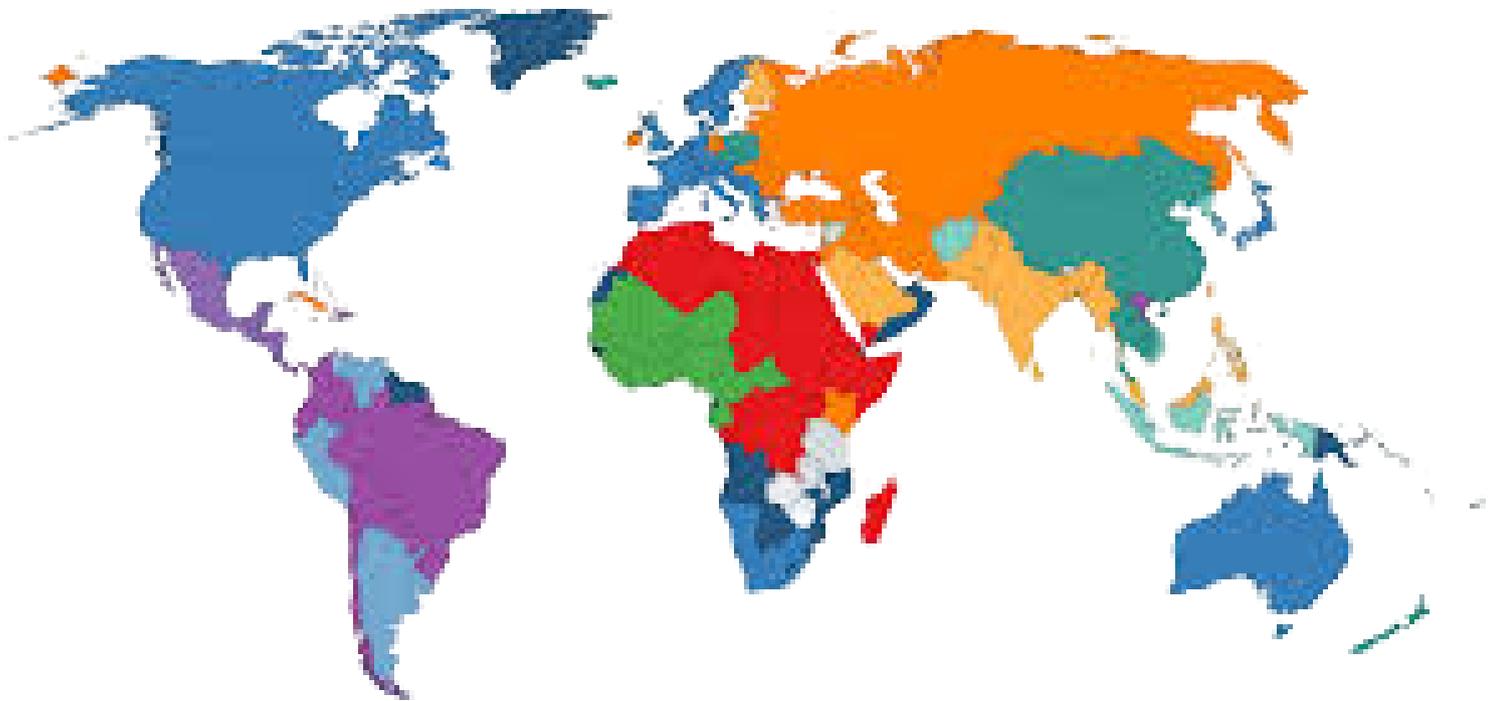


# Multidisciplinary Issues in the Contemporary World



Dr B Bhavana Rao

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# Multidisciplinary Issues in the Contemporary World

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## **Multidisciplinary Issues in the Contemporary World**

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## **PREFACE**

The fields of study amid cross conventional boundaries have evolved in today's fast-paced world, and this is characterized by significant scientific and technical growth. We face numerous issues in the world today that go beyond the purview of a single field. As a result, there is a need to discover answers to a range of problems. A multidisciplinary strategy is necessary to solve these problems.

The spread of knowledge in contemporary society has followed a trajectory of increased specialization across several areas. In order to be able to anticipate and comprehend behavior in nature, humans, and society, our world has been broken down into smaller pieces and forming the disciplines and sub-disciplines. When solving problems, a multidisciplinary approach requires appropriately combining the knowledge of several different areas.

There is a need to understand that the nature of multi-disciplinary issue differs from one aspect to another. There are many such political, social, cultural, diplomatic issues in the present contemporary world which are multi-disciplinary in nature and need a more multi-disciplinary approach to be understood and resolved.

This book is an attempt to bring forth these challenges and strategies in the contemporary world for the benefit of academia in particular and the world in general.

## **ACKNOWLEDGEMENT**

This book on “Multidisciplinary Issues in The Contemporary World” could not have been completed without the support of the academic fraternity.

I sincerely thank all my friends and family for being a constant support not just during my publishing endeavors but also in all walks of life.

I thank Empyreal Publishing House for publishing this work.

**Dr B Bhavana Rao**

## Table of Contents

<b>Preface</b>	<b>IV</b>
<b>Acknowledgement</b>	<b>V</b>
<b>Table of Contents</b>	<b>VI-VII</b>
<b>Title of the Chapter</b>	
<b>HRIS AS A LEVERAGE TOOL TOWARDS HR 4.0</b>	<b>1 – 8</b>
K. Nivethaa and Dr Usha S	
<b>GLOBAL ISSUES IN MULTIDISCIPLINARY ACADEMIC RESEARCH</b>	<b>9 – 12</b>
Dr. Laxmi Sharma	
<b>ORGANIZATIONAL CITIZENSHIP BEHAVIOUR LEADS TO ORGANIZATIONAL EFFECTIVENESS -A NARRATIVE LITERATURE REVIEW</b>	<b>13 – 18</b>
J. Krishna Kumari and Umakanta Nayak	
<b>PERCEIVED EFFECT OF LEARNING DISABILITIES ON THE ACADEMIC PERFORMANCE OF STUDENTS</b>	<b>19 – 27</b>
Onwubiko and Emmanuel Chidiadi	
<b>THE DIFFERENCE OF CONFLICT MANAGEMENT STYLES AND CONFLICT RESOLUTION IN AN ORGANIZATION (SCHOOLS), AS A WORKPLACE</b>	<b>28 – 40</b>
Mr. Shandru Mariyadas and Dr. AR. Saravanakumar	
<b>A STUDY ON BIG DATA AS A SERVICE: ADVANTAGES, MARKET TREND AND CHALLENGES</b>	<b>41 – 51</b>
Santosh Kumar Sharma, Ajay Pratap and Harsh Dev	
<b>E-WASTE MANAGEMENT IN INDIA ISSUES AND STRATEGIES</b>	<b>52 – 60</b>
Sangram Keshari Swain and Bikash Kumar Samantaray	
<b>PRODUCTION OF ECO-FRIENDLY HANDMADE PAPER FROM WASTE PAPER AND OTHER WAYS</b>	<b>61 – 71</b>
Sangram Keshari Swain and Bikash Kumar Samantaray	

<b>THE JOURNEY TOWARDS PEACE AND SECURITY IN GHANA, THE STORY SO FAR, AND THE WAY FORWARD</b>	72 – 74
Seth Amoako Atta and Solomon Ohene Amoako-Atta	
<b>A STUDY ON PRIVACY AND SECURITY ISSUES IN E-COMMERCE</b>	75 – 83
Dr. Geeta Kohade and Ritu Sudhir Thombare	
<b>THE ROLE AND OBJECTIVES OF CRIMINAL LAW</b>	84 – 90
Jaafar Yahay Jaafar Al-Saeed	
<b>MEASURING QUALITY OF OUTREACH IN MICROFINANCE: EVIDENCE FROM VIETNAM</b>	91 – 107
Van Duong Ha and Thi Thuy Nguyen	
<b>EXEMPTION FROM CRIMINAL LIABILITY IN CRIMINAL LAW</b>	108 – 113
Dr. Jetmire Zeqiri and Dr. SC. Agim Beqiri	
<b>A STUDY OF CUSTOMER AWARENESS OF GOVERNMENT SCHEME WITH REFERENCE TO ULHASNAGAR CITY</b>	114 – 124
Deepika Valecha	
<b>IMPACT OF MERGER ON THE PERFORMANCE OF INDIAN PUBLIC SECTOR BANKS MERGED IN 2020 USING THE CAMEL MODEL ANALYSIS: EMERGING NATIONS PERSPECTIVE</b>	125 – 147
Dr. Rajeev Sengupta and Dr. Ameya Patil	
<b>ECO-EFFICIENT PROTOTYPE OF WASTEWATER TREATMENT PLANT APPLYING CLEAN DEVELOPMENT MECHANISM METHODOLOGIES – MEDITERRANEAN COUNTRIES</b>	148 – 168
Firas Fayssal, Adel Mourtada, Mazen Ghandour and Remi Daou	
<b>AN ANALYTICAL STUDY ON THE OPEN PRISON SYSTEM IN INDIA</b>	169 – 173
Shruti Dasgupta and Khwaja Umair	

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**HRIS AS A LEVERAGE TOOL TOWARDS HR 4.0****K. Nivethaa<sup>1</sup> and Dr Usha S<sup>2</sup>**<sup>1</sup>II MA HRM and <sup>2</sup>Associate Professor, Department of Management Studies Women's Christian College**ABSTRACT**

*Industry 4.0 is a terminology that was conceptualized in Germany that prioritized use of technology in processes and data exchange. HR 4.0 would eventually be a direct derivate of Industry 4.0 initiatives. It would encompass e-HRM, HRIS and digitization of the HRM processes. The role of HRIS can be considered as a primary tool to leverage the firm towards HR4.0.*

**Objective:** *The objective of this study is to assess the impact of HRIS on the mediating variables of HR 4.0*

**Methodology:** *An descriptive research design with SPSS tools have been employed*

**Findings:** *It is found that HRIS has a positive impact on process interconnectedness, data management, organizational efficiency and decision making*

**Application:** *This study highlights the importance of a good HRIS and predicts about how it would be stepping stone towards HR 4.0*

**Keywords:** *HRIS, HR 4.0, digitization, efficiency, digitisation*

**INTRODUCTION**

Industry 4.0 is a terminology that was conceptualized in Germany that prioritized use of technology in processes and data exchange. HR 4.0 would eventually be a direct derivate of Industry 4.0 initiatives. It would encompass e-HRM, HRIS and digitization of the HRM processes. The prime HRM functions in an organization deals with people related aspects like Recruitment & Selection, Compensation, General Administration, Employee Welfare, Communication, Organizational Development, Performance Management, Employee Motivation, Rewards & Recognitions and Training & Development. In order to make these functions a little easier, the HR software mechanizes the day to day administrative and general functions performed by the HR department. These HRIS programs can be used for updating and recording the information related to employee and it makes the process of recruitment and selection effective and efficient. An HRIS is used to collect and store data about the organization's employees. HRIS facilitates applicant tracking, interviewing and confirmation process. It can also generate various cost related advantages to the organizations by streamlining the functional operations. These systems also help in tracking the training of the employees, tracking employee's performance and participation and also payroll and accounting and also managing employees leaves and benefits. The role of HRIS can be considered as a primary tool to leverage the firm towards HR4.0.

**Primary Objective**

To assess the impact of HRIS on the mediating variables of HR 4.0

**Secondary Objective**

To assess the level to which HRIS enhances organisational effectiveness in a holistic manner.

To identify how HRIS plays a major role in the recruitment process.

To facilitate the opportunity to use HRIS in decision making

To analyse how HRIS can help improve the employee performance

## LITERATURE REVIEW

Menant, Gilibert and Sauvezon (2021) describe HRIS as a system consisting of processes, procedures, humans and functions obtaining, maintaining, rehabilitation, analysing, grasping and distributing the information that relates to the human resources of organizations. The concepts in acquiring the hardware and software applications to play a facilitating role in the practice, policies and strategies of HRM. HRIS supports a numerous number of applications such as recruitment management, payroll, induction, incentives, training, employee appraisals and career management, skills and talent management, and succession planning. Essentially, HRIS can also be narrated as an enabling computerised system that supports workforce information management through both the managerial and strategic decision-making of an organisation. Gupalasetty Sandeep (2016), HRIS is a software containing a database that allows the entering, storage and manipulation of data regarding employee details of a company. It allows for universal visualization and access of important employee information in detail. HRM usually uses IT as HRIS. It is an integrated system acquiring and storing data used to make analysis and make decisions in the field of HR. HRIS is a sophisticated system that strongly relies on workforce accountability in dealing with complex issues within the organisation. An organization structure including a human resources information system has become an energetic tool in establishing an easier relationship between employees and the organization and among themselves, and information sharing, cooperation (team spirit) and hence added productivity and added work performance. An effective HRIS is a must in today's organizations in order to tackle the issues such as in the emerging organizational demands, more thorough use of information, and more need for information, and the constant pressure for reducing costs and making HR added strategic business partner that HRIS has become a vital tool in enhancing organizational performance and effectiveness, Sergio (2010). HRIS is blended to the problems of the organizations in order to provide low cost, and reduce managerial workforce, and standardize HR processes or simply add strategic value to the decision-making action of the organization. There is consensus that HRIS is a very strong tool in boosting the effectiveness of an organization and hence its HR sufficient and organizational performance among various practices in the organization, Kumar and Parumasur (2013). Brown (2008) warned that HRIS can be recognised as a requisite action for an organization but it may not result in more efficiency if it is not an effective tool for HR functions, and might be opposed to hinder efficiency. As successful HRIS supports planning and accomplishment of basic administrative processes in an organization such as managerial decision-making, technology selection, and organizational reporting structures. Therefore, HRIS has become an active tool in aiding employees to establish relations with their organization and among themselves more easily and thereby yielding more productivity and work performance, Lengnick-Hall and Moritz (2017). According to Bach (2019) the powerful impact on organizational performance is attained through the potency of HRIS usage, measured by the number of different purposes available in the software systems. Some organizations spend a lot of money to acquire HRIS yet are unable to measure the benefits of the system. With the increasing development in technology in the upcoming years, it is possible to create a real time immediate information-based, self- service, and collaborative work environment.

Ankrah & Sokro (2016) after investigating the HRIS system, the researchers found that the use of human resource information systems (HRIS) contributes to the effectiveness of strategic human resources management. By using HRIS, it enhances variables such as cost and time savings, decision-making contributions, daily operational matters, employee performance, quality information effects and employee development commitment which can be considered as strategic HR planning. Silva & Lima (2018) Moreover, strategic HR is not only the organising and accomplishment of actions but also the jurisdiction of results, which must be related to the strategy of the organization by managing the active vision of the resources. For supporting these actions, HRIS can provide data that monitors the internal and external environment for

ascertaining opportunities and threats that influence organizational plan. And its problem-solving function can provide the Development of HR quality and productively.

The key components of ensuring HR 4.0 are interconnection, information accuracy, technical assistance and decentralized decision.

**H1:** HRIS helps build interconnection between and within the HR processes

**H2:** HRIS assists in decentralized decision making

**H3:** HRIS aids in building organization efficiency

**H4:** HRIS ensures data management

## METHODOLOGY

Data collection for this study was from both primary and secondary sources. Data was collected by distributing questionnaire as links through mail and using google form. In this study, a structured questionnaire was prepared and distributed to the respondents. The structured questionnaire prepared by the researcher consisted of both Close ended and open-ended questions. Non- probability convenience sampling is used. The sample size was taken as 155. Out of 155 samples only 111 responded. SPSS was used for data analysis.

## FINDINGS AND INTERPRETATION

**Table 1:** Sample demographics

Particulars	Number of respondents
<b>Gender</b>	
Female	78
Male	33
<b>Age group</b>	
20-25 Years	12
26-30 Years	20
31-35 Years	26
35-40 Years	19
More than 40 Years	34
<b>Work experience</b>	
0-5 years	33
5-10 years	43
10-15 years	18
15-20 years	9
More than 20 years	8

**Table 2:** Level of Hris Used in Organisation

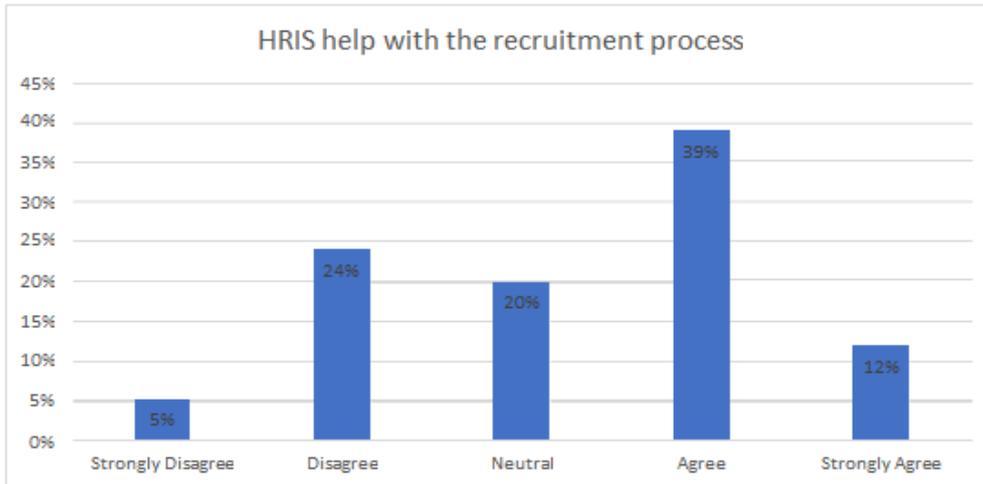
OPTIONS	FREQUENCY	PERCENTAGE (%)
Operational level	7	6
Recruitment, compensation and benefits level	11	10
Supporting workforce planning	21	19
Integration of data	48	43
All the above	24	22
Total	111	100

From the above table, it is inferred that 6% of the employees use HRIS for operational level, 10% of the employees use HRIS for recruitment, compensation and benefits level, 19% of the employees use HRIS for Supporting workforce planning, 43% of the employees use HRIS for integration of data and 22% of the employees use HRIS for all the above options.

**HI:** HRIS helps build interconnection between and within the HR processes

The hypothesis is checked by analyzing the impact of HRIS on recruitment and appraisal process

**Chart 1:** Hris Helps Build Interconnectedness with in Recruitment Process

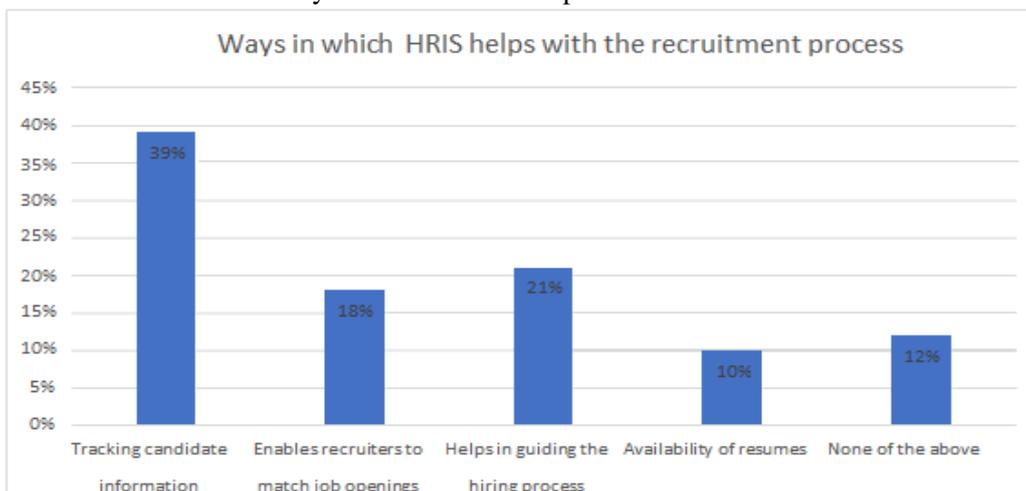


From the above, it is inferred that 5% of the employees Strongly Disagree that HRIS does not help with the recruitment process, 24% of the employees Disagree that HRIS does not help with the recruitment process, 20% of the employees are neutral that HRIS help with the recruitment process, 39% of the employees agree that HRIS help with the recruitment process and 12% of the employees Strongly agree that HRIS help with the recruitment process.

**Table 3:** Ways in Which Hris Helps with Recruitment Process

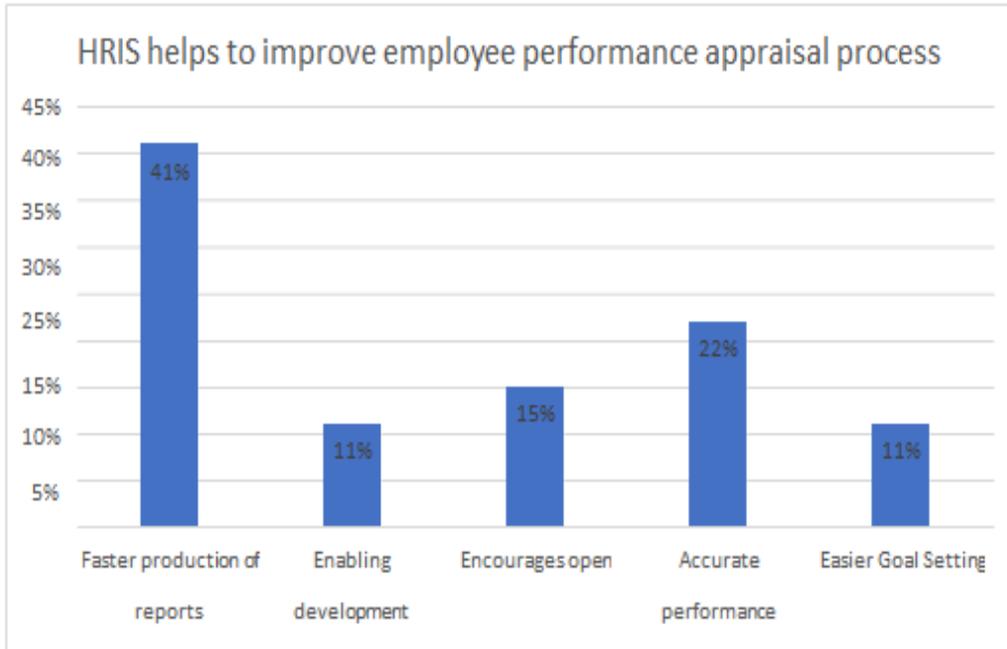
OPTIONS	FREQUENCY	PERCENTAGE (%)
Tracking candidate information	43	39
Enables recruiters to match job openings	20	18
Helps in guiding the hiring process	23	21
Availability of resumes	11	10
None of the above	14	12
<b>Total</b>	<b>111</b>	<b>100</b>

**Chart 2:** Ways in Which Hris Helps with Recruitment Process



From the above, it is inferred that 39% of tracking candidates information helps HRIS with the recruitment process, 18% HRIS enables recruiters to match job in the recruitment process, 21% HRIS helps in guiding the hiring process in the recruitment process, 10% of availability of resumes helps HRIS with the recruitment process and 12% of goes with none of the above mentioned.

**Chart 3:** Hris Helps to Improve Performance Appraisal Process



From the above, it is inferred that 41% of faster production of reports from HRIS help to improve employee performance, 11% of enabling development training helps to improve employee performance, 15% of encouraging open communication helps to improve employee performance, 22% of accurate performance tracking helps to improve employee performance and 11% of easier goal setting helps to improve employee performance.

**H2:** HRIS assists in decentralized decision making

**Table 4:** Existence of HRIS and effective decision making

Value		df	Asymptotic Significance (2- sided)
Pearson Chi-Square	385.877 <sup>a</sup>	16	<.001
Likelihood Ratio	257.112	16	<.001
Linear-by-Linear Association	104.124	1	<.001

From the above table it is inferred that the Chi-square value is 385.877 and value of significance is .001 which is lesser than 0.05. Hence H2- “There is significant relationship between HRIS providing available data for evaluating performance and effective decision making for an employee” is accepted and H0- “There is no significant relationship between HRIS providing available data for evaluating performance and effective decision making for an employee is rejected.

**H3:** HRIS aids in building organization efficiency

Organisational efficiency is measured by the automation of operational work and employees being able to focus more on strategic activities.

**Table 5:** Correlation between existence of HRIS and it enabling freeing up of employees of routine work

		HRIS existence	Freeing up of employee from routine task
HRIS existence	Pearson Correlation	1	.878**
	Sig. (2-tailed)		<.001
	N	111	111

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

According to the above calculated correlation coefficient there is a significant positive relationship between the two variables of existence of HRIS and it enabling employees to free up time. The significance value is 0.001 which is less than 0.05, so null hypothesis is rejected at 95% confidence level. The correlation value is 0.878 which is positive, so we can conclude that two variables have close relationship. Hence the alternative hypothesis is accepted and null hypothesis is rejected.

**Table 6:** Correlation between the existence of HRIS and reduction of cost of office supplies

		HRIS existence	Reduced cost of office supplies
HRIS existence	Pearson Correlation	1	.893**
	Sig. (2-tailed)		<.001
	N	111	111

According to the above calculated correlation coefficient there is a significant positive relationship between the two variables of satisfaction with existence of HRIS and reducing the cost of office supplies. The significance value is 0.001 which is less than 0.05, so null hypothesis is rejected at 95% confidence level. The correlation value is 0.893 which is close to 1, so we can conclude that two variables have close relationship. Hence the alternative hypothesis is accepted and null hypothesis is rejected.

**H4:** HRIS ensures efficient data management

**Table 7:** Regression between HRIS helping recruitment process and keeping track of potential candidates

**Model Summary**

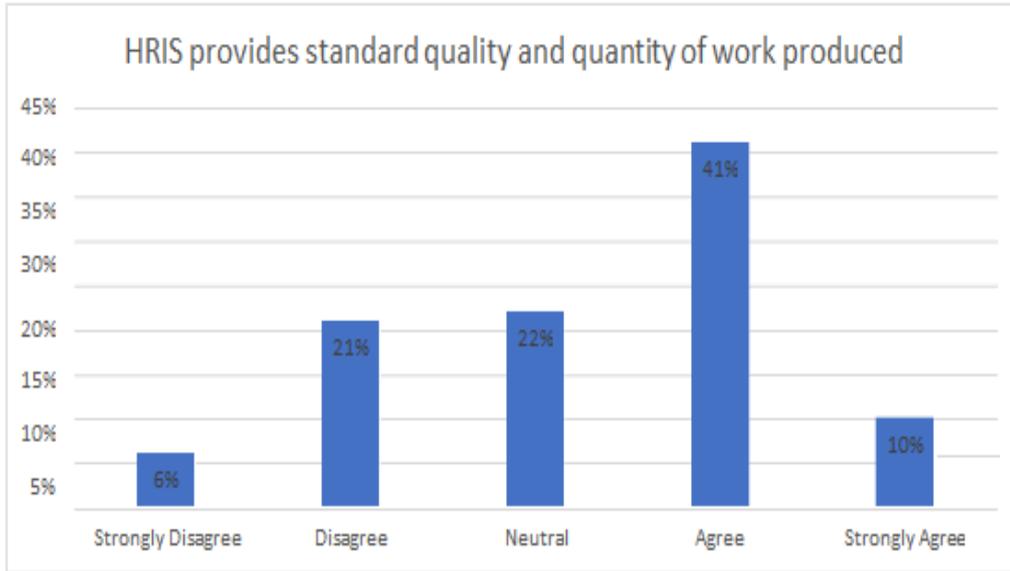
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.900 <sup>a</sup>	.810	.808	.390

**Coefficients**

	Unstandardized Coefficients			Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
(Constant)		1.229	.115		10.719	<.001
HRIS_help_with_recruitment_process		.717	.033	.900	21.550	<.001

The above summary table provides the R values. The R value or correlation value is 0.900 which indicates a high degree of correlation. The coefficient table indicates the regression model predicts the dependent variable significantly well. The significant value is <0.001 which is less than 0.05. This regression is statistically significant in predicting the outcome variable. So, when HRIS is involved in the recruitment process, the tracking of potential candidates information can also be done simultaneously. Hence the alternative hypothesis is accepted and null hypothesis is rejected.

**Chart 4:** HRIS Provides standard quality and quantity of work produced by the employees



From the above , it is inferred that 6% of employees strongly disagree HRIS does not provide standard quality and quantity of work produced, 21% of the employees disagree HRIS does not provide standard quality and quantity of work produced, 22% of the employees are neutral that HRIS provide standard quality and quantity of work produced, 41% of the employees agree HRIS provide standard quality and quantity of work produced and 10% of the employees strongly agree HRIS provide standard quality and quantity of work produced.

