013).

[8] Bhardwaj S., Kumar V., Bhardwaj N.," Reliability Analysis of Diesel Locomotive Engine", International Journal for Research in Engineering Application & Management (IJREAM) ISSN: 2454-9150 Vol-04(04), pp-565-571, (2018).

A STUDY ON SIGNIFICANCE OF VIRTUAL PHYSICS LABORATORY FOR ENGINEERING STUDENTS IN PANDEMIC SITUATION

Ranjita Sinha[1*], Sandip Haldar[1], Soujanya Sengupta[2], Shreyoshi Mishra[2], Bikramaditya Ghosh[2], Dipanwita Bhattacharjee[3], Debolina Malakar[3]

[1] Department of BS&HU(Physics), Asansol Engineering College, Kanyapur, Asansol-713305, West Bengal, India
[2] B. Tech student, 4th Year, Department of Electronics and Communication Engineering Asansol Engineering College, Kanyapur, Asansol- 713305, West Bengal, India
[3] B. Sc Data Science 1st year student, Department of CA, Asansol Engineering College, Kanyapur, Asansol- 713305, West Bengal, India

_____

ABSTRACT

The education of the pupil suffers badly in pandemic specially for the engineering students. Engineering education is highly depending on practical classes and workshops. In this pandemic the physics practical classes for the graduates engineering students could not be materialize. To overcome this situation, the researchers designed and developed virtual physics laboratory. Virtual physics laboratory is very effective educational tool which helps the students to perform experiments in the comfort region of home. It is administered as a pilot project and after completion of the course the achievement test has been taken. The test score shows very satisfactory results.

Keywords: *Virtual Laboratory, Engineering students, Achievement test.*

I. INTRODUCTION

1.1 Background

The emergence of Covid 19 changed the ways we perceive education and information exchange. The pandemic and its extended lockdown periods saw heavy dependence on technology for information exchange and communication. Albeit a time besmirched by loss of uncountable lives, the pandemic revolutionized education in ways unprecedented. While most schools could readily switch to the digital medium, it was difficult for some to transition at the rate which the situation demanded. While the theoretical disciplines continued their curriculum proficiently the practical and laboratory papers were difficult to comprehend (for teachers and students alike).

This led to the incorporation of simulating softwares like NI Multisim in the Engineering disciple where measurement and analysis played a very important role in concept understanding. The COVID-19 pandemic has presented numerous challenges to the field of engineering education, with the disruption of in-person classes and laboratory sessions. As a

result, educators and institutions have sought alternative approaches to ensure that engineering students continue to receive practical learning experiences. Virtual physics laboratories have emerged as a potential solution, providing students with simulated environments to conduct experiments and explore scientific concepts remotely. This study aims to examine the significance of virtual physics laboratories for engineering students during the pandemic and their potential for enriching their learning experiences.

1.2 Objectives

This study aims to investigate the significance of virtual physics laboratories in enabling engineering students to continue their practical learning during the pandemic. The research examines the impact of virtual physics laboratories on student engagement, learning outcomes, and overall satisfaction. A mixed-methods approach involving surveys, interviews, and performance assessments was used to gather data from engineering students who utilized virtual physics laboratories. The results indicate that virtual physics laboratories played a vital role in maintaining experiential learning and enhancing students' understanding of fundamental concepts in physics. The study underscores the importance of virtual laboratories as a viable alternative during a pandemic situation and provides insights for the integration of virtual platforms in future engineering curricula.

1. Literature Survey

John Jongho Park, Mihee Park, Kathy Jackson, and Garrett Vanhoy in their paper "Remote Engineering Education Under COVID-19 Pandemic Environment" discuss the effects of the forcible transition to remote learning throughout engineering curriculums. In their paper they investigate the effects of remote teaching practices on students and instructors alike and propose rational solutions and effective methods to counter the problems faced. Even though their study and investigation is primarily based on US based schools, their proposed solutions are beneficial on a global scale and are effective in almost all scenarios, as they took into account the qualitative and emotional aspects of academic learning. Furthermore, they emphasized how emotional resilience , student instructor interaction, peer-to-peer communication and positive feedback were important for the students and helped them to adapt to the remote learning practices.[1] Dealing with isolation and lack of interaction is what proved to be a major challenge in the pandemic scenario.Therefore experimental sciences not only required adequate academic feedback but also adequate emotional feedback.[2]

Muniram Budhu in his paper "VIRTUAL LABORATORIES FOR ENGINEERING EDUCATION" provides a detailed comparison between traditional laboratories and virtual laboratories. The paper primarily discusses about the incorporation of virtual laboratories for the students belonging to the civil

engineering curriculum. It also explores and exemplifies the 3D modelling and simulation softwares like MATLAB/SIMULINK/MAPLE to simulate a real physical laboratory.He also proposed several advantages of Virtual learning environments and their capability to store, retain and analyse data better than their human counterparts.The paper also provides a comprehensive study of VIRTUAL GEOTECHNICAL LABS housed by GROW Emphasis is mainly done upon the comparison based upon resource utilization. The tabular analysis from the aforementioned paper is given below. [3]

TABLE 1
DIFFERENCES AMONG VIRTUAL LABS AND PHYSICAL LABS

| PARAMETER	VIRTUAL LAB WITH 2-D SIMULATION	VIRTUAL LAB WITH 3-D SIMULATION	SENSOR-ACTUATED & REMOTELY-CONTROLLED VIRTUAL LAB	PHYSICAL LAB
Space Needs	None	None	Yes	Yes
Equipment Needs	None	None	Yes	Yes
Scheduling Logistics	None	None	Yes	Yes
Safety concerns	None	None	Depends	Yes
Other Requirements	WWW & Computer	WWW & Computer	WWW & Computer	Chalkboard
Pre-requisites (Computing)	WWW & Computing skills	WWW & Computing skills	WWW & Computing skills + robotics control	None
Maintenance Cost Items & Frequency in parentheses	Software and lab content updating (annually or semester-based)	Software and lab content updating (annually or semester-based)	Sensors, software, room (at least weekly maintenance)	Equipment (Weekly, if not daily maintenance)
Educational Benefits	1) Variables can be changed; 2) Number-crunching can be hidden from students or performed for them if necessary and to promote concept learning; 3) teaching style can be adjusted mid-way; 4) learning can be continuously monitored; 5) anytime, anyplace learning	1) Variables can be changed; 2) Number-crunching can be hidden from students or performed for them if necessary and to promote concept learning; 3) teaching style can be adjusted mid-way; 4) learning can be continuously monitored; 5) anytime, anyplace learning; 6) provide opportunities for exploration	1) Variables can be changed; 2) Number-crunching can be hidden from students or performed for them if necessary and to promote concept learning; 3) teaching style can be adjusted mid-way; 4) learning can be continuously monitored; 5) limited distance learning	Feel and smells of real-time interaction have an indelible effect on learning (memory, cognition, etc.); limited (traditional) access to learning
Realism (extent to which reality is simulated)	Least realistic; 2-d simulations are often just line drawings	More realistic as the graphics are 3-d	It depends; May be more realistic or less depending on image basis	Most realistic
Relative cost	$	$	$$$$	$$$$$

For the overall qualitative and quantitative analysis of the advent of Virtual labs in the undergraduate domain, their implementation should be studied over a group of students and their demonstrations should be recorded for research purposes. It is difficult to determine the difficulties faced by a student in the virtual environment where he/she is unguided by peers and instructors. The students' ability to successfully grasp the academic content maybe limited and complex concepts may remain untouched.

Therefore, for the effective utilization of such a diverse yet streamlined technology, a dedicated system is required. The system deals with Self Regulated learning and how the students perceive the implementation of virtual labs through a process termed as PICOS where, the researcher needs to analyze whether the use of VLab can stimulate the independence and maturity of students in higher education in conducting experiments in every branch of science. The PICOS approach of the study applied by the author is given below [4]

Table 1. PICOS Approach of the Study.

P	Population	Students in Higher Education Level
I	Intervention	Use of virtual and augmented reality technologies
C	Comparison	None
O	Outcome	Effect on Self-Regulated Learning
S	Study design	Systematic Reviews

The authors from the aforementioned paper (Sapriati, Amalia, Astri Dwi Jayanti Suhandoko, Audi Yundayani, Rafidah Abdul Karim, Udan Kusmawan, Airil Haimi Mohd Adnan, and Ardiansyah Azhary Suhandoko. 2023. "The Effect of Virtual Laboratories on Improving Students' SRL: An Umbrella Systematic Review") went through an extensive study of collected and categorized journals belonging the Scopus and Web of Science (WoS) indexing concerning the topic online remote learning and Self Regulated Learnings(SRLs). This study was conducted based upon the PRISMA guidelines.
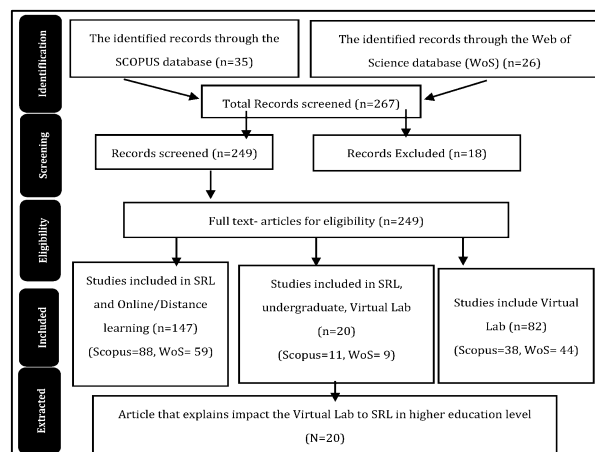
Virtual laboratories in physics are computer-based simulations that allow students and researchers to conduct experiments and explore concepts in a virtual environment. These virtual laboratories aim to provide a realistic and interactive experience that simulates the equipment, procedures, and outcomes of real-world experiments. Here are some components commonly found in virtual laboratories for physics:

1. User Interface: The virtual laboratory typically includes a user interface that allows users to interact with the simulation. This interface may include buttons, sliders, menus, and other controls to manipulate experimental parameters and observe results.

2. Simulated Equipment: Virtual laboratories simulate various types of equipment commonly used in physics experiments, such as oscilloscopes, spectrometers, particle detectors, lenses,

mirrors, and circuits. These simulated instruments behave similarly to their real-world counterparts and allow users to perform measurements and collect data.

3. Experiment Setup: Users can set up and configure the experimental apparatus within the virtual laboratory. They can choose the type of experiment, adjust parameters like initial conditions, select materials, and arrange the equipment in the desired configuration.

4. Data Collection: During the virtual experiment, users can collect data through simulated sensors or by directly measuring quantities displayed on the simulated equipment. This data may include measurements of position, velocity, acceleration, temperature, voltage, and other relevant parameters.

5. Real-Time Visualization: Virtual laboratories often provide real-time visualization of the experiment's progress. This can include visual representations of physical phenomena, such as the motion of objects, the propagation of waves, or the behavior of electric and magnetic fields. Graphs, charts, and numerical displays may also be used to present data.

6. Data Analysis: Virtual laboratories may include tools for analyzing the collected data. Users can perform calculations, plot graphs, and compare experimental results with theoretical predictions. This allows for a deeper understanding of the underlying physics principles and the ability to draw conclusions from the data.

7. Experiment Control: Virtual laboratories enable users to control various experimental parameters, such as adjusting the strength of a magnetic field, changing the angle of incidence of light, or modifying the properties of materials. This flexibility allows for the exploration of different scenarios and the investigation of how changing variables affect experimental outcomes.

8. Error Handling: Virtual laboratories can simulate the presence of experimental errors and uncertainties, providing a more realistic experience. This allows users to understand the limitations of their measurements and consider the impact of uncertainties on the validity of their results.

Overall, virtual laboratories provide a flexible and interactive platform for learning and experimenting with physics concepts. They offer a safe and cost-effective way to explore and analyze complex phenomena, supplementing traditional hands-on laboratory experiences.

The main components of virtual labs was summarized in a tabular form(albeit with different parameters) in a study by Juskaite, Loreta. (2019). [5]

Table 1 The main components of the virtual labs

No	Tools	Notes
1.	The lab sets & equipments	The virtual lab is considered integral to the traditional lab but not an alternative to it. The existence of the traditional lab is very necessary, but in lower numbers and requirements, which help in the possibility of using it by several users outside the lab (Kolb, Boyatzis, & Mainemelis, 2001)
2.	ICT or/and mobiles devices	They are represented in personal laptops, Smartphone's, data loggers, which are linked to the local net or to the international net so that the student can work directly in the lab, or distantly at anywhere and anytime.
3.	Communication network & the related hardware	In case of performing experiments electronically, all the sets should be linked to the necessary device, because the link between the users with a lab will be through digital communication.
4.	The Software of the Virtual Lab	This software is represented in the simulation programs, which are designed by professionals. It is necessary to design this program in an interesting and attractive form; as these programs were designed to attract students' attention and urge them to complete the experiment. This is maintained by the animation and simulation techniques, video, and the three dimensions pictures (Potkonjak et al., 2016).
5.	Co-operation software/ Programs & Management.	These programs are concerned with the method of managing the lab and the ones who perform the experiment, including students and researchers. These special programs register students in the lab program and determine the kinds of access that should be provided to each user in the different experiments.
6.	Technical support	It is important that the educational organization has a technical team to support the training of teachers.
7.	Methodical support	According to the author and after discussions with Latvian physics teachers, the most essential part of the learning process is methodological support. Only by applying methodically multi-functional virtual laboratories it is possible to get the desired results. In Latvian schools, it is the most common problem.

II. PROPOSED METHODOLOGIES

The COVID-19 pandemic has brought significant challenges to the field of education. However, it has also spurred remarkable innovation and the adoption of new approaches to ensure continuity of learning. Here are some key innovations in education during the pandemic:

1. Remote Learning: Educational institutions worldwide quickly transitioned to remote learning models, utilizing various digital tools and platforms to deliver lessons online. Teachers conducted virtual classes through video conferencing platforms, and students accessed learning materials and submitted assignments electronically.

2. Online Resources and Platforms: The pandemic accelerated the development and availability of online educational resources and platforms. These resources included e-books, educational websites, interactive learning platforms, and Massive Open Online Courses (MOOCs). They provided students with access to a wide range of subjects and enabled self-paced learning.

3. Blended Learning: Blended learning models, combining online and in-person instruction, gained prominence during the pandemic. This approach allowed for flexibility and ensured that students could engage in learning both remotely and in the classroom, depending on local conditions and safety measures.

4. Virtual Reality (VR) and Augmented Reality (AR): VR and AR technologies found increased applications in education during the pandemic. They offered immersive experiences and simulations, enabling students to explore virtual environments and conduct virtual experiments, even when physical access to labs or field trips was restricted.

5. Collaborative Online Tools: Various collaborative tools such as Google Workspace, Microsoft Teams, and other virtual whiteboards facilitated collaboration among students and

teachers. These tools allowed for real-time document sharing, group projects, and interactive discussions, replicating the classroom experience in a virtual setting.

6. Gamification and EdTech Apps: Gamification elements and educational technology (EdTech) applications played a significant role in engaging students remotely. Gamified platforms made learning enjoyable by incorporating game-like elements, while EdTech apps provided personalized learning experiences and adaptive assessments.

7. Teacher Professional Development: The pandemic highlighted the importance of supporting teachers in adapting to remote instruction. Educational institutions and organizations offered extensive professional development programs to equip teachers with the necessary skills and strategies for effective online teaching, assessment, and classroom management.

8. Social and Emotional Learning (SEL) Support: Recognizing the impact of the pandemic on students' well-being, schools emphasized social and emotional learning. They implemented virtual counseling services, mindfulness exercises, and online support groups to address students' emotional needs and foster resilience.

9. Data-Driven Decision Making: Education systems increasingly utilized data analytics and insights to inform decision-making processes. Data on student engagement, performance, and feedback from online platforms helped identify areas of improvement, tailor instruction, and provide targeted support to students.

10. Access to Technology and Connectivity: Efforts were made to bridge the digital divide by providing devices and internet connectivity to students in need. Schools, governments, and organizations collaborated to ensure equitable access to technology, enabling students from all backgrounds to participate in remote learning.

These innovations in education during the pandemic have not only helped maintain continuity of learning but have also opened new avenues for educational transformation. They have demonstrated the potential of technology in enhancing teaching and learning experiences, paving the way for a more flexible and inclusive future of education.

Even though Virtual labs cannot entirely replace physical labs and human instructors, Virtual labs can work together with physical labs to provide better outcomes. Virtual Labs have proved to be beneficial for not only smaller groups but also large batches. An excellent opportunity to engage students with technology and in parallel to avoid unforeseen disruptions, as happened recently due to pandemic.[6]

Along with these innovations the proposed methodology requires a sequence of studies and surveys to prove to be fruitful. They are as follows:

1. Sample Selection: Engineering students from multiple disciplines are selected as participants for this study. Both undergraduate and graduate students are included to capture a diverse range of perspectives.

2. Development of Virtual Physics Laboratory: A virtual physics laboratory is designed and implemented, which replicates real-world experiments and offers interactive features, such as adjustable parameters, data collection, and analysis tools. The laboratory is accessible through web-based platforms or dedicated software.

3. Data Collection: Data is collected through surveys, interviews, and performance assessments. The surveys capture students' perceptions of the virtual physics laboratory, including ease of use, engagement, and satisfaction. Interviews provide more in-depth insights into students' experiences and their views on the effectiveness of virtual labs. Performance assessments measure students' conceptual understanding and skills acquisition through tasks related to the laboratory experiments.

4. Analysis: Quantitative data from surveys and performance assessments are analyzed using statistical techniques to identify trends and patterns. Qualitative data from interviews are subjected to thematic analysis to extract key themes and insights.

III. EXPECTED FINDINGS

To illustrate the importance of the proposed methodologies their effectiveness should be measured in terms of their expected findings. These are not quantitative / formulaic parameters rather qualitative deductions about overall impact, development and effectiveness over the proposed methodology/

1. Effectiveness in Replicating Real-World Experiments: The study expects to find that virtual physics laboratories can effectively replicate real-world experiments, providing students with a simulated hands-on experience despite the physical limitations imposed by the pandemic.

2. Impact on Conceptual Understanding: It is anticipated that virtual physics laboratories can enhance students' conceptual understanding of physics principles by allowing them to actively engage with the experiments, observe phenomena, and manipulate variables in a controlled environment.

3. Engagement and Learning Outcomes: The study hypothesizes that virtual physics laboratories have the potential to enhance student engagement and motivation, leading to improved learning outcomes. The interactive nature of the virtual labs, coupled with the ability to repeat experiments and visualize abstract concepts, may contribute to deeper learning experiences.

4. Limitations and Challenges: The research also aims to identify limitations and challenges associated with virtual physics laboratories, such as equipment limitations, the need for technical proficiency, and potential discrepancies between virtual and real-world experiences.

IV. CONCLUSION

This study seeks to contribute to the understanding of the significance of virtual physics laboratories for engineering students during the pandemic. The findings will inform educators, institutions, and developers about the effectiveness of virtual labs, their impact on student learning, and their potential as a complementary approach to traditional hands-on laboratories. Ultimately, the research aims to provide insights for enhancing engineering education, particularly in times of crisis or when access to physical laboratories is restricted.

REFERENCES

[1]Park, John Jongho, Mihee Park, Kathy Jackson, and Garrett Vanhoy. "Remote Engineering Education Under COVID-19 Pandemic Environment." International Journal of Multidisciplinary Perspectives in Higher Education 5, no. 1 (2020): 160+. Gale Academic OneFile (accessed June 13, 2023). https://link.gale.com/apps/doc/A641420979/AONE?u=anon~1bf2527&sid=googleScholar&xid=e554b8b2.

[2]Lei, Z. C., Hong Zhou, W. S. Hu, and Guo-Ping Liu. "Impact of COVID-19 Pandemic on Engineering Education: Case Study with the Online Laboratory NCSLab." International Journal of Engineering Education (2022): 1505-1512.

[3]Budhu, Muni. (2002). Virtual Laboratories for Engineering Education. Int Conf Eng Educ. 1.

[4]Sapriati, Amalia, Astri Dwi Jayanti Suhandoko, Audi Yundayani, Rafidah Abdul Karim, Udan Kusmawan, Airil Haimi Mohd Adnan, and Ardiansyah Azhary Suhandoko. 2023. "The Effect of Virtual Laboratories on Improving Students' SRL: An Umbrella Systematic Review" Education Sciences 13, no. 3: 222. https://doi.org/10.3390/educsci13030222

[5]Juskaite, Loreta. (2019). THE IMPACT OF THE VIRTUAL LABORATORY ON THE PHYSICS LEARNING PROCESS. SOCIETY. INTEGRATION. EDUCATION. Proceedings of the International Scientific Conference. 5. 159. 10.17770/sie2019vol5.3804.

[6]Manchikanti P, Kumar BR, Singh VK. Role of virtual biology laboratories in online and remote learning. 2016 IEEE Eighth International Conference on Technology for Education (T4E). Mumbai, India: IEEE; 2016; p. 136– 139.

SELECTION OF 4-WHEELS ELECTRICAL VEHICLE USING TOPSIS

Ayandeep Sarkar[1], Aditya Ganguly[2], Hrishikesh Dutta[2], Harshadip Das[2], Monosij Chandra[3]
Debashis Sarkar[4]

[1] B.Tech 3rd Year, ME Department, Asansol Engineering College, India
[2] B.Tech 2nd Year, ME Department, Asansol Engineering College, India
[3] B.Tech 1st Year, ME Department, Asansol Engineering College, India
[4]Associate Professor, ME Department, Asansol Engineering College, India

ABSTRACT

In this post pandemic time need of personal and family car have increased many fold. Further, scarcity and cost of fossil fuel have led to increase the demand of Electrical Vehicle (EV). Presently TATA motors holding almost 80% of EV market share. At the same time other automobile companies are also in competitive market. In this study six numbers of 4-wheel cars have been compared on the basis of their price, battery capacity, motor power and distance traveled per each charge. Finally, the vehicles have been ranked using TOPSIS method.

Keywords: *Electrical Vehicle, TOPSIS, motor power, price, battery capacity, travel Distance.*

I. INTRODUCTION

Electrical vehicle (EV) was developed in long back 1830 and first electrical automobile was introduced in 1891, USA. Battery and its charging was main barrier in further development of EV. Later, invention and expansion of internal combustion (IC) engine and its rapid growth, particularly in 1908 successful introduction of first Ford automobile car (Model T), literally smashed the idea of EV. Main disadvantages of IC engine is exhaust gas or emission. Recently developed countries are more concern about carbon footprint. Again rapid reduction of fossil fuel stock, instigated to rethink about EV. Since then all automobile giants are in sprint to capture EV two wheel, three wheel and four wheel market. In India, due to government policy, EV and Plug-in Hybrid electrical vehicle (PHEV) have promising future, as Hybrid fuel technology in automobile is costly [1] at the same time awareness on EV is necessary to achieve this. There are three types of electrical vehicles; Battery Electric Vehicles-they are powered by rechargeable battery, Hybrid electric vehicles-powered by both gas-powered engines and an electric car engine and Plug-in hybrid electric vehicles- both an engine and an electric motor, which can charge their batteries by the use of regenerative braking [2]. Initially rechargeable lead–acid batteries were used in EV, later due to heavy weight, short trip range, long charging time, and poor durability, two major battery technologies used in EVs are nickel

metal hydride (NiMH) and lithium ion (Li-ion) [3]. Growth of Li-ion is more due to its higher specific energy and energy density, though NiMH more developed technology.

An electrical vehicle may be specified by the following parameters of the car, particularly four wheeled cars, Battery Capacity (kWh), Seating Capacity (number persons), Max motor Power (BHp), Max Torque (Nm), Comfort during travel, travel range in one charge (Km) and charging (slow of fast). Though price of the car is not a feature but to the buyer Price is very important. In this study, after taking feedback from various people four important parameters are selected as important criteria and these are, Battery Capacity (kWh), Travel Range (Km/single charge), Motor Power (BHp) and Price (Rs. in Lacks). Further, survey has been carried out to find the weightage of the criteria. For the said survey opinion was taken from various people like, EV expert, driver, academician, researchers, students, owner of EV and general people. Finally received the weightage of the criteria as below,

	Battery Capacity	Travel Range	Motor Power	Price
Weight	0.21	0.33	0.2	0.26

In research six four wheeled cars have been selected as alternatives and ranked using TOPSIS method. Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS) is widely used multi-criteria decision making (MCDM) method used for ranking of the alternatives when multiple numbers of parameters are applicable. Here different 4-wheeled cars namely Nexon EV Prime, Tigor ev ZEV, Citroen eC3, Tigor EV, MG Comet EV and Mahindra E-Verito are considered for ranking. Criteria values was collected from the company websites.

II. METHODOLOGY

Following steps are followed to complete the analysis using TOPSIS;

Step-1. Preparation of Decision matrix.

Step-2. Construction of normalized decision matrix.

Step-3. Preparation of weights of each criteria

Step-4. Preparation of weighted normalized decision Matrix

Step-5. Determination of **ideal solution** and **negative-ideal** solution.

Step-6. Calculation of separation measure from ideal solution and negative- ideal solution.

Step 7. Compute the relative closeness to the ideal solution.

Step-8. Prepare a rank order in the descending order.

Steo-9. Select the best alternative.

III. RESULTS AND DISCUSSIONS

Table:1. Decision Matrix				
Criteria ➡️ Alternatives ⬇️	Battery Capacity (kWh)	Travel Range (Km/single charge)	Motor Power (BHp)	Price (Rs. In Lacks)
Nexon EV Prime	30.2	312	127	14.5
Tigor ev ZEV	26	315	73.75	12.5
Citroen eC3	29.2	320	56.22	11.5
Tigor EV	19.2	250	73.75	8.4
MG Comet EV	17.3	230	42	9.13
Mahindra E-Verito	13.91	110	41	9.46

Table:2. Column wise Square and sum, Square root

	Battery Capacity (kWh)	Travel Range(km/single charge	Motor Power (BHp)	Price (Rs. In Lacks)
Nexon EV Prime	912.0400	97344.0000	16129.0000	210.2500
Tigor ev ZEV	676.0000	99225.0000	5439.0625	156.2500
Citroen eC3	852.6400	102400.0000	3160.6884	132.2500
Tigor EV	368.6400	62500.0000	5439.0625	70.5600
MG Comet EV	299.2900	52900.0000	1764.0000	83.3569
Mahindra E-Verito	193.4881	12100.0000	1681.0000	89.4916
Total of Square	3302.0981	426469.0000	33612.8134	742.1585
Square root	57.4639	653.0459	183.3380	27.2426

Table:3. Normalized Decision Matrix

	Battery Capacity (kWh)	Travel Range(km/single charge	Motor Power (BHp)	Price (Rs. In Lacks)
Nexon EV Prime	0.5255	0.4778	0.6927	0.5323
Tigor ev ZEV	0.4525	0.4824	0.4023	0.4588
Citroen eC3	0.5081	0.4900	0.3066	0.4221
Tigor EV	0.3341	0.3828	0.4023	0.3083
MG Comet EV	0.3011	0.3522	0.2291	0.3351
Mahindra E-Verito	0.2421	0.1684	0.2236	0.3473

Table:4. Weighted Normalized Decision Matrix, Ideal & -ve Ideal solution

Criteria Weight	0.21	0.33	0.2	0.26
	Battery Capacity (kWh)	Travel Range(km/single charge	Motor Power (BHp)	Price (Rs. In Lacks)
Nexon EV Prime	0.1104	0.1577	0.1385	0.1384
Tigor ev ZEV	0.0950	0.1592	0.0805	0.1193
Citroen eC3	0.1067	0.1617	0.0613	0.1098
Tigor EV	0.0702	0.1263	0.0805	0.0802
MG Comet EV	0.0632	0.1162	0.0458	0.0871
Mahindra E-Verito	0.0508	0.0556	0.0447	0.0903
Ideal Sol	0.1104	0.1617	0.1385	0.0802
Negative Ideal Sol	0.0508	0.0556	0.0447	0.1384

Table-5. Separation From Ideal Solution

Battery Capacity (kWh)	Travel Range(km/single charge	Motor Power (BHp)	Price (Rs. In Lacks)	S
0.0000	0.0000	0.0000	0.0034	0.0584
0.0002	0.0000	0.0034	0.0015	0.0717
0.0000	0.0000	0.0060	0.0009	0.0828
0.0016	0.0013	0.0034	0.0000	0.0790
0.0022	0.0021	0.0086	0.0000	0.1137
0.0035	0.0113	0.0088	0.0001	0.1540

Table-6. Separation From negative Ideal Solution

	Battery Capacity (kWh)	Travel Range(km/single charge	Motor Power (BHp)	Price (Rs. In Lacks)	S'
Nexon EV Prime	0.0035	0.0104	0.0088	0.0000	0.1509
Tigor ev ZEV	0.0020	0.0107	0.0013	0.0004	0.1197
Citroen eC3	0.0031	0.0113	0.0003	0.0008	0.1244
Tigor EV	0.0004	0.0050	0.0013	0.0034	0.1002
MG Comet EV	0.0002	0.0037	0.0000	0.0026	0.0804
Mahindra E-Verito	0.0000	0.0000	0.0000	0.0023	0.0481

Table-7. Relative Closeness to Ideal solution and Rank

	S	S'	C= S'/(S+S')	Rank
Nexon EV Prime	0.0584	0.1509	0.72	1
Tigor ev ZEV	0.0717	0.1197	0.63	2
Citroen eC3	0.0828	0.1244	0.60	3
Tigor EV	0.0790	0.1002	0.56	4
MG Comet EV	0.1137	0.0804	0.41	5
Mahindra E-Verito	0.1540	0.0481	0.24	6

IV. CONCLUSION

It can be concluded that among these six four wheel electrical vehicle on the basis of four major criteria named Battery Capacity, Travel Range (km/single charge), Motor Power and Price Nexon EV prime is the best choice as it ranked 1st. It is followed by Tigor ev ZEV, Citroen eC3, Tigor EV, MG Comet EV and Mahindra E-Verito. This study will help buyer to select best car among their choice. Though at this time awareness about EV among the people is limited, researchers need to take care to find criteria weight. It is also possible to calculate criteria weight using other method like AHP.

REFERENCES

[1] Pritam K. Gujarathi, Varsha A. Shah, Makarand M. Lokhande, "Electric Vehicles in India: Market Analysis with Consumer Perspective, Policies and Issues, Journal of Green Engineering, vol-8(1), pp17-36, 2018.

[2] Sandilya DK, Kalita B, Goswami S, Chakrabort Sy "A study on Regenerative braking system with matlab simulation", 2017 International Conference on intelligent Computing and Control(I2C2).

[3] Corrigan D, Masias A (2011) Batteries for electric and hybrid vehicles. In: Reddy TB (ed) Linden's handbook of batteries, 4th edn. McGraw Hill, New York.

[4] Reddy KS, Reddy BST, Reddy AS, Mahalakshmi R "Charging of Battery Station by Hybrid Renewable Energy System using GA Optimized SEPIC Converter", Journal of Green Engineering. Vol.10(9), 2020

Intelligent Computing and Control (I2C2).
Intelligent Computing and Control (I2C2).

APPLICATION OF ARTIFICIAL INTELLIGENCE SYSTEM IN ONLINE LOGISTICS CHATBOX SYSTEM

Sumanta Karmakar[1], Chiranjib Goswami[2], Ayushi Ankita Rakshit[3], Ipsita Mitra[4], Chandan Dutta[5]

[12] *Assistant Professir, Department of Electronics and Communication Engineering*
[345] *Students, Department of Electronics and Communication Engineering, Asansol Engineering College, Asansol-713305, India*

_____

ABSTRACT

Logistics can be benefited using chatbots by improving customer-facing operations and supply chain operations. The reasoning behind this would be mobile applications are becoming a saturated market and messenger applications are surpassing social networking applications regarding to the number of active users. Chatbots do not make mistakes and they are intuitive and easy to use. There are two modules in this online logistics system namely, Admin and Chatbot. Chat where we can chat using AI chatbot. A chatbot is a type of software that conducts a conversation via auditory or textual methods. Most of us have interacted with chatbots while online shopping or planning a holiday. Logistic includes tangible goods such as material equipment and supplies. Chatbot are usually stateful services remembering previous commands. Admin can login using credentials. There you can add questions and give main three keywords. We can enter the message by typing "hi" where AI chatbot will reply with hello greetings. As per the question asked, it will give response accordingly.

**Keywords:** *Chatbot, Information System, Web Application, Mobile Application*

I. INTRODUCTION

Chatbot are usually stateful services remembering previous commands. A chatbot is a type of software that conducts a conversation via auditory or textual methods. Most of us have interacted with chatbots while online shopping or planning a holiday. Logistic includes tangible goods such as material equipment and supplies. Logistics can be benefited using chatbots by improving customer-facing operations and

supply chain operations. Chatbots do not make mistakes and they are intuitive and easy to use. There are two modules in this online logistics system namely, Admin and Chatbot. Chat where we can chat using AI chatbot. Admin can login using credentials. There you can add

questions and give main three keywords. We can enter the message by typing "hi" where AI chatbot will reply with hello greetings. As per the question asked, it will give response accordingly. RF controlled solar panel based robotic vehicle can be used for observing an area and can be used for security purposes. In this solar panel project, solar power-based robotic vehicle is integrated with 360-degree camera. This robotic vehicle movement can be controlled using RF technology for remote operation. This system uses push buttons at the transmitting end. With the help of these push buttons, the receiver is able to receive commands. These commands that are sent are used to control the movement of the robot which gives instructions for either to move the robot forward, backward, left or right etc. It uses the Atmega 328 series of a microcontroller to achieve its desired operation. This robot car has a 360-degree camera that can be used as security surveillance and solar panel for charging the battery. The solar panel has an auto battery cut off system. The wireless camera will be streaming live on the android application.

BLOCK DIAGRAM:
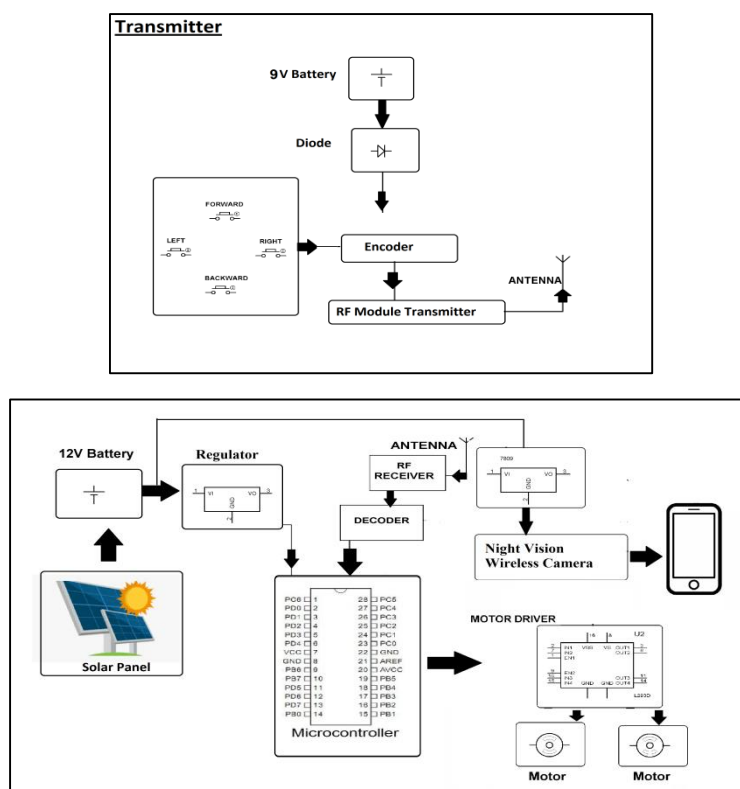
Block Diagram

HARDWARE SPECIFICATIONS:

- Atmega328p
- Solar panel (12V, 5W)

- chassis
- Crystal Oscillator
- Resistors
- Capacitors
- Transistors
- Cables and Connectors
- Diodes
- PCB and Breadboards
- LED
- Transformer/Adapter
- Push Buttons
- Switch
- IC
- IC Sockets

SOFTWARE SPECIFICATIONS:

- Arduino Compiler
- MC Programming Language: C

II. CONCLUSION

At present, e-commerce giants are actively applying artificial intelligence technology and optimizing their own e-commerce platforms to increase the competitiveness. Alibaba, dingdong and Amazon launched the intelligent service robot. in the field of logistics, e-commerce giants have also launched their own products .in terms of recommendation engines, alibaba has a visual artificial intelligence platform DT PAI, jingdong introduced image information platform zhong kui system and the character recognition system, so to speak, on the specific application of artificial intelligence, E-commerce enterprises have their own merits.

With the rapid development and continuous progress of research technology, deep learning platform, voice analysis technology, biometrics technology, image recognition technology, video analysis technology, robot automatic processing system, text analysis and natural language processing (NLP) and other mainstream artificial intelligence technologies will develop steadily, and AI will continue to promote the development and reform of e-commerce in the future.

Artificial intelligence techniques have stepped into the fast lane, with mature technology, is becoming more and more widely applied, it is having a growing impact on aspects such as customer retention and customer satisfaction in e-commerce transactions. As time goes on, Artificial intelligence will become an important driving force for the transformation of e-commerce. With the support of artificial intelligence technology, e-commerce will have a broader development prospect, which is conducive to the establishment of better customer relationship management and the promotion of sales

to bridge the gap between personalization and privacy.

REFERENCES

1. Seiler, R., & Wüest, S. (2022). AN ONLINE EXPERIMENT ON THE STEREOTYPE CONTENT

2. MODEL (SCM) AND CHATBOTS–DOES SWAPPING THE PICTURE MAKE A DIFFERENCE?. In 20th International Conference e-Society 2022, Virtual, 12-14 March 2022 (pp. 131-138). IADIS.

3. Jackson, C. Nanotechnology for Plant Genetic Engineering.

4. Aydın, Ö., & Karaarslan, E. (2022). OpenAI ChatGPT generated literature review: Digital twin in healthcare. Available at SSRN 4308687.

5. Thorp, H. H. (2023). ChatGPT is fun, but not an author. Science, 379(6630), 313-313.

6. Dash, R., McMurtrey, M., Rebman, C., & Kar, U. K. (2019). Application of artificial intelligence in automation of supply chain management. Journal of Strategic Innovation and Sustainability, 14(3), 43-53.

7. Kousiouris, G., Tsarsitalidis, S., Psomakelis, E., Koloniaris, S., Bardaki, C., Tserpes, K., ... & Anagnostopoulos, D. (2019). A microservice-based framework for integrating IoT management platforms, semantic and AI services for supply chain management. ICT Express, 5(2), 141-145.

8. Peng Mianzhu. Research progress and application overview of artificial intelligence [J]. Science and technology square, 2017 (10).

9. David2AI.5 ways artificial intelligence is shaping the future of e-commerce [EB/OL].CSDN, 2018-03

10. Chen Shangyi, jiang xiaolin, qin weijun. Intelligent practice of mobile e-commerce [J]. Information and communication technology, 2015,9 (04):9-14.

11. Zhou Xiaoyuan. Artificial intelligence: ushering in the era of subversive intelligence [M]. Beijing: taihai press, 2018.

12. Lin Jianhong. Application of artificial intelligence technology in e-commerce [J]. China

    business review, 2019(02):19-20.

13. Sun Liang, Huang Qian. Practical machine learning [M]. Beijing: posts and telecommunications

    press, 2017.

14. Wang Tianyi. Artificial intelligence revolution: history, present and future [M]. Beijing: Beijing

    times Chinese book company, 2017.

15. Yang aixi, bu xianghong, yan jiaxiang. Artificial intelligence era: the future has come [M].

    Beijing: posts and telecommunications press, 2018.

16. analysis: what is ai doing for e-commerce? [EB/OL]. Net economy agency, 2017-04-16.

17. inventory: top 10 ai e-commerce solutions in 2018 [EB/OL]. Web.com, 2018-06-26

ARTIFICIAL INTELLIGENCE (AI) IN EDUCATION: TRANSFORMING LEARNING EXPERIENCES THROUGH INTELLIGENT TECHNOLOGIES

Ranjita Sinha[1*], Sandip Haldar[1], Raj Majumdar[2], Aritra Roy[2], Gargi Dhar[2], Gnandeep Sarkar[2], Arijit Kabiraj[2]

[1] Department of BS&HU(Physics), Asansol Engineering College, Kanyapur, Asansol-

713305, West Bengal, India

[2] 1st year BCA student, Department of CA, Asansol Engineering College, Kanyapur, Asansol-713305, West Bengal, India

ABSTRACT

Artificial Intelligence (AI) has emerged as a powerful tool with the potential to revolutionize various sectors, and education is no exception. AI in education encompasses a wide range of technologies, including machine learning, natural language processing, and data analytics. These intelligent systems enable personalized and adaptive learning experiences tailored to individual students' needs and learning styles. By analyzing vast amounts of educational data, AI algorithms can provide real-time feedback, identify knowledge gaps, and suggest customized learning pathways, enhancing engagement and improving learning outcomes. The potential of AI in education is immense, it also presents challenges. Ethical considerations, data privacy, and algorithmic biases must be carefully addressed to ensure equitable and unbiased educational experiences. Additionally, concerns regarding the displacement of teachers and the need for digital literacy among educators need to be taken into account. AI has the capability to transform education by enhancing personalization, expanding access, and improving learning outcomes. By leveraging intelligent technologies, educators can create immersive and adaptive learning environments, empowering students to reach their full potential. However, responsible implementation and ongoing evaluation are essential to maximize the benefits while mitigating potential risks.

Keywords: *Artificial Intelligence, learning outcome, machine learning.*

I. INTRODUCTION

Henry Ford used the comparison to show the innovation does not mean that society should stick to the status quo, such as discovering methods to make horses quicker. It's sometimes important to look outside the box and create fresh approaches. Make cars, which are quicker than Horses and can transport people from point A to point B more quickly, s opposed to faster horses. The significant technological advancement that have occurred over the years,

particularly in the field of education, that have been driven by these concepts methodologies. It is in the 1950's, Dr. Potter a tenured professor at the nearby institution, staggers to a class while carrying a bulky stack of papers. After reading and evaluating the grammer and substance of each paper that the 40 students in his class submitted, he has just finished making them all. Dr. Potter thought the some of the papers had content that had been stolen from other source when reading them, but he was unable to definitively identify the source from which the student had taken the material. The development spread and introduction of technology and in particularly, artificial intelligence has made it simpler for educators to carry out their responsibilities in a more efficient manner and effectively. A significant shift to electronics computers for the mass market was made with the debut of microcomputers, and subsequentlypersonal computers, in the 1970's, according to Flame [1].

Campbell-kelly stated that the rise of personal computers in the 1970's was a major factor in the growth of computer in general and their accessibility to many organisations around various economic sector [2, 3, 7]. The emergence of personal computer made it feasible for people and other non-governmental organisations to possess and utilise computers for a variety of purpose. The use of computer in various areas of the education sector, more specifically, various sectors in the educational institution, has been made possible thanks to increment in computer and related computing technologies, building on earlier research into programmed instructions from the mid-1900's . One such area in the development of computing aided instructions and leaning (CAI/L) in the classroom interactions. The use of computers in the education has increased in various ways thanks to later developments in computer and its related technologies, such as networking, the internet, the world wide web, and increased processing, computing and other capabilities including different programmes and software packages that are task oriented. Specifically, in several divisions of educational institution. The advancement of computer and information communication technologies over time has facilitated the creation of artificial intelligence. The study of intelligent behaviour in people, animals and machines as well as the attempt to build such behaviour into an artefact, such as computers and its technologies, is what Whitby meant by artificial intelligence in definition (p.1). These definitionsmake it clear that artificial intelligence is the result of advance and improvement in computer, and its various technologies, which has enabled computers to do close to human like tasks. Artificial intelligence has also been enormously used in the educational sectors in accordance with the acceptance and application of new technology in education. Artificial Intelligence (AI) focuses on the various aspects, such as

machine learning to create distributed intelligence and striking a balance between web technologies and intelligent agent technology, learning and adaptation among other aspects of WI and AI that enable it to adapt to its environment and perform intelligent function, which should be encouraged and flourished. Artificial Intelligence has been incorporated into a number of departments inside educational institutions as well as the education industry. The use of effectiveness and efficiency in school administration, global learning, personalized/customized learning, smarter material, and many more.

As Artificial Intelligence continues to advance, new educational application become possible.