**Table 8:** Chi-square between hris providing availbale data for evaluating effective decision making for an employee

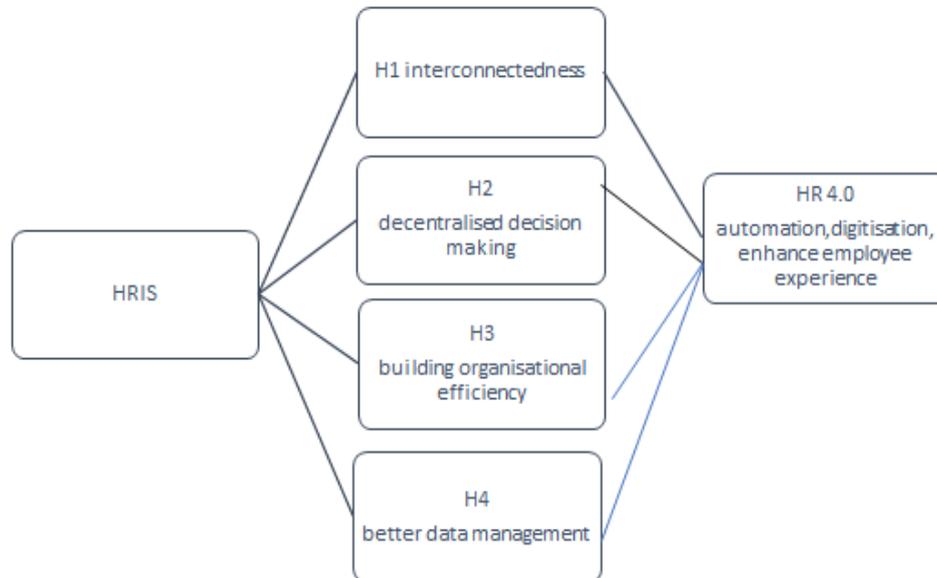
	Value	df	Asymptotic Significance (2- sided)
Pearson Chi-Square	385.877	16	<.001
Likelihood Ratio	257.112	16	<.001
Linear-by-Linear Association	104.124	1	<.001

rom the above table it is inferred that the Chi-square value is 385.877 and value of significance is .001 which is lesser than 0.05.

As a result H1- “There is significant relationship between HRIS providing available data for effective decision making for an employee” is accepted and H0- “There is no significant relationship between HRIS providing available data for evaluating performance and effective decision making for an employee“ has to be rejected. Hence it shows that data available for evaluating performance and effective decision making are not two different independent variables but are two variables that are dependant on each other.

**Application**

The study enables to confirm the basic model where HRIS serves as a preliminary step that leverages the implementation of HR 4.0

**Diagram 1: HR 4.0 MODEL**

### **FUTURE APPLICATIONS AND CONCLUSION**

The backbone of a good human resources department is always the employees who are qualified and have experience in the hands of HRIS. As organisations make technology increasingly important for the financial results, the employees should have the capacity to adapt to the changes and realize their potential. Using HRIS benefits the organisation in many different and hidden ways. The current managerial systems and updating a new one would be much more efficient for the use of computerized data with all the integration of employee information stored is much more effective than manual because it helps in maintaining data with more accuracy in less time and also reduces the cost of office supplies. It is also stated that it improves HRM for administrative and analytical purposes. Thus, HRIS has amazing capabilities that can increase efficiency and help both the HR professionals and the whole workforce process of the organisation increasing productivity.

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**GLOBAL ISSUES IN MULTIDISCIPLINARY ACADEMIC RESEARCH****Dr. Laxmi Sharma**

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Today, people are starting to become active participants in the fight against global issues and as a result, progress is being made. However, there are still individuals unaware of pressing issues around them. Introduction recognizing knowledge created through multidisciplinary research in different parts of the globe is not an easy task. It is not only a question of access and availability, but also is an issue of managing complexity in a limitless domain. Any attempt to do an in-depth analysis of global multidisciplinary research is an unmanageable if not an impossible task.

One has to review articles from countless journals in many countries to produce any credible overview of an acceptable level from a vast array of knowledge. Our interests in knowledge globalization motivated us to do a search of global knowledge by sampling articles with multidisciplinary perspectives and global outreach. We do not intend to produce a comprehensive view of the extant multidisciplinary global research. The present research can at best be termed as an exploratory study to create a base for an expanded future. Thus we have limited the scope of our study to a known journal in multidisciplinary research i.e. *Journal of Knowledge Globalization* which has global knowledge sharing as its mission. We believe papers published may give an indication of the areas of contemporary global knowledge pursuits during the last eight years by the global knowledge community. Discussions and the findings of the research give some indications about the directions and interests of scholars in their pursuits of knowledge in the global arena. One overarching conclusion we can draw from the review is that the research findings and conclusions drawn from the data and experience of one country are not applicable in another country because of social, economic, political, geophysical differences irrespective of the disciplines. However the rigorous tools and methodologies are universally applied.

**The Role of Research**

There has been increasing progress towards solving the global issues; however, for some, this progress is too slow due to lack of understanding of preventative methods, diffusion of responsibility and unanswered questions. These global issue topics for research papers can be used as a starting point to give more insight to others into the issues and how to get involved.

**Global Issues**

- 1. Water Contamination and Shortage:** 2.1 billion people in countries undergoing urbanization have inaccessibility to clean drinking water as a result of pollution, poverty and poor management of resources. Water resources are depleted by agriculture and industry energy production. To put into perspective, agriculture accounts for 70 percent of the reduction of water around the world, with 75 percent of a given countries' water used for this purpose and depleted by contamination. Fortunately, there has been a recent increase in efforts to develop technology to combat contamination and reduce the rate of water depletion.
- 2. Climate Change:** The global temperatures are rising, and are estimated to increase from 2.6 degrees Celsius to 4.8 degrees Celsius by 2100. This would cause more severe weather, crises with food and resources and the spread of diseases. The reduction of greenhouse emissions and the spreading of education on the importance of going green can help make a big difference. Lobbying governments and discussing policies to reduce carbon emissions and encouraging reforestation is an effective way of making progress with climate change.

- 3. The Relationship between Education and Child Labour:** Despite a surge in funding for some countries and increasing attention through social media, education continues to be a luxury around the globe. Reasons include gender preferences and poverty, and child labor — the use of children in industry. According to UNICEF, 150 million children participate in laborious activities dangerous to their health. As one can imagine, this work hinders a child's ability to fully invest in education. Therefore it's most challenging to bring education to sub-Saharan Africa, where the rates of children enrolled in primary education continue to stagger. In addition, fewer students successfully complete secondary education here.
- 4. Violence:** Violence is a global issue that exists in all shapes and sizes. Violence can be done towards a particular group like women or LGBTQ+ members, or it is an act that can be a result of a mentally disturbed mind. There is also violence in response to economic stress. All these varying forms of violence lead to attention on the safety and prevention of such acts. However, there isn't much consideration on how an everyday person can help. In discussions about violence, the biggest questions to answer are: How is this violence used? How is it achieved/accessed? Does the media have a role? How much is the foundation for a particular act of violence is personal? What is the overall goal? Violence can be found in the social, cultural and economic aspects of the world. Whether it is conflict that has broken out in a city, hatred targeted at a certain group of people or sexual harassment occurring on the street, violence is a preventable problem that has been an issue for longer than necessary. With continued work on behalf of the governments of all nations, as well as the individual citizens, the issue can be addressed and reduced.
- 5. Poverty:** In 2015, the International Poverty Line was set to \$1.90. This number means that a person is living in extreme poverty if they live below this line. According to this set line, more than 1.3 billion people are living in this extreme worldwide. This fact suggests that 1.3 billion people have difficulty obtaining food and shelter, regardless of the availability of homeless shelters and organizations. Current questions or topics to explore in an essay or research would be the cause of variation in wages on the international level, and the nature and initiatives that can be taken to solve this global issue at large.
- 6. Inequality:** On a global scale, the focus on inequality tends to be in terms of the distribution of wealth. According to a Global Wealth Report, 44 percent of global net worth is held by only 0.7 percent of adults. This suggests that there is a significant division between economic classes around the world. Recently, research has shown the effects that this economic divide has on communities particularly in health, social relationships, development and stability. For example, in a society where there's a large gap between the rich and the poor, life expectancy tends to be shorter and mental illness and obesity rates are 2 to 4 times higher. In terms of social relationships, inequality on a larger level introduces more violence and crime.
- 7. Terrorism:** Terrorism like the bombing incidents of the last few years continue to claim the lives of innocents. It is a threat to the peace, security and stability of the world, so terrorism prevention methods have been implemented to illustrate what is wrong and should be/could be done to uphold justice. However, the basis of the threats, mindsets and the successes/failures of response efforts still need to be evaluated. Terrorism is an issue throughout the world that causes fear and insecurity, violence and death. Across the globe, terrorists attack innocent people, often without warning. This makes civilians feel defenceless in their everyday lives. Making national security a higher priority is key in combating terrorism, as well as promoting justice in wrongdoings to illustrate the enforcement of the law and the serious punishments for terror crimes.

8. **Child Marriages:** Child marriages are defined as the union between one or two individuals under the age of 18. One in five girls are married before the age of 18, and child marriages prevent children from becoming educated, can lead to severe health consequences and increased risk of violence. Legislation and programs were established in order to educate and employ children in these situations as child marriages do not have enough awareness on individual involvement or emphasis on the common causes for these marriages.
9. **Food:** Poverty, economic inequality and water contamination mean inability to produce sufficient amounts of food to sustain a population. This can, in turn, lead to poorer health and decreased energy to carry out physical and mental functions, leading to more poverty. By 2050, the world would need to find food for approximately nine billion people as cost of production for food will rise in response to the increased amount of individuals. Thus, the United Nations established programs to ensure food security and technology companies make efforts to reduce food production costs.
10. **Pollution** is one of the most difficult global issues to combat, as the umbrella term refers to ocean litter, pesticides and fertilizers, air, light and noise pollution. Clean water is essential for humans and animals, but more than one billion people don't have access to clean water due to pollution from toxic substances, sewage or industrial waste. It is of the utmost importance that people all over the world begin working to minimize the various types of pollution, in order to better the health of the planet and all those living on it.
11. **Security and Well Being** The U.N. is a perfect example of preventing the lack of security and well being that is a serious global issue. Through its efforts with regional organizations and representatives that are skilled in security, the U.N. is working toward increasing the well being of people throughout the world.
12. **Lack of Education** More than 72 million children throughout the globe that are of the age to be in primary education are not enrolled in school. This can be attributed to inequality and marginalization as well as poverty. Fortunately, there are many organizations that work directly with the issue of education in providing the proper tools and resources to aid schools.
13. **Unemployment** Without the necessary education and skills for employment, many people, particularly 15- to 24-year olds, struggle to find jobs and create a proper living for themselves and their families. This leads to a lack of necessary resources, such as enough food, clothing, transportation and proper living conditions. Fortunately, there are organizations throughout the world teaching people in need the skills for jobs and interviewing, helping to lift people from the vicious cycle of poverty.
14. **Government** Corruption is a major cause of poverty considering how it affects the poor the most, eroding political and economic development, democracy and more. Corruption can be detrimental to the safety and well-being of citizens living within the corrupted vicinity, and can cause an increase in violence and physical threats without as much regulation in the government.
15. **Malnourishment & Hunger** Currently there are 795 million people who do not have enough to eat. Long-term success to ending world hunger starts with ending poverty. With fighting poverty through proper training for employment, education and the teaching of cooking and gardening skills, people who are suffering will be more likely to get jobs, earn enough money to buy food and even learn how to make their own food to save money.
16. **Substance Abuse** The United Nations reports that, by the beginning of the 21st century, an estimated 185 million people over the age of 15 were consuming drugs globally. The drugs most commonly used are marijuana, cocaine, alcohol, amphetamine stimulants, opiates and

volatile solvents. Different classes of people, both poor and rich, partake in substance abuse, and it is a persistent issue throughout the world. Petitions and projects are in progress to end the global issue of substance abuse.

With so many current global issues that require immediate attention, it is easy to get discouraged. However, the amount of progress that organizations have made in combating these problems is admirable, and the world will continue to improve in the years to come. By staying active in current events, and standing up for the health and safety of all humans, everyone is able to make a difference in changing the fate of our world.

## ORGANIZATIONAL CITIZENSHIP BEHAVIOUR LEADS TO ORGANIZATIONAL EFFECTIVENESS -A NARRATIVE LITERATURE REVIEW

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### ABSTRACT

*In this paper we review 315 papers published on the topic organizational citizenship behaviour and organizational effectiveness. We tried to summarise the existing factors of organizational citizenship behaviour and organizational effectiveness in the existing literature and investigate the issues raised by published research publications about organizational citizenship behaviour and organizational effectiveness. Lastly, we recommended a research agenda for future study.*

*Keywords: Organizational citizenship behaviour; organizational effectiveness; Human recourse management; Narrative review*

### 1. INTRODUCTION

Organizations have tremendous obstacles in maintaining a healthy relationship between employer and employees as a result of globalisation and the hiring of a varied workforce, as well as rapid changes in the internal and external environment. As the workforce becomes more fragmented, it becomes more difficult for companies to comprehend their employees' diverse requirements and expectations (Promila, 2012). All firms strive to improve employee citizenship and job satisfaction, as well as create value in order to acquire more advantages in competitive marketplaces. Any organisation that values good citizenship as well as employee satisfaction is more powerful and efficient (Kaur,2020).

Organizations and employees that are willing to take on extra responsibilities and provide results that exceed expectations are needed in booming economies. Employees' deliberate work has a tremendous impact on organisations. To improve organisational competence and efficiency, organisations require employee collaboration, compassion, altruism, and, on occasion, extra effort (Chien, 1988). Individuals helping their colleagues, vigorously participating in group meetings, providing important propositions to advance performance, neglecting and complaining about minor issues, exhibiting an eagerness to take on everyday new jobs, and representing the organisation optimistically to the outside world are examples of Organizational Citizenship Behaviour (OCB) (Organ, 1997). Citizenship in Organizations Job behaviour is an important part of job performance that has been the subject of much research in both job satisfaction and organisational effectiveness. The idea behind OCB is that it encompasses employees' activities, which are described as behaviours that assist the company by going above and beyond their normal responsibilities and contributing to the company's success (Organ, 1988. 1977; Organ, Podsakoff, & Mackenzie, 2006).

By these means organizations can achieve organizational effectiveness that is an organization's ability to achieve the goals it sets out to achieve. This is an organisation that achieves a desired result or is prolific in nature and eliminates waste to the greatest extent possible (Kaur,2020).

In this paper, the researcher tends to conduct a narrative literature review on the topic of organizational citizenship behaviour and organizational effectiveness. By these means the study's goals are to:

- Summarise the existing factors of organizational citizenship behaviour and organizational effectiveness in the existing literature.

- Categorise and investigate the issues raised by published research publications about organizational citizenship behaviour and organizational effectiveness.
- Recommend a research agenda for future study

## 2. Methodology of Narrative Literature Review

The narrative literature review methodology is employed in this paper. As a result, in this work, we conducted a search across databases for published journal articles on organizational citizenship behaviour and organizational effectiveness to gather a variety of published publications for narrative review. For article searches, we use the Emerald, Sage, Science Direct, Scopus, and EBSCO bibliographic databases. To find publications for the narrative literature review, we utilised a keyword search. For a period of time, we gathered articles about organizational citizenship behaviour and organizational effectiveness that had been published (1990-2021). Additionally, we employed a systematic deletion method to remove duplicate articles from two databases, such as Scopus and Science Direct. We also removed publications that did not have full-text versions available, leaving us with 315 articles to review for a narrative literature review.

Database	Time period	Total number of articles matching keywords	Total articles selected
Emerald	1990-2021	109	52
Science direct	1990-2021	108	48
Scopus	1990-2021	213	107
EBSCO	1990-2021	209	108
Total		639	315

## 3. NARRATIVE REVIEW

### 3.1. Organization Citizenship Behaviour- Concepts and Definitions

Organizational Citizenship Behaviour (OCB) is a relatively new concept in performance evaluation, yet it symbolises an age-old human behaviour of deliberate action and common assistance with no request for further compensation or formal incentives in return. Dennis Organ was the one who first proposed this concept in the mid-1980s, and it has gained traction in recent years (Kaur,2020). Bateman and Organ were the first to coin the word OCB (1983). Katz's study (1964), which investigates innovative and spontaneous behaviour beyond role prescriptions and distinguishes between high and low performers, is at the heart of OCB's history. The concept of OCB, as well as related concepts such as extra-role behaviour (Van Dyne, Cummings, and Parks, 1995), contextual performance (Borman and Motowidlo, 1993) and organisational spontaneity (George and Brief, 1992; George and Jones, 1997), and did not do well in initial years. The majority of empirical research on OCB focuses on the link between OCB and related categories rather than the nature of OCB. The research is more concerned with substantive validity than with construct validity (Kaur, 2020).

According to Organ (1988), the origins of Organizational Citizenship Behaviour may be traced back to classic management theories such as Barnard's (1938) and the Hawthorne Experiment (Roethlisberger and Dickson, 1939). OCB can help an organisation succeed by improving worker cooperation, increasing productivity, assisting co-workers in coordinating activities within and between groups, and managerial productivity, enhancing the organization's capability, escalating the organization's performance, and enabling the organisation to adapt to environmental changes more efficiently (Organ et. al. 1990).

### **3.1.1. Antecedents of Organization Citizenship Behaviour**

There is a well build body of research discussing antecedents of OCB. There are several dimensions that can be defined as OCB, including being polite and courteous, avoiding conflicts with co-workers and respecting other ideas and values, performing duties without complaint, being helpful to co-workers, protecting organisational guidelines and practises, and following regulations and laws if they are not seen by managers (Srivastva & Saldanha, 2008). Among the many antecedents of OCB some of them are, gender (Diefendorff et al., 2002), career orientation (Chompookum and Derr 2004), age (Pettit, Donohue, and Cieri, 2004), Sportsmanship, Helpful to others, Loyalty, Fulfilment, Initiative, Civic Virtue, Self-Realization (Podsakoff et al., 2000), accountability (Hochwarter, Ferris, Gavin, et al., 2007), job satisfaction (Diefendorff et al., 2002), leadership (Ehrhart, 2004), perceived organization support (Van Knippenberg and Sleebos, 2006), role perception (Podsakoff et al., 2000), person-organization fit (Chandrakumara, 2007), communication (Frenkel and Sanders, 2007), obedience, loyalty, Participation (Inkeles, 1969).

### **3.1.2. Outcomes of Organization Citizenship Behaviour**

The importance of OCB is emphasised by its definition, which links it to organisational success. The effects of OCB, however, are not confined to the organization's performance. The OCB has been found to effect Customer satisfaction (Castro, Armario, Ruiz, 2004; Hansen et al., 2003), organization effectiveness (Koslowsky and Dishon-Berkovits, 2001), organization performance (Podsakoff et al., 2000) employee turnover (Moorman, 1991; Smith et al., 1983), turnover intention (Khalid and Ali, 2005).

## **3.2. Organizational Effectiveness**

Organizational effectiveness grew more essential in the 1980s, and it shifted from being a construct to being a perception (Henry, 2011). This word refers to an organization's ability to access and reallocate resources in order to achieve its goals (Federman, 2006). Organizational effectiveness, according to Cameron (1978), is defined as the organization's ability to function and its access to essential resources. However, according to McCann (2004), companies can achieve their goals by implementing core strategies, and these core strategies serve as a criterion for organisational performance. Organizational effectiveness is defined and measured differently by different schools of thinking. The effectiveness of an organisation can be viewed through the eyes of many management schools of thought. Varying management approaches place different emphasis on and measure different aspects of organisational effectiveness. As previously stated, the current study considers that there is no one-size-fits-all concept of organisational effectiveness. Furthermore, in the context of PC and OCB, the assessment primarily evaluates subjective OE measures such as job satisfaction and morale in isolation rather than examining from an effectiveness standpoint. As a result, financial indications of an organization's effectiveness are taken into account (Promila, 2012). Organizational effectiveness refers to an organization's capacity to achieve its goals with the least amount of time, energy, money, people, and material resources. Some authors take a different approach, stating that in order to improve organisational effectiveness, one should compare net profitability to target profitability or collect data from consumer surveys and corporate growth (Kaur,2020).

Organizational effectiveness is a broad notion that encompasses a number of components for assessing an employee's and an organization's performance. As a result, the most essential aspect of organisational performance has been organisational effectiveness (Lee and Choi, 2003). Organizational effectiveness is defined as "an organization's long-term ability to achieve its tactical and strategic goals on a consistent basis" (Fallon and Brinkerhoff, 1996). Organizational effectiveness is defined by Mott (1972) as "the ability of an organisation to organise its resources and power for accomplishment, change, and production." In reality, successful management and organisations are more likely to deliver higher-quality products.

### 3.2.1. Antecedents of Organization Effectiveness

Organizational effectiveness is influenced by a variety of factors, both directly and indirectly. Some of these factors are service climate (Guthrie et al., 2002), organizational culture (Alvesson, 2011), leadership (Bass and Riggio, 2006), organization environment (Bhardwaj, 2001), quality practices (Eriksson and Hansson, 2003), market Orientations (Ramayah, Samat, Lo, 2011), employee participation (Lau and Lim, 2002), creativity and quality function deployment (Politis, 2005), industrial relations (Katz, Kochan, and Weber, 1985), organization size (Dalton et al., 1980).

### 4. Direction for Future Research

Having reviewed the literature above, we could understand that studies have been conducted on determination of antecedents of organization citizen behaviour and organization effectiveness. However, the limitation of the current research is that there are lack of evidences available in the literature that tends to examine the relationship between these two variables. It means that whether organization effectiveness has to be treated as an outcome variable is debatable. Further, the researcher needs to find out, is there any outcome variable to organization effectiveness. Further, there is a need to provide a thorough instrument or approach for assessing the effectiveness of an organisation. The current study's organisation effectiveness variable is based on financial data. Future study could take into account a mix of subjective and financial measures of an organization's effectiveness.

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## PERCEIVED EFFECT OF LEARNING DISABILITIES ON THE ACADEMIC PERFORMANCE OF STUDENTS

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### ABSTRACT

*This is an empirical study that investigated the perceived effect of learning disabilities on the academic performance of students. The study applied descriptive survey as research design with a total of 50 students in 300 levels randomly selected from two federal universities in Nigeria. The study was guided by one research question and one hypothesis. The principle instrument used to obtain data for the study is a questionnaire titled Learning Disabilities and Students Academic Performance Questionnaire (LDSAPQ). The instrument was validated by three experts in the fields of Measurement and Evaluation and Educational Psychology while Pearson's Product Moment correlation statistics was used to test the reliability of the instrument and reliability coefficient of 0.76 was obtained. On the other hand, a proforma was used to collect student-librarians scores in three compulsory courses offered in the department and this stands in their academic performance data. The data collected were later analyzed using percentages, rank order and Pearson's Product Moment correlation statistics. The outcome of the investigation reveals that student-librarians are faced with different kinds of learning disabilities and based on the hypothesis tested, there was a significant statistical ( $<0.05$ ) relationship between learning disabilities and students' academic performance. It was based on this outcome that it was recommended among other things that government and university management should provide necessary facilities like libraries, laboratories, workrooms and students' accommodation to make learning attractive and that lecturers should diversify their teaching methods so as to address the differences in students.*

*Keywords: Learning disabilities; Students; Academic performance; Teaching method, Library and Information Science*

### 1.0. INTRODUCTION

Learning disabilities is a generic term that refers to different groups of difficulties manifested by significant difficulties in the acquisition and use of listening, speaking, reading, writing, reasoning or mathematical abilities. It is an umbrella term for wide variety of learning problems (Kemp, Smith & Segal, 2013). They added that these difficulties are intrinsic to individuals and are presumed to be as a result of dysfunctions in the central nervous system.

Generally, there has been a misconception between learning disabilities and exceptional students, in this context, it is imperative to clarify for proper understanding that learning disabled students are quite different from exceptional students just like mentally retarded or deaf the issue as explained by Anusiem (2006) is that they cannot accurately perceive things virtually, hear or listen attentively in the same vein writes Ekwe (2003) learning disability is not a problem with intelligence or motivation and that these children are not lazy, deaf or dumb because most of them are smart as everyone else; it is just that their brain are wired differently and this difference affects how they perceive and process information. In other words, learning disabled students are those who have adequate mental ability and sensory processes but fail to utilize them to perform (Anusiem, 2006)

As argued by Ramus (2004), the issue of learning disabilities can make it difficult for those victims to learn as quickly as someone who is not affected by learning disabilities. In this context, student-librarians with learning disabilities should be seen as average or above intelligent but still struggle to acquire skills that influence their performance in school, at home,

and in the community as well as the way they perceive and process information. Since learning disabilities are lifelong reveals Baker (2004) the sooner they are recognized and identified in any student the sooner steps can be taken to subdue the associated challenges

A remarkable sign of learning disability according to Siegel (2013) is a distinct and unexplained gap between a person's level of expected achievement and his performance. Learning abilities as noted by Ekwe (2003) affect people in different ways at various stages of development and ranges from mild to severe and it is not uncommon for people to have more than one learning disability. As has been noted, there are many kinds of learning disabilities and some interfere with student's ability to concentrate or focus and can cause much on him while other learning disabilities can make it difficult for students to read, write, spell and solve mathematical problems. It is after synthesizing the accrued challenges associated with learning abilities that the need arose to investigating the thought effect of learning disabilities on the academic performance of student-librarians.

### **1.1. Statement of the Problem**

The issue of learning disabilities has been seen by many as a challenge that is peculiar to primary and secondary school pupils thereby exempting students in institutions of higher learning. It is pertinent to state, that the perception is an erroneous one as it is on record that there are thousand and one students in tertiary institutions who find it very difficult to read, write; spell, speak, listen and even solve simplest mathematical problems. It has been observed by the researcher while marking students' examination scripts, that many students-librarians experience difficulties in writing correct sentences, reading, spelling, speaking correct English and some with terrible handwritings. It was also observed that many of them are scared of research and statistical courses and have poor calculative capabilities as well as find it difficult to answer questions in the class as a result of the fact that they do not know the correct words to use. Some cannot even read a passage in the text without mistakes in pronunciation. This no doubt, may influence their academic performances. Furtherance, in teaching and learning as a process, a learner is expected to perform some basic skills such as: reading, writing and talking and having learning disabilities, imperatively will make it very difficult for such students to perform all these skills.

On the other hand, studies on the influence/effect of learning disabilities on students' academic performances have been limited to primary and secondary schools pupils with no serious consideration given to students in institutions of higher learning more so, student-librarians and this forms the focus of this study. This situation, calls for concern as some students also have challenges in writing, reading, calculating and even spelling correctly and some also perform abysmally academically. These crops of students appear to be suffering from learning disabilities that may be negatively affecting their academic performance. It is against this backdrop that this study became necessary as to investigate the perceived effect of learning disabilities on the academic performance of students.

### **1.2, Research Objective**

This study has one basic research objective which guided it and this is:

1. To investigate the thought effect of learning disabilities on the academic performance of students

### **1.3. Research Hypothesis**

This study was further guided by one formulated and tested null hypothesis.

1. **H<sub>0</sub>**: There is no statistical relationship ( $P < 0.05$ ) between learning disabilities and students'; academic performance

## 2.0. LITERATURE REVIEW

Learning disability refers to delays, deviations and performances discrepancies in the basic academic subjects for instance, arithmetic, reading, writing, spelling as well as speech and cannot be attributed to mental retardation, sensory deficits, or emotional disturbances or learning disabilities. It is general educational term- an umbrella label- that includes a variety of different conditions (Sawhney & Bansalb, 2014). According to Kirk, Gallagher, Anastasiow and Coleman. (2006), learning disabilities refer to a number of disorders which may affect the acquisition; organization, retention, understanding or use of verbal and non-verbal information adding that specific learning disability means a specific disorder in one or more of basic psychological processes involved in using language, spoken or written which may manifest itself in an imperfect ability to listen, think, speak, read, write, spell or do mathematical calculations.. A learning disability therefore is a neurological disorder that affects one or more of the basic psychological processes involved in understanding or in using spoken or written language they conclude.

Graham, Karen and Swason (2003) defined learning disability as a condition that gives rise to difficulties in acquiring knowledge and skills to the level expected of those of the same age especially when not associated with physically handicapped. They argued that learning disabilities are not the same as intellectual disabilities. Learning disabilities can be described as a disorder in basic process involved in understanding or in using language, spoken or written that manifest itself in an imperfect ability to listen, speak, react, read, write, spell or do mathematical calculation. It also included conditions such as perceptual disabilities, brain injury and developed aphasia (Barker, 2014). Learning disabilities are real and they affect the brain's ability to receive process, store, respond and communicate information. Haqmmil (2004) argued that learning disability is a group of disorders not a single disorder.

Sawhney and Bansal (2014) revealed that in India around 13-14% of all school children suffer from learning disorders. These children are labeled as failures by the society we live in but in reality it's not that these children who have failed but it is the education system that has failed, failed in recognizing and helping them. As teachers are the link between the children and education system, it's their level of understanding and awareness that sets the path for these children's future. A national survey found that 8% of United States of America children have a learning disability (Bloom & Dey, 2006).

In his contribution, Ugwu (2015) highlights the four types of specific learning disabilities as dyslexia, dysgraphia, dyspraxia and dyscalcular. He explains that people with dyslexia have troubles making connections between letters, sound and with spellings and recognizing words, those with dysgraphia have problems with writing while those with dyscalcular have problem understanding basic arithmetic concepts like fractions; number lines, positive and negative numbers and dyspraxia victims have problems with motor task. Learning disabilities in reading (dyslexia) is a language based disorder where the student has difficulties in pronunciation, reading, sound or words recognition. It also deals with language processing, reading, writing and spelling. In this case, the victim is confused about letters, names and sound and experiences difficulties in blending sounds and words, slow rate of reading and trouble in remembering after reading text and assignment (Ekwe, 2003; Anusiem, 2006; Baker, 2014). In addition noted Haqmmil (2004), students with dyslexia have difficulties with phonological skills which involves being able to understand how sounds and letters are matched up to make words

Anusiem (2006), explained that dyscalculia is a mathematical disability whereby an individual have difficulty in solving arithmetic problems, grasping mathematical concepts and symbols, mathematical skills, computation, remembering facts, concepts of time and money. It refers to a a wild range of lifelong learning disabilities involving poor mental mathematical skills and problems with spatial direction added Ekwe (2003). Researchers have further discovered that

students with difficulties in mathematical and computation often have cognitive and neuropsychological deficits including poor performance in working memory, visual perceptions and visuospatial abilities (Kalfman, 2003; Shaley, 2004). Shaley, Manor and Gross-Tsur (2005) in a study found that dyscalculia is an enduring learning disability in many children and more than half of them still perform very poorly in mathematics when they reach tertiary level.

According to Anusiem (2006), dysgraphia has to do with difficulties in writing, pronunciation, selection of words, spelling of words, articulation of ideas and manifestation of problems in sentence formulation. While Kemp, Smith, and Segal (2013), opined that learning disability in writing involves the physical act of writing or mental activities of comprehending and synthesizing information and contend that dysgraphia children find it difficult forming words or sentences and are grammatically poor. On the other hand, noted Anusiem (2006), dyspraxia is a learning disorder that is connected to motor skill development typically the fine motor skill coordination, manual dexterity and this disorder affects motor skill development.

With learning disability, a student struggles with school more so in the areas of reading and mathematics. Inasmuch as much is known about how to help children with learning disabilities, not much is known about the causes of why a child may be learning disabled but some psychologist like Haqmmil (2004) posited that learning disabilities may be as a result of minimal cerebral dysfunction or minimal brain damage. It is believed added Ramus (2004) that any damage in the cortex (seat of mental activities in the brain) can affect learning. This cerebral dysfunction revealed Ginakemp, Melinda, Smith and Jeanne (2013) is always prominent during prenatal development

Sawhney and Bansal (2014) revealed that a learning disability cannot be cured or fixed; it is a lifelong challenge. Unfortunately, most of these children they noted are never identified as learning disabled. Due to lack of awareness among teachers and school authorities, these children are usually labeled as slow, behind, incapable and failures. Repeated failures results in low self esteem and these children slowly stop trying to learn and achieve and eventually drop out of school. Later on these dropped out adolescents and teens with learning disabilities, who have not received proper academic attention and support services, run a higher risk than average for becoming involved with tobacco, alcohol and drug abuse. School drop-out is linked to illegal activities and eventual incarceration, and for becoming prone to teenage pregnancies.

Kavale, Holdnack and Mostert (2005) averred that teachers sometimes are too quick to label children with slightest learning problem as having learning disability with considering that the problem may rest on their teaching methods. However, Hallathan and Kauffman (2006) were of the opinion that the increase in number of children being labeled with learning disability is justified. Obviously concludes Berninger (2006), children with learning disabilities are more likely to perform poorly academically, have high dropout rates and poor employment records. As noted by Mercer and Pullen (2006), students with learning disabilities who are taught in the regular classroom without extensive support rarely achieve the level of competent of even students who are low achieving and do not have a disability.

### **3.0. METHODOLOGY**

#### **3.1. Research Design**

The study adopted a descriptive research survey which is a type of research design that aims to obtain information and systematically describe a phenomenon, situation, or population. More specifically, it helps answer the what, when, where, and how questions regarding the research problem, rather than the why (Voxco, 2021).

#### **3.2. Population Sample**

The sample population of this study was 50 students in 300 levels randomly selected from two federal universities; University of Nigeria, Nsukka (Southern, Nigeria) and Bayero University,

Kano (Northern Nigeria). The sample distribution is 25 from each university. Through the simple random sampling techniques, each student was given equal opportunity of being selected. Using a ballot method, with the help of the two lecturers and course representatives the researcher went to the lecture halls where the supposed sample were taking their lectures, the students were asked to pick a ballot paper of yes/no and those who picked 'yes' formed part of the sample and the questionnaires were administered to them.

### 3.3. Instrument for Data Collection

The major instrument used in collecting data for this study was a 20-item modified 4-point Likert scale type questionnaire of Strongly Agree (SA); Agree (A), Disagree (DA) and Strongly Disagree (SDA) titled Learning Disabilities and Students' Academic Performance Questionnaire (LDSAPQ). The instrument had two sections with section one being for demographic data of the students and section two which contained 20-item structured questions on specific learning disabilities while proforma was used for the collection of students' 'GPA' on three compulsory courses (GST103; Use of Library, LIS221- Basic Classification and LIS311-Cataloguing 11). This served as their academic performance proforma.

### 3.4. Validation of Instrument

The instrument was validated by three experts in the fields of Measurement and Evaluation and Educational Psychology while Pearson's Product Moment correlation statistics was used to test the reliability of the instrument and reliability coefficient of 0.76 was obtained

### 3.5. Method for Data Analysis

The data collected were later analyzed using percentages and rank order to answer the research question whereas, the research hypothesis was tested by correlating the student-librarians' scores on the questionnaire alongside that of their academic scores using Pearson's Product Moment correlation statistics.

### 4.0. Presentation of Data

**Table 1:** Percentage response and rank order of learning disabilities experienced by students (SA & A=Agreed); DA & SDA=Disagree)

S/No	Items	Agreed		Disagreed		Rank
		N	%	N	%	
1	Students with learning disabilities experience difficulties in listening attentively in the class	42	84	8	16	4 <sup>th</sup>
2	Students with learning disabilities find it difficult to read their textbooks and notebooks	30	60	20	40	15 <sup>th</sup>
3	Students with learning disabilities invert words as they write	34	68	16	32	12 <sup>th</sup>
4	Students with learning disabilities find it difficult to write down what they have in mind during exams	44	88		12	2 <sup>nd</sup>
5	Students with learning abilities find it difficult in remembering mathematical symbols	33	66	17	34	13 <sup>th</sup>
6	Students with learning disabilities find it difficult to pass mathematical related subjects	47	94	3	6	1 <sup>st</sup>
7	Students with learning disabilities find it difficult in pronouncing words correctly	32	64	18	36	14 <sup>th</sup>
8	Students with learning find difficult in forming correct sentences	41	82	9	18	5 <sup>th</sup>
9	Students with learning disabilities perform poorly academically	43	86	17	14	3 <sup>rd</sup>

<b>10</b>	Students with learning disabilities feel inferior in the class	36	72.	14	28	<b>10<sup>th</sup></b>
<b>11</b>	Students with learning disabilities find it difficult in expressing themselves in writing	35	70	15	30	11 <sup>th</sup>
<b>12</b>	Student with learning disabilities are clumsy in movement	38	76	12	24	8 <sup>th</sup>
<b>13</b>	Students with learning disabilities are easily distracted in the class	40	80	10	20	<b>6<sup>th</sup></b>
<b>14</b>	Students with learning disabilities are quick to act without considering the outcome of their action	37	74	3	26	9 <sup>th</sup>
<b>15</b>	Students with learning disabilities have low reading skills	40	80	10	20	6 <sup>th</sup>

**N=50**

The data as displayed in table 1, which is for percentages and rank order of the thought effect of learning disabilities among students show that students with learning disabilities find it difficult to pass mathematical related subjects ranked 1<sup>st</sup> followed by students with learning disabilities find it difficult to write down what they have in mind during examinations while students with learning disabilities perform poorly academically ranked 3<sup>rd</sup>. . Occupying the rear in the ranking include students with learning abilities find it difficult in remembering mathematical symbols ranked 13<sup>th</sup>, students with learning disabilities find it difficult in pronouncing words correctly ranked 14<sup>th</sup> and the 15<sup>th</sup> being that students with learning disabilities find it difficult to read their textbooks and notebooks. The totality of it all is that student-librarians experience learning disabilities that negatively affect their academic performance.

**Table 2:** Summary of Pearson Product Moment Correlation between learning disabilities and students' academic performance

<b>Variation</b>	<b>N</b>	<b>DF</b>	<b>Ex</b>	<b>Ev</b>	<b>EX2</b>	<b>Ey2</b>	<b>Exy</b>	<b>Cal R value</b>	<b>Crit</b>	<b>Remark</b>
Learning disabilities (x)	50	48	528	49.6	27.87	1989.16	4777	0/214	0.139	H0 rejected
Academic performance (y)	50									

Data obtained as summarized in table 2 above show that the calculated r-value of 0.214 is greater than the r-critical value of 0.139 at 0.05 of significance and for 48 degree of freedom. Since the r-calculated value is greater than the r-critical value, the law states that the null hypothesis should be rejected. It is on this ground that the research null hypothesis is rejected. This is to say therefore, that there is statistical significant relationship between learning disabilities and students' academic performance.

## **5.0. DISCUSSION OF FINDINGS**

The result of this investigation did show that many students experience learning difficulties such as difficulties in writing; reading; listening attentively in the class, spelling correctly, computation and coordinating of mathematical ideas. It was also discovered that many of them find it difficult to write down what they have in mind during examination. The outcome of this study is in consonance with reports of Ekwe (2003); Anusiem (2006) and Baker (2014) who found that learning disabled children find it very difficult to comprehend, compute and coordinate information and that of Manor and Gross-Tsur (2005) who posited that more than

half of the children with dyscalculia perform poorly in mathematics when they reach tertiary level. The outcome is also in conformity with that of Sheldon (2014) who in his study reported that learning disabled students have problem in abstract reasoning adding that this might affect them in subjects like measurement and evaluation as well as in other mathematical related subjects. One can infer from this result that students having difficulties in storing or recalling of information in long or short time periods for instance during class test and examination periods will definitely performance poorly in them.

The study based on the result of the formulated and tested hypothesis, proofs that there was a statistical significant relationship between learning disabilities and the students' academic performance. The result further shows that students with learning disabilities perform poorly academically. This result is in affirmation to the declaration of Berninger (2006) that children with learning disabilities are more likely to perform poorly academically, have high dropout rates and poor employment records and that of Mercer and Pullen (2006) who revealed that students with learning disabilities who are taught in the regular classroom without extensive support rarely achieve the level of competent of even students who are low achieving and do not have a disability. The outcome of this study is also in tandem with that of Bloom and Dey (2006) and Baker (2014).

### 5.1. CONCLUSION AND RECOMMENDATION

The result of this study is justified considering the fact that learning disabilities affect the brain's ability to receive; process, store, respond and communicate information and these are the basic processes in learning. The implication is that any student who cannot perform these basic functions may face depression and remain frustrated with the end result being abysmal academic performance and eventual dropout of school. Be though as it may, the outcome of this study has established that learning disabilities is not peculiar to children in primary and secondary school and that learning disabilities are also experienced by students in tertiary institutions as some of them also have difficulties in writing, reading, listening, computation etc.

The inference is that learning disabilities can influence students' academic progress just as revealed that there was a significant relationship between learning disabilities and students' academic performance. It is therefore based on the above factors that the following recommendations are made.

- It is no longer news that students with learning disabilities experience difficulties in writing; reading. Spelling, computation among others. In view of this, it behooves school management and examination time-table planners to put into consideration such students by allotting special time for their examinations that will allow them relax to decode and understand all about the questions and should not be stopped abruptly by the examinations; invigilators. In the case of class test, the lecturer involved should plan special time for such students and every assignment and class work should be giving to them ahead of time as this can assist such students to cope with normal students.
- While teaching students with learning disabilities, the lecturer should show high level of cordiality, exercise patience and develop enduring spirit as to giving such students that sense of belonging. Stating the obvious, lecturers who have students with learning disabilities offering their courses should use reinforcement/motivation in stimulating them to learning, avoid using so many materials at a time and language should be vivid, simple, direct and meaningful
- Students with learning disabilities tend to learn better when they visualize. So lecturers are advised to be more visual than verbal communication when teaching. In the case of library and information science, it is a course in the real sense of it that is practical oriented

therefore the students will be well taught if the whole act is in practical rather than theoretical.

- Students with learning disabilities tend to be easily distracted when taught for a long period of time the recommendation is that the learning period should not be too long as to avoid strain on the mental ability of the student.
- As students with learning disabilities who are taught in the regular classroom without extensive support rarely achieve the level of competent of even students who are low achieving and do not have a disability, lecturers should use multi-modal methods to present classroom materials as to address a variety of learning styles among students (for instance, auditory, visual and kinesthetic) as it will help in providing important information in both oral and written formats.
- Lecturers should apply basic teaching methodology and should introduce any new topic through set induction and revising the entry behavior and should from time-to-time summarize previous topics treated and objective of every topic must be clearly stated
- Lecturers should also use diversified methods of teaching so as to make learning interesting and meaningful.
- Government and university management should provide resources that will enhance teaching and learning such as laboratory, conducive lecture halls, library and counseling and psychological units to assist students with learning disabilities in their difficulties and when necessary, refer them for special education for example, when it has been identified on a very high rate of disability.
- On a general note, students with learning disabilities should be encouraged by management, lecturers, parents and fellow students as to giving them that sense of belonging, reassuring them that they have the abilities therefore can excel like any other normal student instead of stigmatizing them.

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## THE DIFFERENCE OF CONFLICT MANAGEMENT STYLES AND CONFLICT RESOLUTION IN AN ORGANIZATION (SCHOOLS), AS A WORKPLACE

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### ABSTRACT

*This paper is a review of conflict management styles and conflict resolution from the managers and supervisor's (principal's) point of view. Conflict is a predictable fact for any organization. The school Leaders should recognize and be relevant various conflict management techniques and conflict resolution styles in classify to form strong dealings with subordinates. Conflict is a situation when two or more parties are in disagreement. Unresolved confrontation can negatively impact the success of an organization (school). So, leaders (principals) must learn how to address and manage conflict depending on the situation and the people involved. Workplace conflicts may result in absenteeism and affect employee (staff) loyalty. To carry out the goals of this study, relevant reports in the field of conflicts management theories were reviewed as well as school administration. The insights afforded from these reports guided in high performing schools in Batticaloa, Sri Lanka. The researcher explored features of principal's conflict management style that were evident in high performing schools and required to discover the characteristics of principal's peaceful management ways. 10 I-AB schools from the total of 64 high performing schools were being selected from research area by Random Sampling Method where Principals, teachers, and non-academic staff and student's leaders have selected as the respondents of primary data collection to fill up the Questionnaire and face to face interview. And also, secondary data (Documentary) would be utilized to ensure the primary data as supportive documents for the study of conflict resolution management theories. The results showed in addition, Conflicts serve as a learning curve for all organizations. Without conflict, an organization will not improve. Superior and subordinates should learn to resolve the conflicts that occur instead of just avoiding that conflict. Employees should learn and practice the various methods of conflict resolution. Superior and subordinates should start solving conflicts as it is the only way to ensure that conflicts are handled better in the future of organizations.*

*Keywords: Conflict management, Conflict resolution, organization, work place*

### 1. INTRODUCTION

A conflict usually occurs when two or more people converse. When people think of conflict in simple terms, they think that happens when serious issues and anger is invoked in communication process. Conflict is misinterpreting one's words or value. Inappropriate, poor communicated information and selecting the wrong channel to transmit the information arise in the parties. There are frequent conflict management styles such as passive aggressive style, forcing style, avoiding style, accommodating style, compromising style, and collaborating style. There are two different types of conflict; one of it is task conflict and focuses on the ways to resolve problems. Conflict in an organization (school) affects the obligation and absenteeism of employees (staff).

#### 1.1 Hypothesis

Due to the causes of developing conflicts among work place and its effects on school developing. By understanding the types of conflict, supervisors can use appropriate conflict resolution styles. If a conflict is left unresolved, it may cause serious consequences. If a manager (principal or leader) only uses one type of conflict management style in handling all conflict in the workplace, it may not work as they expect it to clear that situation.

## 1.2 Objectives

The main objective of the study is to find **The Difference of Conflict Management Styles and Conflict Resolution in workplace** activities through the destructive impacts in school development and it may lead to violence and identify the connection of organization's (school's) effectiveness between staff satisfaction and leader's (principal's) management. **The specific objectives are as follows;**

- To identify the conflicts in workplace (schools) and reasons for the conflicts arises by employee (staff) through review of documentaries.
- To evaluate, Difference of Conflict Management Styles and Conflict Resolution by Applying organizational leaders.
- To call out the impacts of conflicts between staff and give awareness for suggestion to organizational development (school) development

## 1.3 Problems of the Research

Nowadays, staff has strong attitude, According to Pygmalion's Theory, the supervisors' attitude and expectations of staff and how they treat them mostly determine the staffs' performance. When a conflict arises between supervisor (principal) and subordinates, and the staff think that the supervisors has low anticipation of them, the staff will be devoted and may use absenteeism to escape (avoiding style) from the conflict. Managers (principals), supervisors, employers and leaders should use different type of conflict management styles when facing different kind of subordinates, staff and employees. Nowadays, managers (principals or leader) only uses one type of conflict management style in handling all conflict in the workplace (school), it may not work as they expect it to. In conflict response, a supervisor is not only affecting the relationship between the supervisor-subordinate, it also affects the trust and loyalty of subordinate that perceived a supervisor as a representative of the organization. Despite that, there are several factors that can trigger a conflict.

## 2. LITERATURE REVIEW

### Consequences of Unresolved Conflict

According to Journal of Anesthesia, [1] the consequences of unresolved conflict can be separated into two categories: indirect and direct. Indirect consequences are negative promotion and media coverage, decreased morale, increased disability and employee's payment claims, increased turnover, and diversion of imperfect and valuable resources to dispute resolution, consist of legal remedies. The direct consequence of unresolved conflict is a blockade to communication between the members. Appropriate communication among team members is well recognized in some of the safety-critical industries (Davies, 2005).

### Conflict Affects Commitment and Absenteeism

Research has shown [1] that commitment is a critical ancestor of staff behaviour in common and in absenteeism affective commitment is clear as the staff's positive emotional affection to the organization (school) Lined up with the social exchange principle and staff that have strong affective commitment come into contact with an internal strength and support focus, leading to achieve maximum need level of success under the terms of the deal. [2] If affective commitment is low, staff may stop their employment, although absenteeism might be an option to quit work while it provides workers with a mechanism to express their disagreement to serious circumstances in the organization (school) (Gaziel, 2004). Absenteeism and others resignation behaviours such as lateness and personnel turnover will reflect 'indirect' attitudes like increased job unhappiness and low organizational commitment. Research has shown the relationship between supervisory conflict and absenteeism. Specifically, an integrative conflict strategy can be seen as a form of leadership (Lorenzi, 2004) by which leaders (principals) focus to the

desires of a group instead of focus on their own control and individual interests. Supervisors that put into practice an integrative conflict strategy give space to their staff' anxieties and make an effort to satisfy them. Also, it decreases the levels of lack in workforce. School is an organized system in which pupils in various civilizing backgrounds pursue their studies at different levels and receiving commands from the teacher. In involving instructional activities, teachers have to plan their activities by making use of their abilities and capabilities to give effective teaching to the learners. Attitude of novice teachers needs a better change though all other dimensions taken up in the study namely, internal locus of control and self efficacy are reported to be satisfactorily good. But none of these dimensions involved in the academic performance of teachers, offered by (Saravanakumar, AR. Paniadima, A, 2008)

### **Ways of People (staff) Deal with Conflict**

According to Robinson (2010), Pruitt and Rubin (1986), there are more than a few ways that people commonly use to resolve conflict.

- **Passive-Aggressive Style** – People (staff) with passive-aggressive behaviour can be passive one minute and violent the after that second. They do and say things indirectly, act immobilized to form hostility and then protest to others or act out in subversive ways, for example forget to bring important data to a meeting when it is promised (Katz and Kahn, 1996).
- **Avoidance Style** – People (staff) that always stay away from conflict. For example, they pretend that everything is okay to the point that if they are openly asked, “Do you have any worry that you want to express?” they usually say, “No”. People who favour the avoidance style tend to ignore conflict. Avoidance style is common in East Asian culture, Chinese cultures main concern in maintaining affiliation. They usually use this style to maintain a harmony situation (Huang, 1999).
- **Compromising Style** – This involves a give-and-take condition in which both parties will give up something after collaboration in order to reach an agreement (Yuan, 2007). It will create I-win and I-lose section to create compromise. These people change their own opinion either because they found sufficient reasons to do so or simply to avoid continued confrontation (Lussier, 2010)
- **Collaborating Style** – People (staff) who make your mind up the conflict with the best solution agreeable to all parties. It is commonly named as problem-solving style. They attend to the issue openly, honestly and neutrally by communicating with the other party. Previous study showed that, there is significant positive relationship in using collaborating style and people's satisfying their task, their supervision and their job in general (Alexander, 1995).
- **Forcing Style** – People (staff) who use aggressive behaviour to solve the conflict. They force other people in order to achieve their goals. They use establishment, threats, and scare styles to force the parties agree with it (Lussier, 2010).

**Accommodating Style** – People (staff) who use interventions of other parties to resolve the conflict. These people are not assertive but supportive (Yuan, 2007).

### **Different Styles of Conflict - Advantages and Disadvantages**

According to Lussier (2010), each conflict style has advantages and disadvantages. The benefits and weaknesses of each conflict style are given as follows.

- **Avoidance Style** – The advantage of this style is that can uphold the relationship between managers (principals) and subordinates (staff). The weakness of this style does not resolve conflict. Montoya-Weiss, Massey and Song (2001), found that using this style will hurt

relationship of a team. People usually let the conflict be pointed while time goes on. In fact, avoiding the problem does not make it go away, but this is making it worse.

- **Compromising Style** - Benefit of this style is conflict can resolve in short period while the relationship is still maintained. Weakness of this style is compromising styles usually starts to another fallout (Suboptimum decisions). If people do to excess this style, it may cause the people being gluttonous and ask for several times to get achieve their needs.
- **Collaborating Style** – The advantage of using this style is make all parties joyful with the final decision (Montoya-Weiss et al., 2001). On the other hand, due to letting all parties to be fulfilling the final decision, it may use longer time and put in more try than other styles.
- **Forcing Style** – The benefit of this style is improved organizational decisions will be choose if the forcer is correct rather than choosing a less effective decisions. The weakness of this style is aggressions and annoyance occurs toward its users. Research suggested that forcing is a negative conflict management style that would reduce team performance (Cohen & Bailey, 1997).
- **Accommodating Style** – Relationship is maintained by the users. The more effective ideas may not be used due to accommodating style. Abuse of this style may leads to misplace of affiliation that they try to maintain.

### 3.0 METHODOLOGY

Data of evaluate, the conflict resolution theories which identified, How to apply between staff and organization (school) by managers (principals) have collected by Random Sampling method where selected managers and employees as a schools Principals, teachers and non-academic staff as the respondents of primary data collection to fill up through interview and questionnaire method to fill up data and the most important the previous researches and documentary evidence also as a secondary data have been utilized to ensure the topic and primary data as supportive for this study. 10 I-AB schools from the total of 64 schools are going to be selected by Random Sampling Method in research area. Based on the ratio of 5: 1, 180 teachers and 89 students' leaders have been chosen as sampling population. From the records, teachers, principal, vice-principal and non-academic staff and student's leaders would be selected as sample. As being higher number of teachers and students' leaders presented in the study location, random sampling would be carried out to select the sampling population. Both qualitative and quantitative methods have been used to analyses the results. Mostly, qualitative analysis has ensured as being principal, teachers, students and non-academic staff have been countered as the respondents of this study. Along with the statistics, analysis, discussion, compares and contrast too.

### 3.1 Data Collection

#### 3.1.1 Schools Information of Zonal Education – Batticaloa, Sri Lanka.

**Table 3.1** “Schools Information of Batticaloa, Sri Lanka”

Zonal Division	Types of school				Total
	I AB	IC	type II	type III	
<b>Manmunai North</b>	08	04	16	11	39
<b>Eravur Pattu</b>	01	03	03	02	09
<b>Manmunai Pattu</b>	01	03	04	08	16

(Zonal Education Office, Batticaloa - 2019)

According to the Table 3.1: shows as included Schools Information of Batticaloa Zonal education, batticaloa District Sri Lanka” of the research area, it means total numbers of schools in the research area.

### 3.1.2 Details of School for Research Study

**Table 3.2** “Details of school for research study”

Zonal Division	Number of school for selection	
	I AB schools	Sample schools
Manmunai North	08	08
Eravur Pattu	01	01
Manmunai Pattu	01	01

(Zonal Education Office, Batticaloa - 2019)

**Note:** According to the table 3.2, (Details of school for research study) “Situation was created to choose the schools which consists more number of staff as being the number of variables and factors are higher in this study. Through which, conflicts based on individual and managerial drawbacks have been collected as well. Therefore, I AB schools have more number of staffs and students where sampling population has been higher than the other schools. Random sampling method has encouraged to ensuring the possibilities of getting equal chances by individuals.”

**Table 3.3** “Selected internal sampling population”

Name of the School	Principal and vice-principal	Teachers	Non-Academic staff	Students’ leader
A	03	76	12	40
B	06	85	12	45
C	06	110	18	55
D	06	126	18	65
E	06	90	15	55
F	03	72	15	35
G	06	107	18	55
H	03	76	15	30
I	03	65	13	35
J	03	59	8	30

(School Record and Zonal Education Office, 2018-2019)

Note: according to the Table 3.3, (School Record and Zonal Education Office, 2018-2019) “From the records, teachers, principal, vice-principal and non-academic staff have been selected as sample. As being higher number of teachers presented in the study location, random sampling has been carried out to select the sampling population.”

### 3.1.3 Details Of Sample

**Table 3.4**” final sample of elements”

Name of the School	Total No. of Teachers	Sample of Teachers	Total students’ Leaders	Sample of students’ Leaders
A	76	15	40	08
B	85	17	45	09
C	110	24	55	11
D	126	26	65	13
E	90	18	55	11
F	72	14	35	07
G	107	21	55	11
H	76	15	30	06
I	65	13	35	07
J	59	12	30	06

Note: according to the Table 3.4” final sample of elements” “Based on the ratio of 5: 1, 180 teachers and 89 students’ leaders have been chosen as sampling population. Along with the sample, random sampling would continue to select the number of sample too.”

#### **4.0 DATA ANALYSIS AND INTERPRETATION**

Analyzing the data in an appropriate way is the most important part of the dissertation writing. Interpretation analyze quantitative data gathered using questionnaire. Reliability test has been conducted to confirm the reliability and validity of the statistical data. The data has included tables, bar charts, percentages etc. The qualitative data has been subject to content analysis to bring opinions and differences with the quantitative data collected. Both qualitative and quantitative methods have used to analyses the results. Mostly, qualitative analysis have been ensured as being principal, teachers, students and non-academic staff are going to be countered as the respondents of this study. Along with the statistics, documentary evidence, analysis, discussion, compares and contrast have been done.

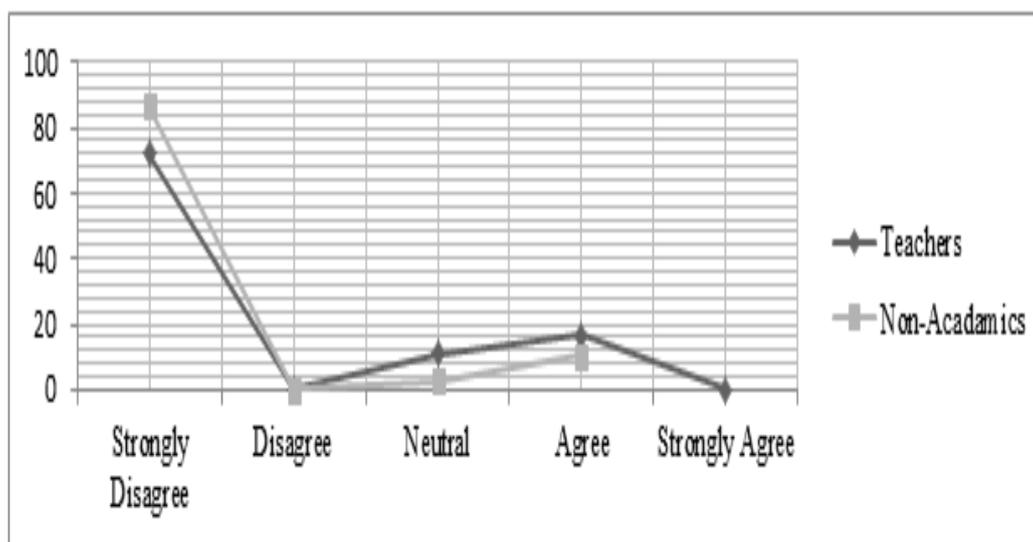
#### **4.1 DATA ANALYSES**

**4.1.1 Special Objective 01:** To identify the conflicts in workplace (schools) and reasons for the conflicts arises by managers and employee (staff) through review of documentaries.

**4.1.1.1 Documentary Analyses :** After exploratory a variety of sources, such as journal articles and web-based documents, an effective team leader learns how to resolve the conflict by using the following eight stages to navigate with challenging interaction in senior team, Develop ground rules; Select a facilitator; Uncover the details of the problem and its history; Check the facts and clarify perceptions; Focus on individual and shared needs; Develop multiple options for solving the issue; Develop doable next steps; and Make mutual-beneficial agreements such as, **Passive-aggressive style, Avoidance style, Compromising style, Collaborating style, Forcing style, Accommodating style were identified by staff as a people view and Process of Conflict Resolutions has been taken through staff opinion and Avoidance style, Compromising style, Collaborating style, Forcing style, Accommodating style too identified through past researches.** the researcher determined that there was inadequate information explaining the process principals undergoes to build teachers and non academic staff relationship roles in an effort to develop a high-developing school. “Most of the documentary evidence of research history, said man power is very important to effective administration and conflict resolutions are essential need to development of organization. The managers should be as a leader in administration. The researcher determined that there was insufficient information explaining the process leaders and managers (principals) should be undergoes to build peaceful management skills.