II. ARTIFICIAL ITELLIGENCE IN CURRENT EDUCATION

The image of artificial intelligence that comes in our mind is just about a supercomputer having enormous processing power, adaptive behaviour and other capabilities which specifies as a human like cognition and functional abilities, and which actually improve the supercomputer's interaction with humans. In fact, a variety of films have been produced to demonstrate the capabilities of AI, such as in smart buildings where the technology can control the temperature, air quality and even play music based onthe felt mood of the building resident's. Beyond the traditional notion of AI as a supercomputer to encompass embedded computer system, there has been a growth in the application of AI within the education sector. For instance, AI, computers an other supporting technologies may be integrated into robots that enhance student learning starting with the most fundamental kind of education, early childhood education. In fact, Timms asserted that cobots- the use of robots that collaborate with instructor or other robots are being used to teach kids basic skills like spelling and pronunciation while also adapting to the student's capacities. [7-9]. According to Chassignol et al., artificial intelligence has been of education. The focus of this study will be on these domains, which Chassignol et al. Consider as the foundation for examine and comprehending artificial intelligence in education. The use of AI algorithm and system in educational sector is rapidly gaining interest per year

III. PURPOSE OF STUDY

It is unavoidable that information technology has had a variety of effects on education as a result of its continuing application or use. This study aims to evaluate how various uses of AI in education have affected or had an impact on various aspects of education. The study will specifically aim to evaluate how AI has impacted sectors of education such as teaching, learning, administration, and management. The study is expected to show that AI has

enhanced instructional and learning effectiveness overall, as well as effectiveness and efficiency in the performance of administrative activities in education.

contribute to the expanding body of research, theory, and empirical data that identifies and analyses the various ways AI has impacted education. By promoting evidence-based decision-making and management and leadership practises in the sector, it will help academics, professionals, and policymakers, such as administrators, management, and leadership of educational institutions, and the education system. Numerous stakeholders in the education system will gain from this study. It will be on the sector. The results will also supplement those of previous studies and guide government policy and initiatives targeted at promoting the effective application of information technology, particularly artificial intelligence (AI), in the field of education.

IV. NATURE OF AI

Traditionally, artificial intelligence (AI) has been closely linked to computers. A review of the various articles reveals, however, that while computers may have served as the foundation for the development of artificial intelligence, there is a trend away from considering the computer alone, the hardware and software, or the equipment, to be artificial intelligence. This is especially true in the context of the education industry. Artificial intelligence has been made possible to transmit to machines and other objects, including robots and buildings, thanks to embedded computers, sensors, and other developing technologies [9]. In fact, Chassignol et al. give an in-depth definition and outline of AI. They describe AI as both a theory and a field

The definition of AI given brings up nearly identical components or aspects of AI that have b een discussed by other researchers and in other studies.

AI was described by Sharma et al. as "machines that can approximate human reasoning [11] (p.1).In a similar vein, Pokrivcakova noted that AI is the result of decades of research and dev elopment that brought together system designers, data scientists, product designers, statisticia ns, linguists, cognitive scientists, psychologists, education experts, and many others to develo p educational systems with some level of intelligence and the ability to perform different function including to assist teachers and students.

V. TECHNICAL ASPECT OF AI IN EDUCATION

Intelligent education, cutting-edge virtual learning, data analysis, and prediction are all parts of AI-aided education. Table 1 lists the main applications of AI in education and the accompanying technologies. Be aware that as learning requirements increase, AI-enabled education is becoming more crucial [10, 14]. Both teachers and students receive timely, personalised training and feedback from intelligent educational systems. By using a variety of computing technologies, particularly those linked to machine learning , which are strongly tied to statistical models and cognitive learning theory, they are intended to increase the value and effectiveness of learning.

On the basis of machine learning, data mining, and knowledge models, many strategies are incorporated into AI systems for learning analysis, recommendation, comprehension, and acquisition [18, 19]. The basic components of an AI education system are learning materials, data, and intelligent algorithms. These components can be further broken down into two categories: system models (which include learner models, teaching models, and knowledge models) and intelligent technologies. A model serves as the brain of an AI system, and technologies power it.

VI. ROLE OF AI IN EDUCATION

Timms makes an intriguing observation: artificial intelligence (AI) is extremely potent and has the ability to permeate and strongly influence changes in several societal sectors, with the education sector being one that is likely to be significantly affected by AI. Indeed, it is clear from the various papers under evaluation that AI has been adopted and utilised in the field of education, where it has encouraged advancements in a variety of areas of the industry. More specifically, it is clear that AI has been used in education, particularly in administration and teaching, and as a result has affected or had an impact on students' learning within the context of the narrative and framework proposed by Chassignol et al., which also forms the study's scope.

Further investigation of the various sources revealed additional significant findings, including the possibility of overcoming the physical constraints imposed by national and international borders due to the application of AI in education, as learning resources are now housed on the Internet and the World Wide Web. Utilising other features of AI, such as language translation tools, enables students to study best within the context of their unique talents. Learning online or using web-based learning platforms makes the content available from anywhere in the

globe. As will be shown in the section on the discussion of the study's findings, the results do in fact show that administration, instruction, and learning are more effective and efficient.

: In fact, there is evidence of AI in the context of application in the education sector that goes above and beyond the typical perception of AIs as computer systems solely, even from a review of other publications. An overview and summary of the nature of AI's application in education are given by Pokrivcakova's definition and description of the topic [12]. The implication is that AI in education is intended to do more than merely accomplish tasks typically performed by computers and devices associated to computers. Sharma even asserted that AI in its entirety trumps our current understanding of it

VII. IMPACT OF AI IN EDUCATION

A. AI IN ADMINSTRATION

The execution of administrative and management tasks in education has been significantly impacted by the application of AI in education, in its various forms and fulfilling distinct functions. It has made it possible for educators to carry out their administrative duties, such grading and giving feedback to pupils, more successfully. The programmes offered by AIWBE have features that give teachers access to grading manuals, making it simpler for them to evaluate student work and give comments [9, 10, 11, 12]. Similar capabilities and features are accessible on programmes like Knewton, which give instructors built-in functionality for performance evaluation, grading, and feedback for students to promote continual learning progress. AI has simplified administrative work and increased teachers' and instructors' efficiency and effectiveness in imparting knowledge instruction for students. A wide range of features offered by intelligent tutoring systems enable teachers to carry out many administrative activities, such as grading and providing feedback. Other software, including Grammarly, Ecree, PaperRater, and TurnItIn, among others, that makes use of AI also gives instructors the capabilities to carry out various administrative tasks, such as plagiarism checking, rating and grading, and giving students feedback on their areas for improvement. AI has significantly reduced the amount of paperwork and work that instructors must do, especially when performing various administrative tasks, allowing them to concentrate on their primary responsibilities, instruction and the dissemination of materials that are in line with the curriculum being used at the institution or nationally. Although many of the articles evaluated did not have this aspect of education as their primary focus, those that did showed evidence of attaining improvements in the quality of administrative processes

and tasks, as well as the effectiveness and efficiency of the teachers or educators in the performance of various administrative tasks.

B. AI IN LEARNING

The study's focus also includes student learning experiences, which have been significantly impacted by the adoption and application of AI. In fact, according to Rus et al.'s summary of the impact of AI on learning, ITS promotes deep learning because working with the conversational agents that are a crucial component of the system will probe and prod students until they are able to adequately explain themselves in detail, including the reasoning behind their position, improving the uptake and retention of information [10] (p.43). The numerous advantages of AI in students' learning experiences are covered in this study and others in various ways.

AI makes it possible to track the progression of learning, including knowledge and understanding, and uses the results to improve the system's ability to tailor content to the needs and abilities of the students. This motivates students and makes use of personal capabilities to increase uptake and retention [10, 12]. For instance, Pokrivcakova noted that AI has made it possible to develop and use intelligent learning systems and adaptive content that is tailored to each student's learning needs and abilities. For instance, intelligent virtual reality and the use of the same in simulation teaching and learning have been shown to have a positive impact on learning. (p.143)

VIII. DISCUSSION OF THE RESULT

It is clear from the various articles and studies reviewed that with technological developments and advancements, computers and other technologies related to computers, as well as other innovations, have encouraged the development of artificial intelligence. Artificial intelligence has permeated various spheres of society and may have a significant impact on various industries in which it is used. The education industry is one of these areas where AI has been used and is having a significant influence.

A definition and description of AI were regarded necessary as a foundation and framework for comprehending how AI has affected education. The many definitions produced from the studies considered revealed various AI principles, traits, and nature. As implied by the name, intelligence is a fundamental feature and tenet of AI. Until the advent of AI, this quality was exclusively reserved for humans [4, 5, 7, 9, 13, 17]

AI, computers, and consequently embedded systems like robots and facilities are given human-like qualities by intelligence, including cognition, learning, adaptability, and decision-making capabilities [6, 11, 13, 15, 16]. Academic institutions, in particular, now have the chance to harness and leverage the breakthroughs and advancements that led to the creation and usage of AI in the education sector.

: Therefore, it is implied and inferred from the analysis that the deployment of AI in particular educational institutions has had a significant impact on the education sector in general. When employing AI or leveraging AI, teachers and instructors can execute a variety of duties more quickly and effectively, including administrative tasks like evaluating, grading, and delivering feedback to students on their submitted assignments.

Teachers are also able to increase the quality of instruction by utilising AI or the various forms of AI, such as web-based and online intelligent systems, cobots, and chatbots. Students, on the other hand, are able to have a better and richer learning experience because AI uses machine learning, as suggested by the various studies. AI uses machine learning to assess capabilities and needs, and after that, with the results of such an analysis, develops and disseminates personalised or customised content, ensuring higher uptake and retention and, as a result, improving learning.

IX. CONCLUSION

Assessing the effect of AI on education was the study's goal or purpose. Utilising a literature review as part of the research concept and methodology, a qualitative study was conducted. Journal papers, professional publications, and conference reports from professionals were found and employed in an analysis to help the study's goal be achieved. The creation and usage of computers and computer-related technologies paved the way for research and inventions that eventually led to the creation and use of AI in a variety of fields. The development of personal computers in particular, as well as later advancements that increased processing and computing power and the capability to embed or integrate computer technologies in various tools, equipment, and platforms, has facilitated the growth and application of AI.

In the education sector, particularly in the educational institutions that were the subject of this study, AI has been widely accepted and deployed. With an emphasis on examining how AI has been deployed and the results it has had, the analysis evaluated the influence of AI on the administrative, instructional, and learning aspects of education.

AI in education first appeared as computers and computer-related systems, then as web-based and online learning environments. The usage of cobots or humanoid robots as teacher coworkers or independent instructors, as well as chatbots to carry out teacher or instructor-like tasks, has been made possible by embedded systems. The usage of these platforms and resources has increased or permitted the productivity and effectiveness of teachers.

X. ACKNOWLEDGEMENT

REFRENCES

[1] K. Flamm, Creating the Computer: Government Industry and High Technology, Washington, DC, USA:Brookings Institution Press, 1988.

[2] M. Campbell-Kelly, Computer Student Economy Edition: A History of the Information Machine, Evanston, IL, USA:Routledge, 2018.

[3] M. M. L. Cairns, "Computers in education: The impact on schools and classrooms" in Life Schools Classrooms, Singapore:Springer, pp. 603-617, 2017

[4] B. Coppin, Artificial Intelligence Illuminated, Boston, MA, USA:Jones and Bartlett, 2004.

[5] B. Whitby, Artificial Intelligence: A Beginner's Guide, Oxford, U.K.:Oneworld, 2008

[6] V. Devedžic, "Web intelligence and artificial intelligence in education", Educ. Technol. Soc., vol. 7, pp. 29-39, 2004

[7] M. J. Timms, "Letting artificial intelligence in education out of the box: Educational cobots and smart classrooms", Int. J. Artif. Intell. Edu., vol. 26, no. 2, pp. 701-712, Jan. 2016.

[8] Y. Fang, P. Chen, G. Cai, F. C. M. Lau, S. C. Liew and G. Han, "Outage-limit-approaching channel coding for future wireless communications: Root-protograph low-density parity-check codes", IEEE Veh. Technol. Mag., vol. 14, no. 2, pp. 85-93, Jun. 2019

[9] M. Chassignol, A. Khoroshavin, A. Klimova and A. Bilyatdinova, "Artificial intelligence trends in education: A narrative overview", Procedia Comput. Sci., vol. 136, pp. 16-24, Jan. 2018.

[10] V. Rus, S. D'Mello, X. Hu and A. Graesser, "Recent advances in conversational intelligent tutoring systems", AI Mag., vol. 34, no. 3, pp. 42-54, Sep. 2013

[11] R. C. Sharma, P. Kawachi and A Bozkurt, "The landscape of artificial intelligence in open online and distance education: Promises and concerns", Asian J. Distance Educ., vol. 14, no. 2, pp. 1-2, 2019.

[12] S. Pokrivcakova, "Preparing teachers for the application of AI-powered technologies in foreign language education", J. Lang. Cultural Edu., vol. 7, no. 3, pp. 135-153, Dec. 2019.

[13] United Nations Education Scientific and Cultural Organization (UNESCO). How Can Artificial Intelligence Enhance Education?, 2019, [online] Available: https://en.unesco.org/news/how-can-artificial-intelligence-enhance-education.

[14] H. T. Kahraman, S. Sagiroglu and I. Colak, "Development of adaptive and intelligent Web-based educational systems", Proc. 4th Int. Conf. Appl. Inf. Commun. Technol., pp. 1-5, Oct. 2010.

[15] R. Peredo, A. Canales, A. Menchaca and I. Peredo, "Intelligent Web-based education system for adaptive learning", Expert Syst. Appl., vol. 38, no. 12, pp. 14690-14702, Nov. 2011

[16] Surjandy, W. Suparta, A. Trisetyarso, C. H. Kang and B. S. Abbas, "Warding off the plagiarism with the applications (Case study at Bina Nusantara university student and faculty member)", Proc. Int. Conf. Inf. Commun. Technol. (ICOIACT), pp. 511-514, Mar. 2018.

[17] D. Crowe, M. LaPierre and M. Kebritchi, "Knowledge based artificial augmentation intelligence technology: Next step in academic instructional tools for distance learning", TechTrends, vol. 61, no. 5, pp. 494-506, Jul. 2017.

[18] S. Nunn, J. T. Avella, T. Kanai and M. Kebritchi, "Learning analytics methods benefits and challenges in higher education: A systematic literature review", Online Learn., vol. 20, no. 2, pp. 1-17, Jan. 2016.

[19] Y. Kim, T. Soyata and R. F. Behnagh, "Towards emotionally aware AI smart classroom: Current issues and directions for engineering and education", IEEE Access, vol. 6, pp. 5308-5331, 2018.

UNIVERSITY RECORD MAINTENANCE SYSTEM USING AUTOMATION TECHNIQUES USING MINIMUM TIME TO IMPROVE EFFICIENCY

[1]Bishnu Sah, [2]Swetank Rajhans, ,[3*]Amitava Chakraborty, [4]Subhas Chandra Nath, [5]Soumen Prakash Kabi, [6]Sejuti Majumder

[1]*Alumni, Department of CA, Asansol Engineering College and Analyst, Consulting, Deloitte, Kolkata,*
[2]*Alumni, Department of CA, Asansol Engineering College and Scholar Trainee WILP, Wipro Technologies, Bengaluru,*
[3,4,5,7]*Assistant Professor, Department of Computer Application, Asansol Engineering College,*
[6]*Alumni, Department of CA, Asansol Engineering College and Programming Expert, Creonix Online, Asansol.*

ABSTRACT

With the execution of the University Record Maintenance System, the University will be capable to streamline its administrative tasks such as managing Student records, Course schedules, Examination results, and Faculty information. It will also provide an online platform for Students to access their information, submit assignments, and communicate with their Professors and Mentors.The system will help to reduce manual errors and save a significant amount of time, as all the information will be stored digitally, making it easily accessible and searchable. Moreover, the system will enable the University to generate reports and statistics, facilitating data-driven decision-making. In summary, the University Record Maintenance System will modify the way the university operates, making it more efficient, organized, and transparent. It will benefit all Stakeholders, including Students, Faculty, and Staff, and lead to a higher level of academic excellence. By computerizing the record-keeping process, increases the efficiency, reduces the risk of human error, and improve level of security. Storing all the information in a single database makes it easy to search for and update information. Since the system automatically organize the data, it saves time and the resources involved in it. It sounds like the proposed system will be a great asset to the university, by allowing for more efficient and responsive record-keeping services. The secure access control ensures that sensitive data is only allowed to access by the authorized users.

Keywords: *Users, Data, Records, Access, Information, Database, Digital, Security*

I. INTRODUCTION

UNIVERSITY MANAGEMENT SYSTEM deals with the maintenance of University data, records, instructions, and student's information within the University. UMS is an automation system, which is used to store the information and students record.

This software is supported to eliminate and, in some cases, reduce the hardships faced by this existing system. Moreover, this system is designed for the particular need of the university to carry out operations in a smooth and effective manner. The application is reduced as much as possible to avoid errors while entering the data. It also provides error message while entering invalid password and id. No formal knowledge is needed for the user to use this system. Thus, by this all it proves it is user-friendly.

University Management System, as described above, is reliable and fast management system. It can assist the user to concentrate on their other activities rather to concentrate on the record keeping. Thus, it will help organization in better utilization of resources.

II. LITERATURE REVIEW

In order to determine progress, prospects, and barriers associated with the technological evolution of Nigerian universities, Sani in his work assesses the state of automated information services in a select group of Nigerian institutions. The study was carried out in the middle of 2002 utilising site visits, surveys, and interviews with university officials, faculty and staff, students, and researchers. The results show that automated services fell short, with just around 40% of the anticipated services being accessible and used. In comparison to non-federal colleges, federal universities produced more automated services since they had gotten more financing for such systems. The main challenges are a lack of funding, access to electricity and broadband, as well as human resources for systems that are automated. The respondents were only moderately satisfied with databases relating to management information systems (MIS) and computerised accounting systems, but they were extremely unsatisfied with the level of automated library services. The study's overall findings show the difficulties Nigerian universities have had integrating automated information services. [1]

The work of Saquin et al., talks about the creation of a computerised student academic record management system for the Philippines' DMC College Foundation Incorporated (DMCCFI). There are restrictions and difficulties with the current manual approach for keeping and

archiving student records. A centralised structure was devised and put into place to deal with these problems. Business intelligence is integrated into the system, which also has modules for assessment, grade submission, and a student terminal with security measures. Rapid Application Development (RAD) was the development methodology used, and the toolsets included Windows Server 2008 R2, Microsoft Visual Studio C#, Dev Express, MSSQL, and SmartDraw. The system's evaluation revealed that it was extremely satisfactory, and the dean, coordinators, and MIS employees all firmly agreed on its efficacy. The usefulness of the suggested system also garnered great marks. It was determined that the constructed system has the abilities and features required to enhance the effectiveness of the registrar services at DMCCFI, and it is advised for use right away. [2]

The goal of the work by Tamboli et al., in their paper is to develop a computer-based system that streamlines an educational institution's administrative processes. The program will be web-based and give college employees access to enter and manage student data, including grades, fees, and personal information. An individual ID will be given to each student for system-wide use. The suggested program intends to streamline administrative procedures, lessen human error, and handle student databases efficiently. It is appropriate for a variety of educational institutions since it provides an easy-to-use interface at a reasonable price. Currently, manual record keeping and data entry are prevalent practises, but they provide challenges when working with a sizable student population. Commercial solutions are too expensive, making them unusable for small businesses and individual teachers. The work suggests automating administrative tasks utilising a desktop or laptop computer, a local server or internet server, and a PHP-based application. Data will be highly secured to avoid unauthorised access, and the program will be tested to verify that only accurate information is accepted. [3]

The paper by Dabas et al., looks at nine university library systems in Punjab, Haryana, and Chandigarh to see how their automation mechanism state is at the moment. It emphasizes the requirement for comprehensive information content digitization in order to modernize libraries. In university libraries, it examines the purpose, elements, and field of library automation. Considerations include the sorts of library collections as well as the accessibility of gear and software. The study gives a summary of historical viewpoints and concentrates on housekeeping tasks, such as procurement, distribution, and financial administration. It discusses the issues and challenges of library automation and suggests solutions. The results

show that the 9 libraries are moving closer to automated systems and that housekeeping automation have been completed already. The sample is thought to be indicative of university libraries in India. The article emphasizes INFLIBNET's assistance with staff training, software development, and hardware purchase. It implies that networking and the digitization of printed documents may be among the innovations of the future. [4]

The usage of wireless networks for communication (WCN) in a logistic tracking information system (LTIS) for university logistics is the main topic of Li's work. To assess data performance and efficiency, an algorithm for building intelligent logistics systems is used. The system allows for monitoring and automated control of logistics, which leads to quicker reaction times, less energy use, and less sensor usage. In light of rising labour costs, it discusses the necessity for automation logistics systems and places a strong emphasis on the need of constant and real-time communication. For organisations to increase economic benefits and competitiveness, sophisticated logistical monitoring information management systems must be implemented. The study emphasizes the critical requirement of a wireless communication network infrastructure that can quickly and reliably adapt to the complicated industrial environment. Current logistics tracking information management systems are being developed and implemented because they are thought to be very advantageous for businesses since they enable efficient control, integration, and sharing of logistics-related data, which boosts productivity and competitiveness. Overall, the study emphasizes the advantages of WCN and clever algorithms in streamlining logistical operations at universities. [5]

III. OBJECTIVE

The objective of this work is to manage the details of Students and Colleges. The work is totally built at administrative end and thus only the administrator is granted the access. The purpose of this work is to build an application program to reduce the manual work for managing the Students, Registrations, and College registration.

The main goal of this system is to automate the process carried out in the organization with improved performance and realize the vision of paperless work, it reduces the manpower needed to perform the entire administration task by reducing the paper works needed.

Moreover, storing and retrieving of the information is easy, so less time is needed to do a work, and work can be done in a more effective manner.

Goals of University Management System –

1) To provide Programming support to keep existing information system viable & responsive to needs.

2) In this work it allows us to keep the records of Colleges affiliated to the University.

3) To allow the university to operate more effectively and efficiently by providing more responsive services and data of every colleges which come under the University.

4) To consolidate college data and information in to a comprehensive database, with secure access control providing and integrated view of a complete college university relationship.

5) It helps the administrator to add current notices and view them.

IV. METHODOLOGY

We saw that many universities used the old methods for storing and managing its data. They used notebooks, pen and paper medium for retrieving and accessing the information, as a result of which there was many room left for errors to take place and in actual there used to be many errors working that way out, so we made the University Management System. This work is implemented through Python.

Creation of Databases: - We create three databases Student, College, Announcement using sqlite3 package in Python.

Creation of Graphical User Interface (GUI): - We create the GUI using *Tkinter* libraryin Python. *Tkinter* allows us to create windows and different widgets like label, button, etc.

V. MAIN TEXT

In the existing system records have to be stored manually and accessing them is difficult but in proposed system we can computerize it using this work. All the details of the student and colleges are maintained in a single record so searching and upgrading the details are easier.

Lack of security of data: - In paper work there is a lot of lack of security because any one can access the database easily.

More man power: - In paper work it takes more man power to arrange the old and new data to arrange accordingly.

Time consuming: - it takes a lot of time to maintain the data of College and Student.

Consume large number of paper work: - Needs manual calculations.

VI. LIMITATION

While the works successfully solve the problems that were discussed before but it still comes with some limitations like:

1) This work cannot manage each and every section, such as every Student, Teacher and Staff.

2) There is no attendance portal currently available in our work because of this student can't access their daily attendance percentage.

3) In this Work Student cannot access their marksheet from student login section.

4) As our Work have limitation, but we hope to improve it in our future, our future goal plane details are given in Future Goal sheet.

VII. FUTURE SCOPE

We also want to modify our application for the future work. We hope this work will help us in our future work.

1) The aim of this work is to manage each and every section, such as every Student, Teacher and Staff.

2) Every teacher of particular colleges can login and manage their college students.

3) Student can easily access their marksheet from student login section.

4) There will be an online payment system for the college semester fees.

5) There will be a system for downloading Admission form for new applicant.

VIII. CONCLUSION

This work proved good as it provided practical knowledge all about handling procedure related with Automation with University record maintenance. It also provides knowledge about the latest technology used in Python technology using Tkinter that will be great demand in future. This will provide better opportunities and guidance in future in developing works independently.

REFERENCES

1. Evaluation of automated services in Nigerian universities.

2. DEVELOPING AN AUTOMATED STUDENT ACADEMIC RECORD MANAGEMENT WITH BUSINESS INTELLIGENCE

3. Institute Administration Automation and Student Database Management System

4. Automation Scenario In University Libraries: A Study of Some Selected Libraries

5. Research on Automation Control of University Logistics Management System Based on Wireless Communication Network

MULTIPLE DISEASE PREDICTION USING MACHINE LEARNING

[1]Divyanshu Kumar, [2]Ramratan Kumar, [3]Abhishek Kumar Choudhary, [4]Ankita Choudhary,

[5]Sanket Onkar, [6]Sambhaw Samrat, [7]Soumen Sen

[1,2,3,4,5,6]*Student, ECE Dept, Asansol Engineering College*
[7]*Assistant Professor, ECE Dept, Asansol Engineering College*

_____

ABSTRACT

Machine learning and Artificial Intelligence are playing a huge role in today's world. From self-driving cars to medical fields, we can find them everywhere. The medical industry generates a huge amount of patient data which can be processed in a lot of ways. So, with the help of machine learning, we have created a Prediction System that can detect more than one disease at a time. Many of the existing systems can predict only one disease at a time and that too with lower accuracy. Lower accuracy can seriously put a patient's health in danger. We have considered five diseases for now that are Heart, Lung Cancer, Parkinson, Breast Cancer and Diabetes and in the future, many more diseases can be added. The user has to enter various parameters of the disease and the system would display the output whether he/she has the disease or not. This paper represents the project work which can help a lot of people as one can monitor the person condition and take the necessary precautions thus increasing the life expectancy.

Keywords: *Machine learning, Artificial Intelligence.*

I. INTRODUCTION

In today's digital era, data has become a valuable asset, with vast amounts being generated across various industries. In the healthcare sector, data encompasses comprehensive information related to patients. However, existing models in the healthcare industry typically focus on analyzing individual diseases, such as diabetes, cancer, or skin diseases. There is a lack of a unified system that can analyze multiple diseases simultaneously. To address this limitation, we propose a system that leverages Django to predict multiple diseases accurately and promptly.

The proposed system aims to analyze diseases such as Diabetes, Heart Disease, and Parkinson's Disease, with the potential to expand to include more diseases in the future. By utilizing machine learning algorithms and Streamlit, we can implement the multiple disease prediction system. The behavior of the final model will be saved as a Python pickle file, facilitating efficient model usage.

The significance of this system lies in its ability to analyze diseases by considering all relevant parameters that contribute to the disease's occurrence. This comprehensive approach enhances the system's efficiency and accuracy in detecting diseases. By leveraging machine learning algorithms and Django, we can provide users with immediate and precise disease predictions based on the symptoms they enter.

Description:

A lot of analysis over existing systems in the health care industry considered only one disease at a time. For example, one system is used to analyse diabetes, another is used to analyse diabetes retinopathy, and another system is used to predict heart disease. Maximum systems focus on a particular disease. When an organization wants to analyse their patient's, health reports then they have to deploy many models. The approach in the existing system is useful to analyse only particular diseases. In multiple diseases prediction system, a user can analyse more than one disease on a single website. The user doesn't need to traverse different places in order to predict whether he/she has a particular disease or not. In multiple diseases prediction system, the user needs to select the name of the particular disease, enter its parameters and just click on submit. The corresponding machine learning model will be invoked and it would predict the output and display it on the screen.

Problem System:

In the current landscape of healthcare analysis, most machine learning models focus on analyzing a single disease per analysis. This means that separate models are required for liver analysis, cancer analysis, lung diseases, and so on. If a user wants to predict multiple diseases, they are forced to navigate through different websites or platforms, lacking a unified system for comprehensive disease prediction. Moreover, some existing models exhibit lower accuracy rates, posing potential risks to patients' health outcomes.

The lack of a common system that can perform multiple disease predictions presents challenges for organizations seeking to analyze their patients' health reports. Deploying multiple models for each disease analysis not only increases costs but also consumes valuable time and resources. Additionally, some existing systems consider only a limited set of parameters, which can lead to inaccurate and false results, further compromising patient care.

To address these issues, there is a pressing need for a comprehensive and accurate system that can predict multiple diseases simultaneously. By developing such a system, healthcare organizations can streamline their analysis processes, reduce costs, and enhance patient care outcomes.

Proposed System:

In multiple disease prediction, it is possible to predict more than one disease at a time. So, the user doesn't need to traverse different sites in order to predict the diseases. We are taking five diseases that are Diabetes, Heart, Lung Cancer, Parkinson Disease, Breast Cancer. As all the five diseases are correlated to each other. To implement multiple disease analyses we are going to use machine learning algorithms and Streamlit. When the user is accessing this website, the user has to send the parameters of the disease along with the disease name. Streamlit will invoke the corresponding model and returns the status of the patient.

MOTIVATION

The primary objective of this research is to develop a comprehensive model for predicting multiple diseases, including Heart Disease, Diabetes, Parkinson's Disease, Lung Cancer, and Breast Cancer. The study aims to identify the most effective classification algorithm for assessing the likelihood of multiple diseases in a patient. To achieve this, a comparative analysis is conducted using various classification algorithms such as Logistic Regression, Support Vector Machines (SVM), Naïve Bayes, Decision Trees, and Random Forests.

While these machine learning algorithms are widely used, accurately predicting multiple diseases is a critical task that requires the highest possible accuracy. There is a pressing need to create a system that allows end users to predict diseases based on provided symptoms without visiting hospitals. This approach would alleviate the burden on hospitals and reduce the workload on medical staff. Additionally, such a system would help decrease the financial costs associated with treatment and minimize panic-inducing situations that often occur during advanced stages of diseases.

By implementing this system, timely and appropriate medication can be provided, potentially lowering the mortality rate. The system also encompasses other components that contribute to its effectiveness in disease prediction.

Moreover, this research addresses the growing demand for accessible healthcare solutions by leveraging technology. By developing a user-friendly system for disease prediction, individuals can conveniently assess their health status from the comfort of their own homes. This not only reduces the need for frequent hospital visits but also empowers individuals to take proactive measures for their well-being.

The comparative study and analysis of various classification algorithms enable the identification of the most accurate and reliable algorithm for disease prediction. This ensures that the developed system provides trustworthy and precise results to users. Additionally, the

research emphasizes the importance of accuracy in multiple disease prediction, as erroneous predictions could lead to detrimental consequences for patients.

The potential impact of this research is substantial. By reducing the rush in hospitals, medical staff can allocate their time and resources more efficiently, thereby improving the overall quality of patient care. The financial burden associated with costly treatments can be mitigated through early detection and intervention, ultimately leading to more cost-effective healthcare practices.

Ultimately, the proposed system aims to contribute to the enhancement of public health outcomes. By enabling timely detection and intervention for multiple diseases, it has the potential to save lives, improve patient experiences, and alleviate the strain on healthcare systems.

II. OBJECTIVE

There exists a pressing need to develop a system that enables individuals to predict chronic diseases without the necessity of visiting a physician or doctor for diagnosis. This system would leverage machine learning techniques to identify various diseases based on the observed symptoms of patients. Currently, there is a lack of standardized procedures for handling both text and structured data in this context. Therefore, the proposed framework aims to consider both structured and unstructured data to achieve accurate disease predictions.

Machine learning has the potential to significantly improve the accuracy of disease predictions by effectively analyzing the available data. In the healthcare industry, providing high-quality services to all patients remains a major challenge, often limited to those who can afford it. Despite the existence of extensive healthcare data, it is not being efficiently and reliably mined to uncover valuable insights for informed decision-making.

By implementing a system that allows users to predict diseases based on provided symptoms, the rush at hospital outpatient departments (OPDs) can be reduced, alleviating the workload on medical staff. Furthermore, such a system can minimize costly treatments and prevent critical situations at advanced disease stages, facilitating timely and appropriate medication. Ultimately, this can contribute to lowering the mortality rate associated with these chronic diseases.

The proposed system also includes a database feature that stores user-entered data along with the diagnosed disease, serving as a valuable past record for future treatments. By utilizing machine learning algorithms, the accuracy of disease analysis is enhanced. Collectively, this

system aims to simplify health management, utilizing data mining techniques to detect chronic diseases at an early stage.

Machine learning, which involves training computer systems to improve their performance based on examples or historical data, plays a pivotal role in this framework. The process of enabling computers to learn from data and experience is at the core of machine learning. Through the stages of training and testing, disease prediction based on patient signs and medical history can be accomplished. The integration of machine learning technology presents a promising avenue for effectively addressing healthcare challenges within the medical sector.

Overall, this proposed system seeks to leverage the power of machine learning to enable accurate and accessible disease prediction, paving the way for improved healthcare outcomes and more efficient healthcare practices.
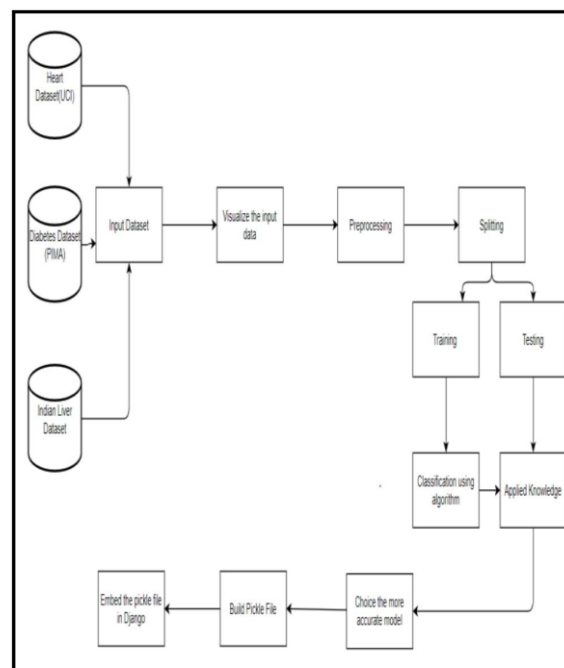
DESIGN

Architecture Design

Fig 1 Architecture Design

In the figure no 1 we have experimented on three diseases that is heart, diabetes Parkinson, breast cancer and lung cancer as these are correlated to each other. The first step is to get the dataset for heart disease, diabetes, Parkinson, Brest Cancer and Lung Cancer we have imported the UCI dataset, Kaggle dataset respectively. Once we have imported the dataset then visualization of each inputted data takes place. After visualization pre-processing of data
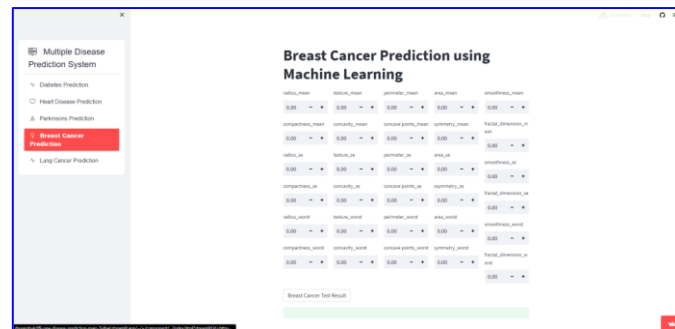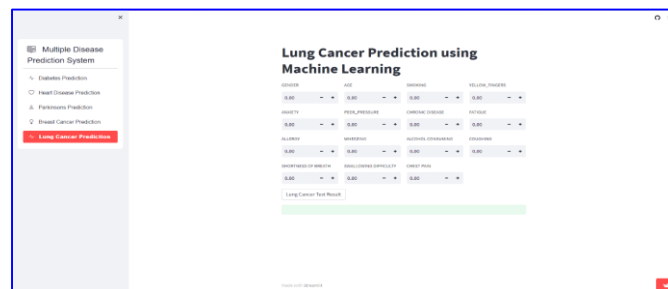
takes place where we check for outliers, missing values and also scale the dataset then on the updated dataset we split the data into training and testing. Next is on the training dataset we had applied ken, boost and random forest algorithm and applied knowledge on the classified algorithm using testing dataset. After applying knowledge, we will choose the algorithm with the best accuracy for each of the disease. Then we build a pickle file for all the disease and then integrated the pickle file with the Django framework for the output of the model on the webpage.

<u>User Interface Design</u>

Fig 2 Diabetes User Interface

Fig 3 Heart Disease User Interface

Fig 4 Parkinson's Disease User Interface

Fig 5 Breast Cancer User Interface

Fig 6 Lung Cancer User Interface

III. FUTURE SCOPE

- Integration of Multi-omics Data: Future research may focus on integrating multiple types of omics data, such as genomics, proteomics, metabolomics, and epigenomics, to enhance the predictive power of machine learning models. This comprehensive approach can provide a more holistic understanding of disease development and progression.

- Incorporation of Environmental Factors: Expanding machine learning models to include environmental data, such as air quality, pollution levels, lifestyle factors, and socioeconomic indicators, can improve disease prediction accuracy. This integration can help identify and assess the impact of environmental risk factors on disease outcomes.

- Real-Time Data Analysis: Advancements in data processing speed and availability of real-time health data from wearable devices and sensors offer opportunities for real-time disease prediction and monitoring. Machine learning models can be developed to analyze streaming data and provide timely alerts or interventions for early detection and prevention.

- Interpretable and Explainable Models: Enhancing the interpretability and explainability of machine learning models is crucial for their acceptance and adoption

in clinical practice. Future efforts may focus on developing models that provide transparent explanations for predictions, allowing healthcare professionals to understand and trust the decision-making process.

IV. CONCLUSION

- In conclusion, the field of Multiple Disease Prediction using Machine Learning holds tremendous potential for revolutionizing healthcare by enabling early detection, personalized interventions, and efficient resource allocation. Through the integration of diverse datasets and the application of various machine learning algorithms, significant progress has been made in predicting diseases such as heart disease, diabetes, Parkinson's disease, lung cancer, and breast cancer.

- The findings from this project highlight the effectiveness of machine learning algorithms, including logistic regression, decision trees, support vector machines, random forests, naive Bayes, and gradient boosting methods, in predicting multiple diseases. These algorithms offer unique strengths and advantages, ranging from interpretability and simplicity to handling complex relationships and high-dimensional data. By leveraging features such as genetic markers, biomarkers, clinical records, lifestyle factors, and emerging data sources, more accurate and holistic risk assessments can be achieved.

- The successful implementation of machine learning-based disease prediction models requires careful consideration of data quality, feature engineering, model selection, validation, and ongoing monitoring to ensure their reliability and generalizability. Additionally, future research and development are crucial to refine existing algorithms, explore new techniques, validate predictive models in diverse populations, and overcome challenges related to data privacy and ethical considerations.

REFERENCES

1. Sivakami, M., Prabhu, P. , Classification of algorithms supported factual knowledge recovery from cardiac data set, Int. J. Curr. Res. Rev. 13(6) 161- 166. ISSN: 2231-2196 (Print) ISSN: 0975-5241 (Online).

2. Sivakami, M., Prabhu., P., (2019) A Comparative Review of Recent Data Mining Techniques for Prediction of Cardiovascular Disease from Electronic Health Records. In: Hemanth D., Shakya S., Baig Z. (eds) Intelligent Data Communication Technologies and Internet of Things. ICICI 2019. Lecture Notes on Data Engineering and Communications Technologies, vol 38. Springer, Cham 477-484. ISSN 2367-4512 ISSN 2367-4520 (electronic), ISBN 978-3-030-34079-7 ISBN 978-3-030-34080-3 (eBook) .

3. Jothi, N., Rashid, N. A., W. Husain, (2015) Data mining in healthcare – A review, Procedia Comput. Sci. 72 306–313.

4. Prabhu, P., Selvabharathi. S., (2019) Deep Belief Neural Network Model for Prediction of Diabetes Mellitus. 3rd International Conference on Imaging, Signal Processing and Communication, ICISPC pp. 138–142) Institute of Electrical and Electronics Engineers Inc. ISBN:9781728136639.

5. Manne, R., Kantheti, S. C., (2021) Application of artificial intelligence in healthcare: chances and challenges, Curr. J. Appl. Sci. Technol. 40 (6) 78–89, https://doi.org/10.9734/cjast/2021/v40i631320.

STUDY OF MECHANICAL PROPERTIES OF FDM 3D PRINTED PLA MATERIAL

Anish Deb[1], Sumanta Karmakar[2], Srikumar Ghosal[3], P K Rao[3], Sourav Rajak[4], Arghya Kundu[4], Sasanka Sekher Lahiri[4], Aayush Kumar Singh[4], Shakeeb Khan[4]

[1] *Assistant Professor, Department of Mechanical Engineering, Asansol Engineering College*
[2] *Assistant Professor, Department of Electronics and Communication Engineering, Asansol Engineering College*
[3] *Technical Assistant, Department of Mechanical Engineering, Asansol Engineering College*
[4] *Student, Department of Mechanical Engineering, Asansol Engineering College*

_____

ABSTRACT

Additive Manufacturing has become one of the primary advances of the fourth industrial revolution. Fused Deposition Modelling (FDM) is one of the most widely used additive manufacturing processes for various applications. FDM is an additive manufacturing technology that creates 3D components using a continuous thermoplastic or composite material thread in filament form. An extruder feeds the plastic filament through an extruding nozzle, which is melted and then selectively deposited layer by layer onto the build platform in a predetermined automated path. This study aims to review research the progress on factors that affect the 3D printing results of the fused deposition modeling (FDM) process. The review is carried out by mapping critical parameters and characteristics determining FDM parameters. In this study after printing few sample with a fixed infill density, raster angle, nozzle temperature, mechanical testing has been carried out. Mechanical testing for hardness testing, impact testing and compression has been carried out for the sample. The testing results has been tabulated and discussed with reference to the previously published article.

Keywords: *3D Printing, FDM Technology, PLA Material, Mechanical Properties.*

I. INTRODUCTION

While the developments of additive manufacturing (AM) techniques have been remarkable thus far, they are still significantly limited by the range of printable, functional material systems that meet the requirements of a broad range of industries, including the health care, manufacturing, aerospace, dental industries and automotive industries. Furthermore, with the rising high demand for sustainable developments. Each AM method has its specific applications based on its own advantages. Powder bed selective fusion methods are suitable to produce complex and high accuracy components. While wire-fed AM methods (beam/arc) have the highest deposition rates due to the feedstock of wire materials, which are commonly used to produce large scale components.

The concept of AM - that is most commonly referred to as rapid prototyping (RP) and free-form fabrication is governed by 3D printing (3DP), which covers a set of techniques that use a layer-by-layer deposition to build parts or products; usually with a small size, in low quantities, and with a complex, tailored design. The emergence of 3D printing in the industry began in 1986, when Charles Hull created the first commercially available 3D printer, using the stereolithography (SLA) technology, to improve the plastic fabrication process. A few years later, Carl Deckard developed an apparatus to produce a part comprising a plurality of sintered layers by selective laser sintering (SLS). In the early 1990 s, fused deposition modeling (FDM) was invented by Emanuel Sachs and co-workers. In the last two decades, 3D printing has proven usefulness in multiple sectors, such as aerospace industries, defense and aircraft areas, automobile sectors, architectural industries and even art fields. Tissue engineering, regenerative medicine and dentistry also adopted 3D printing. Being able to print tissues and organs by 3D printing was a big step forward in the biomedical world.

With the high demand for lightweight, more functional and cost-efficient product systems. The recent levels of research and developments in nano-materials, biomaterials, and composites, supported by improving metrological methods have certainly created more opportunities for exploring potential applications for polymer-based material systems. This is especially in the development of advanced, multifunctional material systems (MFMSs), i.e. polymer composites in the form of polymer blends, nano-based polymer composites, hydrogels, etc. which continue to be a very promising area for driving product system developments that meets the sustainability, high performance requirements of global supply chains, especially in light of toughening government regulations, and increasing demand from developing economies.

Initially, 3D printing has been extensively used by architects and designers to produce aesthetic and functional prototypes due to its rapid and cost-effective prototyping capability. The use of 3D printing has minimised the additional expenses that are incurred in the process of developing a product. However, it is only in the past few years that 3D printing has been fully utilised in various industries from prototypes to products. Product customisation has been a challenge for manufacturers due to the high costs of producing custom-tailored products for end-users. On the other hand, AM is able to 3D print small quantities of customised products with relatively low costs. This is specifically useful in the biomedical field, whereby unique patient-customised products are typically required. Customised functional products are currently becoming the trend in 3D printing as predicted by Wohlers Associates, who envisioned that about 50% of 3D printing will revolve around the manufacturing of commercial products in 2020.

The advantages of 3D printing technology will continue to emerge through continuing research efforts, which must be undertaken to understand and eliminate constraints that inhibit the use of this technology. Design tools to assess life-cycle costs i.e., AM-oriented computer-aided design (CAD) systems with more user-friendly and advanced simulation capabilities are some of the key aspects that need to be realized. A distinguished advantage of 3D printing is mass customisation i.e., production of a series of personalised goods such that each product can be different while maintaining a low price due to mass production. 3D printing is devoid of the added cost due to mould making and tooling for a customised product. Therefore, mass production of a number of identical parts can be as cost-effective as the same number of different personalised goods.