**4.1.2 Special Objective 02:** To evaluate, Difference of Conflict Management Styles and Conflict Resolution by Appling organizational leaders.

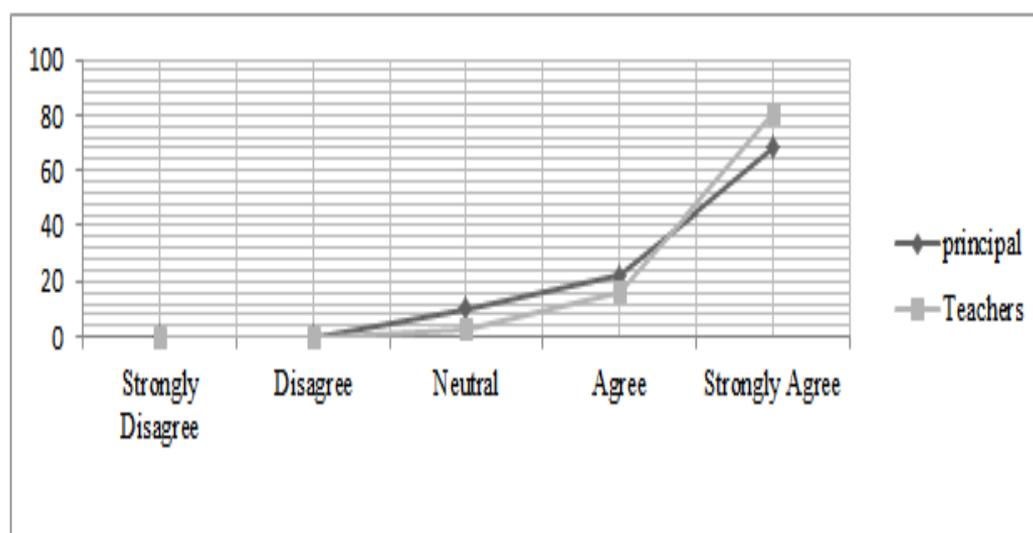
**Question:** “Our school base conflict management strategies are peaceful way of guiding for continuing study and developing to the school administration by the school leaders”



**Figure 4.1** “level of applying conflict management strategies by school leaders”

“According to the question, Figure 4.1 shows: 130 teachers and 125 non academic staff have chosen “strongly disagree” and 30 teachers, 10 student leaders and 15 non academic staff have chosen “agree”, 20 teachers and 04 non academic staff have chosen “Neutral”. So above mention percentage, we are coming to know the current conflict management strategy which is going on the schools is not suitable system to correct resolution way of guiding for continuing study and developing to the school administration.”

Question: “when the strict/hard resolution for the conflicts management methods were applied by me, conflicts were arisen by the teachers and non-academics”

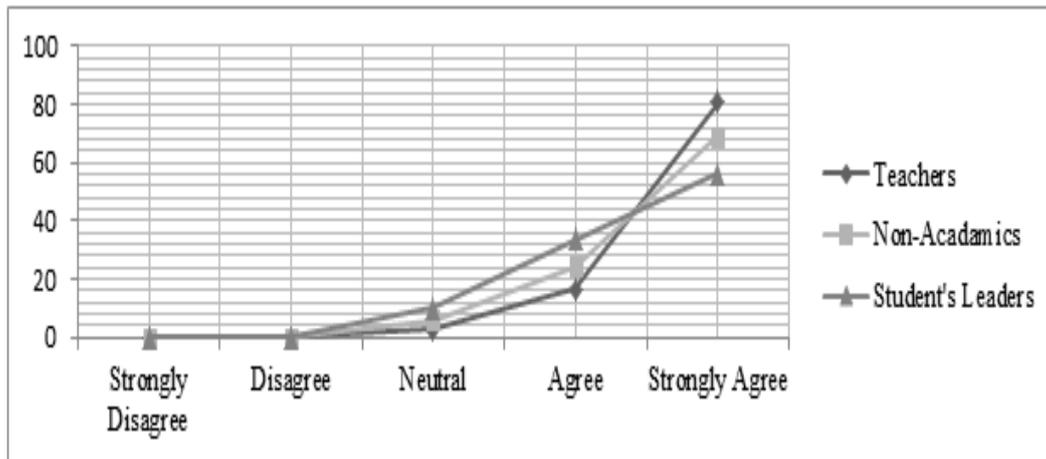


**Figure 4.2** “conflict arisen after strict resolution conflict management styles”

“According to the question, Figure 4.2 : 145 teachers have chosen strongly agree and 30 persons have chosen agree and 31 principals have chosen strongly agree and 10 persons has chosen agree, 05 person has chosen Neutral. So we are coming to know strict resolution management methods will create a new confrontation with the staff (employees) and the administration.”

**4.1.3 Special Objective 03:** To call out the impacts of conflicts between staff and give awareness for suggestion to organizational development (school) development

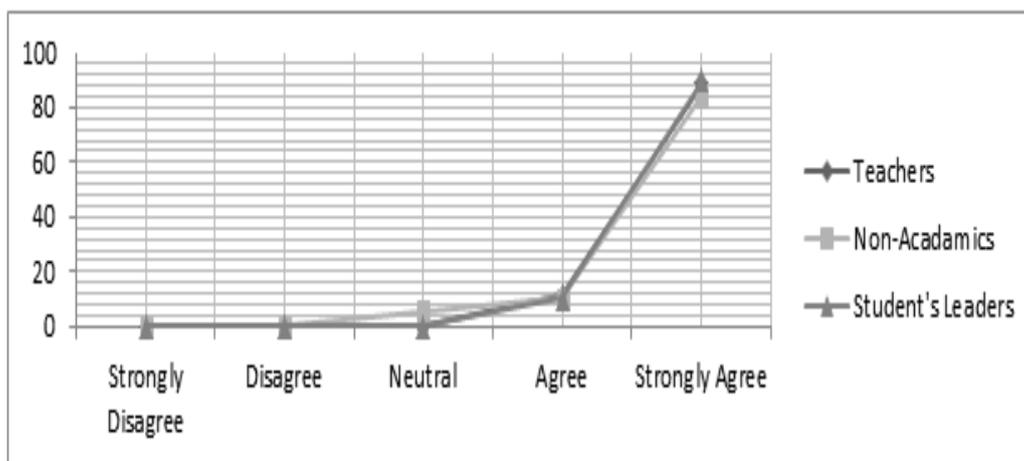
**Question:** “the staff (employees) job satisfaction and peaceful enthusiasm of school administration is very essential needs to develop the school effectiveness”



**Figure 4.3** “staff (employees) job satisfaction and peaceful enthusiasm needs”

“According to the question (Figure 4.3) , 145 teachers have chosen strongly agree and 30 persons have chosen agree, 100 Non- academics have chosen strongly agree and 35 persons have chosen agree, 50 student’s leaders have chosen strongly agree and 30 persons have chosen agree. So we are coming to know, staff job satisfaction and peaceful school enthusiasm is must for school’s effectiveness and developments.”

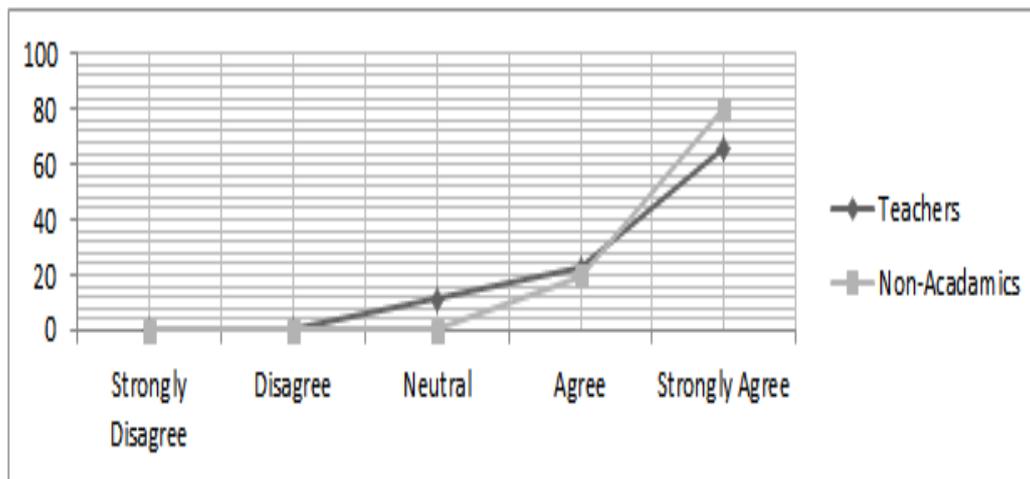
**Question:** “We expect All the Principals must get the knowledge about different and flexible conflicts managing methods from how to create the peaceful administration of school”



**Figure 4.4** “staff need to flexible conflicts managing methods”

“According to the question (Figure 4.4), 160 teachers have chosen strongly agree and 20 persons have chosen agree, 121 Non- academics have chosen strongly agree and 15 persons have chosen agree, 80 student’s leaders have chosen strongly agree and 09 persons have chosen agree. So we are coming to know, Principals must get the knowledge about flexible leadership methods from how to create the peaceful administration of school”

**Question:** “The (principal) manager should provide the courage on developing the skills of the (academic staff) employee, secure the harmony with the surroundings and take more attention over the livelihood development of the person who works at the organisation (school administration)”



**Figure 4.5** “manager’s courage on developing the skills of staff”

“According to the question (Figure 4.5), 119 teachers have chosen strongly agree and 41 persons have chosen agree, 116 Non- academics have chosen strongly agree and 28 persons have chosen agree. So we are coming to know, every principals should be provide the courage on developing the skills of the academic staff, secure the harmony with the surroundings and take more attention over the livelihood development of the person who works at the school administration.”

## DISCUSSION

This paper discusses the different types of conflict management, conflict resolution, and its sound effects in place of work. Studies have shown an motivating scene when supervisors (principals) handle conflicts in a calculating way, the affective obligation of subordinates remains unchanged and they are rarely in absent. Whereas, emotional attachment to the organization (school) can be improved by the supervisor’s integrative conflict strategy. If the supervisors (principals) solve conflicts in a controlling way, the affective commitments of subordinate remain unchanged and they are not likely to be absent. In fact, emotional part to the organization (school) can be improved by the supervisor’s (principals) integrative conflict strategy. Conflict is decisive process variables, which regularly serve as a mediator between previous conditions of team behavior and team outcomes.

## CONCLUSION AND SUGGESTIONS

In conclusion there are a number of types of conflict that have been named by different authors, from their viewpoint. Consequence of unresolved conflict may affect staff job satisfaction and employee (staff) loyalty in any given organization (school). Superior should mediate a conflict by using the right method. Conflict may affect employees’ commitment through the organization (school) and increase the rate of absenteeism in workplace. In addition, there are several ways to deal with conflict, such as passive hostility, negotiation, collaborating, obliging and etc. Different styles of conflict management have its benefits and weaknesses, users have to identify the most suitable conflict styles based on the different location they are in. By following the conflict resolution procedure, conflicts will be solved without problems. Conflicts give out as a learning curve for all organizations. Without conflict, an organization (school) will not improve. Superior and subordinates (principals) should learn to resolve the conflicts that occur

instead of just avoiding that conflict. Employees (staff) should learn and put into practice the a variety of methods of conflict resolution. Superior should start solving conflicts as it is the only way to ensure that conflicts are handled better in the future. Based on Robinson (2010), an effective team leader learns how to resolution the conflict by using the following eight stages to navigate with demanding interaction in senior team.

### **Step 1: Develop ground rules for constructive commitment**

The first serious step is to build up a set of ground rules for how people (staff) will connect each other in an organization, and of course, follow and put into effect those ground rules. It is a simple fact of the human condition that people need some guidelines to help rule their behaviour. Simply hoping that everyone will rise to the occasion and behave logically is immature. The leaders must consistently model and enforce the ground rules.

### **Step 2: Select a facilitator**

Management is needed when a team environment become not efficient or aggressive. In most of the confrontational situations, the parties involved are emotionally trapped up to unbiased and objectively deal with the conflict resolution process by themselves. In some situation, another party such as a colleague can be enlisted to help assist the process, while others will engage the executive in charge. Help from outside the organization will be needed rarely, but if you can develop the internal ability to “mediate” conflicts, most issues can be resolve effectively Research has suggested that when managers adopt a conflict management style that focal point on satisfying needs of parties involve in

### **Step 3: Uncover the details and history related to the issue**

Everyone’s position must be taken notice. The parties involved must offer all the related details such as the situation as well as any information about earlier challenge to solve the problem. All people arguments must be heard and get all parties to involved in resolution. It is very important that all voices are heard, no matter how uncertain is. Regularly, extremely assertive and fluent people (staff) push their agenda while the less assertive or articulate people feel uncomfortable. Therefore, the more pushy/articulate person may win the argument while the other party is offended and then may just exhibit a resistance to the outcome in a passive-aggressive way.

### **Step 4: Check for the facts and clarify perceptions**

Rather than approaching the issues as what the lawyers might trying to do and prove the other influence are wrong, try to confirm the reality of an issue, so that all parties involved will understand the problem and its serious penalty. The facilitator is a key role during this step as he or she must help the participants to separate the “evidence” from perceptions and maintain a calm attitude toward probing the evidence and resolving the conflict.

### **Step 5: Importance of individual and shared needs**

It is necessary that the parties involved appreciate each other’s real needs such as need for success and need for self-government. Managers (principals) need to know the satisfactory suggestion by all parties. If suggestion is dissatisfying, resistance to resolution occurs. Managers (principals) will reach a mutually acceptable solution by understanding and attempting to maintain each party’s needs.

### **Step 6: Develop vary options for solving the issue**

In finding solutions to a notorious problem, think about three to five options. If one option goes wrong, you will still have other options as back up (Darling and Walker, 2001). When people are under stress and at the same time conflict is caught up, then they try to hold off all fixed ideas. Brainstorming is one of the effective methods to generate several options on reducing conflict. Multiple options make the resolution process smoother when two parties are in great contentious level.

**Step 7: develop achievable next step**

Think of achievable next steps as stepping-stones along the trail of resolving conflict. They make the last decision become reasonable, available small solutions or proceedings chief to a comprehensive solution. People (staff) involved will see a hopeful vision, which reinforces the positive actions managers are using as manager completed each possible step. Achievable small steps build trust, force and improve the relationships for working together.

**Step 8: Make mutually beneficial agreements**

After developing multiple options and before taking any realizable steps, parties have to plan and come into an agreement. Team members have to distinguish and choose to emphasize their common goals. Therefore, team elements will think about the conflict resolution. Mutual confirmation and success will increase the level of confidence among team members, and they are confident to handle difficulties (Robinson, 2010). Some of the individualities have to be removed towards compromise. In fact, not every wish or wants are all satisfied during this phase. Therefore, the ground rule "Develop and use a decision-making rule that generates the level of commitment needed" is very important. Managers who follow these steps will facilitate and raise their team's performance. Developing an environment where resolve a conflict effectively is the model and difficulty even though the professional of leader. Effort is worth when results in positive outcomes. Through contentious issues, employees (staff) feel more confident at working, they will benefit from working more and be more productive for the reason that they spend less touching energy toward activities that are not obliging, for example, avoidance, backstabbing, and/or releasing pent up anger in outburst, etc. Positive emotional energy will increase through the workplace and people (staff) will be more delightful and willing to contribute for the organizations.

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## A STUDY ON BIG DATA AS A SERVICE: ADVANTAGES, MARKET TREND AND CHALLENGES

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### ABSTRACT

*The term “Big Data” is the data which is large in volume, generated in great velocity and exists in different variety in the real world, collected from different heterogeneous sources such as educational data, research data, browsing data, social media data, sensor data, public data, government data, transaction data, etc and yet growing exponentially with time. Such kind of data can be exist in different varieties such as structured (organized), semi-structured (semi-organized) and unstructured (unorganized). Handling such variety of data through traditional data management system has become very complex and tedious. Now a day’s a number of applications available in today’s era which requires high speed data transmission capacity for the storing and computing such kind of huge data. The solution is to use Big Data as a Service. Instead of recruiting in-house people to manage the vast quantity of unstructured data, companies utilize Big Data as a Service to free up organizational resources by leveraging the predictive analytics expertise of an outside service provider, including storage and computing services. This paper provides the details about BDaaS, advantages of using it, application areas of BDaaS and at the last defines some of the challenges faced by industry along with the market trends.*

### I. INTRODUCTION

With the development and expansion of Information and Communication Technology (ICT), several kind of small and big devices are introduced through which several kinds of heterogeneous data (picture, text, audio, video, etc.) are procreated every time. These data when combined together become Big Data. For example 500 millions tweets are sent every day, generates millions of zettabytes data every year. To handle such kind of data the concept of Big Data was proposed in 2005 by O’Reilly Media as traditional data management technologies were unable to manage and process the large amount of data because of the complexity involved in data. It is characterized by 5Vs as volume, velocity, variety, value, and veracity [1]. Volume denotes the quantity of data, velocity denotes the time required for processing a big quantity of data, variety denotes the many forms of data, veracity denotes data trust and dependability and the value denotes the value of the data to be pulled out from the big volume. It means that the collected data is useless until and unless the business fetch out some value from it.

Also a variety of high-demand mobile network services such as cloud computing, grid computing, mobile cloud computing, and others are available today, that require high data transmission rates for specific operations such as storing, managing, analyzing, and processing data on cloud computing servers, as well as high-speed streaming of high-definition videos. Cloud computing is referred as on demand service solution for providing easy and reliable services in the terms of Software (SaaS), Infrastructure (IaaS) and Platform (PaaS) to IT (information technology) resources [2]. As generated data is very big, we have to analyze the proper storage and computing techniques for extracting meaningful information derived from these data. Therefore the concept of Big Data as a Service was introduced in [3]. It is a cloud

based service platform which provides all kinds of services related to big data analytics, storage, database, computing, etc. to the users.

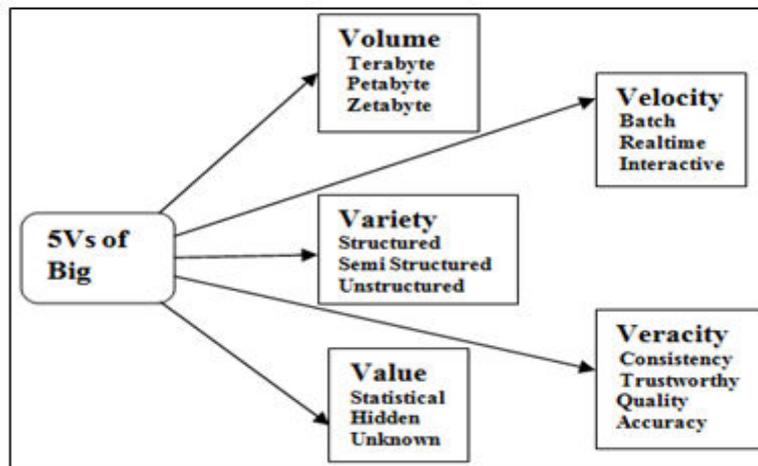
The remainder of the paper is laid out as follows: In the next section, the background details of Big Data, Cloud Computing and Big Data as a Service are provided. Then application and benefits of Big Data as a Service are provided. Then we have given some challenges and their possible solutions and at the last we have concluded it.

## 2. BACKGROUND DETAILS

We've covered the fundamental details of Big Data, Cloud Computing, and Big Data as a Service in this part.

### 2.1. Big Data

We can assume big data as a collection of data which is very high in volume, complex and conventional data management methods are not sufficient to manage and process it. Big Data is defined using 5Vs as Velocity, Volume, Velocity, Value, Variety and Veracity (figure 1).

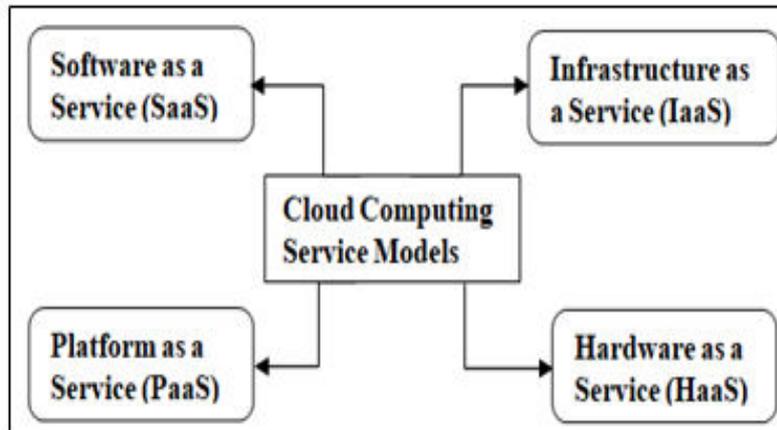


**Figure 1:** Five Characteristics of Big Data

Volume refers to huge quantity of data which are generated from diverse sources like social network, sensor network, educational data, browsing data, mobile data, etc. The rate at which data is created, gathered, and evaluated in order to extract useful information is referred to as velocity. It also defines the processing types required for big data such as real time, interactive processing, etc. Variety of data means the heterogeneity of data as structured (organized), semi-structured (semi-organized) or unstructured (unorganized). Veracity refers to the trust, consistency, and assurance of quality or credibility of the collected data. Value refers to how useful the collected data is in the growth of the business or in the critical decision making. Among these Vs volume, veracity and variety are related to security aspect of the data [4]. Although Big Data presents a lot of benefits to the organizations but still it suffers from various challenges as Heterogeneity, processing of data, visualization of data, scalability, privacy and security, higher cost, higher technological threshold, and profits are tough to be assured [5][6][7].

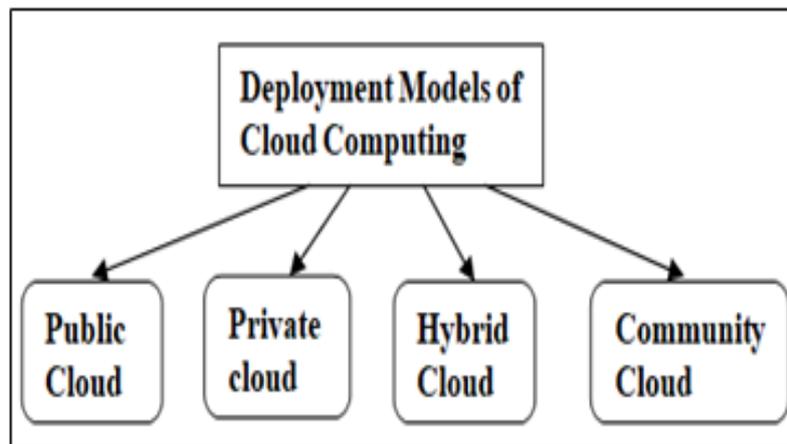
### 2.2. Cloud Computing

Cloud Computing is a technology that provides services from application to storage and processing power through internet on-demand basis. The services provided by the cloud are hosted at distant data centre and supervised by service providers of the cloud on pay-per-use basis. The core service models of Cloud Computing are Software as a Service (SaaS), Platform as a Service (PaaS), Infrastructure as a Service (IaaS), and Hardware as a Service (HaaS) [8] as shown in figure 2.



**Figure 2:** Service models of Cloud Computing

According to National Institute of Standards and Technology (NIST) Cloud Computing is classified into four deployment models- public cloud, private cloud, hybrid cloud and community cloud [9] as in figure 3.



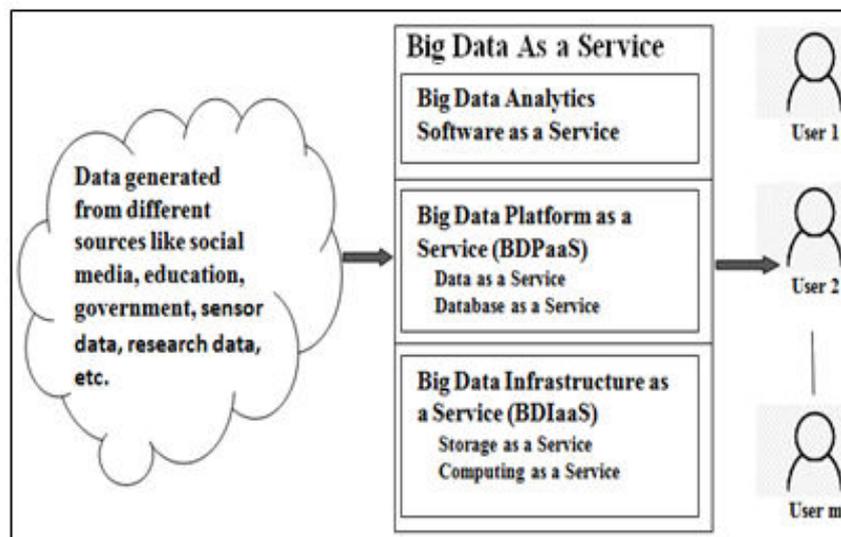
**Figure 3:** Deployment models of Cloud Computing

Self-service provisioning, elasticity, use-on-demand service, pay-per-use, migration flexibility, broad network access, multi-tenancy, and resource pooling are just a few of the benefits that cloud computing offers to customers.

### 2.3. Big Data as a Service

With the high growth of cloud computing, a variety of new services are being implemented in the cloud infrastructure to provide extensive capabilities to the user. Because of this a-lot-of services and its consumers are increasing rapidly day to day. As a result enormous explosion of data is generated from different sources through using mobile phones, social networks, or different kinds of service oriented systems. These huge data are different in nature and become very complex to process using traditional approaches for finding meaningful information. Also storing and implementing data analytics techniques for analyzing and extracting information at one place are a big challenge since data is generated in a very fast speed and heterogeneous in nature. The solution is Big Data as a Service (BDaaS) is a concept that incorporates different big data warehousing, administration, and analytics methods into services and makes them available to consumers via Application Programming Interfaces (APIs) [3]. It reduces the cost, enhances the efficiency and empowers seamless integration. Big Data as a Service is a cloud based computing service and relies upon the cloud storage and computing facilities to maintain

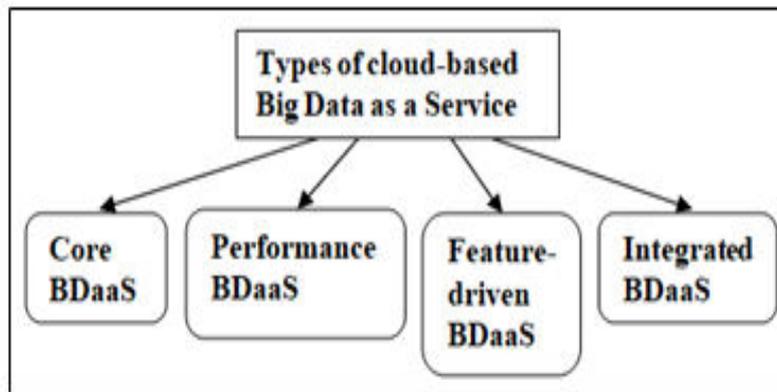
data sets and provide access to them for the users and business organization. It normally comprises three layers as Big Data Infrastructure as a Service (BDIaaS), Big Data Platform as a Service (BDPaaS) and Big Data Analytics Software as a Service (BDASaaS) as in figure 4. BDIaaS comprises storage as a service and computing as a service for the automation of data collection, storing, processing and visualizing large amount of data so that meaningful information can be extracted. BDPaaS comprises Cloud Storage, Data as a Service and Database as a Service, allow consumers to build critical applications on top of massive data sets. For example Google's BigQuery is used as a BDPaaS that provides Google's large storage and compute power to the users for analyzing large data sets and obtain real-time business insights in very less amount of time (usually in seconds) via REST interface. BDA approaches are a complex process of collecting, organizing, analyzing, and analyzing huge data sets of various types in order to uncover hidden patterns, unknown correlations, market trends, customer preferences, and other important information that can help businesses make decisions. [10].



**Figure 4:** Framework of Big Data as a Service

Big data techniques are too complex and very expensive that most of the companies cannot afford it. Also there is a sort of skilled data practitioners in every organization. For such kind of business organizations, Big Data Analytics Software as a Service would be a good choice to obtain the business intelligence service that turns their unstructured data into an valuable one [11]. Big Data analytics Software as a Service is defined as a web-based, multi-tenant service that use Hadoop, noSQL and different machine learning algorithm along with various pattern discovery methods for analyzing huge amount of data [12]. Big Data Analytics Software as a Service would be cost effective and it improves the business practices when Big Data Analytics techniques are offered as a Service by service providers. Also there are four kinds of cloud based BDaaS- Core BDaaS, Performance BDaaS, Feature-driven BDaaS and Integrated BDaaS as in figure 5. Core BDaaS offers a nominal use of Hadoop with HDFS and YARN together with other services such as hive. For example AWS's Elastic Map Reduce provides such kind of services. The services were provided as part of a large-scale architecture and were designed expressly for irregular workloads.

Performance BDaaS service optimize the outcome of Hadoop infrastructure's performance. It would be the right choice for those companies that are fast expanding but are confined by scale and complexity as well as related SaaS layer and are unable to construct data architecture independently. In this case companies can outsource their needs related platform and infrastructure to the service providers and focus only on the domain specific processes.



**Figure 5:** Types of cloud-based Big Data as a Service

Feature-driven BDaaS is appropriate for businesses that demand more functionalities than what is typically available in a Hadoop environment. For example Qubole provides such kind of service that performs through the web, database adapters and APIs. Depending on the load, it starts, scale, and stops Hadoop clusters transparently. Integrated BDaaS is a mixture of Performance BDaaS and Feature-driven BDaaS and provide maximum performance.

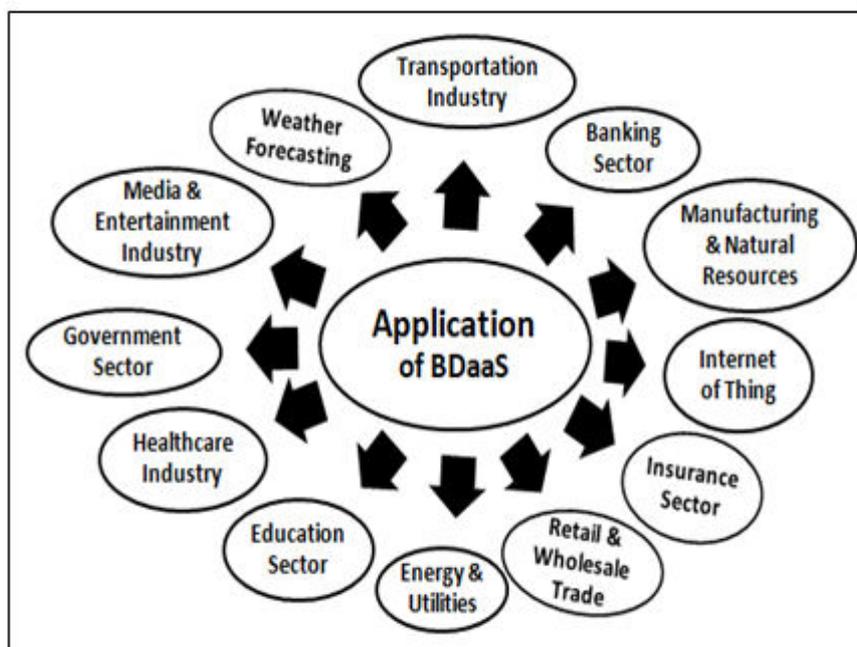
### 3. LITERATURE SURVEY

In this section we will provide an extensive research which has been done on BDaaS platform. Authors in [13], have given a detailed study of big database management system for large applications in the cloud and focusing on update heavy web applications, ad-hoc analytics and decision support system for deep analytics. Also gave the open issues and future opportunities. In [14], the authors offered a comprehensive overview of huge data processing in the perspective of cloud computing, focusing on necessary problems that include storage and computing architecture of cloud computing, parallel processing frameworks, and MapReduce optimization. In [15], authors have provided the solution to reduce the complex problems of big data by introducing company's own infrastructures along with merging different infrastructures based on cloud platform (various public or private) using Hadoop Architecture. In [16], service oriented enterprise architecture for big data application was explored in the context of cloud computing. In [17], authors have proposed universal storage architecture for the Big Data in the cloud computing surroundings utilizing clustering analysis for the division of the cloud nodes into various clusters based on the communication charge between nodes. An architecture of Big Data work flow management system in the cloud was presented in [18], and address the challenges of running Big Data on cloud platform focusing on management and usage part. Authors of [19], have presented a data centric method for lowering cooling power expenses and ensuring thermal reliability in the Big Data Analytics clusters in the cloud while maintaining performance impact. In [20], authors have proposed well-formed methods for migrating geo-distributed large data to the cloud in a timely and cost-effective manner, for processing utilizing a MapReduce-like framework. In [21], authors have proposed a cloud based framework with the integration of R to offer functions of big data statistical and analytics for mining and analyzing huge amount of data. In [22], Authors have presented a big data framework "distributed GraphLab" based on cloud computing for data mining and machine learning. In [23], authors have introduced a solution based on Hadoop ecosystem that collects and extracts data from social media and constructing a graph that may be utilized for further analysis. In [24], a general framework (high level design) for BDaaS was introduced where authors have defined three basic stacks as data storage, processing engine, and supporting libraries which are connected together & also supported by a resource scheduling to form the basic building block of the framework. Also these are surrounded by 4 well-designed components (payment management,

service description and discovery, data security & fault-tolerance, and QoS management). In [25], authors have proposed a generic framework for BDaaS in which the layers of this model are directly mapped onto the different segments of Big Data lifecycle. This model also specifies the criteria for technology selection which is based on the recognition of computing and data models for the application. In [26], authors have given a detailed survey on the cloud based big data service types. In [27], authors have presented a novel framework for BDaaS platform for representing, reducing, integrating and processing Big Data then offer proactive services to the users. Here the proposed framework contains three planes as the cloud plane, the sensing plane and the application plane. In [28], an architecture for big data systems in private cloud has been proposed, using a real system for evaluating the functionalities of big data systems. This study explains the functionalities and proposed solutions for the big data in the private cloud including new practical use cases that are evaluated using PoC in real world scenarios. A detailed report for the comparative analysis of cloud-based big data frameworks based on cloud computing of leading enterprises (like Amazon, IBM, Google, etc.) is presented in [29], where big data analytics, big data storage and data warehouse have been included in the comparison used by leading enterprises. In [30], authors have presented a Hadoop based data model for providing a high performance computing of Big Data in Cloud computing environment based on signal clustering and analytic hierarchy model. In [30], authors have provided the requirement for big data workflow in the cloud environment. In [31], authors have presented a novel service quality model Big Social Data as a Service (BSDaaS) which is a composition framework for extracting data from social media platforms and then process it to transform into meaningful information. In [32], authors have illustrated the existing solutions and techniques provided for big data and its rise in cloud computing environment including current research gap and open challenges.

#### 4. APPLICATION OF BIG DATA AS A SERVICE

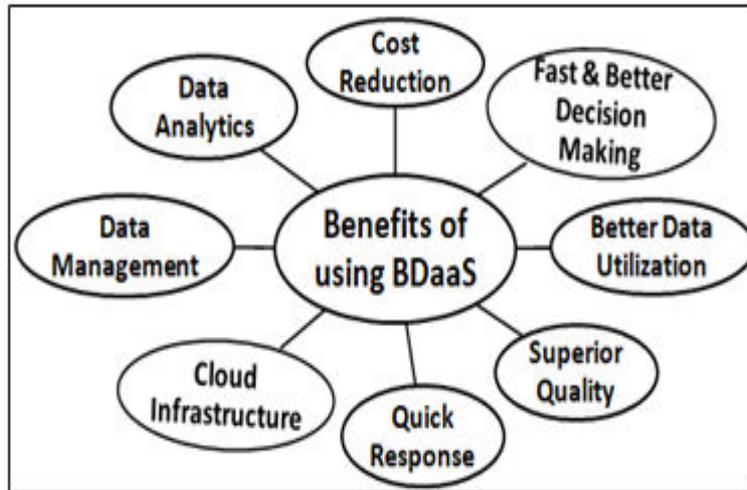
Today there are numerous business organizations use the benefits and services of BDaaS for enhancing the productivity of their business without investing cost for developing the infrastructures and other resources. The application areas of BDaaS are displayed in figure 6 as transportation industry, banking sectors, manufacturing and natural resources, IoT, insurance sectors, education sectors, etc.



**Figure 6:** Applications of Big Data as a Service

## 5. BENEFITS OF BIG DATA AS A SERVICE

Benefits of using BDaaS are defined in figure 7.



**Figure 7:** Benefits of Big Data as a Service

### 5.1. Cost Reduction

For small business organization, implementing Big Data analytics tools and other resources could be very costly. This cost can be reduced using BDaaS, since storage, data management and analytics services are provided by BDaaS in on-demand and cost effective manner.

### 5.2. Fast & Better Decision Making

BDaaS provide Analytics software tools as a service which is very fast and give accurate results on which business organizations can analyze information immediately and take decision based on what they have learned for the betterment of their business.

### 5.3. Better Data Utilization

BDaaS provide ease and simplicity to utilize and visualize the data. Data can be accessible from any of the enterprise's divisions or location very fast as the architecture of data delivery is very simple. Also if any changes are required in the business environment then alterations are easy to implement.

### 5.4. Superior Quality

As all data is under the control of BDaaS providers, it provides the better quality assurance of the data since various kinds of improved data analytics techniques are used for analysis and visualization. Also various security techniques are used to provide the user's data security and privacy, therefore business organizations need not to worry about data theft and other security breaches.

### 5.5. Quick Response

Today most of the BDaaS enterprises provides Service oriented Architecture (SOA) based services on demand basis therefore they offer high level of ductility during accessing mission-critical data from cloud based data as a service providers.

### 5.6. Cloud Infrastructure

BDaaS provides cloud based storage and computing as a service to the business organizations, therefore users need not to worry about their data storage they have generated and also need not to worry about extracting, managing and analyzing the data for extracting the meaningful for the betterment of their business.

### **5.7. Data Management**

BDaaS provides policy based better data management solutions including the software, data warehousing, infrastructure and platform as a service to the organizations for determining which information should be stored at which place within an organization's IT environment so that data could be safe and exist.

### **5.8. Data Analytics**

Most of the organization has not the skilled people who have expertise of big data analytics methods. For such kind of companies BDaaS is better option that consists of various automatic tools and algorithms that allow consumers to manage, compute and analyze large quantity of data for achieving their business goals.

## **6. MARKET OF BIG DATA AS A SERVICE**

BDaaS is a novel and growing cloud-based outsourcing model for Big Data solutions and deployment of the Big Data projects. It is a combined structure of Data as a Service, Hadoop as a Service and Data Analytics as a Service. Amazon Web Services, Google Cloud Dataproc, Salesforce Wave Analytics, IBM BigInsights on Cloud, Microsoft Azure HDInsight, and Qubole Data Service are some major BDaaS service providers that provide Big Data and Analytics based on self-service in their Big Data platform [33]. The Big Data as a Service industry is mostly focused on public cloud installations, although customers may now deploy the Google, AWS, and Microsoft platforms in their own data centers and other on-premises facilities. [34]. In 2020 the worldwide big data as a service (BDaaS) market size was prized at USD 10.92B and according to the verified market research [35], is estimated to reach USD 85.36B by 2028, registering a CAGR of 29.40% over the forecast period from 2021-2029. The key companies who have adopted Big Data as a Service market are BFSI, It and telecom sector, Ecommerce and Retail sector, Healthcare and Life sciences, Manufacturing and Media whereas big key players or vendors that provide Big Data as a Service are Google, Microsoft, AWS, Oracle, SAP, Teradata, Salesforce, Splink, Qubole, Hitachi, Accenture, IBM, etc.

## **7. KEY CHALLENGES AND OPEN RESEARCH ISSUES**

Although a lot of research has been done in the field of BDaaS, but still there is a need to explore some of the areas. In this section we have explored the challenges related to BDaaS which are as follows:

### **7.1. Security and Privacy of Data**

As we know that BDaaS is a cloud based framework and provides its services through Internet. It means that user's data is under the control of third party in the context of storing and processing the data. There is a possibility of data stealing, cyber attack, breaking authentications, etc. Although service providers already implemented much more security tools and techniques, but still it is a need to explore this field to provide more security to the user and protect their data.

### **7.2. Service Delivery and Billing**

It is something hard to estimate the expenses involved in all kind of processing due to on-demand nature of the cloud services. Budgeting and cost evaluation will be very tough until and unless the cloud service provider has some appropriate and comparable benchmarks to give. Therefore, this field is also challenging which needs to be explored more.

### **7.3. Cost Management**

Most of the business organizations ramp up their processing capabilities through the use of BDaaS services without investing large amount in amount in hardware and infrastructure since services are provided on-demand basis. However, It is very difficult to specify the cloud services offered by BDaaS providers and estimate their quantity and cost since these cloud-based services are on-demand and scalable.

#### 7.4. Shortage of Resources and Expertise

It is another challenge that service provider companies are dealing-with today. As cloud computing methodologies are improving day by day in a rapid pace and business organizations are progressively putting added workloads in the cloud environment, it is very hard for the service provider companies to keep up with the new and emerging tools. Also there is a big shortage of trained and expert people of new and emerging cloud computing tools in the organization.

#### 8. CONCLUSION

Big Data as a Service is a cloud based service oriented platform used to provide storage, data management and analytics services of increased amount of diverse data generated from different sources. The basic goal of BDaaS is to provide reliable, cost effective and valuable insights to business organizations which are unable to install above said services in-house due to cost. In this paper we have defined Big Data as a Service in detail along with its application areas, advantages and benefits in detail. Also we have given business and market trends of BDaaS along with major key players who provide BDaaS services to the consumers. At the last we have given some challenges faced by BDaaS.

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**E-WASTE MANAGEMENT IN INDIA ISSUES AND STRATEGIES**

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**ABSTRACT**

*Electronic waste or e-waste is one of the quickest developing area of the global waste stream and is expanding at a lot higher rate than all other waste streams. Main focus of the current study is electronics waste (e-waste) which is growing as a serious environmental challenge for coming days. The rapid sell and use of electronic products, discarded electronics equipment has become a matter of concern as it contains hazardous and toxic substances. Computers are made from more than 1,000 materials, a considerable lot of which are harmful and they contribute considerably to the e-waste stream, which is assessed to be ca. 20 to 50 million tons every year at the same time E-waste, while reusing or recycling is likewise dangerous because of harmfulness of some of the substances which contains different cancer-causing elements. Different methods adopted by different nations to manage the e-waste by reusing, re-manufacturing, extending producer responsibility and standard to the sustainable management of e-waste.*

*Keywords: E-Waste, WEE, Sustainable Waste Management*

**INTRODUCTION**

Waste electrical and electronic equipment (WEEE) or Electronic waste (E-waste) is a vital flow of waste in the modern-day global environment. Electronics waste is the quickest developing waste stream in the industrialized and urbanized world. [1] Last 10years back, the quantity of waste generated was treated as small enough to be diluted within the environment. With enormous development of hardware and electronics area, the requirement of the hardware items has been improved complex. The quicker change of different features in the electronic gadgets and in the hardware with accessibility of the improved items driving the users to dispose the electronics devices quickly. [2] This has become the main reason for generation of e-waste critically. The main source of electronics waste is the disposal of the electronic and hardware items from private sectors, Government offices, public sectors and various research institutes. The household consumers are also playing significant role in the production of electronic waste. [3]

Some other factors accountable for the vast generation of E-waste include speedy modifications in data and communication technologies, growing versatility of almost all EEEs, rapid technological developments and improvements and the downward fashion in price tags. E-waste became one of the highest growing waste among all groups of waste streams nowadays and is taken into consideration a tremendous environmental disaster. E-waste consists of enormous amount of precious and important metals, restoration of that's vital for both environmental and economic reasons. It, as a consequence, has attracted massive international interest due to its rich precious metal content. [4]

**Electronics Waste Management****What is Electronics Waste:**

E-Waste can be characterized as outdated, broken electrical and electronic gadgets which have arrived at their finish of life period or are not, at this point fit for the ideal use and are bound for reusing, recuperation, or removal. On India E-Waste is characterized according to schedule I of E-Waste management rules 2016.

### Global Electronics Waste Flow and Quantity

As per the Global E-Waste Monitor 2017, the total volume of electronic waste in the year 2016 is surveyed to be at 44.7 million metric tons, which is indistinguishable from 4500 Eiffel towers. Be that as it may, under 20% of this waste are recorded and reused in a naturally and socially reasonable way.

The majority percentage of E-Waste across the world is recycled in highly hazardous conditions in the developing parts of the world like Africa, South East Asia, and Latin America. [5]

### E-Waste Material Composition

It contains different valuable metals like Gold, Silver, Copper, Palladium, Platinum, and so on. The overall assessment of the assistant unrefined material present in e-waste in 2016 would be more than 50,000 crores of rupees from United Nations reports. Careful and intelligent e-waste organization, as it generates new openings, is helpful for our world, the economy and people too. [6]

## Constituents of E-Waste:

E-Waste Source	E-Waste Component	Environmental Hazard	Effects on Human
CRTs (used in TVs, Monitors, ATM, Video Camera, etc), Batteries, PVC cables, Paints	Lead, barium & other heavy metals	These metals leaching into the ground water and release of toxic phosphor	Anemia, Renal Toxicity, Insomnia
Batteries, Housing & Medical Equipment	Mercury	Air emissions as well as discharge into rivers of glass dust	Renal Toxicity, Muscle tumors, Mental retardation, Cerebral palsy
Plastics from printers, keyboards, monitors, etc	plasticizer bisphenol-A (or BPA), as well DEHP and DBP, plastic compounds known as phthalates	Chlorinated plastics release harmful chemicals into the surrounding soil, which seep into ground water or other surrounding water sources which cause serious harm to the species that drink this water.	Risk in developing heart problems, obesity, reproductive disease
PVC & polymer, Paints, Printing inks, Electrical transformers & capacitors	Polychlorinated Biphenyls (PCBs)	include extreme pollution from production, toxic chemical exposure during use, hazards from fires	Suppression of immune system; Damage to the liver, nervous and reproductive systems

**Table:** Constituents of e-waste

### Hazardous Components in E-Waste

Electronics waste substitutes dangerous substances like Lead, Mercury, Cadmium, CFCs, and Flame Retardants which when managed in an unscientific manner can cause serious health hazards not only to the person exposed to the toxic substances but also to the population leaving in the surrounding area by polluting the air, water, and soil. However, not everything about E-Waste is bad news. E-Waste also contains a large variety of valuable materials and plastics. Nearly 60 elements of the periodic table can be extracted from complex electronics. [7]

## Hazards of E-Waste

<div style="background-color: #92d050; color: white; padding: 5px; text-align: center; font-weight: bold; margin-bottom: 5px;">Hg</div> <p><b>MERCURY</b> Atomic Number : 80</p> <p>A Neurotoxin Causes brain and liver damage</p>	<div style="background-color: #92d050; color: white; padding: 5px; text-align: center; font-weight: bold; margin-bottom: 5px;">Pb</div> <p><b>LEAD</b> Atomic Number : 82</p> <p>A Neurotoxin. Short-term exposure to high levels of lead can cause vomiting, convulsions, coma or even death</p>	<div style="background-color: #92d050; color: white; padding: 5px; text-align: center; font-weight: bold; margin-bottom: 5px;">  </div> <p><b>POLYVINYL CHLORIDE (PVC)</b> Formula : <math>(C_2H_3Cl)_n</math></p> <p>An organic toxin. When combined with water, it forms Hydrochloric Acid, and when inhaled leads to respiratory problems</p>
<div style="background-color: #92d050; color: white; padding: 5px; text-align: center; font-weight: bold; margin-bottom: 5px;">Ba</div> <p><b>BARIUM</b> Atomic Number : 56</p> <p>A Neurotoxin and a Cardiovascular toxin. Causes brain swelling, muscle weakness, damage to the heart, liver and spleen.</p>	<div style="background-color: #92d050; color: white; padding: 5px; text-align: center; font-weight: bold; margin-bottom: 5px;">  </div> <p><b>DIOXIN</b> Formula : <math>C_{12}H_4Cl_4O_2</math></p> <p>A Carcinogen, Can lead to malformations of the foetus, decreased reproduction and growth rates and cause impairment of the immune system.</p>	<div style="background-color: #92d050; color: white; padding: 5px; text-align: center; font-weight: bold; margin-bottom: 5px;">As</div> <p><b>ARSENIC</b> Atomic Number : 33</p> <p>Can lead to various diseases of the skin and decreases nerve conduction velocity. Can also cause lung cancer and can often be fatal</p>

Electrical and electronic equipment contain different hazardous materials which are harmful to human health and the environment if not disposed of carefully. While some naturally occurring substances are harmless in nature, their use in the manufacture of electronic equipment often result in compounds which are hazardous.

**Picture:** Hazards of e-waste

**Picture:** Adverse Impact of e-waste

**Source:** <https://greencitizen.com/learn-more/harmful-effects/>

### Conception and Generation of E-waste:

E-waste refers to electronic gadget and electrical gadgets which are disposed by consumers, mainly comprises computers, televisions, air conditioners, washing machines and refrigerators. Additionally, monitors, printers, mobile phones and photocopiers considered outdated by their owners also included in E-Waste. As of 2018, China has 109 traditional E-Waste disassembling companies and the first listed on the subsidy catalog for the dedicated fund was E-Waste such as air conditioners, televisions, laptops, refrigerators and washing machines. The Chinese government has not yet made any regulation about how to subsidize the proper destroying of small appliances like printers, monitors, cell phones etc. With the quick improvement in economy, the longevity of applications is reduced, leading to the creation of a massive amount of E-Waste. Basically, the material composition of E-Waste contains metals, additives and plastics. Different research has shown that plastics predominantly comprise of acrylonitrile butadiene styrene, polystyrene and polypropylene. Most of the metals in nature can be found in E-Waste. [8]

According to different researchers, the production of E-waste increases every year. Because of the missive generation of E-Waste, many technics must be adopted to resolve this issue. If no worldwide measures are executed to discard E-Waste, landfill area could be occupied with the aid of E-Waste. At the same time organic pollutants and heavy metals present in the E-Waste will create pollution in surrounding environment. However different metals present in E-Waste are likewise assets, and if with appropriate strategies, the lack of metal assets worldwide these metals can be alleviated. [9]

### E-Waste and Global Market:

From different studies it is observed that around 50 million tons of E-Waste was produced worldwide in 2018. Half of which is personal gadgets like smart phones, tablets, screens, TVs and computers, with the rest being larger residential electrical appliances and heating and

refrigeration equipment. Regardless of 66% of the global population is protected by E-Waste enactment, just 20 percent of worldwide E-Waste is reused every year, which implies that 40 million tons of E-Waste is either scorched for asset recuperation or wrongfully exchanged and handled in an unacceptable manner. Alone in the US, in excess of 100 million PCs are discarded with under 20% being reused appropriately. [10] China disposes of 160 million electronic gadgets a year. Before, China has been viewed as the biggest E-Waste unloading site on the planet. A huge number of individuals have skill in destroying electronic garbage. The rate at which the E-Waste volume is rising worldwide is between 5% and 10% per year. In India, the volume of E-Waste produced was 146,000 tons per year. Although, this information just incorporates e-waste produced nationwide and does exclude waste products (both lawful and unlawful) which are generous in arising economies like China and India. The cause is that a huge quantity of waste of electronic and electrical equipment approaches India from overseas nations. Switzerland is the primary nation in the universe to have set up and executed a proper E-Waste management system that has reused 11 kg/capita of E-Waste against the 4 kg/capita goal set by EU. [11]

### **E-Waste and Indian Market:**

India creates almost 2 million tons of electronic waste every year. E-waste is creating veritable general prosperity and biological affair in India. India is the "fifth-largest exported electronic waste on earth"; around 2 million tonnes of electronic waste are shipped annually and an unknown proportion of electronic waste is imported from different countries around the world. [12]

Yearly, computer gadgets represent almost 70 percent of e-waste, 12 percent originates from telecom sector, 8 percent of clinical, and 7 percent of electric equipment. Practically 75% of electronic waste is generated by both government and private entities, with the liability of the individual family being merely 16%.

Electronic waste is a standard, easy-going name for electronic things moving toward the completion of their "supportive life." PCs, televisions, VCRs, sound frameworks, copiers, and fax machines are typical electronic things. You may reuse, renovate, or reuse a large number of these items. With this E-waste trash list, which includes devices such as mobile phones, laptops, PCs, video game consoles, cameras, and some more, an up-grade is done. In January 2018, India had 1,012 billion complex Portable Associations. The number is continuously developing exponentially. [13]

The Compound Yearly Production Rate of electronic waste is 30 percent, as indicated by ASSOCHAM, a modern body in India. With changing purchaser conduct and fast financial development, ASSOCHAM gauges that India will create 5.2 million tons of E-Waste by 2020.

While electronic waste recycling is a wellspring of pay for some individuals in India, it additionally represents various health and environmental dangers. Over 95% of India's electronic waste is unlawfully reused by casual waste pickers called kabadiwalas / raddiwalas.

### **Impact of Recycling E-Waste:**

Generally, most of the E-Waste contain some sort of recyclable materials, including metals, plastic and glass. Since these materials cannot be retrieved for various uses due to incorrect removal techniques and methods. If E-Waste is disassemble and processed in a rough way, its poisonous constituents can unleash destruction on the human body. Processes like disassembly, incineration and wet chemical processing are utilized to discard the waste and result in the direct introduction and inward breath of destructive synthetic compounds. Protection materials like hand gloves and face covers are not generally utilized and labourers regularly come up short on the information and experience needed to complete their job. Recycling or reusing of E-Waste is contaminating the water, air and soil. By burning of wires and cables emits chlorinated dioxins,

brominated dioxins cause air pollution and it also causes cancer. During the recycling, because of no economic value, chemicals which are present in E-waste simply dumped. These harmful chemicals substances drain into underground water in this way degrading the nearby groundwater quality and delivering the water unsuitable for human utilization just as farming purposes. When E-Waste is disposed in landfills, mercury, arsenic, lead, PCBs and cadmium make the soil polluted and not useful for agricultural purposes. [14]



It is assessed that about 50 million tons of e-waste were collected worldwide in 2018. Most of these are personal E-Waste like smartphones, tablets, computers, TVs and screens, while the others are massive household appliances like refrigerators.

#### **Opportunities of E-Waste Management in India:**

The Ministry of Environment, Climate Change and Forest disclosed the E-Waste (Management) Rules in 2016 to minimize E-Waste generation and improve re-use and recycling. Because of these principles, the government body introduced the EPR, which makes manufacturers subject to the collection of 30 percent to 70 percentages (more than seven years) of the e-waste they generate, according to the report. [15]

E-Waste is a valuable source of metals such as silver, copper, and gold, which can be extracted and brought back into the cycle of creation. There is notable economic prospective in the effective recuperation of significant materials in E-Waste and can turn out revenue producing chance for both individual and endeavours. The E- squander Management Rules, 2016 were revised by government of India in March 2018 to smooth and constructively execute the eco-friendly management of E-Waste in India.

#### **Amendments to E-Waste Management Rules (2018)**

- The spectrum of electronic waste based on EPR has been updated and is acceptable as of October 1, 2017. For E-Waste in weight, the stage informative assortment focuses on 10 percent of the amount of waste produced as shown in the Extended Producer Responsibility Plan during 2017-18, with a 10 percent continuous expansion until 2023. The goal was to create 70 percent of the amount of electronic waste created after 2023.
- The amount of electronic waste that is collected by producers from 1st October 2016 to 30th September 2017 need to be reflected by March 2018 in the revised Extended Producer Obligation orientation.

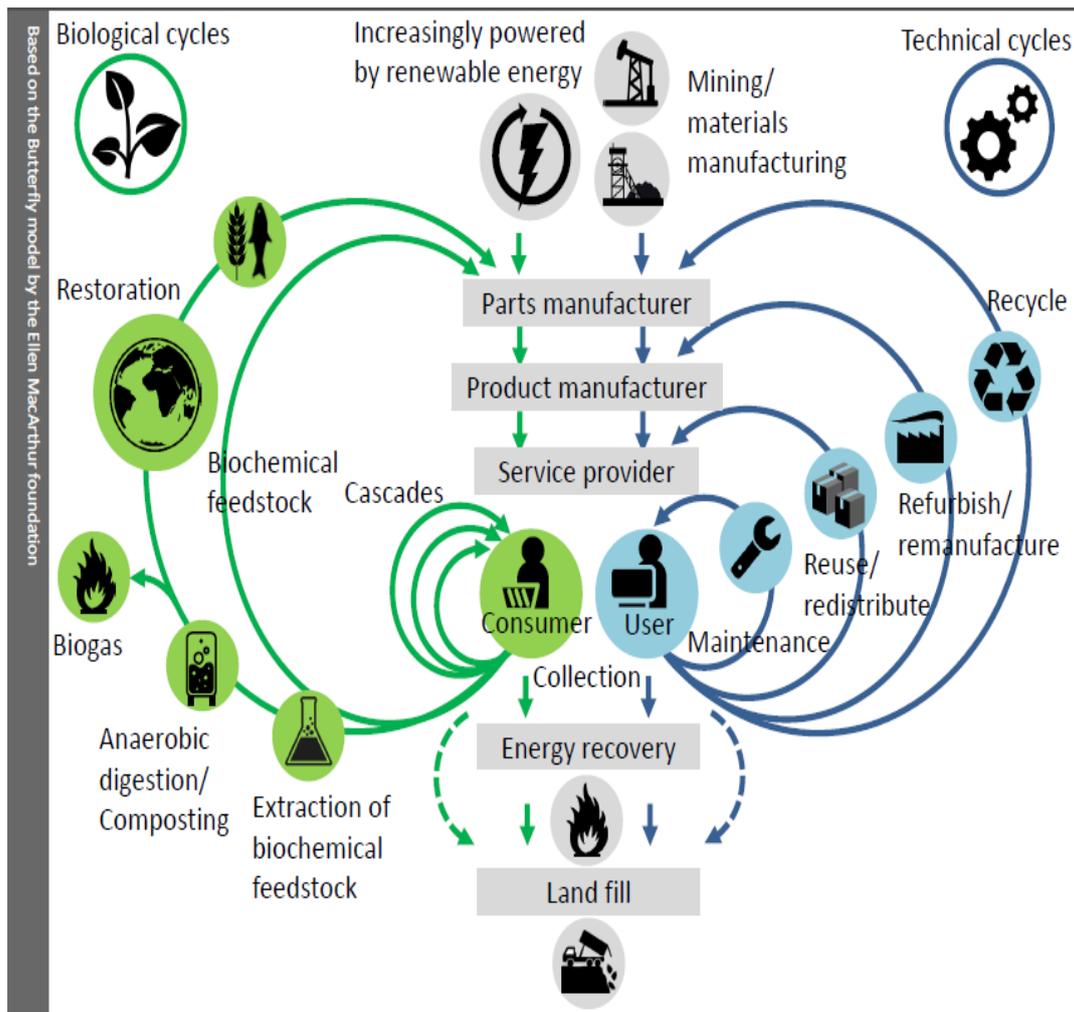
- The PROs shall apply for enlistment by the CPCB to approve exercises endorsed in the Guidelines.
- Separate electronics waste assortment expectations have been included for new makers, those makers whose number of long stretches of deals activity is not exactly the normal existences of their items. The normal degrees of the items will be according to the rules gave by CPCB now and again.
- Under the Reduction of toxic materials (RoHS) arrangements, the expenses for inspection will be bear by the administration to reduce the Hazardous Substances test. On the off chance that the item doesn't consent to RoHS arrangements, at that point the expense of the test will be borne by the Makers.