Generally, decisions across material, process, and design strategies occur in a nonlinear and integrated fashion that requires careful consideration and knowledge of their relation to an application. Here, materials, process, and design strategies for polymer printing are reviewed in the context of medical applications, with a critical assessment for how each of these decision factors influence applications and one another. Initially, materials are reviewed to highlight their capabilities and properties, with data presented to compare diverse materials available for mechanical applications. Objective of the current study is to experimentally determine the mechanical properties like impact strength, hardness and compressive strength of PLA based 3D printed product using FDM Technology.

II. LITERATURE SURVEY

Muammel M Hanon et al. (2021) studied that the influence of various process setting on the dimensional accuracy of 3D printed product of cylindrical and rectangular forms. Also the influence of various process setting and color on the weight of the printed part with different color and orientation. The researchers observed that worst dimensional accuracy for cylindrical specimens with 45^0 angle sample due to tilted layer position. Also a remarkable influence was noticed for the layer thickness parameter, 100 µm layer with inferior thickness accuracy as compared to 200 µm. The raster direction angle parameter has insignificant impact on thickness accuracy.

Muammel M Hanon et al. (2020) studied that the present work is concerned with the examination of the effect of fused deposition modeling process settings and the presence of bronze on the mechanical and tribological (in terms of wear and friction) behavior of 3D-printed bronze/ PLA composite .There is a steady increase in the number of studies on the 3D printing of reinforced thermoplastic polymers the commercial FDM 3D printers could be utilized affordable and good quality alternative for fabricating The On-Edge print orientation revealed maximum tensile stress of 28 MPa ,The Upright sample showed

a very fragile behavior, with extremely rapid fracturing of the printed layers with 1.1% elongation at the break point.

Mohanraj Ramasamy et. al. (2021) studied that Additive manufacturing is an advanced manufacturing technology to fabricate three dimensional (3D) objects by adding materials in a layer by layer approach based on part design.FDM process starts with the design of Computer Aided Design (CAD) model of the partG-code has been generated based on the data to control the FDM machine In this work, an experimental investigation has been carried out to study the influence of raster angle ,infill pattern showed partial brittle-ductile fracture failure mechanism. Inter-raster failure mode has been observed in part built with honeycomb pattern.

Mohammad S. Alsoufi et. al. (2019) studied that Worldwide, in modern manufacturing industries, the attention to maximizing productivity has been one of the set performance targets for an extended period One of the latest non-conventional technologies to have made an important step over the last two decades or so is additive manufacturing (AM) techniques \. Experimental investigations at the small scale level are necessary to understand the warping characteristics in FDM 3D of prototypes. The error in accuracy observed in the final part of FDM 3D printed products arises from shrinkage during cooling and solidification or warping as uneven heat distribution creates internal stresses within a part.

Prairit Sharma et. al. (2022) studied that   industrial revolution dawned in the manufacturing and processes landscape, a new technique of manufacturing parts was idealized. Additive Manufacturing or 3D Printing is the process of rapidly materializing. Computer-Aided Design (CAD) models. The AM technique could create prototypes and can almost instantly realise complex shapes and intricate features in the design. The ever-increasing demand for customization, sustainability and improved quality has brought additive manufacturing techniques to the forefront in the production domain. The machine learning model works on the decision tree algorithm and finds patterns in the effect of the various parameters studied in this research on dimensional accuracy.

Manav Doshi et. al. (2022) studied that Additive Manufacturing (AM) is one of the most commonly researched technologies for processing various components. Adding fibers into the thermoplastic matrix and preparing high-performance filaments have been indicated by Valeanetaon the mechanical properties of the 3D printed parts as these objects are used abundantly in biomedical and tissue engineering. In this article, working principle of FDM process in given initially, in this article, a thorough review of the FDM process is carried out, and it can be concluded that proper alterations in the printing parameters lead to an increase in the tensile strength significantly and Young's modulus autonomously and

concurrently. The maximal tensile strength and Young's modulus were found to be recorded with the 0 raster angle.

III. MATERIALS AND METHODS

Thermoplastics: The most widely used materials in FDM printing are thermoplastics, which can be melted and solidified repeatedly without undergoing significant chemical changes. Popular thermoplastics used in 3D printing include:

A. Polylactic Acid (PLA): PLA is a biodegradable and plant-based thermoplastic. It is easy to print with, has a low melting temperature, and offers good strength and surface finish. PLA is commonly used for prototypes, consumer products, and educational purposes.

B. Acrylonitrile Butadiene Styrene (ABS): ABS is a durable and impact-resistant thermoplastic. It has a higher melting temperature than PLA and exhibits better mechanical properties. ABS is suitable for functional prototypes, automotive parts, and electronic housings

C. Polyamide (Nylon): Nylon is a strong and flexible thermoplastic that offers excellent durability. It has a high melting point and is commonly used for functional prototypes, gears, and parts requiring high wear resistance.

D. Polycarbonate (PC): PC is a strong, transparent, and heat-resistant thermoplastic. It is well-suited for applications that require high impact resistance, such as protective covers, automotive components, and medical devices.

Metals: FDM printing with metals, known as metal additive manufacturing, involves using powdered metals that are selectively fused together. Metal 3D printing is often used in industries such as aerospace, healthcare, and automotive. Common metals used in 3D printing include stainless steel, aluminium, titanium, and nickel alloys.

III.I Procedure in 3d Printing:

Design: The first step in 3D printing is creating or obtaining a digital 3D model. This can be done using computer-aided design (CAD) software or by downloading pre-existing models from online repositories.

Slicing: Once the 3D model is ready, it needs to be sliced into thin layers using slicing software. This software translates the 3D model into instructions that the 3D printer can understand, specifying parameters such as layer thickness and infill density.

Preparing the Printer: Before printing, the 3D printer must be prepared. This involves ensuring the print bed is clean and level, loading the desired material (filament or resin) into the printer, and calibrating the printer settings.

Printing: The 3D printer follows the instructions from the sliced file to build the object layer by layer. For filament-based printers, the filament is melted and extruded through a heated nozzle, which moves along the X, Y, and Z axes to deposit material. For resin-based printers, the liquid resin is selectively cured using UV light, solidifying each layer.

Post-Processing: Once the printing is complete, the object may require post-processing. This can include removing support structures, sanding or polishing the surface, applying finishes or coatings, or post-curing the object in the case of resin-based prints.

Finishing: After post-processing, the printed.

III.II Criteria for Selecting Suitable Filament:

When choosing filaments for 3D printing, there are several criteria to consider to ensure you select the most appropriate material for your specific application. Here are some key factors to consider:

Strength and Durability: Determine the strength requirements of your printed object. If you need a strong and durable part, filaments like ABS (Acrylonitrile Butadiene Styrene) or nylon are good choices. If you require even greater strength, filaments with reinforcing fibers like carbon fiber or glass fiber can be used.

Flexibility: Consider the flexibility or rigidity needed for your printed object. Flexible filaments like TPU (Thermoplastic Polyurethane) or TPE (Thermoplastic Elastomer) are suitable for applications that require elasticity or impact resistance. On the other hand, rigid filaments like PLA (Polylactic Acid) or PETG (Polyethylene Terephthalate Glycol) provide stiffness.

Heat Resistance: Evaluate the temperature requirements of your application. For high-temperature applications, filaments like ABS, PETG, or nylon are preferable as they offer better heat resistance compared to PLA. Specialty filaments like PEEK (Polyether Ether Ketone) or PEI (Polyetherimide) can withstand even higher temperatures.

Chemical Resistance: Consider whether your printed object will come into contact with chemicals. Filaments like PETG, nylon, or polycarbonate are known for their chemical resistance and can withstand exposure to various chemicals without degrading.

Printability: Evaluate the ease of printing with the filament. Some filaments require specific printing conditions, such as higher nozzle temperatures or heated beds. PLA is generally considered easy to print with, while filaments like ABS or nylon can be more challenging due to their higher printing temperatures and potential warping issues.

Cost: Determine your budget and the cost of the filament. Different filaments vary in price, with some specialty materials being more expensive than standard ones like PLA. Consider the cost-effectiveness for your specific application.

Aesthetic Requirements: If you have specific aesthetic requirements, such as a smooth surface finish or translucent appearance, consider filaments like PLA, PETG, or resin-based materials.

Environmental Impact: If environmental sustainability is a concern, you may prefer filaments that are biodegradable or made from renewable sources, such as PLA or certain types of bio-based materials.

By considering these criteria, you can choose the most appropriate filament that aligns with your specific application's requirements and constraints.

IV. RESULTS AND DISCUSSION

IV.I. Model of Spur Gear

Spur gears play a significant role in mechanical engineering and can obtain a high transmission and energy consumption ratio, common elements used in the transfer of motion, and high intensity control for mechanical drives, i.e., belt drives, chain drives, and cylindrical drives. Such power transmission components are subjected in terms of load and speed to nonconforming working environments, which are often important at high speeds. Here we will design a spur gear using AutoCAD software the slice using Cura slicer software and print using FDM 3D Printing machine using PLA material.

Spur Gear Specification:

Diameter of gear = 30mm

Hole diameter = 10.2mm

Number of teeth = 20

Width of gear = 13.63mm

Fig 1- Model of Spur Gear

IV.II CALCULATION OF STRENGTH IN PLA MATERIAL:

IMPACT TEST:

In this test we will find out the amount of energy absorbed by the PLA test specimen at different infill of material.

Test Machine - Izod/Charpy impact test machine

Test material - Polylactic Acid (PLA)
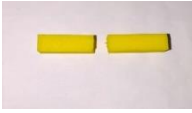
Angle of striking hammer=141^0

Material Specification-(55*10*10) mm

Dimensional Accuracy of specimen – Least count of Vernier scale = 0.02 mm

Table 1: Impact Test Result

Sl No	Drg Spec	Main Scale Reading	Vernier Scale Reading	Total Reading
Breadth				
1	10	10	-1	9.98
2	10	10	18	10.36
3	10	10	0	10
Height				
1	10	10	11	10.22
2	10	10	12	10.24
3	10	10	17	10.34
Length				
1	55	55	58	56.16
2	55	55	59	56.18
3	55	55	-3	54.94

Test Result:

At Infill 35%	At Infill 45%	At Infill 60%
Amount of energy stored=2joule	Amount of energy stored=2joule	Amount of energy stored=2joule
Fig.2 35% Infill	Fig.3 45% Infill	Fig.4 60% Infill

Compression Test:

In this test we will find out the compressive strength of the PLA material.

Test Machine- Ultimate Tensile Test machine, Compressive Test machine

Test material-Polylactic Acid (PLA)

Material Specification-(12.7*12.7*25.4) mm-ASTM D695

Compressive strength = Ultimate load /Cross-sectional are

Infill Percentage=100%

Dimensional Accuracy of specimen – Least count of Vernier scale = 0.02 mm

Table 2: Compression Test Result

Sl No	Drg Spec	Main Scale Reading	Vernier Scale Reading	Total Reading
Breadth				
1	12.7	12.8	14	12.98
2	12.7	13	16	12.98
3	12.7	12.9	15	12.98
Height				
1	25.4	25.6	40	26.40
2	25.4	25.5	41	26.28
3	25.4	25.5	41	26.32
Length				
1	12.7	13	16	13.32
2	12.7	13	17	13.34
3	12.7	13	17	13.34

Compression Test Result:

a.	In Universal Testing Machine, we get	
	Ultimate load = 10 kN	
	Cross-sectional area = 161.29 mm^2	
	Compressive strength = 62 N/ mm^2	Fig. 5
b.	In Compression Testing Machine, we get	
	Ultimate load = 5 kN	
	Cross-sectional area = 322.58 mm^2	
	Compressive strength = 15.50 N/ mm^2	Fig. 6

Observation:

Here we can observe that from the above tests that we get different compressive strength of same material in different machine and in different orientation

Hardness Test:

In this test we will find out the Brinell Hardness of the PLA material-

Test Machine- Brinell Hardness machine

Test material-Polylactic Acid (PLA)

Material Specification-(25*13*6) mm-ASTM D618

Diameter of Ball (D) =5mm

Infill Percentage=35%

BHN=2P/πD(D-(D2-d2)1/2

P=Load applied on the specimen(kgf)

D= Diameter of Ball(mm)

d= Diameter of indentation(mm)

Dimensional Accuracy of Specimen- Least count of vernier scale=0.02

Table 3: Hardness Test Result

Sl No	Drg Spec	Main Scale Reading	Vernier Scale Reading	Total Reading
Breadth				
1	13	13.2	25	13.7
2	13	13.2	26	13.72
3	13	13.2	0	13.2
Height				
1	6	6	7	6.14
2	6	6	5	6.10
3	6	6	2	6.04
Length				
1	25	25	27	25.54
2	25	25	28	25.56
3	25	25	25	25.50

Test Result:

We applied load on our test specimen and we get

BHN=2P/πD(D-$(D^2$-$d^2)^{1/2}$ kgf/mm^2

P=250kgf D=5mm   d=3.3mm

BHN =2*250/3.14*5(5-$(5^2$-$3^2)^{1/2}$ kgf/mm^2

BHN = 2*250/3.14*5(5-(25-10.89)1/2 kgf/mm2

BHN =2*250/3.14*5(5-$(14.11)^{1/2}$) kgf/mm^2

BHN = 500/15.7(5-3.75) kgf/mm^2

BHN = 500/3.14(1.25) kgf/mm^2

BHN = 500/19.625 kgf/mm^2

BHN = 25.4841 kgf/mm^2

BHN = 2*250/3.14*5(5-(25-10.89)1/2 kgf/ mm^2

BHN =2*250/3.14*5(5-$(14.11)^{1/2}$) kgf/mm^2 BHN = 500/15.7(5-3.75) kgf/mm^2

BHN = 500/3.14(1.25) kgf/mm^2

BHN = 500/19.625 kgf/mm^2

BHN = 25.4841 kgf/mm^2

Fig.7 Hardness Test of Specimen with
indentation

All the tests are performed on PLA material and we get the following results as per Table 4.

Table 4

Sl. No	Test Name	Specimen Size	Test Machine	Infill %	Test result
01.	Charpy Impact Test	55*10*10mm	Charpy impact test machine	35%	Energy stored=2J
02.	Charpy Impact Test	55*10*10mm	Charpy impact test	45%	Energy stored=2J

			machine		
03.	Charpy Impact Test	55*10* 10mm	Charpy impact test machine	60%	Energy stored=2J
04.	Compression Test	12.7*1 2.7*55 mm	Ultimate tensile test machine	100 %	Compressive strength=6 2.00N/mm^2
05.	Compression Test	12.7*1 2.7*55 mm	Compressive test machine	100 %	Compressive strength=1 5.50N/mm^2
06.	Brinell Hardness Test	25*13* 6mm	Brinell Hardness Test Machine	35%	Brinell Hardness Number (BHN)=25 .4842 kgf/mm^2

V. CONCLUSION

The outcome of this project was to design and print a spur gear of PLA material and calculate the strength of PLA material applying different types of loads on the required specimen which has been successfully completed. The design of specimen for Hardness test and Compression test was done according to ASTM standard and we had observed that in Brinell Hardness test we get Brinell Hardness Number as 25.4842 kgf/mm^2. In case of Compression test we use two different machines i.e., Ultimate tensile test machine & Compressive test machine and both the specimen in two different orientation and in both cases, we observed two different results i.e., for UTM we get Compressive Strength= 62.00N/mm^2 and for CTM we get Compressive Strength= 15.50N/mm^2. Then we perform Charpy Impact test over our printed specimen in different infill parameter. We calculate the stored energy of specimen on 35%, 45% and 60% infill percentage of material. We observed that for all the infill percentage we get same amount of stored energy i.e., 2 Joule.

At last, we can conclude that among various 3D printing technology available for additive manufacturing Fused deposition modeling is most feasible and can easily implemented without much complexity as we had already discussed that we get some amount of dimensional inaccuracy from the original model specimen but its not more than 1%.

VI. ACKNOWLEDGEMENT

REFERENCES

1. Hanon M. M., Zsidal L. and Ma Q., (2021). Accuracy investigation of 3D printed PLA with various process parameters and different colors. Materials Today : Proceedings, 42, 3089 - 3096. doi:https://doi.org/10.1016/j.matpr.2020.12.1246.

2. Hanon M. M., Alshammas Y. and Zsidai L., (2020). Effect of print orientation and bronze existence on tribological and mechanical properties of 3D-printed bronze/PLA composite. The International Journal of Advanced Manufacturing Technology, 108, 553-570. doi:https://doi.org/10.1007/s00170-020-05391-x.

3. Ramasamy M., Moorthy E. S., Balasubramanian A., Kumaran P. K. S., Baig M. B. N., Alagappan S. and Moorthy M., (2021). Effect of process parameters on tensile strength and surface quality of PLA-ABS part produced by fused deposition modeling. Indian Journal of Engineering & Materials Sciences, 28, 300-310.

4. Alsoufi M. S., Alhazmi M. W., Suker D. K., Alghamdi T. A., Sabbagh R. A., Felemban M. A., Bazuhair F. K., (2019). Experimental Characterization of the Influence of Nozzle Temperature in FDM 3D Printed Pure PLA and Advanced PLA+. American Journal of Mechanical Engineering, 7, 45-60.

   doi:http://pubs.sciepub.com/ajme/7/2/1/index.html.

5. Sharma P., Vaid H., Vajpeyi R., Shubham P., Agarwal K. M., Bhatia D., (2022). Predicting the dimensional variation of geometries produced through FDM 3D printing employing supervised machine learning. Sensors International, 3, 100194. doi:https://doi.org/10.1016/j.sintl.2022.100194.

6. Doshi M., Mahale A., Singh S. K. and Deshmukh S., (2022). Printing parameters and materials affecting mechanical properties of FDM-3D printed Parts: Perspective and prospects. Materials Today: Proceedings, 50, 2269–2275.

   doi:https://doi.org/10.1016/j.matpr.2021.10.003.www.teslacoildesign.com/design.html

FOREST FIRE DETECTION SYSTEM

Gurjeet Singh[*], Abhishek Singh[a], Aman Kumar Patel[a], Ankita Paul[a], Haiqua Naaz[a], Md Araib Ashif[a], Nilava Bepari[a]

[*]*Assistant Professor (Electronics and Communication Engneering),*
[a] *B.Tech 4th yr(Electronics and Communication Engineering)*
Asansol Engineering College, Electronics and Communication Engineering, Kanyapur, Asansol

_____

ABSTRACT

The IOT industry is rapidly growing in the current scenario. Each one of us now understands the significance of Internet of Things. At present, it is being used in almost all industries making our lives a bit easier. Forest fires have become a massive threat across the globe, causing numerous negative impacts on human habitats and forest ecosystems. Climatic changes and the greenhouse effect are among the consequences of such destruction. Sadly, a higher percentage of forest fires occur due to human activities. Therefore, to minimize the catastrophe caused by forest fires, there is a need to detect them in their initial stage. This paper proposes a system and methodology that may be used to detect forest fires at the initial phase using IoT.

This paper emphasizes detecting forest fires as early as possible by measuring various parameters which can lead to forest fires. An IoT-based forest fire detection system is suggested in this paper to detect fires by

monitoring values through sensors like the DHT22 temperature and Humidity sensor, MQ5 Smoke Sensor, Capacitive soil moisture sensor, and Flame sensor. The values are retrieved from the sensor through a wi-fi-enabled microcontroller (NodeMCU) and uploaded to the cloud. When these values reach a certain threshold, a message or a call is triggered and received by the user.

This approach can potentially save lives or at least prompt the implementation of safety measures. The main aim of this paper is to propose a system that can detect potential fire hazards at the earliest possible stage, thus preventing the occurrence of horrific wildfires. Our project has the potential to predict and detect fires, sending notifications to responsible authorities for immediate action before it is too late to control the forest fire.

Keywords: *Forest Fires, WSN, Detection, Visualization, Alert System, fire prevention*

I. INTRODUCTION

In India the summer season has witnessed the highest number of forest fires, especially during the months of April to June. This period is attributed by low humidity, high temperature, dry vegetation, hence creating favourable conditions for the occurrence and

spread of forest fires. According to the Forest Survey of India, a number of 52,785 forest fires were detected using MODIS (Moderate Resolution Imaging Spectro-radiometer) sensor and 3,45,989 forest fires were detected using SNPP-VIIRS (Soumi-National Polar-orbiting Partnership – Visible Infrared Imaging Radiometer Suite) in forest season from Nov 2020 to June 2021.

Forest fires pose huge threat to wildlife as well as economy. This can be in terms of loss of wildlife habitat, damage to timber, other forest resources as well as the tourism industry. One notable example of such forest fire which caused significant wildlife and economic losses in India was the 2016 fire in Uttarakhand, which kept on burning for several months. According to a report by the comptroller and Auditor General of India (CAG), the total monetary loss due to the forest fires was estimated at around 2,500 crore (approximately USD 340 million).

Overall, the collateral damage caused by these can be significant, hence alarming the need of effective forest fire management and prevention measures. This paper focuses on development of smart on the surface system which collects accurate data for the parameters related to forest fire. Wireless Sensor Network (WSN) is used where the collected data is uploaded to IoT cloud and continuous visualization of data is performed and an alert is triggered after the values reach certain predetermined threshold. This can prove to be a fast and cheap solution than obtaining satellite data. Also, the collected data can be used for further analysis to help reduce future occurrences of forest fires. Hence allowing prompt detection and immediate response in order to limit the fire's spread.

II. RELATED WORK

WSN comprises of various different sensor nodes put together spatially which are connected to a central node where all the data is received from all the different sensors. Each of the sensor node comprises of single or multiple sensing elements. Apart from sensors there is a data processing unit, a power source (usually a battery), communication component. The sensed data is sent to the central node which further sends it to the desired end. WSNs are generally used for monitoring applications like border monitoring, environment monitoring, gathering meteorological variables, etc. One such application of WSN as elaborated in [1] placed several small nodes to detect the environmental changes and sent this data to the central cluster node which in turn transferred it to the server through the gate for easy maintenance and scalability of data.

Another method for monitoring and detection of forest fire as discussed in [2] uses data aggregation in WSNs. This paper proposes a method which provides faster and a bit more effective reaction to forest fires by consuming validated WSN's energy, therefore maximizing the network's operational efficiency. This is also confirmed by large number of experiments in simulation. WSN can be a better choice for the tasks like detection of earthquake, landslide, flood, forest fire, etc[4]. To minimize the power consumption of sensors, techniques like keeping only selective components active while rest are deactivated were proposed [8][9][10].