**Revised Collection Targets for Producers and OEMs**

\* Of the amount of waste created as shown in Extended Producer Responsibility Plan

\*\* Revised goals as amended by the electronic waste rules amendment dated 22<sup>nd</sup> March 2018 by G.S.R. 261(E) vide notification.

\*\*\* New makers and existing makers those have begun activities as of late for example number of long periods of activity is not exactly the normal existence of their items referenced in the rules gave by CPCB.



**Picture:** Butterfly model for e-waste recycling

### Key Stakeholders for a Sustainable E-Waste Management System

The key stakeholders distinguished along the administration chain have their individual jobs and duties towards feasible E-Waste the board in the nation. Inside the recycling or reusing network, numerous partners are included. Every partner shares its particular duties regarding data, material and monetary streams. Each and every stakeholder works as per their role and responsibility. Table 1 presents the stakeholders and their roles.

Stakeholders	Responsibilities	
Management authorities	E-waste recycling Fund Management Centre	Operation of the system
	State Council	Release of Regulation
	Authorities from local municipal level, provincial level, and state council level	Planning; Technical policy; Environmental inspection, etc.
Collectors	Retailer	Collection of the e-waste and submit them to qualified recyclers.
	Professional collector	
	Repair shops	
Third party Service Provider	Logistics Providers	Transportation
	Quality Inspector	Environmental inspection
	IT service provider	IT service
Producers		Pay the e-waste recycling fee according to market share
Recyclers		Sorting; dismantling; treatment of e-waste
Waste disposers		Landfill or incineration of hazardous material & waste
Consumers		Submit (or sell) the e-waste to the qualified collectors

(Table 1: Stakeholders in E-waste Recycling unit)

Associates in the Non-formal area in India include IT enterprises, government workplaces, public and private area foundations, business and corporate houses and educational institutes, etc alongside Kawadiwalas (ragpickers), scrap vendors, entire merchants, recyclers, dismantlers. Among these various partners, IT ventures, government workplaces, public and private area establishments, business and corporate houses educational institutes, and so on are predominantly liable for the creation of the E-Waste. They produce the E-Waste and then move it on to the Kawadiwalas (rag pickers), scrap vendors, entire merchants, recyclers for the management motive. The associates liable for overseeing E-Waste in the non-formal area fundamentally do significant tasks like assortment, isolation, disguising, and dismantling. Kawadiwalas and little piece sellers are predominantly accountable for collection work. They typically collect the E-Waste from a buyer with an appropriate compensatory cost. Kawadiwalas are one of the most effective authorities of E-Waste. E-Waste is gathered in mass amount by

huge piece sellers from IT enterprises, government workplaces, public and private area offices, school, colleges and other business and corporate houses, etc.

India has EPR based E-Waste legislation since the year 2011 and more recently the electronic waste management rules, 2016, and rules for amending electronic waste, 2018, apply to each maker, maker, shopper, mass buyer, assortment focus, vendor, e-retailer, refurbisher, dismantler and recycler associated with fabricate, deal, move, buy, assortment, stockpiling, and preparing of E-Waste or electrical and electronic gear recorded in Schedule I of the guidelines.

### **EPR- Extended Producer Responsibility**

As per the 2001 OECD Guidance, Extended Producer Liability (EPR) is defined as an objective ecological arrangement-based strategy in which the producer is responsible for an item over the life cycle of an item's post-purchase process. It gives a structure to the mindfulness age on E-waste just as financing to empower a framework for assortment, invert coordination, reusing, and removal of E-waste in a naturally and socially dependable way.

### **More Research on E-Waste Management:**

Significantly more ecological epidemiological investigations are expected to assess the current standing of E-Waste management framework in India, to survey the E-Waste amounts and definite adequacy of the issue in Indian metropolitan zones, and to develop associations with the casual recycling sectors. The critical data will be created by these learnings that may facilitate in designing a scheme for E-Waste management. India should start a perception system for diseases and prosperity results of e-waste. The manageability of e-waste the board systems should be ensured by improving the collection and reusing structures. It is appealing to set up an open private relationship in setting up repurchase or drop-off core interests. Demanding improvement reusing charges is another approach to manage to ensure waste the board viability. The approach to sustainable future growth can be to find and effectively implement the best solutions for e-waste management around the globe. The elimination of dangerous substances in electronic and electrical supplies and the expansion in the use of their safer alternatives have been adopted by a number of nations by the Restriction of Hazardous Substances Legislation in the production of such substances. So many more such less dangerous substitutes should be defined which can be used in electrical components.

### **CONCLUSION**

Problems, because of E-Waste, are probably going to be major in near future. At whatever point a client replaces PC or cell phone, the item may disappear from the client however it never disappears from the surrounding. Thusly, there should be systematic development through innovative work, in the items to upgrade and recycle. Additionally, there is require of a structure that can manifest the way for the administration of E-Waste. Most likely India is being overwhelmed by casual area in administration of E-Waste as of now however India has likewise begun thinking on practical administration of E-Waste. The outline has been ready for E-Waste dealing with and rules, which is accessible at site of Ministry of Environment and Forests. The obligations of assortment focus, makers, recyclers, dismantlers, customers, and so forth, are remembered for it. It will be intriguing to see that how effectively these standards can help in the reasonable administration of E-Waste.

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## PRODUCTION OF ECO-FRIENDLY HANDMADE PAPER FROM WASTE PAPER AND OTHER WAYS

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### ABSTRACT

*In the present case, the recycling and reuse of waste substances plays a key role in the environment. Paper is a really useful thing for all. Reuse of waste paper can solve many environmental issues and reduce environmental pollution, keeping the ecosystem stable. It is estimated that around 35 percent of our waste consists of paper products. This high demand for paper is a major factor in the deforestation of the world's forests. It also contributes greatly to the waste management problems we are facing around the world. To combat these problems, paper recycling has become a large industry. This chapter gives an insight into the composition, creation, and recycling of the various waste papers and their products with different innovative ways of hand paper making.*

*Keywords: Paper Waste, Hand Paper, Waste Management*

### 1. INTRODUCTION

Growing quality of life and high resource use habits have unwittingly and adversely influenced the urban environment – creating waste far beyond urban and agency control. Cities are now addressing the problems of high waste volumes, the costs involved, recycling processes and methods and the effect on local and global ecosystems of waste.[1] Universally, population growth together with economic growth, production of waste also increasing, which is remain as major concern for developing as well as developed countries [2]. Most developed nations went through a period when they were growing ecologically. Today, notwithstanding, the majority of these nations have successfully tended to a significant part of the wellbeing and natural contamination issues related with squanders age.

#### General Aspects of Paper Waste Management

Early researcher cited as the waste control is one of the public infrastructures which might be based on a particular form of physical infrastructure to offer the products or services, and in this respect, it resembles the strength, herbal gasoline, and water region. Waste control rehearses shift for developed and developing nations, for city and country areas and for private and business makers. The board for non-hazardous private and institutional waste in metropolitan districts is commonly the duty of neighbourhood government specialists, while the executives for non-unsafe business and business squander is regularly the obligation of the generator. While recycling began to be recognized as critical for each environmental and aid control reasons, recycling rates for family wastes in maximum advanced international locations inside the Nineteen Eighties were inside the low single figures with the aid of percentage. Modern-day western waste management systems have rebuilt recycling prices over the past 20 years. Modern-day waste control structures, which many growing united states cities aspire to, are all characterised via high recycling quotes of clean, supply separated materials [3].

Maximum technologies for waste management are mature and have been efficiently carried out for decades in many countries. In Turkey, solid Waste control law got here into pressure in order to control solid waste in 1991. The regulation has been constantly updated. Considering the directive of Waste body EEC and the other directives as part of the requirements of the integration process, the department has started the arrangements for the regulation of Waste body and the draft of the law has been presented for attention. Subsequently, the waste management is carried out consistent with the Turkish stable Waste control that become adopted

in 2008. Within the regulation, the procedures about the category of the wastes, collection, transportation, and transient storage of the wastes inside the institutions and the transportation of them to the final disposal region were defined. Within the closing a part of the law, the technique of the disposal of the wastes was cited. New trends in the discipline of waste control ought to be covered into the gadget.[4]

Massive portions of this waste cannot be eliminated. But the environmental impact can be reduced with the aid of making extra sustainable use of this waste. This is called the “Waste Hierarchy”. The hierarchy of disposal alternatives, which categorizes environmental affects into six degrees, from low to excessive; namely, lessen, reuse, recycle, compost, incinerate and landfill. The waste pecking order remains the foundation of most waste minimization procedures. The expectation of the waste pecking order is to remove the most extreme reasonable preferences from stock and to create the base amount of waste. Waste arrangement strategies range widely among explicit nations and areas. Homegrown waste arrangement administrations are regularly given by utilizing neighbourhood specialists, or by method of private industry. A few regions, mostly those in less created global areas, do presently don't have a proper waste-assortment device [5].

### **Utilization of Paper Waste**

In pulp and paper industries, considerable amount of solid waste, waste water and waste gases are generated. Notwithstanding of different strategies alongside various methods used to change over waste materials for recuperation of crude materials, it is likewise used for land filling, Fertilizing the soil, Vermi-treating the soil, creation of Lactic corrosive, assembling of Ethanol, creation of creature Feed, Anaerobic absorption and so on. Distinctive paper waste sludge produced from paper fabricating industry can be used as a substitution to the diverse mineral filler material for different cement blends according to their physical and synthetic properties for some fundamental quality trademark like compressive quality, water assimilation, thickness and flexural and so on. Similarly, waste material utilized for the manufacturing of ceramic materials, fiber board products, Cellulose-primarily based specialty products, Nanocomposites etc.[6] There are opportunities for awareness of ecological improvements of this industry both by using development of the used technologies of various merchandise and through usage of some of the generated wastes like secondary raw cloth and strength resources.

Paper is one of the easiest and most commonly recycled products. Recycled paper already saves millions of trees, immense amounts of water, space in landfills, and all the fossil fuels and other resources that go into the process of making and disposing of paper. The more we recycle, the more we can save.

### **Sustainably Repurposing Paper into Compost**

For most people, adding shredded paper to compost is probably the easiest and best way to repurpose it. Benefits of this approach include:

- **Paper is a Source of Carbon:** Shredded paper is an excellent source of Carbon, especially newsprint and financial-statement types of paper. Carbon is an essential component of a healthy compost system and adding shredded paper can help you attain the ideal Carbon to Nitrogen ratio of 25C:1N. A simple rule is, if your compost pile is smelly, you need more carbon.
- **Moisture Retention:** Adding shredded paper increases moisture retention which helps material break down faster and reduces odors and leakage issues. When used in soil, moisture can be recovered more at the root level and this promotes healthy growth.
- **Increases Soil Volume:** The volume of soil is increased with the addition of shredded paper. This means more fresh compost is available to use around your landscape.

- **Worms:** Shredded paper helps with vermicomposting because worms love paper and use it as a source of food and shelter in compost. Shred your paper if you'd like it to be easier for your worms to consume.[7]

Keep in mind however that there are some papers that shouldn't be recycled or composted. These include waxy papers, papers with foil or tape on them, and papers that have strong dyes, heavy inks, and other printing chemicals. Also don't compost coffee cups, take-out boxes, milk or juice cartons and paper plates because they often contain plastic. Only compost them if they are certified compostable.[8]

### **Fundamentals of Hand Paper Making**

The essential papermaking measure includes plunging a screen extended over a casing (the form and deckle) into a tank of mash, lifting the screen out of the tank, and shaking it to and fro - and side to side - with the goal that the strands interlock and bond on head of the screen surface as the water channels through the screen. The newly made piece of paper is then framed (moved) onto a surface - generally a felt and is then squeezed and dried.

People in this field are always inventing new equipment, adapting items from other industries, and redesigning old machines to function better. Networking is a great way to find the things you need or learn how to build them. There are several papermaking organizations, a trade magazine called *Hand Papermaking*, and a wealth of information to be found on the Internet, from papermaking Web sites that highlight artists' offerings to those that show the uses of the process in the developing world to sites that feature university and art center course offerings.

### **Collecting and Preparing the Fiber**

Paper can be made out of a variety of materials, ranging from recycled paper to plant fibers, such as flax, corn husks, or iris leaves, to pre-processed pulps, such as, cotton linter and other natural fibers including cotton and linen rags. All these materials contain fiber, an essential ingredient in papermaking. Fibrous plants have been used throughout history to create many of the things we use every day, such as clothing, linens, baskets, and rugs.[9]

Fiber comes from plants with an abundant supply of cellulose. All plants contain cellulose, but some contain a higher percentage than others. Cotton linter, one of the staples in Western papermaking, contains the most cellulose - up to 95 percent.

Bast fiber the inner bark of tree branches and the stalk herbaceous annuals and perennials - is located between the bark and the core of a branch. The inward barks of many arrangement very meaty and veld a decent measure of fiber for making strontrous pieces of paper. Bast fibers were used to make the first papers in Asia and are still in use today. There are two main types of bast fiber: woody bast, from the branches of trees such as elm (*Ulmus americana*) and paper mulberry (*Broussonetiapyriferal*) and herbaceous bast, from the stalks of herbaceous annuals and perennials such as milkweed (*Asclepias speciosa*) and nettles (*Urtica dioica*). A third type of bast fiber is found in the petiole, or leaf stem, of plants such as abaca (*Musa textilis*), Petiole fibers are typically long, tough, and stringy - similar to the stringyWoody bast come from tree branches fiber found in pineapple tops.

To acquire the usable fiber in bast fiber plants, the branches on stalks must be steamed (to isolate the inward bark fiber from the center) and afterward scratched (to eliminate the external dull hued bark).

### **Beating Pulp**

Beating the pulp is an essential step in the paper making process. The fiber needs to be turned into a loose viscous matter that can be scooped onto a screen to form sheets of paper. This can be achieved by several methods, including hand beating using simple house hold equipment, such

as blender or using specialized equipment designed for paper making such as Whiz mixer, a stamper or a Hollander beater.[10]

The equipment used to beat the fiber and length of time will vary the resulting paper. Particularly when you use a Hollander beater, lengthening the beating time can produce dramatic result. Abaca fiber beaten for 30minutes will produce a soft opaque sheet that shrinks very little; if it is beaten for more than 8 hours, the resulting sheets are crisp and translucent, with a high shrinkage rate.

### **How Beating Works:**

Individual papermaking fibers are slender, just millimetres in length. They are made up of cellulose molecules - long chains of hydrogen and oxygen atoms - with tiny fibrils resembling pipe cleaners, which interlock and bond when formed into sheets of paper. This bonding is called hydrogen bonding, and it occurs naturally between cellulose and water molecules because they have similar polar charges, which allow them to attach together like magnets. As the cellulose molecules are beaten, tiny fibrils on the fiber surfaces are raised, creating sites for water molecules to attach.[11]

Beating also shortens the fibers, so they are evenly distributed during sheet forming. As water is removed and evaporates throughout pressing and drying, the fibers are actually pulled closer together, and hydrogen bonds form between the cellulose molecules. A few fibers can be beaten right after they are obtained, with having to be cooked first such as recycled paper, prepared sheet pulp from paper making supplier. Also, plant fibers like flax or hemp can be beaten without cooking if it will be beaten in a Hollander beater. Plant fibers can be beaten by different processes like Hand beating, Blender beating, Hollander beating, beating with drill attachments and whiz mixers and beating with stampers

### **Using Additives**

Several additives can be blended into your papers to colour and coat them and protect them from deterioration. These additives are ne necessary, but they will change the quality of your pulp and, in many cases, enhance your papers. Most of them can be blended into the pulp at the end of the beating cycle and before you start making sheets. If you wish to add something to only one particular batch of pulp. You can stir it directly into the vat.[12]

### **Sizing:**

Sizing is a liquid substance that coats fibers and makes them more water repellent and bleed-resistant. It allows you to use watercolours and inks on the finished sheets.

### **Surface Sizing:**

Sizing can also be applied to papers after they are formed into sheets and dried. This technique, called surface sizing, adds an additional layer of protection against contaminants in the air. Traditionally used throughout Asia and Europe, surface sizing may have contributed to the permanence and durability of many historical papers. This technique coats the paper and gives it a sturdier finish than internal sizing. Surface sizing can also be purchased from papermaking suppliers.

Some common materials used for sizing include corn, rice, and wheat starch, as well as gelatine.

### **Buffers, Brighteners, and Fillers:**

Some additives can make paper smoother, opaquer, and resilient to environmental conditions that cause degradation. Calcium carbonate ( $\text{CaCO}_3$ ) comes in powder form and can be added to the pulp at the end of the beating cycle. It protects the paper from acidic contaminants in the air by slightly increasing the paper's alkalinity. It also acts as a filler, occupying the subtle crevices between the fibers and thus making sheets of paper smoother and opaquer. Clay or kaolin, also comes in powder form; it can be used to make paper opaque and smooth. It is also useful in

paper casting, because it reduces shrinkage during drying. Titanium dioxide (TiO<sub>2</sub>) is a white pigment that can be added to make paper whiter, opaque, and smooth. A number of other additives, each with its own specific purpose, can be used in the papermaking process.[13]

**Formation Aid:** This slimy substance is added to the vat during use of the Japanese sheet-forming technique, or any other techniques to slow the drainage time. This leaves more time for dispersing fibers during sheet forming. It also prevents the fiber from clumping. The traditional Japanese formation aid is *neri*, which is extracted from the roots of the Japanese tororo plant (*Abelmoschus manihot* Medikus or *Hibiscus manihot* L.) by a process of pounding and soaking them in water. In a few hours the water becomes a thick, gooey slime called *tororo-aoi*. There are also natural alternatives to *neri*, such as the fruit of the okra plant and the roots of hibiscus and hollyhock.

Retention aid (also known as retention agent) is a cationic substance (made up of positively charged ions) that binds pigment to the fiber's surface. Pigments tend to have a negative charge and will therefore attach to the pulp if the proper amount of retention agent is added. Soda Ash (Na<sub>2</sub>CO<sub>3</sub>) powder is a base substance that guides in the expulsion of non cellulose materials from a plant fiber when it is doused or cooked in arrangement with the fiber. It is the most widely recognized antacid utilized in papermaking.

Methyl cellulose is an archival water-based adhesive, it can be used to size paper externally, strengthen bonding when casting with pulp and to attach paper to paper in the wet or dry state. It is available in powder form.

There are several methods of colouring paper, but the two main tinting agents are pigments and dyes. Colour permanence is of great concern to many papermakers. In general, pigments are more permanent than dyes, especially in terms of being lightfast (not fading over time): these are the most typical colorants used by hand papermakers.

### **Making Paper**

There are three basic types of papermaking Western, Eastern, and deckle box. Eastern papermaking and the deckle box technique came before Western papermaking and were originally used with bast fibers, such as kozo, mitsumata, daphne, gampi, and hemp. These fibers produced smooth surfaces for the ink and brushwork common in Eastern countries. When papermaking found its way to Europe, where the stylus was the common writing tool, cotton and linen rags were the usual raw materials. These types of paper were also used when the printing press was invented.

Although each technique was developed for use with certain fibers, they are somewhat interchangeable. Western papermaking is suitable for many fibers, but when couching (transferring paper from a mould to a felt) becomes difficult, you might try Japanese paper making, which is also ideal for making very strong, thin papers. The deckle box technique can be used to make very large sheets of paper, because you can pour rather than dip the sheets, thereby eliminating the need to lift a large mould and deckle. It is also good for making thick sheets, combining pulps, and making a sheet without a vat.[14]

### **Papermaking Techniques and Projects**

#### **Pulp Painting:**

Paper pulp can be pigmented and used as a medium to paint on surface of a wet sheet of paper - the wet base sheet is similar to painting canvas. Layers of pulp can be applied and built up on the freshly made sheet of paper. When pressed, the layers flatten and bond, becoming one uniform surface.

Pigmented paper pulp has a different consistency than paint. It can be applied by squirting it through a bottle, turkey baster, or syringe. If it is refined enough, it can even work with a brush. As layers of pulp are applied to the base sheet, they can be misted with water to create varying intensities of color, scraped through to bring up colours that lie underneath, and manipulated in a variety of ways. Using pulp painting techniques different projects can be done.

**Ex:** Marbleizing paper, Fine-Line Stencilling

#### **Laminating:**

Laminating can be done while working on top of a freshly couched sheet of paper. Several sheets can be laminate one on top of the other, or collage other materials onto the sheet. A two-toned sheet of paper also can belaminate one color or fiber to another; when pressed and dried, the fibers will bond and become one sheet of paper. Or, collage items such as photographs, strings, and fabric directly onto the surface of a sheet when it's still wet.

#### **Embedding:**

One can sandwich items between two sheets of paper to creating textures or add structure to a sheet. Use a translucent fiber on one side (or both) to embed an object such as a photograph, or a leaf to make it visible or slightly hidden. Embed a piece of lace, plastic mesh, or a handful of seeds to make a textured paper. Or, sandwich pieces of string or wire to make structural sheets that can be bent or manipulated.

**Ex:** Making a Laminated Wire Lantern, Laminated book cover with pocket.

#### **Decorating with Inclusions:**

Adding items to paper making Vat is one of the simplest ways to make unique and intriguing papers. Decorative elements should be small and light weight so they don't sink to the bottom of the vat. They should also be flat, so they don't cause problem when pressing. Plant fibers, flower petals or small swatches of fabric are just a few possibilities.

**Ex:** Flower petal paper.

#### **Making Shaped Sheets:**

Shape of the paper can be varied by designing shaped deckles which control where pulp flows onto the mould. For small sheets like cards or stationery, circles and cards can be made or even mould surface can be divided to make more than one sheet at a time.

**Ex:** Making multiple cards and envelopes.

#### **Papermaking Using Plant Fiber**

Papermaking is a craft whose ancient methodology and techniques, developed almost 2.000 years ago. The interest today in making paper from plants, which still guide the ways in which paper is made today. Papers possibilities are endless, and there is heightened interest today in making paper from plants, which are plentiful, easy to harvest, and require little equipment to process. Professional papermakers and entrepreneurs around the world are using handmade paper made from common plant fibers to develop new products in the form of stationery, books, lamps, and jewellery in addition to simply selling unique handmade sheets.

One ought not need to go farther than their own lawn or neighbourhood to locate various plants reasonable for papermaking. Numerous regular nursery plant parts make dazzling papers, for example, the leaves of irises, gladioli and daylilies, the stems of okra and hollyhocks and the stalks of corn. Indeed, even in your kitchen manure, one can discover papermaking plant parts, for example, onion skins, artichoke leaves, and corn husks.

#### **Collecting Plant Fiber**

Fiber is a major component of paper making plants providing elasticity, flexibility and tensile strength. Fabrious plants have been used for long time to make items such as cloth, mats and

baskets. These plants can likewise be utilized to make papers and they will frequently get the job done as the sole fixing in the pieces of paper. Papermaking plants can be found at river beds, swamps, garden, and plants. [15]

There are three main type of plant fibers used in paper making:

**Bast Fiber**

The fibrous inner bark located between the outer surface bath and the inner core of trees or shrubs is called the bast. There are three types of bast fiber: woody, taceous and petrole.

**Leaf Fiber**

Moody bast is found in the stems, branches of shrubs such as Blackbe, Vines, Petrole bast is Stalks and stems or long leaved plants the banana family the manila hemp.

**Grass Fiber**

The short fibers of grass like plants contain less cellulose and are more brittle than leaf or bast fiber, but nevertheless they make interesting papers. Tall weeds and wild grasses such as straws, rushes, sedges, swamp grasses, and beach grasses are good sources of papermaking fiber. The best papermaking grasses are the ones that are the most difficult to tear.

**Getting Ready to Make Paper**

There are several steps involved in making a sheet of paper. Raw material (papermaking fiber) can be obtained by collecting plant material or from a papermaker. Once the fiber got selected, it will process further or break it down into the tiny individual strands that will bond with each other to form sheets of paper. This process is differing from fiber to fiber.

Most of the plants fiber needs cooking while all the fibers required to be beaten using one of the beating processes like hand beating process or beating in a Hollander beater to break it down and to make into paper pulp by hydrate the fiber. After the beating cycle, mash can be blended in with water in a tank at that point shape and deckle (an edge that moulds and supports the strands in sheet like structure) must be plunged all through the tank of mash. To make settle the mash on the screened surface of the shape, water must deplete through gaps in the screen.

The pulp settling onto this screened surface becomes the sheet of paper. Remove the deckle, tilt the mould (and your sheet of paper) to let the excess water drain off, and then transfer, or couch, the sheet of paper onto a felt or blanket. You can couch seat various pieces of paper one on head of the other, each isolated by a layer of felt or cover. You must press the sheets to remove most of the remaining water, and then dry them using any of the techniques.

**Tools and Equipment:**

The basic tool and equipment required for paper making are as follows:

- Moulds and Deckles
- Vat
- Felts
- Table, tray or stand for couching
- Strainers lined with mesh or drain basket
- Scoops
- Plastic buckets with handles
- Sponges

**Processing Plant Fiber**

Fiber preparation is possibly most important step in papermaking process. All plants must be cooked and beaten to obtain the fibrous material that constitutes paper pulps but some require further processing.

**Cooking the Fiber**

All plant fibers must be cooked in an alkali solution called a caustic solution prior to making paper. Cooking breaks down the fiber into a pulpable material with the aid of an alkali, such as soda ash, washing soda, lye, or lime, the non-cellulose materials like lignin, pectin, waxes and gums are dissolved and then rinsed out. There are several alkalis that you can use, but the one most commonly used by papermakers is soda ash, which is inexpensive and available from papermaking suppliers. Cooking can be done in step by step process.

**Beating the Fiber**

Individual papermaking fibers are long, slender shafts, only millimeters in length, with hairlike projections called fibrils. If enlarged, they might look like pipe cleaners. The fibrils are raised from the outer cell walls of cellulose and other fibers during beating. Beating roughens the fibrils and makes it possible for them to inter twine and form connections, or bond, and allows water to penetrate the walls of the fiber (called hydration). This bonding of the cellulose fibers is called hydrogen bonding, and it occurs during sheet formation as the hydrated cellulose fibers interlock.

Beating of the fiber can be done through hand beating process or with a blender, both are simple and inexpensive way to beat pulp. The blades of a blender actually cut the fibers so the resulting paper will have a different look than hand beaten. There are few additives can be added to paper to color coat or protect them from the elements in the environment that cause deterioration. These additives are not necessary but they can change the quality of the pulp.

**Recycling of Paper Into New Paper:**

The manual production of paper at home can be very simple. It is also an excellent way to use your old receipts, junk mail, paper and scrap paper to dump in a recycle bin to make something of glorious handmade beauty instead. Paper can also be recycled into new paper. Here is a DIY process from for recycling paper to make your own paper. Buying all the equipment new would cost around \$120 USD, but most people already own the items needed. One exception would be a shredder, but the paper can also be shredded by hand before being added to the blender. A really high-powered blender (like a BlendTec or Vitamix) can also blend and shred. This leaves only the cost of the mesh and picture frame without the glass, both of which can be purchased for less than \$10 USD.

Most types of paper are usable for this paper making process, except for:

- Used paper towels
- Paper that is stained with food dirt or paint
- Greaseproof or baking paper
- Wallpaper
- Paper with gum on it like stickers etc.

Here is a summary of the equipment and process.

**Equipment:**

- Picture frame without the glass
- Mesh larger than the picture frame

- Kitchen bowl larger than the picture frame
- Sponge
- Towel
- Blender
- Shredder or shred by hand or use a high-powered blender like a BlendTec or Vitamix

**Process:**

- ❖ Creating the screen: Tape or staple the mesh to the picture frame
- ❖ Mixture: Shred the paper you are recycling and blend it with warm water in the bowl
- ❖ Once you have a smooth pulp, submerge the picture frame into the mixture
- ❖ Pull the frame back out and rest it on an old towel. The mesh should be full of the paper pulp from your washing-up bowl
- ❖ Add any decorations, such as dried flowers, or scraps of colored paper that you like and cover with a little more pulp from your bowl
- ❖ Press the sponge across the frame to squeeze excess water from the pulp
- ❖ Leave the frame to dry for at least a day, and then peel off your new sheet of paper

**Alternative Business Option: Recycled Paper Products:**

An alternative approach to a paper recycling business is to collect the paper and create a product from it that you can sell to make a profit. If you live in a small community, you can offer to collect their recyclable paper from them and use it in your products. It is also a great way to recycle your own paper.

By treating the paper pulp, you can recycle it into paper for your own use and for creation of new products. Some potential products you can manufacture at home are paper plates, paper envelopes, paper pockets, and many more. With a little creativity, you can turn an old paper bag into a cute holiday gift bag. You can also turn paper bags into actual gift wrap by turning them inside out or turn them into gift tags! You can also create your own paper (see above) and sell it as an arts and crafts option for others.