Several other research on WSNs were carried out. One of which proposed fusion of information from multiple sources which in turn was considered in final decision making, which actually is better than using sources independently, after fusion two algorithms based on the threshold ratio and Dempster-Shafer theory were used [3].

Furthermore, research conducted as discussed in [5] in order to enhance the detection accuracy proposed application of machine learning approaches, such as support vector machine (SVM) classification and regression techniques such as logistic regression. Although this approach poses limitations like limited energy, energy required to process the data, limited computations, complex ML algorithms [6] [7].

Availability of power can be a challenging aspect in forest areas, relying solely on battery power can be difficult as they do not last long, and power distribution via wire would be costly. Hence researchers proposed the idea of using solar powered systems as secondary power source along with rechargeable batteries as the primary power source [3][12].
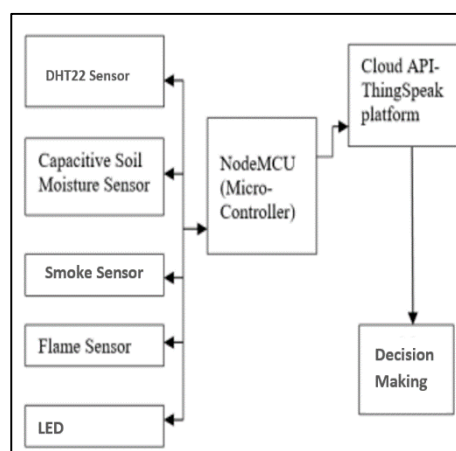

Fig 1: Block Diagram of the proposed system

III. PROPOSED WSN SYSTEM

In most of the cases, cause of forest fires can be both natural and man-made, throughout the globe. Particularly in summer season the environment becomes hot and dry leading to a favourable condition for the occurrence of forest fires. Therefore, acting as a fuel for them. Another significant cause of such disasters is global warming. Each such event not only destroys thousands of hectares of forest land, but also has a huge impact on wildlife habitat, economy, resources and facilities and public assets. Apart from these firefighters and locals face high risk of horrific accidents each year.

Hence detection of such forest fires in early stages becomes necessary in order to avoid such horrific consequences. In this paper we have proposed a model that consists of, array of wireless sensor networks which keep on monitoring various parameters related to forest fire, such as temperature, humidity, soil moisture and concentration of smoke in a particular region. Simultaneously the data from all the sensor nodes, is sent to a central node (NodeMCU), which uploads the collected data to an IoT based cloud (ThingSpeak). On the other hand, the data is continuously visualized on the cloud using graphs and widgets. There is a predetermined threshold for each sensor, once it is reached, an alert is triggered using a web-based service-IFTTT (If This, Then That) which connects different online platforms and services via applets

Fig 2: Test results for a particular period of time

and sends alert via email, message, automated call, etc.

Hardware that can be used to monitor and detect such events are available in various

kinds. Our system uses a flame sensor, MQ5 smoke sensor, capacitive soil moisture sensor, DHT22 humidity and temperature sensor. All these sensors send their data to the base station, which then uploads it on the server for further visualization, analysis and decision making.
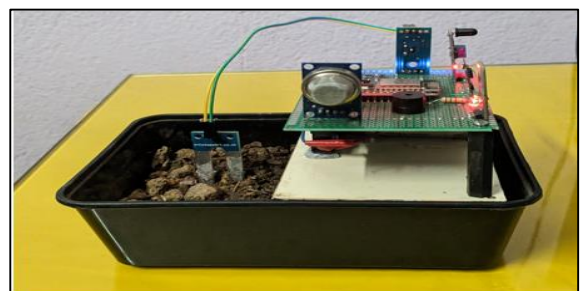

Fig 3: Sensor node assembled for fire detection

IV. RESULT AND DISCUSSION

The proposed design of forest fire detection system has been tested thoroughly. The sensors used here are able to detect all the environmental parameters, which pose potential threat to forest areas, with desired accuracy. The design mainly comprises of four sensors DHT22 sensor, MQ5 sensor, capacitive soil moisture sensor, flame sensor. Figure 2 shows the above-mentioned model. The system was tested in various environmental conditions. Sensor readings for different environmental parameters have been tested extensively and the data got logged successfully on the cloud based IoT monitoring system.

Figure 3 shows graph for different parameters recorded by the sensors for a particular period of time. Also, the call and message-based alert were tested successfully after simulating an occurrence of fire using a controlled candle flame. Similarly smoke from burnt paper were used for testing the smoke sensor, dry soil for soil moisture, and hot air blower for temperature and humidity. Changes in the value of parameters occurred as expected and their respective alerts were triggered successfully on the user's device.

V. CONCLUSION

It has been proposed to develop and enhance the already existing WSN node to monitor and detect forest fires in early stage for accurate detection. Various basic environmental parameters which directly have an impact on forest fires were successfully detected by the sensor setup, also some additional parameters of forest fire were taken into consideration. The data visualization of parameters as shown in graph were accurate and responsive. Further improvement and enhancement of the sensing node via various other techniques like camera imaging, intelligent programming algorithm, is one of the targets for the future work in this research. Finally, at the end of the project, the highly applicable WSN system proposed to detect the forest fires in initial stage turns out to be very useful for the prevention of forest fires.

REFERENCES

1. Kadir, E. A., Irie, H., and Rosa, S. L.. Modelling of wireless sensor networks for detection land and forest fire hotspot. International Conference on Electronics, Information, and Communication (ICEIC). 2019; pages 1–5. **(CONFERENCE PAPER)**

2. Liu, Y., Liu, Y., Xu, H., and Teo, K. L.. Forest fire monitoring, detection and decision-making systems by wireless sensor network. Chinese Control and

Decision Conference (CCDC) 2018; 5482–5486p. doi:10.1109/UKSim.2013.133 **(CONFERENCE PAPER)**

3. Díaz-Ramírez, A., Tafoya, L.A., Atempa, J.A., Mejía-Alvarez, P. Wireless Sensor Networks and Fusion Information Methods for Forest Fire Detection. Elsevier Ltd. 2012; 69–79p. doi:10.1016/j.protcy.2012.03.008. **(ELECTRONIC ARTICLE WITH DOI**

4. Diwaker Pant, Sandeep Verma, Piyush Dhuliya. A study on disaster detection and management using WSN in Himalayan region of Uttarakhand. 2017 3rd International conference on advances in computing, communication & automation (ICACCA)(Fall). 2017/9/15; 1-6p. **(CONFERENCE PAPER)**

5. Singh, Y., Saha, S., Chugh, U., Gupta, C. Distributed event detection in wireless sensor networks for forest fires. In 2013 UKSim 15th International Conference on Computer Modelling and Simulation, Cambridge. 2013; **(CONFERENCE PAPER)**

6. Kansal, A., Singh, Y., Kumar, N., Mohindru, V. Detection of forest fires using machine learning technique: A perspective. In Third International Conference on Image Information Processing, India. 2015; doi:10.1109/ICIIP.2015.7414773. **(CONFERENCE PAPER)**

7. Zhang, T., Zhao, Q. & Nakamoto, Y. Faulty sensor data detection in wireless sensor networks using logistical regression. In 2017 IEEE 37th International Conference on Distributed Computing Systems Workshops (ICDCSW), Atlanta. 2017; doi: 10.1109/ICDCSW.2017.37. **(CONFERENCE PAPER)**

8. Bayo, A., Antolín, D., Medrano, N., Calvo, B., Celma, S. Early detection and monitoring of forest fire with a wireless sensor network system. In Procedia Engineering, Spain. 2010; 248-251p. **(JOURNAL)**

9. Alkhatib, A. A. Wireless sensor network for forest fire detection and decision making. International Journal of Advances in Engineering Science and Technology. 2013; 299-309p. **(JOURNAL)**

10. Sakib Abdullah, Sandor Bertalan, Stanislav Masar, Adem Coskun and Izzet Kale. A Wireless Sensor Network for Early Forest Fire Detection and Monitoring as a Decision Factor in the Context of a Complex Integrated Emergency Response System. 2017; 1-5p. doi: 10.1109/EESMS.2017.8052688. **(CONFERENCE PAPER)**

11. Sakr, George E.; Ajour, Rafik; Khaddaj, Areej; Saab, Bahaa; Salman, Alaa; Helal, Ola; Elhajj, Imad H.; Mitri, George. Forest fire detection wireless sensor node. Advances in Forest Fire Research, Imprensa da Universidade de Coimbra. 2014; 1395-1406p. doi:10.14195/978-989-26-0884-6_153. **(JOURNAL)**

DIVING INTO THE ABYSS: UNLEASHING DEEP LEARNING'S POTENTIAL IN MARINE ECOLOGY

Lumbini Bhaumik[1], Ankan Bandyopadhyay[2], Anupurba Khan[3], Dr. Abhishek Bandopadhyay[4]

Assistant Professor, Computer Science and Engineering, Asansol Engineering College

3rd year Student, Computer Science and Engineering, Asansol Engineering College

2nd year Student, Artificial Intelligence and Machine Learning, Asansol Engineering College

Assistant Professor, Computer Science and Engineering (AI&ML), Asansol Engineering College

ABSTRACT

Deep learning (DL) is revolutionizing all areas of science, including marine ecology. With advanced data processing capabilities, data from sensors, cameras, and acoustic recorders can now be analyzed quickly and reliably, even in real time. Commercial algorithms are available that can accurately locate, count, and categorize species in digital media and detect hidden patterns in complex data. However, the successful implementation of DL in marine ecology requires collaboration between ecologists and data scientists. This work aims to bridge the gap between these disciplines and promote the use of DL for ecosystem-based management of the marine environment.

Keywords: *Deep learning, Ecosystem-based management, marine ecology, marine monitoring.*

I. INTRODUCTION

Marine ecosystems are essential for supporting the human population with sustainable resources, but they are highly vulnerable to climate change and human-induced pressures (Ant˜ao et al.,2020). To make informed management-decisions, up-to-date for the information about marine ecosystems is crucial. Advanced observation techniques, such as high-end cameras, sensors, and AI algorithms, have significantly improved data collection and analysis in marine ecology.

However, collaboration between ecologists and data scientists remains a challenge (Beyan et al., 2020). This research aims to bridge the gap by providing an overview of AI methods and promoting interdisciplinary partnerships. By embracing AI techniques and fostering collaboration, we can enhance our understanding of marine ecosystems, support ecosystem-based management, and ensure the long-term health and sustainable use of these critical resources.

Technological advancements have provided ecologists with powerful tools for collecting data from marine ecosystems, but integrating these tools with traditional sampling methods can be challenging. Artificial intelligence (AI) has revolutionized data interpretation and analysis in marine ecology, enabling efficient and accurate analysis of large volumes of data collected from sensors, cameras, and other observation technologies (Knausgard et al., 2021).

However, collaboration between ecologists and data scientists faces obstacles such as knowledge gaps and jargon. This research aims to facilitate collaboration and expedite project development by providing an overview of popular AI methods for ecological data analysis. By establishing a common language between disciplines and showcasing the potential of AI, researchers can bridge the gap and unlock valuable insights for ecosystem-based management, ensuring the long-term sustainability of marine resources.

Analysis of Deep Learning

Artificial intelligence (AI) encompasses diverse algorithms, with machine learning being the most widely adopted approach. Machine learning algorithms learn from data-rich environments, such as image databases, through supervised or unsupervised learning. Supervised learning involves tagging or categorizing data, while unsupervised learning allows algorithms to discover data structures without labelled data. Deep learning (DL), a subset of machine learning, is extensively analysed in this study (Lessmann et al., 2019), focusing on its profound impact on ecological data analysis. DNNs dominate image and audio classification. DL excels in pattern recognition, customer evaluation, and crisis management. In marine ecology, DL-based object detection and semantic segmentation locate and classify species, facilitating abundance quantification. DL extends to coastal ecology, aiding tasks like fish counting and species characterization.

The effectiveness of shallower models, like one-layer Kohonen networks (Suryanarayana et al., 2008), in classifying and visualizing biological data is highlighted. Case studies demonstrate the successful implementation and investigation of machine learning algorithms in ecological data analysis, presenting diverse approaches for region of interest labelling, image-based classification, pixel-wise segmentation, spectrogram analysis, and segmented time series data analysis.

DL, particularly through DNNs, has revolutionized ecological data analysis by enabling accurate classification and identification of images and audio data. In the field of marine ecology, techniques such as object detection and semantic segmentation have significantly improved species localization, classification, and abundance quantification. While deeper

neural networks generally offer advantages, shallower models like one-layer Kohonen networks can effectively handle biological data. Coastal ecology research presents a promising avenue for leveraging DL techniques in various data analysis tasks.

The transformative potential of DL, particularly in ecological research, is evident. By fostering interdisciplinary collaboration between ecologists and computer scientists, this study encourages the adoption of DL techniques and accelerates progress in ecological research. Thus, AI encompasses diverse algorithms, with machine learning being widely adopted. DL, particularly through DNNs, has a profound impact on ecological data analysis, revolutionizing classification and identification of images and audio data. DL techniques are superior in various domains, including marine ecology, with applications in species localization, classification, and abundance quantification (Grasso et al., 2019). Shallower models also effectively handle biological data. Case studies exemplify the implementation and investigation of machine learning algorithms, showcasing alternative approaches. This study fosters interdisciplinary collaboration and encourages the adoption of DL techniques to accelerate ecological research progress.

Deep Neural Networks

Neural networks approximate functions by learning from training data and adjusting their weights through optimization. The activations of neural networks align with the training data, and the loss function measures the difference between predicted and expected outputs. Overfitting, where the network memorizes data without capturing general trends, is a concern. Validation and testing datasets are used to assess performance and detect overfitting. Well-trained neural networks consist of active or inactive neurons that minimize the loss. Adjusting the weights and learning rate ensures each neuron's contribution is appropriately accounted for. Shallow networks have one hidden layer, while deep networks have multiple hidden layers. Depth does not always correlate with problem-solving ability. Deep learning relies on large amounts of training data, but deep unsupervised learning can reduce the dependence on labelled data (Ferreira et al., 2020). Deep semi-supervised learning combines labelled and unlabelled data to overcome data scarcity. In marine ecology, deep neural networks hold promise for addressing various issues.

Deep Neural Networks (DNNs), especially Convolutional Neural Networks (CNNs), are widely used for image and video classification. CNNs employ convolutional operations to extract features from images, enabling classification. The introduction of AlexNet (Krizhevsky et al., 2012) in 2012 marked a significant improvement in CNN performance. Early models faced challenges such as the vanishing gradient problem, but subsequent

advancements, including inception networks, residual architecture, and squeeze-and-excitation networks, addressed these issues and improved CNN architectures. These advancements allowed for capturing features at different scales, training deeper networks, and emphasizing important features. CNNs have revolutionized image and video classification tasks and have shown state-of-the-art performance in domains like marine ecology. Object detection complements CNN models by identifying areas of interest in an image and providing location information. By dividing an image into sections using bounding boxes, tasks like counting the number of fish in an image become possible. Advancements in pixel-level identification have expanded CNN capabilities, allowing detailed categorization of every region in an image using encoder-decoder architectures. Siamese Neural Networks (SNNs) play a role in individual identification by determining similarity between inputs, such as faces or fish images. SNNs are effective in learning semantic similarity but require more data and computational time for training. In audio signal processing, DNN-based techniques address limitations of traditional audio signal classification by combining feature extraction and classification. Various DNN topologies, including convolutional, feed-forward, and recurrent networks like RNNs, are used alone or in combination to enhance modelling capabilities. Attention-based techniques and transformer-based approaches further improve performance. Combining convolutional approaches with RNN and attention has proven effective in environmental sound classification. These techniques can be applied individually or in combination for audio classification tasks in marine ecology.

Evaluation Criteria

Different evaluation criteria, such as accuracy, precision, and recall, assess the performance of trained DL models. Accuracy measures correctly classified data, while precision and recall evaluate positive predictions and identification of positive instances. A DL algorithm can be accurate but imprecise or vice versa, depending on bias and variance. Validity is achieved when an algorithm demonstrates both accuracy and precision. The choice of evaluation metric depends on the dataset. Accuracy suits balanced data, while precision or recall is preferred for unbalanced datasets, common in ecological data. High recall indicates effective class recognition, while high accuracy implies a low false-positive rate. The F1 score combines precision and recall and is recommended when in doubt. Overall, assessing methods using the F1 score is a recommended guideline.

Data

Data scarcity in deep learning can be mitigated by leveraging pre-trained models trained on larger datasets like ImageNet. Fine-tuning these models with smaller, more relevant datasets

captures individual variations and general image patterns. In classification and object detection tasks, human experts label the dataset, matching the labeled data (Y vector) with input data (X vectors) using a classifier algorithm. Accuracy is then assessed against the true labels. Similarly, in audio tasks, important occurrences are marked with start and stop times for data segmentation. Labeled datasets exist for both images and audio and can be utilized when data is scarce. Training involves dividing the labeled dataset into subsets for training, validation, and testing. The model is trained on the training set, evaluated on the validation set, and assessed for overall accuracy on the test set. These strategies address data scarcity challenges, facilitating effective deep learning applications.

Table 1. Methods of object detection used for the Discussed cases

CASE STUDIES	OBJECT DETECTION	
	When To Use	Possible Method
Analysis and classification of fish species and their movement, from media (CASE 1)	Images with 1+ fish	YOLO with Ap A
Image analysis to monitor and track plankton populations. (CASE 2)	Images with 1+ organisms	YOLO with Ap A
Passive acoustic monitoring (PAM) to study whales (CASE 3)	Spectrograms with 1+ calls	R-CNN with Ap D
Individual Visual re-identification in wild fish populations (CASE 4)	Images with 1+ fish	YOLO with Ap A
Ghost fishing gear detection (CASE 5)	Images with 1+ gear	R-CNN with Ap A

Established Cases: Identifying and Measuring Marine biodiversity

Deep learning has transformed ecological studies by automating manual operations and speeding up data processing. Deep learning provides efficient solutions for processing and analysing data from underwater recording equipment in these ecological studies. By replacing manual tasks, researchers can accelerate their studies, gain deeper insights, and contribute to the conservation and management of marine ecosystems.

Case 1- Analysis and classification of fish species, as well as monitoring their movement, in photos and videos.

The monitoring of fish populations and communities plays a vital role in marine management and conservation (Lopez-Vazquez et al., 2020). Traditional methods often

involve invasive and time-consuming techniques such as animal handling and tagging. To overcome these limitations and accelerate data analysis, it is crucial to develop passive methods. Deep learning has emerged as a promising solution for automatic recognition, classification, and tracking of fish using photos and videos.

In underwater scenarios, multiple fish are often present in the same image, making normal classification algorithms impractical. To address this challenge, object detection techniques can be applied before classification. Object detection identifies and isolates individual objects within an image, preparing the data for subsequent classification. This can be achieved through separate steps in a pipeline or integrated within object detection models like YOLOv1-YOLOv4.

Identifying and counting fish species in photos and videos using deep learning techniques can be challenging. Existing object detection datasets lack the necessary diversity for accurate fish detection. To improve accuracy, training deep neural networks on fish images in their natural habitats is crucial. This requires collecting and labeling relevant picture and video data. Publicly available datasets like Fish4Knowledge, temperate fish species datasets, and NOAA fishery datasets are valuable resources for fish detection and species identification.

For species identification, specialized convolutional neural networks (CNNs) that focus solely on classification achieve the best performance. For example, a squeeze-and-excitation-based CNN achieved a classification accuracy of 99.27% on the Fish4Knowledge dataset and 87.74% on a dataset of temperate species. Videos are frequently used in marine research to study animal behavior and track swimming speed. Object tracking techniques can be employed to continuously track the position of moving objects, such as swimming fish. This can be done by combining detection algorithms with tracking algorithms, often utilizing Kalman filters or recursive estimators. Alternatively, deep learning can be used to solve the multi-class tracking problem in a single step, providing a more integrated approach but with less fine-scale control.

Deep learning serves as a crucial building block for automating picture and video analysis in fish quantification, classification, and tracking. It can be applied as a comprehensive solution to the multi-object tracking problem or as a modular pipeline with distinct processes for detection, association, and track creation. The versatility of deep learning methods allows for customization according to different ecosystems and species, leveraging the training datasets available. The potential of artificial intelligence in monitoring fish populations is significant,

offering efficient and accurate analysis to support marine management and conservation efforts.

Case 2- Utilization of image analysis to monitor and track plankton populations.

Plankton, crucial for marine ecosystems, serve as the foundation of food webs and indicate ecosystem health. Monitoring their composition and abundance is vital for coastal monitoring and understanding ecosystem dynamics. AI techniques, including deep learning, have been developed to efficiently process increasing plankton data, focusing on classification and counting.

Deep learning models have proven highly beneficial in plankton classification, achieving accuracy levels above 90% for diverse taxa and classification difficulty. Commercial systems like Imaging FlowCytobot, VPR, IISIS, ZooCam, and FlowCam capture images and use similar workflows for segmenting organisms and assigning taxonomic classes. These systems also extract object properties, providing insights into plankton community structure and function.

Initially, statistical methods were used, but machine learning approaches, such as support vector machines and random forests, replaced them. Collaborative convolutional neural networks (CNNs) handle class imbalance and environmental changes, improving accuracy. While accuracy may decrease with large and diverse datasets, state-of-the-art CNNs achieve high accuracy on independent datasets.

Unsupervised clustering and context data improve accuracy. Deep learning aids in analysing samples, tracking plankton, and detecting harmful algal blooms. Expert input is necessary for high taxonomic resolution and challenging identification tasks. Integrating image-based data, genomics, and acoustics on autonomous platforms enhances coastal monitoring. Deep learning, data sharing, and collaboration expedite plankton analysis for effective ecosystem monitoring and conservation.

Overall, advancements in deep learning and collaboration offer significant potential for detailed plankton analysis, benefiting ecosystem monitoring and conservation efforts.

Case 3- Use of passive acoustic monitoring (PAM) to study whales.

Passive acoustic monitoring (PAM) automates whale call detection and classification using techniques like matched filtering, spectrogram correlation, and CNNs. Object detection combines region-based CNNs and pre-trained CNNs to overcome limitations in call location and timing. NAS algorithms enhance automated whale call detection, while recurrent networks like long short-term memory networks and transformers gain popularity for PAM

data analysis. These advancements in PAM automation provide insights into whale species, including population trends, migration patterns, and behaviours. Manual processing of PAM recordings is labour-intensive and subjective, but deep learning approaches offer high accuracy. CNNs have been successfully used to detect various whale species, focusing on specific calls like blue whales' D call and fin whales' 40 Hz calls. Overall, automated whale call detection with deep learning techniques improves efficiency and accessibility for researchers studying whales through PAM.