(Recycled Paper Products)

Creative retailers are also selling other items that have not traditionally been made from recycled paper. For instance, Different people sell flower vases, picture frames, clocks, and other crafts made from recycled paper. Here are a couple Etsy retailers who sell recycled paper products they made themselves too.

### CONCLUSION

Paper is a crucial material that is utilized all around. Perilous Waste Specialists would prefer not to suspend paper creation as it is extremely important and the vast majority of the paper waste can be reused. Wastepaper can be remake environmentally friendly manner for a nominal fee so that recycled paper products can be used in our daily life. On a final note, It can be recommend that everybody should compost as many paper products and junk mail letters as possible! Every paper composted is a paper saved from the harmful process of paper recycling—or worse yet, wasteful landfill disposal. For those of you who are still skeptical, I find it helps to look at the situation this way: there are pollutants virtually all around us, both in the air and in the water table. Does it really do that much harm if some contaminants end up as insoluble compounds in the soil? After all, there's probably not a single place on earth that is completely contaminant-free. So, in my opinion, it's much better to compost than not to compost.

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**THE JOURNEY TOWARDS PEACE AND SECURITY IN GHANA, THE STORY SO FAR, AND THE WAY FORWARD****Seth Amoako Atta and Solomon Ohene Amoako-Atta**

Peace has literally been defined to mean the absence of war or absence of physical violence, however, Galtung shares different view altogether. Galtung defines Peace to include oppression, poverty, alienation, intimidation, illiteracy, squalor, disease, ignorance among others. Best (2006) also defines peace as a process involving activities that are directly or indirectly linked to increasing development and reducing conflict both within specific societies and in the wider international community. Galtung outlined two forms of peace as negative peace and positive peace. A negative peace is based on an absence of armed conflict and direct violence, where there is an emphasis on preserving the status quo and on negotiations between major actors. Negative peace is often the security found when warring actors quit the battle in international life and there is little talk about reconciliation and forgiveness for the belligerents' return home across national borders.

In contrast, the notion of positive peace goes beyond simply the absence of direct violence, and includes addressing the needs of all levels of civil society in terms of economic, social, and political justice and respect for human rights. The concept of positive peace underlies political efforts. Usually at the end of a civil war or communal conflict to rehabilitate a society and its institutions, seek justice in some form, and pursue reconciliation and even forgiveness between groups and individuals. In practice, real-world peace lies along a spectrum between negative and positive peace.

**Peace Enforcement**

Peace-enforcement entails the physical interposition of armed forces to separate ongoing combatants to create a cease-fire that does not exist.

Boutros-Ghali, on the other hand, uses the term to refer to actions to keep a cease-fire from being violated or to reinstate a failed cease-fire.

Peace enforcers are often not welcomed by one or either side(s). Rather, they are active fighters who must impose a cease-fire that is opposed by one or both combatants; in the process, the neutrality that distinguishes peacekeepers will most likely be lost.

**Effects of Conflict**

Given the intensity and violent nature of some of the conflicts especially in the in Northern Ghana, particularly those between the Mamprusis and Kusasis in Bawku, the Nanumbas and Konkombas in Nanumba North District, and the Dagbon crisis over the Dagbon Kingship, it is not out of place to draw the conclusion that conflict retards the growth and development (Canterbury and Kendie, 2010). Ghana and most parts of Africa are faced with the challenge of scarce resources, but in most case a lot of these resources are diverted from development and channeled to security. More so, after every violent clash, reconstruction and rehabilitation of destroyed facilities and infrastructure become additional burden for the government and other stakeholders. The destruction caused to social infrastructure like schools, water and health facilities during violent conflicts are just a few of the negative results of conflict. According to UNDP Report The 1994 Konkomba Nanumba conflict popularly known as the guinea fowl-conflict that escalated to involved several feuding tribes in the northern region led to the destruction of lives and properties. By the time the conflict was over, according to some estimates close to 2,000 people were dead. Schools, clinics, and development projects estimated to be worth millions of dollars were destroyed. At least 423 villages were burnt or destroyed.

Some towns were “ethnically cleansed.” The conflict left over 178,000 internally displaced people, out of an estimated population of close to 700,000 for the entire region (Brukum, 1999).

In most cases some violent conflicts lead to loss of lives. Especially the electoral related ones like the recent by- elections at Ayawaso wuogon and the clashes at Techiman during the 2020 general elections. What we need to note that some properties lost to violence can be restored but, it is practically impossible to bring back lives lost to violence. It is therefore imperative to find means of protecting positive peace in order that conflicts and peacekeeping issues will be nib to the bud if not eliminated completely.

Ghana according to an Afrobarometre report which is widely applauded by the international community as the ‘Golden Child’ of West Africa for the manner in which the democratic process appears to be consolidating, and for leading the way for peaceful, free and fair elections in the sub-region. There are various approaches prescribed by scholars as measures to protect positive peace, however, we must not lose sight of the fact that peace is not just the absence of conflicts. There must be other factors that must be considered as a nation if we intend to promote positive peace. Below are some of the effective ways to bring about positive peace and eradicate conflicts with its associate peacekeeping matters.

In the first place, there must be regular free and fair elections. Most of the conflicts in Africa and Ghana for instance are politically motivated. When the populace and for that matter the political parties lose confidence in the electioneering processes, little disagreement can ignite serious conflicts. Several reports have come to commend Ghana because of the various transitions it has gone through by voting. Periodic registration of people Eighteen Years and above to give them the access to exercise their franchise a step in the right direction to ensure the will of the people always prevail. But the situation may gruesome if the electioneering process is skewed to the advantage of a candidate.

The institutions responsible and mandate by law to conduct elections must always ensure that the processes are transparent free and fair. Political parties must be given the needed training and guidelines so as to educate their followers. The amount of money and resources that will be allocated to this training cannot be compared to the huge sums of money and resources that will be wasted should the country be plunged in to violence as a result of disputed election results. The two recent General elections have been disputed and resolved through the court. Even though none of these resulted in violence, time spent on it cannot not be recovered. The 2012 general election for instance was in court for eight months or more and was carried live on the national television. Just imagine the amount of money lost by Media outlets alone and the number hours that people spent following proceedings. Is it not better to educate the people involve and make sure the processes are carried out in free and fair manner?

Secondly, the unemployment situation in the country must be treated as a national security issue. There is saying that *the devil finds work for the idle hands*. It is quite not uncommon to find unemployed people, especially the youth to partake in violent conflicts. In order to reduce graduate unemployment, the country’s education must be restructured to include more vocational training and entrepreneurial skills. This will equip the students with employable skills to start their own businesses after the training. If most of the people are doing their business, they turned to be ambassadors of peace. This is because when there is no peace, business cannot flourish. Moreover, it easier for the unscrupulous Politicians to induce the unemployed youth to engage in violent conflicts, more than to convince those who are busily working to earn a living.

Again, When people are in to business, the probability for them to involve in other things that are in conflict with the nation such; arm robbery, prostitution, drug trafficking and others is very

less. Governments must therefore be concerned about the problem of unemployment if they wish to promote positive peace, eradicate conflicts and prevent wars and peacekeeping missions.

Finally, there must be good governance guided by rule of law. The constitution of the country is the supreme law of the land and the provision of peace, security and justice has always been perceived as the mandate of the state. Majority of the population look to the state to ensure social justice and peace through its formal institutions such as the police, military, judiciary, paramilitary organizations and other law enforcement agencies. Any attempt by any of the Organs of Government to suppress the other, or abuse their mandate has the tendency to spark conflicts. The executive arm, the judiciary, and the legislature must be allowed to operate independently. The law is not a respecter of persons as they say and therefore the law must be applied to the letter whenever anyone is found culpable. The other state institutions with the mandate to fight corruption and maintain human right issues like the office of the Special Prosecutor (SP), the Commission on Human Rights and Administrative (CHRAG) must be empowered to discharge their duties without fear or favor.

If the state institutions are strengthened, the citizen will have confidence and will be ready to access their services rather than resorting to violence or taking the law into their own hands whenever they feel cheated. The two contested presidential election results at the Supreme Court is a living testimony in Ghana, where potential post election conflicts (violence) have been prevented through the court.

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Bimpong-Buta, S.Y. (2013). Essential requirements of customary arbitration. Daily Graphic, 14 November, p. 10.

#### **CODEO'S STATEMENT ON THE OFFICIAL RESULTS OF THE 2020 PRESIDENTIAL ELECTIONS**

Country Reports on Human Rights Practices for 2019 United States Department of State • Bureau of Democracy, Human Rights and Labor

Marina Rakopyan 'Human rights and democratisation during 2019: The case of Armenia, Georgia and Moldova' (2020) 4 Global Campus Human Rights Journal 539-556 <http://doi.org/20.500.11825/2033>

Transparency International Corruption Perception Index, 2018. Available at: [www.transparency.org](http://www.transparency.org). Accessed on 18/06/2019. 23WANEP NEWS 2019.

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**A STUDY ON PRIVACY AND SECURITY ISSUES IN E-COMMERCE****Dr. Geeta Kohade<sup>1</sup> and Ritu Sudhir Thombare<sup>2</sup>**<sup>1</sup>Associate Professor and <sup>2</sup>Research Scholar, Chhatrapati Shivaji Maharaj University, Navi Mumbai**ABSTRACT**

*E-commerce is electronic commerce. It is the buying and selling platform of goods and services over the internet. The title of the research paper is a study on privacy and security issues in e-commerce. the study focused on the objective to know about customer satisfaction and customer preferences, the hypothesis was H0: services provided in e-commerce are not associated with customer security. H1: services provided in e-commerce are associated with customer security. In this research paper, primary data was collected through the questionnaire with the help of google form, there were 103 respondents, and secondary data was collected through the internet, journals, textbooks, and websites this research paper contains random sampling methods also descriptive research design is used. This study will help us to secure our data with proper planning and to avoid online fraud.*

*Keywords: privacy, security, e-commerce, customer, online shopping*

**INTRODUCTION**

E-commerce (electronic commerce) is the buying and selling of products on online services over the internet media. It is conducted through computers, laptops, tablets, smartphones, etc. almost anything can be purchased through e-commerce in today's world. four types of business transactions that occur either as business-to-business (B2B), business-to-consumer (B2C), Consumer-to-consumer (C2C), and Consumer-to-business (C2B). examples of e-commerce, are Amazon, eBay, Flipkart, Olx, etc. e-commerce is the faster buying process. Always open platform for customers.

**REVIEW OF LITERATURE**

Mahmood h Shah , Ramanus okeke, Rizwan Ahmed,(2013) journal of basic and applied scientific research, the topic a study on privacy and security in e-commerce. the study focused on the objective to know about the importance of security in e-commerce. and also to know about the privacy violations after engaging in online shopping. the key concerns before releasing personal information in online shopping despite rapid growth in e-commerce .many of the trust and privacy issues concern remain unaddressed. Several issues such as data privacy, data security and safety, data disclosure, and sharing by the seller with third parties have been explored with regular internet shoppers

**OBJECTIVES**

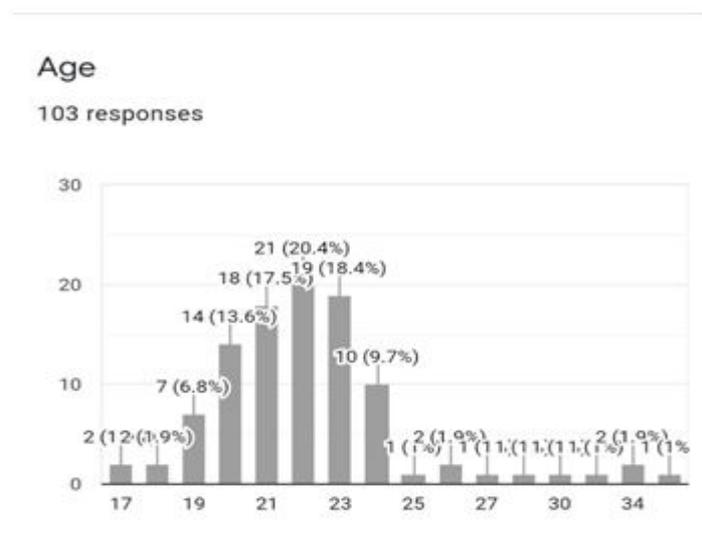
1. To know about the importance of security in e-commerce
2. To study the consumer's various problems with online payment
3. To know about customer satisfaction while online transactions
4. To know about customer preferences regarding security
5. To know about the online system is functioning properly

**HYPOTHESIS****H0:** Services provided in e-commerce are not associated with customer security**H1:** Services provided in e-commerce are with customer security

**RESEARCH METHODOLOGY**

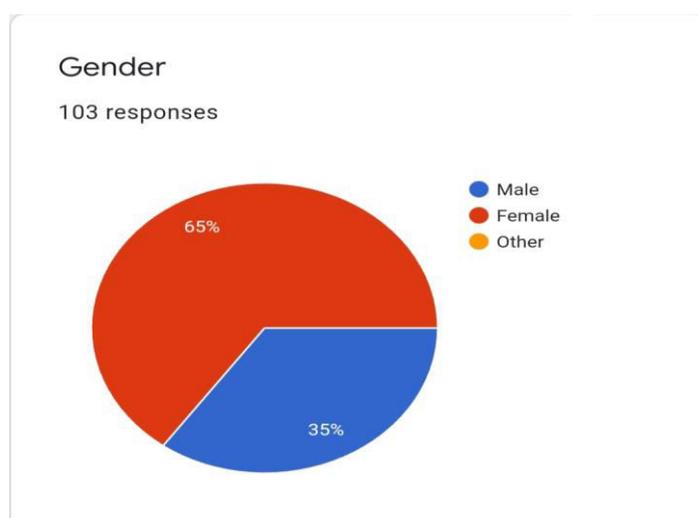
1. University of study: Navi Mumbai
2. Sample design: Random sampling design
3. Sample size: 100
4. Research design: Descriptive research
5. Collection of data: the collection of data is divided into two parts that are primary as well as secondary data
6. Data analysis and data interpretation: done through to the table, pie chart, and graph

**Data Collection and Interpretation**



**INTERPRETATION**

The average ages of the respondents are within the 19-24 years and some respondent is of the aged 25-35 years



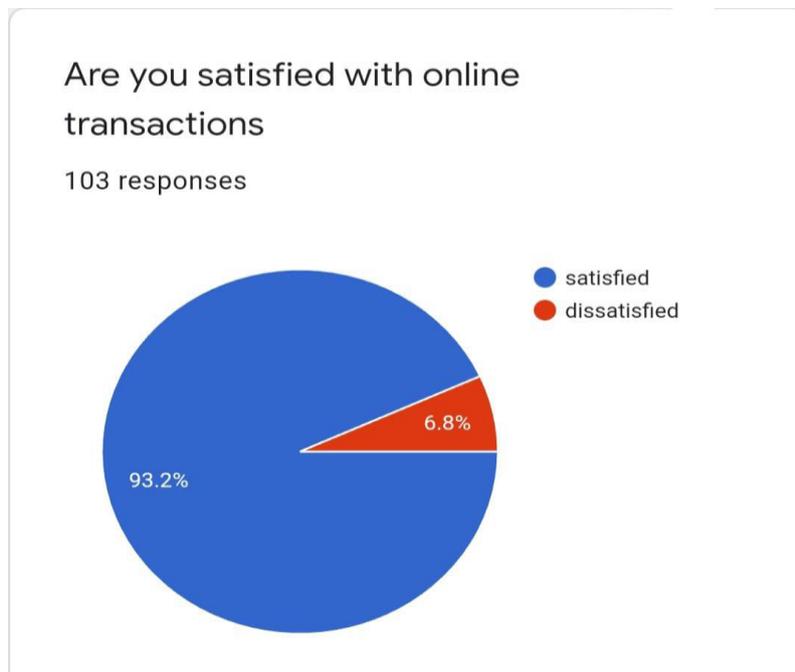
**INTERPRETATION**

The average female respondent is 65% and the remaining male respondents are 35%



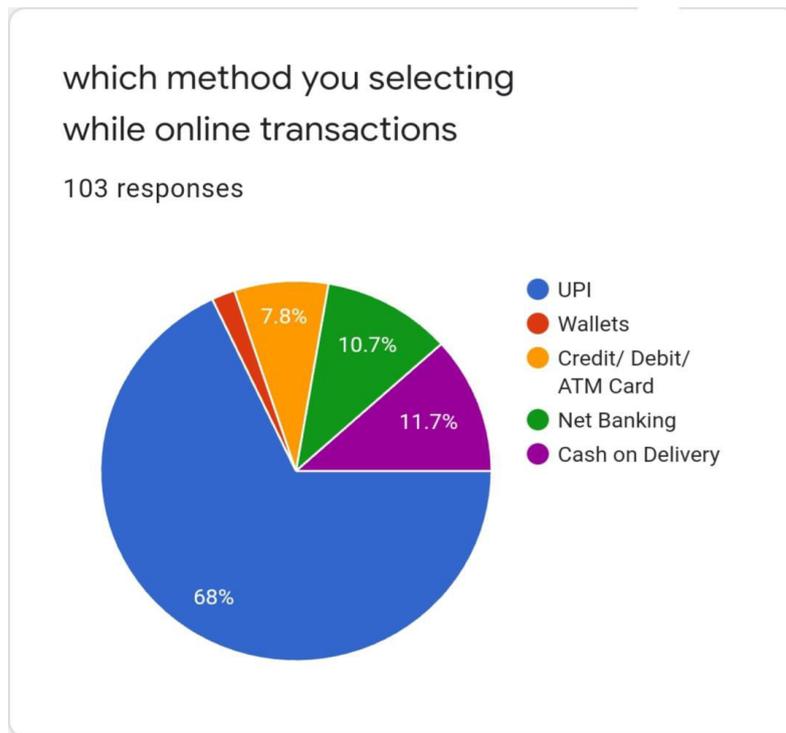
**INTERPRETATION**

Around 42.2% for cyberattacks, 23.5% for preventing crimes, 10.8% for improving customer service, etc



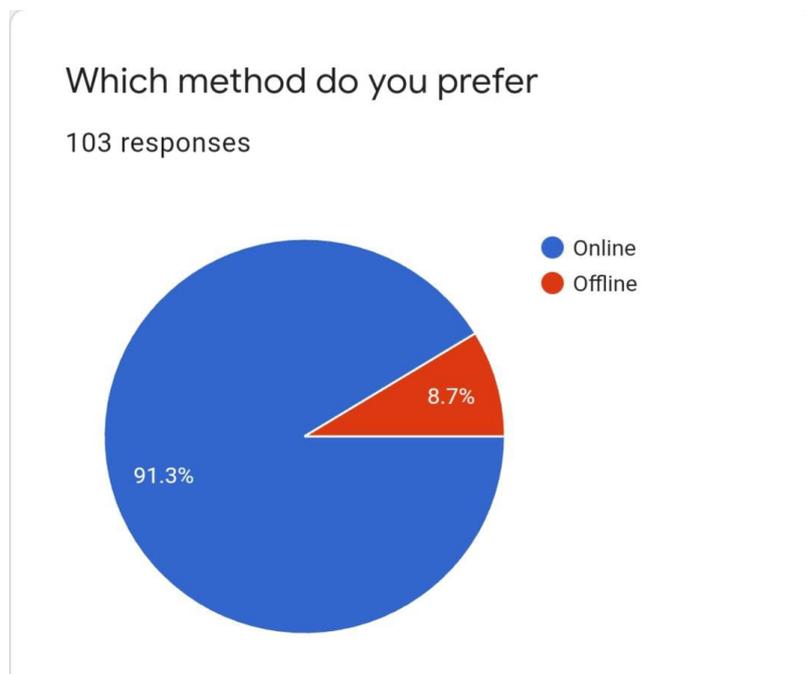
**INTERPRETATION**

93.2% of customers are satisfied with online transactions and 6.8% of customers are dissatisfied with online transactions.



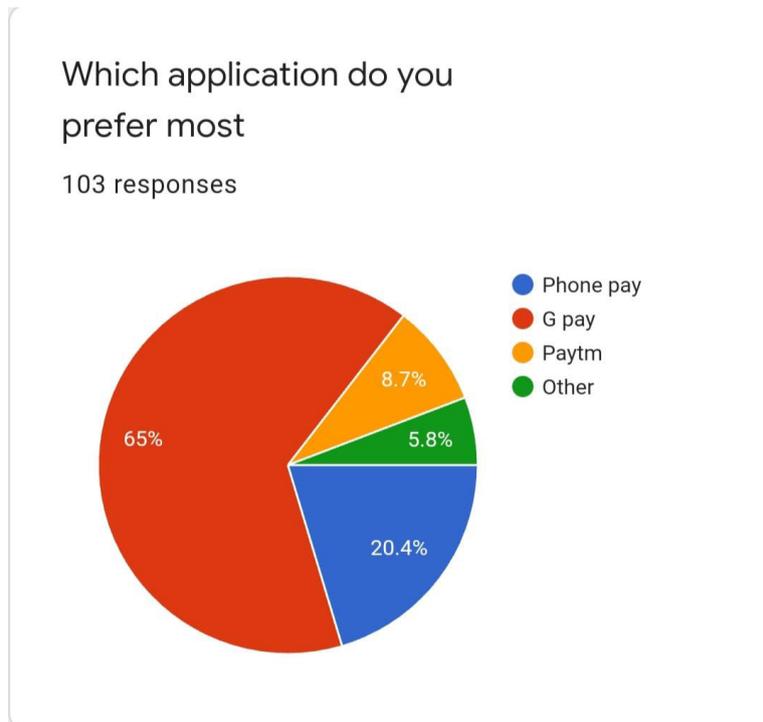
**INTERPRETATION**

In online transactions 68% of customer uses the UPI method, also 11.7% of customer uses cash on delivery (COD), and the remaining uses wallets, etc



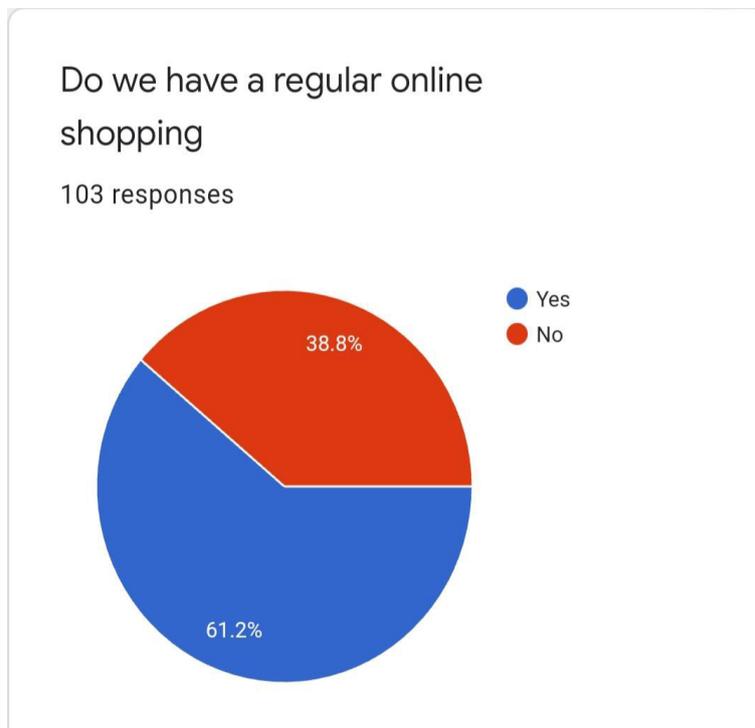
**INTERPRETATION**

Most the people prefer online method because its time consuming and fast transfer method so 91.3% of customer uses the online method and 8.7% uses the offline method.



**INTERPRETATION**

Most of the people prefer G pay i.e 65% and 20.4% of customer uses the phone to pay and 8.7% prefer Paytm, etc

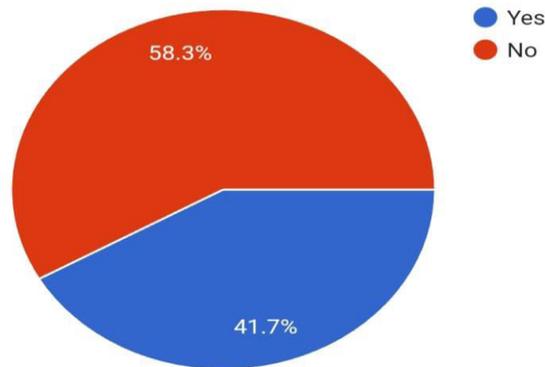


**INTERPRETATION**

In this analysis, it's clear that 61.2% of customers have online shopping, and 38.8% of customers go for offline shopping.

Do you have any similar work experience in other applications

103 responses

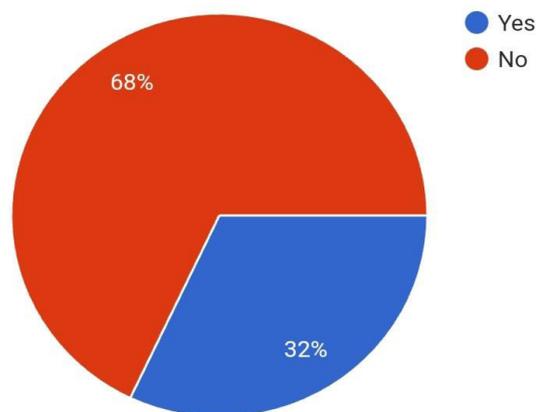


**INTERPRETATION**

Around 58.3% of customer feels similar work experience in other applications and 41.7% of customer haven't

Are you facing any technical issue

103 responses



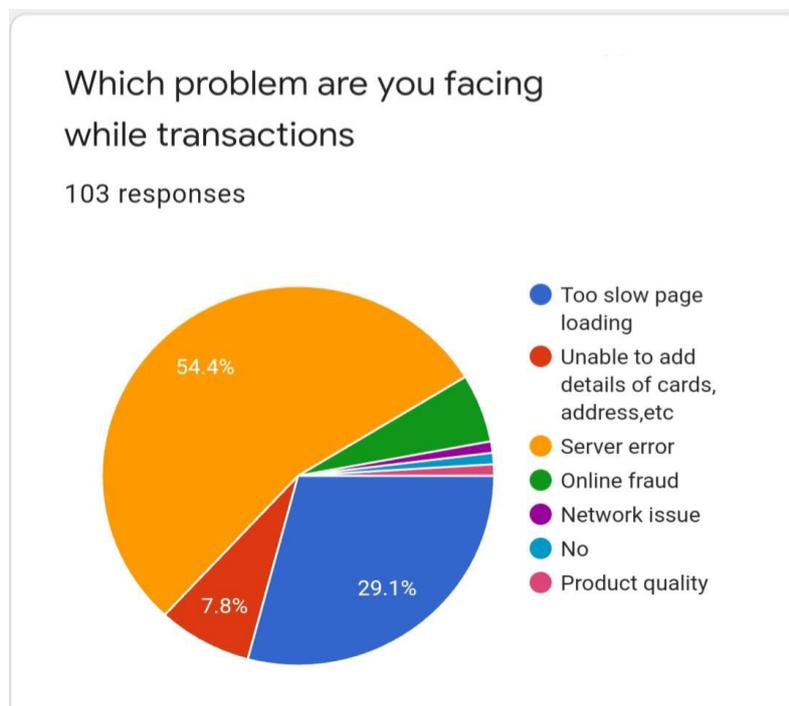
**INTERPRETATION**

It's very clear from this analysis that 68% of respondents are facing technical issues and 32% of respondents think that they are not facing any technical issues.



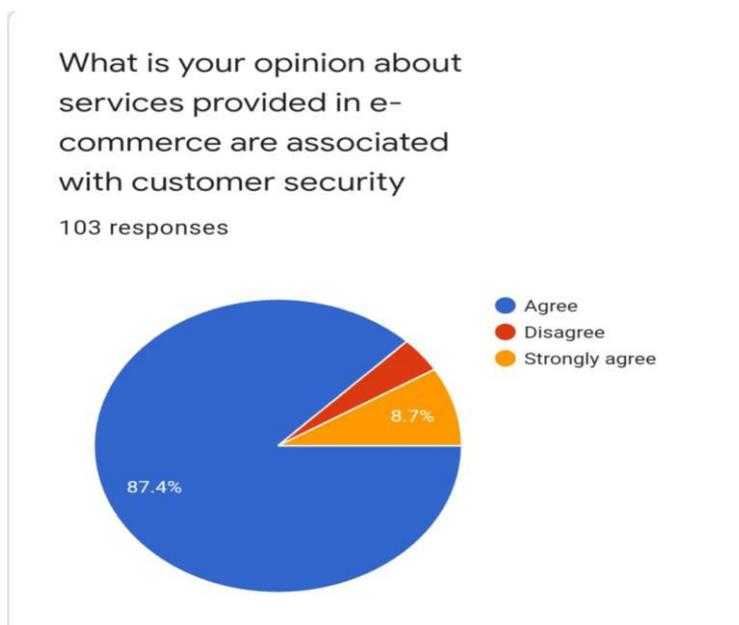
**INTERPRETATION**

Out of this analysis, 60.2% of customers feels good about online transaction and 29.1% of customers have a very good experience and the remaining 10.75 customers had an excellent experience



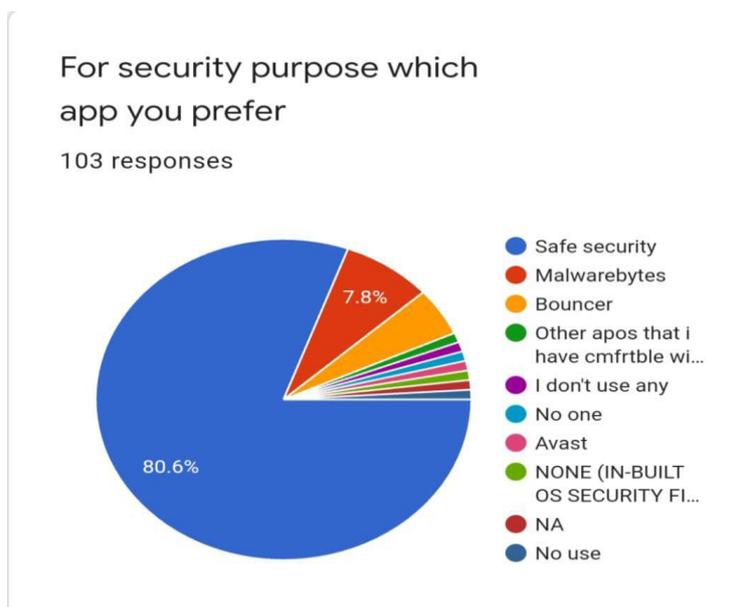
**INTERPRETATION**

In this analysis, it's clear that most of the customer-facing server error problems are 54.4%, and 29.1 % of customer-facing too slow page loading, and also some customers are unable to add details of cards, address, etc.i.e7.8%



**INTERPRETATION**

Services provided in e-commerce are associated with customer security then around 87.4% of respondents are agreeing about the statement and 8.7% of respondents disagreed with the statement



**INTERPRETATION**

Out of this analysis, 80.6% of respondent uses safe security application and 7.8% of respondent uses malwarebytes,etc

**FINDINGS**

1. Maximum customers agree with the statement that Services provided in e-commerce are associated with customer security.
2. It has been found that 54.4% of respondents are facing server error problems during transactions.