Table 2. Classification Methods Applied for Discussed Cases

CASE STUDIES	CLASSIFICATION	
	When To Use	Possible Method
Analysis and classification of fish species and their movement, from media (CASE 1)	Images with fish / species	0/1 Squeeze and-excitation with Ap B
Image analysis to monitor and track plankton populations. (CASE 2)	Images with single organisms	CNN with Ap B
Passive acoustic monitoring (PAM) to study whales (CASE 3)	Spectrograms with 1/0 calls	CNN with Ap F
Visual re-identification of wild fish individuals (CASE 4)	Images with individuals	0/1 CNN with Ap B
Ghost fishing gear detection (CASE 5)	Images with 0/1 gear	CNN with Ap B

Emerging cases

DL identifies patterns in visual and audio data that are hard for humans to detect. These advancements leverage DL's capabilities and find applications in different domains.

Case 4- Individual visual re-identification in wild fish populations

To address concerns about animal behavior and ecology, such as growth, migration, and survival, it is crucial to have methods for individual identification. Currently, the most common approach is to mark animals with physical identifiers like leg rings, number

scratching, or tattoos to distinguish individuals during re-sighting or re-capture. However, these methods can be expensive, logistically challenging, and intrusive to the animals.

An alternative and more advantageous method for data collection is to utilize photos or videos from wildlife cameras and apply deep learning (DL) image analysis to leverage the natural markings that help identify individuals (Schneider et al., 2019). Many animals, similar to humans, possess distinct physical characteristics such as intricate spots and stripes on their skin, fur, or feathers. Trained computer vision systems can effectively differentiate between individuals belonging to different classes, even when the distinguishing characteristics are highly complex.

Individual re-identification (Re-ID) is a technique employed by convolutional neural networks (CNN) to identify individuals in animal photos across various taxa. Impressive accuracy rates have been achieved in Re-ID for birds (93.6% accuracy), turtles (95.5% accuracy), and terrestrial and marine mammals (92.5% accuracy). Fish species, especially coastal fish like the corkwing wrasse (Symphodus melops), exhibit distinct visual pigmentation that can be observed in photographs and videos. Leveraging this visual information, Re-ID has the potential to replace physical tagging for identifying individual teleost fish, enabling the measurement of movement, behavior, and growth. Additionally, Re-ID can enhance video-based abundance monitoring by addressing the issue of duplicate counting when individuals re-enter the field of view.

Re-ID by CNN in wild populations faces obstacles due to the need for verified images/videos of known individuals. One solution is combining PIT tags, RFID, and synchronized underwater cameras to identify tagged individuals. This integration enables distant detection and automatic labeling, advancing AI-based Re-ID with a large dataset in a short time.

Overall, leveraging DL image analysis and natural markings through Re-ID techniques holds great potential for non-invasive and efficient individual identification in animal research and monitoring, addressing the limitations associated with traditional marking methods.

Case 5- Ghost Fishing Gear Detection

The term "ghost fishing" refers to the ongoing problem of fish, crabs, and other animals being caught in lost fishing equipment (Brown et al., 2007). This issue has had severe consequences, with numerous reports of fish trap losses. To improve the effectiveness of clean-up efforts, the utilization of deep learning (DL) can play a crucial role in locating and

detecting missing equipment. This enables workers to focus their efforts on retrieving the equipment, potentially with the assistance of remote-controlled vehicles.

One approach to detecting ghost fishing gear involves using side-scan sonar to collect data and applying clustering and noise reduction techniques to identify objects. By analyzing areas with clusters of detected objects, more accurate detection of ghost fishing gear becomes possible. This method relies on identifying areas with high entropy to locate objects in images.

To detect lost fishing equipment, researchers use an R-CNN with a towed underwater camera, achieving higher precision for identifying fishing nets. Image classification techniques identify gear types, even with low-resolution photos. Side-scan sonar and video data provide relevant information, while towed cameras offer a cost-effective solution. DL improves ghost fishing detection, aiding clean-up efforts and minimizing ecological impact.

Table 3. Various Methods of Segregation Used in Discussed Cases

CASE STUDIES	SEGMENTATION	
	When To Use	Possible Method
Analysis and classification of fish species and their movement, from media (CASE 1)	Outlines of 1+ regions wanted	R-CNN with Ap C
Image analysis to monitor and track plankton populations. (CASE 2)	Images with single organism (morphology)	R-CNN with Ap C
Use of passive acoustic monitoring (PAM) to study whales (CASE 3)	Separation for 0+ calls in time series	RNN with Ap G or transformer with Ap G
Visual re-identification of wild fish individuals (CASE 4)	Images outlined with fish	R-CNN with Ap C
Ghost fishing gear detection (CASE 5)	Areas with partially dissolved fishing nets	R-CNN with Ap C

II. DISCUSSION

Advancements in technology have transformed ocean study and management with the integration of AI and machine learning (ML). Researchers utilize these techniques to process and interpret complex datasets, as indirect observations are common in marine research. Autonomous platforms like underwater vehicles and cabled observatories continuously collect real-time data, enhancing ocean monitoring in a cost-effective and non-intrusive manner.

AI reduces manual effort and improves efficiency in data analysis. Neural networks can quickly process vast amounts of data, enabling automated systems to identify relevant changes and support ecosystem-based management. However, expert involvement is still necessary for tasks like training and modifying analyses. Researchers must cultivate multidisciplinary skills and foster collaborations to meet these demands.

Open access and data sharing are essential for facilitating progress in marine science. Enforcing open access requirements for publicly funded data promotes the availability and reuse of information. The FAIR Principles enhance data accessibility and usefulness. Global projects develop marine databases and pipelines for imagery and training sets (Bacheler et al., 2017). Ultimately, we envision globally accessible libraries of photos, videos, and metadata, similar to existing genetic databases.

The integration of AI and ML in ocean study and management offers immense potential. Advanced observational methods, autonomous platforms, and open access to data accelerate scientific progress and improve monitoring capabilities. Collaboration and interdisciplinary skills are crucial for realizing the vision of a data-driven and AI-powered future in marine science.

III. CONCLUSION AND FUTURE SCOPE

The UN Decade of the Ocean aims for a sustainable and resilient ocean. AI integration in marine ecology is crucial, uncovering unknown aspects and threats to ecosystems. AI generates knowledge to address challenges, providing insights into marine structures and functions. This empowers informed decisions, promotes sustainability, and creates a digital representation of the ocean for global stakeholders. Cross-disciplinary collaborations are vital, with marine scientists partnering with data and computer scientists for effective ecosystem-based management amid environmental changes. Vast ecological data should be seen as an opportunity for AI utilization. The convergence of marine sciences and AI advances understanding and addresses critical issues. By embracing collaboration and cutting-edge technologies, we pave the way for sustainable ocean management in the Decade

of the Ocean and beyond.

REFERENCES

Stefan Lessmann, Johannes Haupt, Kristof Coussement, and Koen W De Bock. Targeting customers for profit: An ensemble learning framework to support marketing decision making. Information Sciences, 2019.

Iragavarapu Suryanarayana, Antonio Braibanti, Rupenaguntla Sambasiva Rao, Veluri Anantha Ramam, Duvvuri Sudarsan, and Gollapalli Nageswara Rao. Neural networks in fisheries research. Fisheries Research, 92(2-3):115–139, 2008.

Isabella Grasso, Stephen D Archer, Craig Burnell, Benjamin Tupper, Carlton Rauschenberg, Kohl Kanwit, and Nicholas R Record. The hunt for red tides: Deep learning algorithm forecasts shellfish toxicity at site scales in coastal maine. Ecosphere, 10(12): e02960, 2019.

Andr´e C Ferreira, Liliana R Silva, Francesco Renna, Hanja B Brandl, Julien P Renoult, Damien R Farine, Rita Covas, and Claire Doutrelant. Deep learning-based methods for individual recognition in small birds. Methods in Ecology and Evolution, 11(9): 1072–1085, 2020a.

Alex Krizhevsky, Ilya Sutskever, and Geoffrey E Hinton. Imagenet classification with deep convolutional neural networks. In F. Pereira, C. J. C. Burges, L.Bottou, and K. Q. Weinberger, editors, Advances in Neural Information Processing Systems, volume 25, pages 1097–1105. Curran Associates, Inc., 2012. URL_https://proceedings.neurips.cc/paper/2012/file/c399862d3b9d6b76c8436e92 4a68c45b-Paper.pdf.

Kristian Muri Knausgard, Arne Wiklund, Tonje Knutsen Sørdalen, Kim Tallaksen Halvorsen, Alf Ring Kleiven, Lei Jiao, and Morten Goodwin. Temperate fish detection and classification: A deep learning based approach. Applied Intelligence, pages 1–14, 2021.

Lopez-Vazquez Lopez-Guede, Marini, Fanelli, Johnsen, and Aguzzi. Video image enhancement and machine learning pipeline for underwater animal detection and classification at cabled observatories. Sensors, 20(3):726, 2020.

Laura H Ant˜ao, Amanda E Bates, Shane A Blowes, Conor Waldock, Sarah R Supp, Anne E Magurran, Maria Dornelas, and Aafke M Schipper. Temperature-related

biodiversity change across temperate marine and terrestrial systems. Nature ecology & evolution, 4(7):927–933, 2020.

Nathan M. Bacheler, Nathan R. Geraldi, Michael L. Burton, Roldan C. Mũnoz, and G. Todd Kellison. Comparing relative abundance, lengths, and habitat of temperate reef fishes using simultaneous underwater visual census, video, and trap sampling. Marine Ecology Progress Series, 574:141–155, 2017. ISSN 01718630. doi: 10.3354/ meps12172.

Cigdem Beyan and Howard I Browman. Setting the stage for the machine intelligence era in marine science. ICES Journal of Marine Science, 77(4):1267–1273, 2020.

Stefan Schneider, Graham W. Taylor, Stefan Linquist, and Stefan C. Kremer. Past, present and future approaches using computer vision for animal re-identification from camera trap data. Methods in Ecology and Evolution, 10(4):1151–1155, 2019. ISSN 2041210X. doi: 10.1111/2041-210X.13133.

James Brown and Graeme Macfadyen. Ghost fishing in European waters: Impacts and management responses. Marine Policy, 31(4):488–504, 2007.

POWER PLANT LEAKAGE DETECTOR BY USING COMPUTER APPLICATIONS

Sayandeep Kundu

Student, Department of Electrical Engineering, Asansol Engineering College

_____

ABSTRACT

The main problem in current situation of leakage detection is the cost and need for maintenance that is being used for thermal imaging system in that case if we use proximity sensor (or IR sensor) then the working life of the sensor as well as the model will be prolonged and to understand the concept of it two c programming was made.

The project is only a simple idea description that without a power-plant image ray sensing how a proximity sensor or IR sensor (maybe) can be used for detecting small holes and save leakage losses which can also affect power-plant efficiency.

Simply, it has a great probability to use it in the future as the scope of future AIML will be further improved with study and the model will be useful in that tough and rough cases or environmental scenarios where abnormal situations may occur and the normal conventional system may not line up with that so far in this situation.

Keywords: *leakage detection, cost, maintenance, proximity sensor, IR sensor, c programming model, power-plant efficiency, AIML*
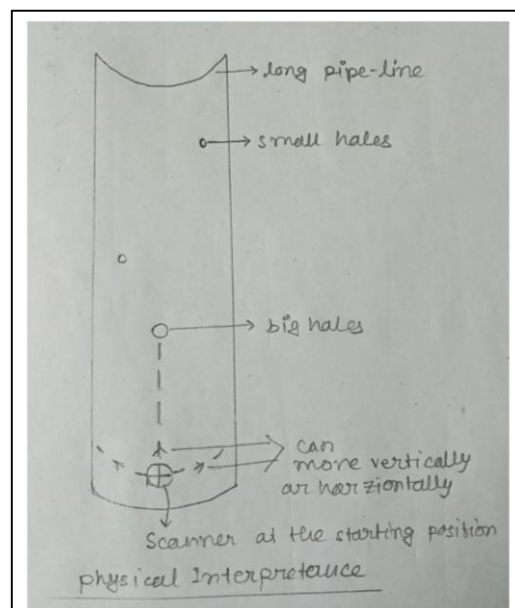
I. INTRODUCTION

Fig-1

In a vast thermal electricity generation power-plant, always we have to consider the product or amount of electricity generation and generation unit must maintain a constant voltage and power rating as the variation in overall product may cause damage or sudden failure or breaks of the electricity provided.[1] Losses in terms of electricity production also be included in the calculation of total revenue getting at the end of each year and a particular amount of loss beneath a certain level can only be considered for continuing normal operation of that sub-station.[2]

- **Uniqueness of work**

The existing thermal imaging sensing system acts upon radial power spectrum binding and auto-correlation function [Digital signal processing concepts] with specified frequency at some Hz. First, they used an optical system (lenses), then filtering arrangement and then the all the procedures are going with the processors. Since it is totally different from our process as the base of this paper is some software models to be implemented via relay and sensing mechanism through 2 orientations of 3 software model versions.

II. WORKING OF THE C-MODEL

In first version it has been made two software projects

1. Automatic power-plant leakage detector
2. Manual power-plant leakage detector

And with the second version of the software program, where it will be able to measure the radial distance from the sensor as similar with the working of proximity sensor

- **Working**

At the beginning the hole is detected in the z-axis means the floor is detected at which floor the extra small holes are present, then accordingly the proper given length it will direct the equipment (like boiler, economizer, super-heater etc.) of a power plant.

In the middle of the screen there is a sensor which will move if proper input is given and when it will touch the hole then it will be printed on the screen the holes' location in x-axis(row) and y-axis (column) also it is printing the position of the scanner and accordingly with second version it will be helpful to determine the distance between Sensor and holes.

III. EXPLANATION

C programming was made to understand how they detect it from the control room and manage it accordingly.

Two software projects on C language are done to prescribe the working fundamentals as a control room's picture of a power-plant while they are detecting holes in large equipment using automation system other by thermal imaging, one is manual, system can detect the hole manually by user input and another is automatic, system can use both manually and automatic with providing any extra input effort.

IV. INTEGRATION PART

1.In the third or latest version of the project- **Automatic power-plant leakage detector**, it is implemented the project with similar basis of AI (Artificial intelligence) that you need not to be give any input to starting or stopping or controlling the program: Actually, it automatically detects the hole in the C-model and manually it can be done by **Implementation of AI** in the working model.

2.In the latest version of the project - **manual power-plant leakage detector,** the factor of temperature and humidity is also included which can affect the health of the system (pipeline or any) accordingly

- **How the system differs with different temperatures and sensitivity?**
    Basically, if the temperature is high or the humidity is low, then the pressure of nearby air or atmospheric pressure is at such a critical position or greater than riskier condition that the holes might be take place significantly. It is true for reverse condition, that is when the temperature is low or humidity is high then the pressure decreases instantly and never breakdown of pipe-material occurs where holes might be born which is shown in software program in an efficient manner.

3.The process of cyber-security part (password system) also integrated with both of the systems with prior importance.

V. FUTURE ASPECTS

1. It will be helpful to determine if proximity sensor be used to determine power-plant gas leakage in future scenario
2. It will be very helpful to understand how the process of the leakage detection can be carried out over sub-station (because in the thermal imaging system also they matched the reflected beam's wavelength in a certain range to make a decision)
3. It may be helpful indicating the system-overall-working-condition in various rough atmosphere

- **Leak calculation**

Suppose the average pressure of the target equipment is x pounds and the average radius of the one hole is y inches;

So, the absolute pressure is $P = x + 14.4$ pounds in total;

So, the total area under 1 hole is: $A = \pi(y)^2$ sq. inches.

The total area under n holes: $n\pi(y)^2$ sq. inches.

So, the total force exerted by leak and loss=$P * A = n\pi(y)^2 * (x + 14.4) = n\pi x(y)^2 + 14.4n\pi(y)^2$ poundal

So, the total gas exerted $1000 * [n\pi x(y)^2 + 14.4n\pi(y)^2]$ cube-feet volume of gas /hour
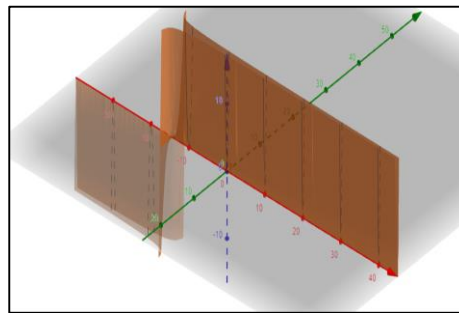
Fig-2

Taking n=1, and z=force in poundal, x= pressure in pound & y= radius in inches

So, it is clear that the volume of leak-gas or waisted gas is simply changes in-proportion with x (the pressure of the equipment) if radius of the hole is fixed [helps to advance the curve] and with radius(y) parabolically if x is constant.[3]

VI. PRACTICAL USE

[tells about how I can implement it practical Life, not only for detecting holes but also for filling the holes]
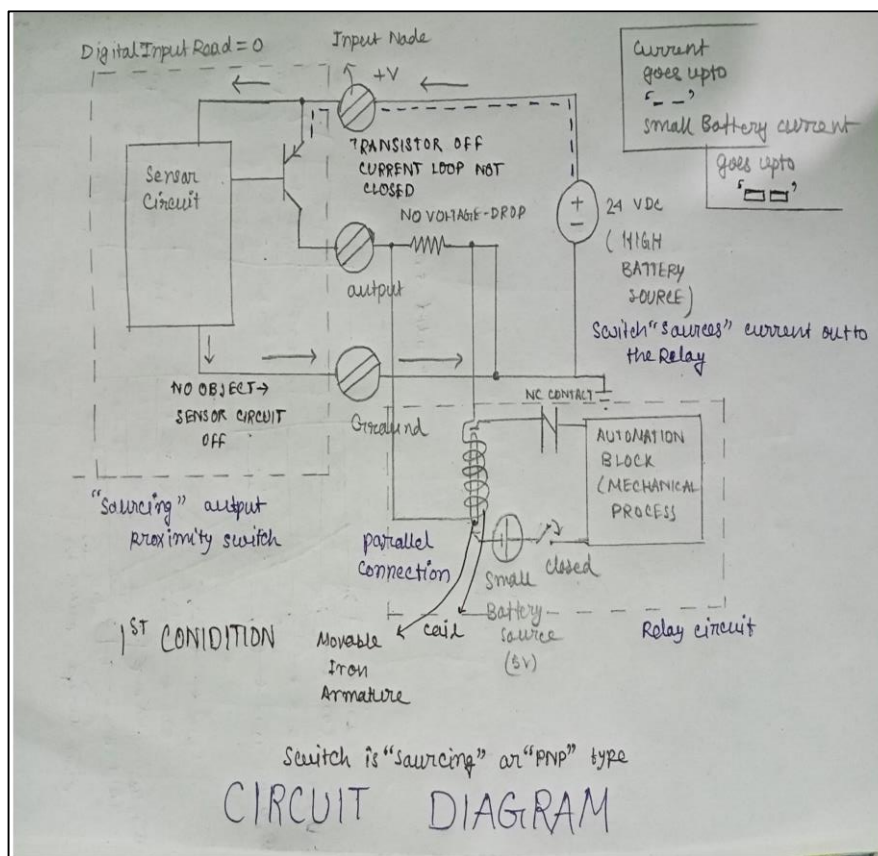
Fig-3

Actually, there should be use of proximity sensor as a switch as when it will sense the obstacles as an object in pipeline or some container then it will be at its on condition (inputdigitalread=1) and when it can't sense any object nearby it then it will be at off condition (inputdigitalread=0) means no platform or support is their or hole is present there.
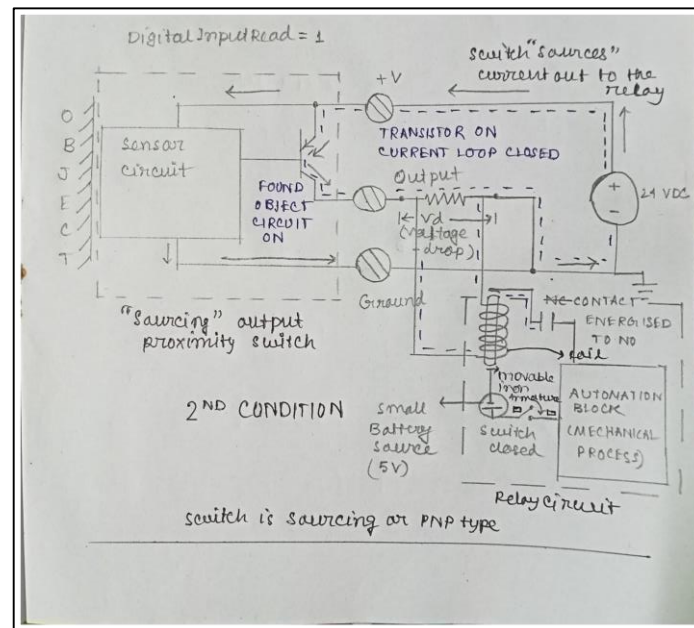
Fig-4

Proximity switches will be attached with some relay to divert power; when it will off and after diverting it the control goes over some Robotics part (mechanical process) of the sensor and by automation it will fill up the hole by the contents already in it and then again sensor will sense the object as inputdigitalread will be 1 & the process will be continued.

This whole process is shown in terms of software application in a similar manner.

- **Advance technological assessment**

The process of technological assessment is basically to protect the main system with prior time and it can be possible through implementation of high pressure sensor which senses the pressure above a certain given limit and trip the circuitry to open all the connection viable to operation of plant or ask to relay mechanism to do that work by transferring control to the robotics part in a same manner previously described but when the filling down of all the hole objects are done, some delay function is added to that pressure sensor to get optimum pressure (accumulated by passing some time) to start again at normal conditions. That is why pressure valves used in large equipment and safety valves used to boiler to reduce the pressure under a certain level and also the loss due to damage will be removed at a certain percentage. As the use of equipment for a long day also creates the damage as well as holes so only pressure valves along with pressure-gauges can't be sufficient. It is required to put IOT based model or robotics arrangement along with curricular maintenance schedule to prevent extra damage. So, no requirement of additional circuit or relay mechanism is

essentially helpful to connect with AI System and robotics part directly with extra privilege of safety (may be another protective device from other disciplines).

VII. ADVANTAGES

1. The software model is very less in size to implement
2. The software is very easy to understand for any people associated with control room or maintenance team
3. Similar working with the proximity sensor
4. AI or machine learning concepts can be further implemented over it
5. Maintenance cost is absolutely beneath a certain low-limit.
6. It is synchronized with temperature and pressure in second version
7. AI is adapted in the latest version that where should scanner go

VIII. DISADVANTAGES

1. Graphics of the software model is very poor
2. Not estimated if it's totally cost effective
3. Robotics may be needed with relay

IX. CONCLUSION

It is estimated a working model of leakage detector using over only c language, the model may be further implemented and we can be benefited from it using automation or AI over the working model though working hardware model is not prepared but the system conditional behavior and the software model as well as the idea is implemented is totally from own concept. Hope that will be beneficial for further implementing or researching it accordingly and will be able to know how the future Aspects and possibilities are going to be.

REFERENCES

1. Fahimipirehgalin, M. Trunzer, E. Odenweller, M. & Vogel-Heuser, B. (2021). Automatic Visual Leakage Detection and Localization from Pipelines in Chemical Process Plants Using Machine Vision Techniques. https://www.sciencedirect.com/science/article/pii/S2095809921001867

2. ShahulHamid, S. Jamal, N. Shajahan, M. (2013). Automatic Detection and Analysis of Boiler Tube Leakage System. https://www.researchgate.net/publication/314420384_Automatic_Detection_and_Analysis_of_Boiler_Tube_Leakage_System

3. sciencing.com. (2017). How to Calculate the Gas Loss in a Pipe. https://sciencing.com/how-7918141-calculate-gas-loss-pipe.html

4. jordi3736. (2017). Relay - Explained and animated - how relay works. https://youtu.be/Ca20ktPygY8

5. Editorial Staff. (2015). Proximity switches Circuit Diagram Operation. https://instrumentationtools.com/proximity-switches-circuit-diagram-operation/amp/

COMPARATIVE ANALYSIS OF ONLINE AND BRICKS & MORTAR BROKING FIRMS IN INDIA

[1]Arpodip Mukherjee, [2]Loveprit Singh, [3]Afzal Ansari, [4]Upasana Mourya, [5]Dipanshu Keshari, [6]Robin K Agarwal, [7]Sandip Karmakar

[1,2,3,4,5]Student, Department of Management Studies, Asansol Engineering College
Assistant Professor, Department of Management Studies, Asansol Engineering College

_____

ABSTRACT

In quest to find the sustainability and remain competitive in the digital arena, all the service providers related to capital market has been simulating their operational and marketing activities with the high usages of data driven approach and artificial intelligence. In India, traditional brokerage firms, being the part of such ecosystem, acts as a bridge between investors and capital market, has been also upgrading their services and charge in the influence of peer company pressure and changing business landscape because of entry of online players. Similarly, the online brokerage firms are also adjusting their activities to compete high with the already available and heavily networked bricks & mortar-based brokerage houses. Very less research works is available explaining about the performance of all types of brokerage firms in these changing dimensions. Hence, this study is done to find the comparative positions of both the Online and Bricks & Mortar based Brokerage houses in India in terms of different Charges, Leverages, Customer Review, Services and Business Model.

**Keywords:** *Capital Market, Brokerage Firms, Financial Services*

I. INTRODUCTION

Online trading is a method through which an investor can buy and sell Equities, Mutual Fund, Commodities, Bond, Exchange Traded Fund etc. Bricks and Mortar trading refers to the traditional face to face buy and sell products. In the current scenario online trading in India is growing rapidly. As per the data prescribed by two depositories NSDL and CDSL the total number of demat account in India 12.7 crore up to August-2023. According to outlook money approx. 3 million new demat accounts opened in July, 2023. This is because of Economic growth, renewed infrastructure and real estate development, younger population, and more awareness about benefits of investing for long-term growth. During the Corona pandemic time frame from March 2020 to August, 2022, we have witnessed an economic slow-down in all over the world. But interestingly in India there is a 145% growth in demat account during that period. The total number of demat account was 40.90 million before March, 2020 but the

number has crossed 100 million mark in August, 2022. Similar growth we can see in Mutual Fund industry also. Now we can open and manage our mutual fund portfolio through different broking firm like Upstox, Grow, ET Money etc. As per the data provided by AMFI the total AUM of Mutual fund industry stood at Rs.46.58 lacs crore up to September, 2023, which was Rs.22.04 lacs crore in September, 2018. We have considered various variables like Charges, Leverages, Customer Review, Services and Business Model to do the competitive analysis of Online and Bricks and Mortar broking firms in India. These variables are considered with reference to the various research work of Aygoren, Hakan & Yesilyurt, M. Ensar. (2011). Impact of Firm Attributes on the Efficiency of Brokerage Houses.

Contemporary Features	Zerodha	Upstox	5 Paisa	Angel Broking	Edelweiss	IIFL	Sharekhan	ICICI Direct	HDFC Securities	Motilal Oswal
3 in 1 Account	✗	✗	✗	✗	✗	✗	✗	✓	✓	✗
Charting	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Automated Trading	✓	✗	✗	✗	✗	✗	✗	✗	✗	✓
SMS Alerts	✗	✗	✓	✓	✓	✓	✓		✓	✓
Online Demo	✓	✓	✓	✓			✓	✓	✓	✓
Online Portfolio	✗	✗	✓	✓	✓	✓	✓	✓	✓	✓
Margin Trading Funding Available	✗	✗	✓	✓	✓	✓	✓	✓	✗	✓
Margin Against Shares (Equity Cash)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Margin Against Shares (Equity F&O)	✓	✓	✓	✓	✓	✗	✓	✓	✗	✓

Table 1: Contemporary Services by the Brokerage Houses

Source: https://www.chittorgarh.com
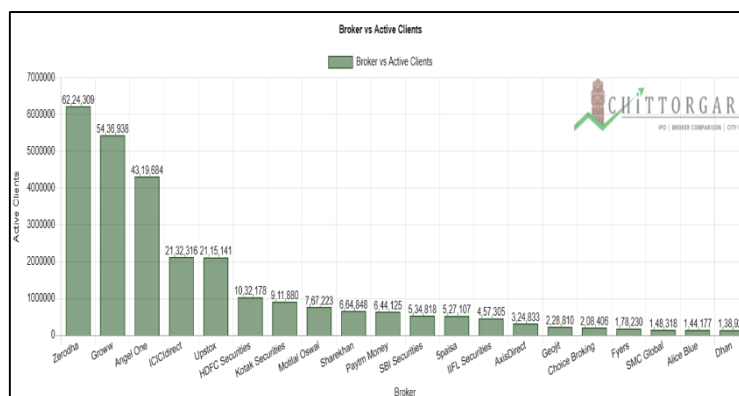
II. LITERATURE REVIEW

Fang, H., Song, Z., Nofsinger, J. R., & Wang, Y. (2017), Following the Split-Share Structure Reform, which started in 2005, Chinese companies saw a significant decrease in non-tradable shares. A fall in the firms' cash dividend pay-outs is related to a decrease in non-tradable shares or an increase in share tradability. The positive correlation is reduced in businesses with less financial restraint, is only marginally influenced by corporate governance, and is unaffected by investment opportunities or the type of controlling shareholder. The findings underline the fact that companies pay out cash to shareholders to make up for trade restrictions and come to the conclusion that dividends continue to be paid out when companies have easier access to outside finance. After accounting for firm fixed effects and eliminating variables that could change about the firm, these conclusions hold up to different definitions of non-tradable shares.

Simone, C., Barile, S., & Grandinetti, R. (2021), The topic of this study, which is framed under the service-dominant logic paradigm, is the formation of new market spaces that are conceptualised as new contexts of use. The purpose of this work is to describe how brokerage and exaptation tactics led to the formation of a new value creation framework. By addressing a gap in the literature, the paper explains why and how the service-dominant logic and brokerage strategy, or a strategy that brokers different cultural domains and contexts of use, and their variant exaptation, or a strategy that brokers a technological domain characterised by a specific use with a completely different context of use, are useful for framing the emergence of a new market space. The second goal of the research is to illustrate how the T-shaped model of firm cognitive endowment can enable brokerage and exaptation methods. The research identifies the characteristics of a strong cognitive endowment in terms of in-depth talents and dynamic ability to elicit new and potentially beneficial contexts of use.

Luong, T. S., & Qiu, B. (2021), This paper demonstrate that a firm's cost of equity is reduced by social ties between its executives, directors, and brokerages. To address endogeneity issues, we conduct quasi-natural experiments and discover that the discovered impact of firm-brokerage social ties on the cost of stock is most likely causal. The effect is discovered to be stronger for organisations with more supple information, stringent financial limitations, insufficient corporate oversight, or significant executive equity ownership. We also find that firm-brokerage social links lower SEO under-pricing, lessen information asymmetry in stock markets, and raise the firm's equity valuation, which is in line with the findings on the cost of equity.

Al-Aamri, I., Hussain, S., Su, C., & Hsu, H. H. (2022), The size of the brokerage house has a significant impact on how useful segment data is to financial analysts, as this article demonstrates. The size of the brokerage firm serves as a proxy for analysts' access to company managers and to in-house knowledge. We demonstrate that the adoption of International Financial Reporting Standard 8 (IFRS8) improved forecast accuracy for analysts in major brokerage houses but not for those in smaller brokerage houses using data for large UK corporations. Additionally, when segments represented lines of business, analysts in smaller brokerage companies had difficulty projecting. In the case of the analysts for large brokers, no such effect was noticeable. We relate these findings to the enhanced understanding that analysts in big brokerages attained as a result of their better access to managers and internal assistance.

III. OBJECTIVES OF THE STUDY

1. The objective of the study is to measure the competitive advantages in terms of different Charges, Leverages.
2. The objective of the study is to measure the competitive advantages in terms of Leverages.
3. The objective of the study is to measure the competitive advantages in terms of Customer Review.
4. The objective of the study is to measure the competitive advantages in terms of Services and Business Model.

IV. RESEARCH WORK

All the brokerage firms were scanned under four mentioned parameters as per the objectives of the research work. The details of each section helped us to know more about the differential nature of Bricks and Mortar and Online Brokerage Firms in India.

Charges and Leverage: No significant difference has been observed in this category among brokerage firms. The primary and sole reason for it is peer rival pressure.

V. BUSINESS MODEL

A significant shift among the brokerage firms has been seen from physical platform to digital platform; from guided trading to autonomy; from trading screen to trading app; from expert opinion to AI based advice; from limited offering to multiple trade options; from delayed settlement to very quick settlement. In the following schema, all possible causes and resultant of the business model in Brokerage firms has been shown:
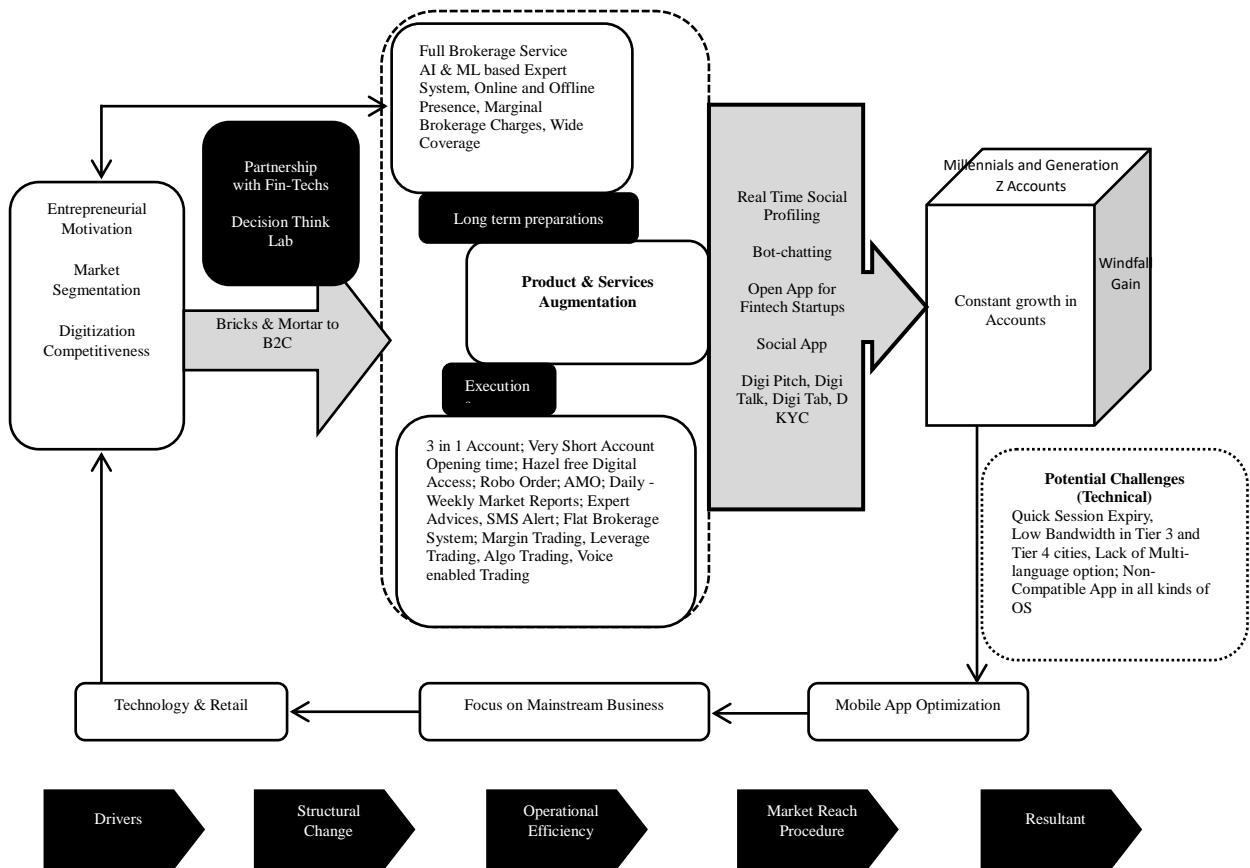
VI. VALUE ADDITION SCHEMATIC FOR BROKERAGE FIRMS IN INDIA

Reviews:

Though the parameters like Charges, Leverage and Business Models are not so significantly explained about the effectiveness of the brokerage firms. The Review helped to understand the effectiveness of firms in a much better way.

Analytic Hierarchy Process (Saaty, 1987) were used to identify the most likeliness of the customers with respect to the criteria like Fees, Trading Brokerage, Trading Platform Usability, Customer Service, Research Capabilities and Overall Rating for different Broking Houses from their customers. The ranks were obtained in the scale of 1-5 for the broking houses for different criteria. The standard weight for the criterion were obtained from the expert opinion of the different industry people.
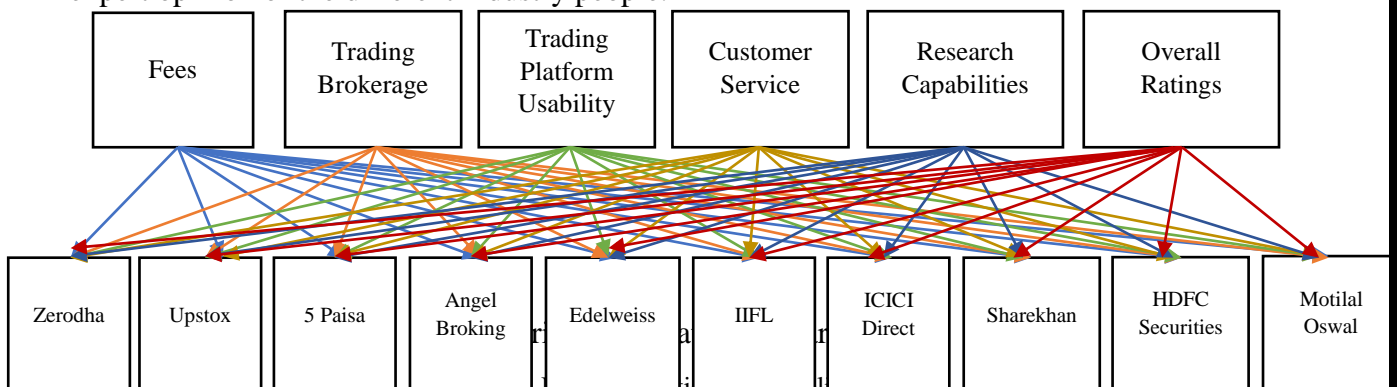
	Fees	Trading Brokerage	Trading Platform Usability	Customer Service	Research Capabilities	Overall Ratings	Weightage
Fees	1.00	0.25	0.50	3.00	0.20	4.00	10.83%
Trading Brokerage	4.00	1.00	1.00	3.00	0.50	6.00	22.26%
Trading Platform Usability	2.00	1.00	1.00	5.00	2.00	8.00	28.86%
Customer Service	0.33	0.33	0.20	1.00	0.25	5.00	7.43%
Research Capabilities	5.00	2.00	0.50	4.00	1.00	6.00	27.64%
Overall Ratings	0.25	0.17	0.13	0.20	0.17	1.00	2.98%

$$\lambda_{max} = 6.6149; CI = 0.1230; RCI = 1.24; CR = 0.099174 \, (Less \, than \, 10\%)$$

Broking Firms	Fees	Trading Brokerage	Trading Platform Usability	Customer Service	Research Capabilities	Overall Ratings	Total Score
Angel Broking	3.5	3	3.5	2.5	2.5	2.5	300.81
Zerodha	3.5	4.5	3.5	3.5	2.5	3.5	344.62
Edelweiss	3.5	3.5	3.5	2.5	3	3.5	328.75
IIFL	2.5	2.5	3.5	2.5	3.5	2.5	306.50
Motilal Oswal	2.5	2.5	2.5	2.5	2.5	2.5	250.00
Sharekhan	3.5	2.5	3.5	3.5	3.5	3.5	327.74
ICICI Direct	2.5	1.5	3.5	2.5	3	2.5	270.41
Upstox	3.5	3.5	2.5	2.5	2.5	2.5	283.09
5 Paisa	3	3.5	2.5	2.5	2	2.5	263.85
HDFC Securities	2.5	1.5	2.5	2.5	2.5	2.5	227.74

Ranks for the company in terms of likeliness thus found like:

Zerodha – Edelweiss – Sharekhan – IIFL – Angel Broking – Upstox – 5 Paisa – Motilal Oswal – HDFC Securities.

VII. CONCLUSION

Parameters like Fees, Trading Brokerage, Trading Platform Usability, Customer Service, Research Capabilities are taken for the study and we came to know that all the broking firm (which are taken for the study) are providing this services. To be specific, more weights has been given to Trading Platform Usability, then Research Capability and Trading brokerage is in the 3rd place. We have measure the performance of the broking firm taking the rating from 1 to 5 with respect to the different parameter mentioned above. The result suggests that overall score of Zeroda broking firm is the highest among the 10 selected broking firm, whereas Edelweiss is in the 2nd place and Sharekhan is in the 3rd place. From the data analysis and its result this is quite clear that there is a sharped shifting from the Bricks & Mortar broking firm to the online trading. These top three and the others broking also the other firms provides hassle free trading of different financial products. Using this platform

now we can do trading, invest and also get the guidance and analysis of the different stocks and investment options.

REFERENCES

- Al-Aamri, I., Hussain, S., Su, C., & Hsu, H. H. (2022). The importance of brokerage house size in determining the utility of IFRS8 segment data to financial analysts. Journal of International Accounting, Auditing and Taxation, 47, 100472.

- Fang, H., Song, Z., Nofsinger, J. R., & Wang, Y. (2017). Trading restrictions and firm dividends: The share lockup expiration experience in China. Journal of Banking & Finance, 85, 83-98.

- https://www.zeebiz.com/economy-infra/news-demat-accounts-grow-26-to-127-crore-in-august-255993

- https://bfsi.economictimes.indiatimes.com/news/financial-services/demat-accounts-cross-100-million-for-first-time-steep-rise-in-last-four-months/94027945#:~:text=The%20number%20of%20demat%20accounts,to%20the%20COVID%2D19%20pandemic.

- https://www.amfiindia.com/indian-mutual

- Luong, T. S., & Qiu, B. (2021). Does it pay to be socially connected with wall street brokerages? Evidence from cost of equity. Journal of Corporate Finance, 68, 101939.

- Simone, C., Barile, S., & Grandinetti, R. (2021). The emergence of new market spaces: Brokerage and firm cognitive endowment. Journal of Business Research, 134, 457-466.

- Saaty, T.L. (1980) The Analytic Hierarchy Process. McGraw-Hill, New York.

- Sachdeva, M. and Lehal, R. (2023), "Contextual factors influencing investment decision making: a multi group analysis", PSU Research Review, Vol. ahead-of-print No. ahead-of-print.

ABOUT THE EDITORS

Dr. Sudip Basu

Dr. Basu is presently serving as Assistant Professor in the Department of Management Studies, Asansol Engineering College, Asansol, West Bengal, India. He is having 12 years of academic experience. Dr. Basu has been awarded Ph.D. (Management), MBA (Marketing & Finance), BBA (Sales & Marketing Management). He is the Author of 02 Books. He has 04 Patent Publications, 21 National and International Research Paper and Book Chapter publications to his credit including Scopus Indexed, Taylor & Francis, Web of Science (ESCI), UGC Care Listed Journals. He has attended 100 National and International Conference/Seminar/Webinar participation as well as presented 19 research papers including National and International conferences in various Universities and Colleges. He attended 15 FDPs & 12 Workshops and also completed 18 Online Courses. He is the Editorial Board Member of various reputed Journals, Editor of various Books, Review Member of reputed Journals, Member of various Professional Bodies like Calcutta Management Association, Indian Academic Researchers Association, ERDA, ISDS (Registered with Japanese Government), Eurasia Research etc. He has been invited as a Guest Speaker, Session Chair, Keynote Speaker in various Conferences, Seminars, Webinars, Symposiums, Workshops. He has been awarded with Academic Excellence Award in 2023 and Best Faculty (Male) Award in 2020.

Mr. Robin K Agarwal

Robin K Agarwal is posted as HoD for the Department of Management Studies in Asansol Engineering College. He is currently pursuing his PhD. His area of interest is Startups and Strategic Management. During his academic career of 13 years, he has conducted variety of courses and mentored numerous graduate students. Currently he is in the leading role of NBA, NAAC and NIRF team of the institute. He is the coordinator of AEC Incubation Centre. Apart from academics, he remains an entrepreneur where he has initiated and operationalized 3 different business firms. Mr. Agarwal is known for positivity and his constant engagement for the betterment of his students.

Published by

International E-Publication

Asansol Engineering College