3. It has been observed that most customers are satisfied with online transactions.
4. Many more customers are facing technical issues while online transactions.

#### **LIMITATIONS**

1. Credit card payment is not yet secure.
2. This study is only focused on the Navi Mumbai area
3. Customer contact information is missing
4. In this survey covered around 100 sample sizes.

#### **SUGGESTIONS**

1. Take better care of your passwords.
2. Don't trust any security applications.
3. Help other customers to be more secure.
4. Do not store your sensitive data.
5. Do not share your passwords and pin codes to avoid banking fraud or online fraud.
6. Put strong passwords for your applications
7. Always backup your system.
8. Use secured websites.

#### **CONCLUSIONS**

It has been concluded that privacy and security are still ongoing research problems. even though most customers are satisfied with the online transaction but some customer is dissatisfied with online transactions. The result of this paper is based on a limited convenience sample size. Maximum customers agree with the statement that services provided in e-commerce are associated with customer security. day by day e-commerce plays an important role in our daily life. In the future, I will conduct a large-scale survey on security and privacy issues in e-commerce.

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## THE ROLE AND OBJECTIVES OF CRIMINAL LAW

**Jaafar Yahay Jaafar Al-Saeed**

Legal Department, Ministry of Higher Education and Scientific Research, IRAQ

### ABSTRACT

*The rules of criminal law can be considered legal rules that have the necessary characteristics, and these rules are intended to achieve the most important vital goals related to the social and political entity, especially since criminal law is a branch of other public law branches, and it is possible to employ general criminal law in order to achieve and ensure rights related to the public interest, and thus preserving the entity of the state and not harming it socially at the level of the individual, family and group, as well as politically by respecting the general basic principles of the state constitution and its political institutions.*

*Keyword: (criminal law, legal rules, role and objectives).*

### INTRODUCTION

The law is defined as a set of general, abstract rules that regulate the behavior of individuals in society, and these rules are accompanied by a material penalty that guarantees and guarantees their respect and optimal application of the law. According to this definition, the general law is the meaning that is used in applying the word law when it is launched, and this is the general meaning intended by the term law. But at other times, the term law may not express this general meaning, as it may mean a set of legal rules (representing the law) that the legislative authority can set to organize a specific case, for example, it is said that the law of lawyers or the law of organizing universities. In the literature of criminal law, the focus has been continue when needed of apply the principles of criminal law in assessing criminal-legal activities (T. Kruessmann, 2020). So we can say that the law is a set of rules that the state enacts in order to regulate its rights to impose and apply punishment. It can also be said that it is a set of rules by which criminal responsibility and penalties are determined as a result of a dangerous human behavior in society, and the resulting social, cultural and other effects. In analyzing the criminal law philosophy , the soulful plurality of authors understands this as an exhaustive lists of basic provisions set by law (E. Herlin-Karnell, 2020). The law can be expressed as a set of legal rules specific to abstract acts and the penalties prescribed for them, either in the form of applying penalties or resorting to preventive measures. The crime in the broad sense represents the actions carried out by one person or several persons, which are determined by the state in accordance with positive law, and which would cause serious disturbance in society, as it would result in damage or a threat to the public interests of the society or the individual. The court has the main function of arbitrator, but hasn't any participation in the question, or investigate and collected of evidences. The criminality trialed may be itself be only a composed of crime (Minakanitsakan T. 2005). These rules may set and specify the most important conditions that must be met to inflict punishment on the perpetrator of the crime, as well as work on organizing the rules and procedures for research in the investigation of crimes and the procedures of the courts, and thus the implementation of the sentence imposed by the criminal.

### Characteristics of Criminal Law:

In fact the matter of punishments regulation occurs by law (Minakanit T. 1985).The criminal law must be based on realistic foundations and conform to it, and the legislator does not have the right to rely on assumptions in order to enact a specific criminal rule. This is what is called the legal model of the crime, the fact that the criminal base must include different types of constitutive elements for a specific criminal incident or a specific criminal event.

- The criminal law must be based on reality and it must be completely identical to it, and it is not possible to use the assumption or rely on it in the enactment of a specific criminal rule, and this is what is known as the legal model of the crime, that the criminal rule must include various basic formative elements. It is necessary to provide them in the criminal incident when it occurs, and there is a necessary measure for this rule represented in the punishment, which in turn is supposed to match the realistic model of the crime with its legal model, and the main purpose of this congruence is to reveal accurately the acts committed during the crime, all for the sake of implementation of the principle of “no crime and no penalty except in the presence of a previous legal text.”
- We can say that the nature of criminal law can't stop only at the idea of the legal model of crime, but adds jurisprudence in addition to the characteristic of accurate and precise identification of its texts, through clarity, simplicity and accuracy, and this in turn leads to the removal of criminal law from the field that interpretation and avoidance of decisions results in angles of interpretation that are inconsistent with the true principle which says “there is no crime and no punishment without the presence of a text”. In fact, there are some European and American criminologists, who thought that the reformation of the individual necessary to be the only rightful object of retribution (Ua-amnoey, et al. 2004). In **figure no. (1)** The most characteristics of criminal law are shown.



**Figure no. 1:** to show characteristics of criminal law.

Apologetic defenses are bind to the external context and removed criminal responsibilities as well as civil responsibility (Reed, A. et al. 2016). several types of behaviors are illegal in many countries (Jubaer, et al. 2021). Continental law is high plains and articulates in questions of easement, and warrant than Anglo\American law (Jubaer, Shah. 2021).

#### **Objectives of Criminal Law:**

- One of the most important goals of criminal law is that we find stability in the law and ensure the achievement of justice and the defense of public and common interests, and that reaching the stage of legal stability is the only considered goal of criminal law, and that achieving justice and common interests are the two important elements necessary to achieve stability in criminal law.
- With regard to legal stability, we can understand from it how to reach the codification of the punitive or criminal rules that must be applied in order for individuals to know more details

about the legal controls in human life, knowing what is prohibited and what is permissible in them. Their activity and they have the right to live a beautiful and quiet life far from all kinds of dangers and possible disturbances.

- The pursuit of justice is one of the main important goals of the criminal law, because the criminal rule is divided into **two parts**:
  - 1) The first part is commissioning or criminalization.
  - 2) The second part is retribution, and the idea of justice is linked to punishment.
- Punishment must be fair and have **two main functions**: (a utilitarian. and corrective function), which are generally to protect society from crime, and then a moral function.

### The Main Sources of Criminal Law:

#### 1- The Constitution:

If we note that the 1996 and 2011 constitutions and previous constitutions contain basic principles related to criminal law, and are considered its main source, among them we mention the principle of equality, the principle of fundamental freedoms, the principle of legality or (the presumption of innocence), as well as the principle of non-retroactivity of laws.. .

#### 2- Law:

It is defined as the legislative text that Parliament votes and is published in the Official Gazette. Everyone, unlike individual administrative decisions, which in turn deal with special cases. There are many examples of this, such as; the Moroccan criminal group was influenced by the principles of European codification of the principle of criminal legality, as well as the written law and other legal paragraphs related to criminal law.

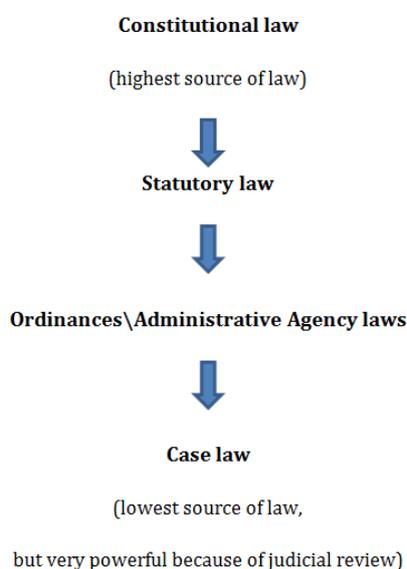
#### 3- Foreign Laws and International Treaties:

The international criminal law legislator can stipulate reciprocity in criminalization, and this is considered a kind of criminal similarity in acts when international law is considered a source of legal base. A side can prove any circumstances relevant with the facts in issue, but no any others (Wadicharoen M. 2004). There is a role for international treaties that can be a source of general criminal law if most of the necessary conditions are met, and this shows the extent of overlap between private criminal law and international or public law. In the other hand we can put the main sources of law in **figure no. (2)**, as shown below:



**Figure no. 2:** to show the main sources of law.

The 1st source of law is constitutional-law, two constitutions are applicable in any state; the federal\or U.S constitution, which is in forces through the United-states of America. The 2-nd source of law is represented by statutory law. While the government action represented by the application of constitution, by regulation of individual\private actions.



**Figure no. 3:** to show the followed serious of criminal law sources.

### **Relationship of Criminal Law with Other Branches of Law:**

There is a close link, and a real and clear relationship between criminal law and all other branches of law, and this relationship appears whenever there is a need to strengthen the penal rules in order to protect them, as follows:

#### **1- Criminal law and Civil law:**

The link between the criminal law and the civil law is evident through the right to property, which includes imposing the penalty for theft, fraud and breach of trust, in addition to fire and damage. Criminal law may be occur with an ordinary person, because of the limitation of the ideas of crime to the legal wrongs which violently offend moral-feelings of people. Criminal and civil wrongs, then, are not severely separates groups of actives but are alwise one and the same activity as considered in several viewpoints, this being one not of nature but just of relation (Lee, A. et al. 2015). It is known that the criminal law is related to the personal status laws, and this relationship is clarified by the protection of marital rights by imposing punishment on adultery and desertion of the family, in addition to protecting the right of custody by establishing a system and a financial penalty for that in the event that one of the parents refuses to hand the child over to the one who has the right his custody.

#### **2- Criminal Law and Constitutional Law:**

The relationship of criminal law with constitutional law appears through the protection of the constitution and the system of government in the state through the criminal law, and imposes penalties on those who attempt to prejudice the security of the state, and the constitutional law determines the principles on which criminal law is built, such as considering that the accused is innocent Unless proven guilty by the judicial authority.

#### **3- Criminal Law in Administrative Law:**

The link between criminal law and administrative law through the criminalization of bribery or embezzlement of public funds through the abuse of influence and abuse of power. It also protects the public authority from attacking it by anyone, as the criminal law criminalizes

assaulting employees during the performance of their work or humiliating them. It also protects public institutions, as it criminalizes exposure to public safety, roads, transportation and other public facilities.

#### **4- Criminal and Commercial Law:**

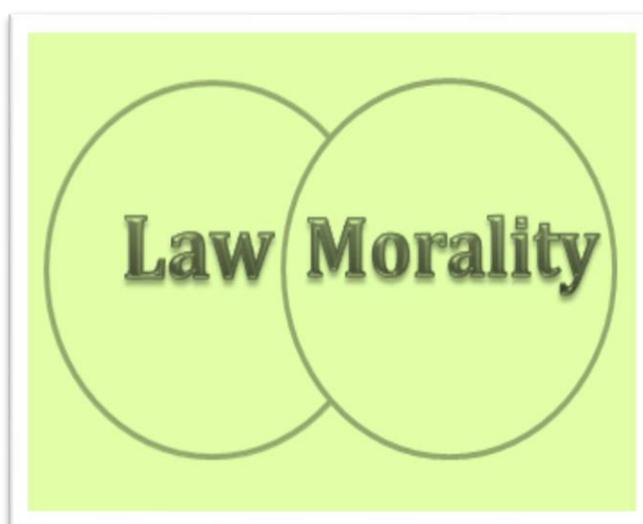
The relationship of the criminal law to the commercial law is revealed through the protection of dealing with money and bills, by imposing penalties for anyone who withdraws a trust receipt on a bank without a balance.

#### **5- Criminal Law and Public International Law:**

Criminal law has a close link with public international law by regulating solidarity and relations between states in order to combat crime and impose punishment on criminals by defining the legal authority of penalties with regard to crimes and criminals in the territory of the state and also outside it, as well as regulating the issue of extradition of criminals to their original country.

#### **The Relationship of Criminal Law to the Rules of Morality:**

Criminal law is related to moral rules, in that each of them aims to please the individual and the group by imposing a system that all people must abide by, improving their behavior and behavior and modifying their interactions with each other, provided that the appearance of the link between the two is subject to the obligations and rules it stipulates. It should be noted that seduction is not considered a crime (Kitisuphakarn S. 2019). The law and its preservation, in order to achieve the basic goal of consolidating this relationship. The major crimes that must be punished by the penal code are at the same time inconsistent with the most important rules of morality. Murder, wounding, indecent assault, theft, fraud, treason and espionage are the closest example of this. However, there is no way to achieve complete conformity in all the crimes established by the penal code and ethical violations. In figure no. 4; to illustrate the relationship between law and morality.



**Figure no. 4:** to show the tightly relationship between law and morality.

The penal codes include a number of offenses that have nothing to do with moral principles. While many of the behaviors prohibited by the rules of ethics are not punishable by the penal code. For example, lying, hypocrisy, gossip and exaggeration are prohibited in the rules of morality, but they are not punished by the penal code, while when violating the rule of driving on the road or not lighting car lights when driving at night, for example, the penal code is punished even though it is seen as far from the rules of morality. The criminal text cannot be

applied unless it is in force, and it is not so until one month has passed from the date of its publication in the official gazette approved in the state, and this is in accordance with the text of resolution no. 225 of the constitution for some Arabic countries such as Egypt for the year 2014. On this basis, there is no approval of the people's assembly on the law suffices because of its enforcement, and it is not sufficient for the president of the republic to issue the indicated law, and it is also not sufficient to publish it in the official gazette in order for it to be effective, but a full month must elapse from the date of publication. In application of this, the criminalization text cannot be applied to an act that was committed before its entry into force. This is clear as define in section under (Book-2, Title-10, Chapter-3) of the Penal-Code as the deliberated terminations of a pregnancy by procuring the mis-carriage, or pre-mature delivery of a woman (Florida, et al. 1998).The criminal text shall remain in force, applicable to all acts or crimes committed, until it expires by cancellation, which may be express or implied. Explicit repeal is only achieved when a new law is issued that includes an explicit text deciding the expiration of the previous law, so the moment the new law comes into force is the same moment the previous law was repealed. As for the implicit repeal of the law, it is achieved only when the new law includes a text that contradicts the ruling in the previous text, or when the new law regulates the same subject that was dealt with by the regulation of the previous law. According to the rule of gradation in legislation in terms of force, criminal legislation can only be repealed explicitly or implicitly by legislation equal to it in degree or higher than it.

## CONCLUSION

It becomes clear to us through what we have mentioned in our current research that the criminal law has an effective and prominent role in the human society in order to establish fixed controls for dealing with individuals, and thus order is achieved in every aspect of life and the absence of aggression. On this basis, the types of criminal law and its relationship with other laws were discussed, and the outputs that can be reached by looking at what researchers have documented at the state and local levels have been discussed.

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## MEASURING QUALITY OF OUTREACH IN MICROFINANCE: EVIDENCE FROM VIETNAM

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### ABSTRACT

*Microfinance outreach is a mission that encompasses all operations of microfinance institutions (MFIs), it is an important goal to achieve operational sustainability and performance for most microfinance service providers. Many researchers showed that quality of outreach is defined by the customer satisfaction. This study uses the five broad dimension theory of service quality, data will be collected from the way of survey from the MFIs' customers and later on will be analyzed by statistical technique and tools like descriptive statistics, and correlation method. The descriptive statistics are conducted to show out some specific areas in which MFIs need to pay more attention. The correlation analysis is to find out the relationship between each independent variable and the dependent variable. Finally, the conclusion and recommendation will summarize the key findings of the research and give suggestions to MFIs in Vietnam.*

*Keywords: Customer satisfaction, financial service, microfinance, microfinance institution, microfinance outreach.*

### 1. INTRODUCTION

Microfinance refers to the provision of financial services to poor and low-income clients offered by different types of service providers. (Brady and Burton, 2016). Microfinance outreach is the provision of microfinance products and services of MFIs to microfinance customers including poor households, low-income people and micro enterprises. Accordingly, microfinance service providers provide loans, capital mobilization, payment, money transfer, insurance services and non-financial services to microfinance customers. The interest in microfinance outreach had burgeoned over the years, development practitioners, policy-makers, and multilateral and bilateral lenders recognized that providing an efficient, microfinance services was important for this segment of the population. Microfinance outreach could be a critical element of an effective poverty reduction strategy. Improved access and efficient provision of savings, credit, and insurance facilities in particular could enable the poor to smoothen their consumption, manage their risks better, build their assets gradually, develop their microenterprises, enhance their income in earning capacity, and enjoy an improved quality of life. Microfinance outreach could contribute to the promotion of markets, improvement of resource allocation, and microfinance could also contribute to the development of the overall financial system through integration of financial markets; thus, microfinance helps to promote economic growth and development.

However, microfinance outreach was not really diverse in Vietnam, and MFIs had only focus on credit and savings. The microfinance services were often designed in the direction of inheriting from the previous programs and projects so microfinance services still did not fully meet the needs of customers. The payment services have not provided for customers, insurance services had only been deployed to a limited extent. Therefore, increasing the quality of outreach, i.e., increasing customer satisfaction towards microfinance outreach is the very first factor that counts. When customers are completely satisfied with microfinance outreach provided by MFIs, they will tend to use microfinance services more due to its convenience in the access to microfinance services, which increase their ability to actively participate in and benefit from the development opportunities. At the same time, MFIs can provide an effective way to assist and

empower customers; thereby, microfinance outreach can contribute to the development of the overall financial system through integration of financial markets.

## 2. LITERATURE REVIEW

### 2.1 Quality of Outreach and Customer Satisfaction

According to Copestake (2007), quality of outreach is defined by the MFIs' customer satisfaction. Satisfied customers were also likely to be good customers, and raising public expectations could raise current social performance by encouraging MFIs to invest more on service quality to win and maintain customer loyalty. Wagennar (2012) also showed that quality of outreach was the level of satisfaction to the microfinance customers.

There are many definitions that have been taken place for customer satisfaction by different researchers. Customer satisfaction research literature agreed that service quality was a measure of how well the service level delivered matches customer expectations. Delivering quality service meant conforming to customer expectations on a consistent basis. The study sought to maintain the position that service quality was a partial determinant of satisfaction (Parasuraman et al., 1985). According to Solomon et al. (2006), satisfaction or dissatisfaction was more than a reaction to the actual performance the quality of a product or service. Satisfaction was not just a matter of functional but also of the hedonic performance of the product—something which might be more difficult for the producer to ensure beforehand, and it was highly influenced by expectations regarding all aspects of quality. Sokefun (2011) showed that customer satisfaction provided an indication of how successful organisation was at providing products, services to the marketplace. According to Biesok and Wyród-Wróbel (2011), there are many definitions of satisfaction in the literature, which stress in the varying degrees the individual aspects of customer satisfaction, including: (i) Definitions of the satisfaction relates to the reaction to services and products: The client's emotional response, combining his experiences and feelings after consumption of a product or service, with the expectations and perceived value. The consumers have positive emotions when evaluating a product or service, and they compare perceptions of a business performance with distinctive standards, which generally are their expectations. (ii) Definitions of the satisfaction relates to an opinion on compliance: The buyer opinion about degree of compliance of transactions in relation to his needs and expectations. At the same time, the customers' precept the degree to which the customer's requirements have been fulfilled. Valuation of acquired product or service. (iii) Definitions of the satisfaction relates to the feelings of the purchaser related to the acquisition of a good: Feeling experienced by customer having used the offer meeting his expectations. The buyer's awareness that his expectations were fully met or exceeded with the organization he was serviced by. Customer satisfaction caused by gaining something, fulfilling wishes, is a state of pleasure derived from the specific reason. Subjective impression formed gradually by repeated customer experiences with products and services of a certain company. Mind state is an emotion that expresses satisfaction or dissatisfaction of the choice made by buying. Reflection of a situation in which the final product offered by the organization meets a set of customer requirements. Customers have positive, or negative feelings in relation to the value they receive when using a particular product offered in a particular situation. Providing to the customers a set of values which best meets their needs.

In banking sector, Kombo (2015) showed that customer satisfaction provides a platform for the banks to enhance relationships with their customers, thus, enabling the banks to achieve their objectives for long term success. The results also demonstrated that the most important factor for customer satisfaction is the wide availability of bank branches, and the factor most associated with customer dissatisfaction is the high prices of products and services. At the same time, the results showed that both satisfaction and dissatisfaction partially influence the number of banking services and banks that customers choose to open accounts with. Chochořáková et

al. (2015) examined the dependence of additional purchases of banking products from customer loyalty and dependence of bank clients' loyalty from their satisfaction with the bank's customer service. The result was found that satisfied customers were significantly more likely to recommend their bank to their friends, they often considered that they would use their bank in the future. The customers are more interested in the services of their banks when they choose to keep their savings, take out mortgage loans from their bank and use other banking services offered by their bank. Therefore, the customer loyalty reflects the likelihood that customers will purchase additional banking products and services. The study of Ozatac et al. (2015) was to evaluate the determinants of customer satisfaction on higher service quality in banking sector. The perception of customers on determinants of service quality is analyzed by SERVQUAL model. Empirical results revealed that customer satisfaction in the banking sector depends on good, and firm relations, building trust between customers and bank employees. Abhijith and Menon (2018) showed that customer satisfaction for the banking sector has got many dimensions and varies from person to person. From the study it was found that the net profit and closing stock of a bank did not have an impact in improving the customer satisfaction. There were many other factors like credibility, customer services, easiness of operations, etc. Those were the factors that act as the driving factor in improving customer satisfaction. The study also showed that banks with very high profit and closing stock price does not guarantee good customer satisfaction. The indicators of customer satisfaction depended upon the intrinsic as well as extrinsic services rendered by the bank which would add value to the organization as well as the customer not on the share value price or the profit margin.

In microfinance sector, According to Kanyurhi, E. B. (2013), microfinance industry was affected by competition leading to customers' switching across MFIs. Therefore, many MFIs are interested about customer satisfaction and understand their customers' preferences to survive and develop in a competitive environment. The study found that responsiveness remains the most important dimension in microfinance sector. Results revealed that customer's branch, customer's revenue and number of services accessed by customers strongly influence customer's satisfaction. The study of Ali et al. (2016) showed the leading indicator of loyalty and repurchase intention is a customer satisfaction. This study was focused on identification of basic factors or areas which determine the customer satisfaction in microfinance industry. Results concluded that MFIs' policies and procedures, the physical appearance of the branch, empathy and commitment of staff with the customers are major factors which determine the customer satisfaction in microfinance sector.

The existence of MFIs on the financial market is conditioned with a number of satisfied customers. Microfinance customers are the key factor of the existence and MFIs' development on the financial market. The MFIs need to provide valuable and unique microfinance products and services to their customers, that will satisfy their needs. This satisfaction includes not only the feelings associated with the microfinance outreach process, but also the atmosphere before and after the execution of microfinance outreach.

The concept of customer satisfaction has in general become of particular importance and customer satisfaction towards microfinance services provides an indication of how successful a microfinance institution is at providing microfinance services to the customers. The MFIs would expect to retain and expand customer base of microfinance services, if the microfinance services meet customers' expectations or surpasses expectations. Therefore, measuring customer satisfaction towards microfinance outreach is very important and necessary.

## **2.2 Measuring Customer Satisfaction**

According to Biesok and Wyród-Wróbel (2011), The idea of the customer satisfaction is understood differently. At its base there is a concept of needs and their fulfilling. Various understanding of the needs and emotion leads to an alternating treatment of satisfaction, and to a

different outreach to its measurement. In the operations of any institutions, measuring customer satisfaction is a very important aspect, especially in the changing market conditions. Customer satisfaction information can help guide the organization to address issues related to meeting stated customer's requirements. It can also help the organization to understand and address the customer's expectations, or issues related to the customer's perception of the delivered product or the organization, and thereby enhance customer satisfaction. The purpose of customer satisfaction measuring is: identification of criteria which play a key role of customers in evaluating the product or service, the perception of a product or service, the fulfillment of customer expectations for product or service, the level of customer satisfaction, comparing the level of customer satisfaction with products of the competition, understanding the main factors of customer satisfaction, determining customer's expectations, identifying the most important customer service elements, and individual factors influencing the customer service.

**Table -1:** Five broad dimension of service quality

<b>Dimension</b>	<b>Description</b>	<b>Specific Illustrative Criteria</b>
<b>Tangibles</b>	Appearance of physical facilities, equipment, personnel and communication materials.	Appearance of physical facilities, appearance of service personnel, appearance of tools or equipment used to provide service.
<b>Reliability</b>	Ability to perform the promised service dependably and accurately.	Accuracy of microfinance services, perform microfinance services effectively when promised, dependable and accurate performance.
<b>Responsive</b>	Willingness to help customers and provide prompt service.	Providing prompt service, readiness to service, handling of urgent request, promptness and helpfulness.
<b>Assurance</b>	Knowledge and courtesy, ability to inspire trust and confidence ability to win trust and confidence of customer.	Competence, courtesy, creditability and security.
<b>Empathy</b>	Caring, easy access, good communication, customer understanding and individualized attention given to customers.	Listening to customer needs, caring about customers' need, providing personalized attention, easy Access, good communication with customer and understanding.

*Source:* Parasuraman et al. (1990)

Therefore, the research on service quality is essential in customer satisfaction measuring. There are many definitions that have been taken place for service quality by different researchers. Service quality was defined the degree of discrepancy between customers' normative expectation for service and customer perception of service performance (Parasuraman et al., 1985). Beside the study of Parasuraman et al. (1988) showed that service quality was the simple or weighted average of the gap between the expectations of customers and customers' perceived performance along five dimensions. Service quality can be measured using five dimensions: Tangibility, reliability, assurance, responsiveness, and empathy as can be seen in Table 1.

The study of Al-Azzam (2015) found that service-offering channels in the banking system has emerged on the scene with a wide variety of forms such as internet banking, automated teller machine, telephone banking and banks. Growing competition and the financial systems have been forced to evaluate the importance of customer satisfaction. This study has used the model of service quality (Parasuraman et al., 1988) with five dimensions to evaluate its effect on the customer satisfaction among banks customers. The results indicated that the higher the service

quality, the more the customer's satisfaction. The findings indicated that these five factors have positively affected the customer satisfaction. This research also showed that the service quality was an appropriate tool to measure the quality of service in the banking sector in the bank. Therefore, the banking sector practitioners regarded this instrument a very important tool to evaluate, support, and improve the quality of their services.

Ramya et al. (2019) said that service quality means the ability of a service provider to satisfy customer in an efficient manner through which he can better the performance of business. The concept of service quality is not an independent term, means, its formation depends upon several factors related to service and service firms. These factors are tangibility, reliability, assurance, responsiveness, and empathy. (i) Tangibility is defined as the appearance of physical facilities, equipment, communication materials and technology. All these provide enough hints to customers about the quality of service of the banks or firms. Also, this dimension enhances the image of the banks or firms. Hence, tangibility dimension is very important to the banks or firms, and they need to invest heavily in arranging physical facilities. (ii) Reliability is defined as the ability to perform the promised service dependably and accurately. In broad sense reliability means, service providers' promises about delivery, provisions, problem resolutions and pricing of the products and services. Therefore, this is an important element in the service quality perception and loyalty of the customer. In the banking services, the reliability dimension includes regularity, attitude of service, keep customers informed, consistency, procedures, etc. (iii) Responsiveness is the willingness to help customers, and to provide prompt service. This dimension focuses in the attitude, and promptness in dealing with customer requests, questions, complaints, and problems. Responsiveness also focuses on punctuality, presence, professional commitment of the employees or staff, the length of time customers wait for assistance, answers to questions, the process of service delivery and employee attitude towards requests of customers. (iv) Assurance can be defined as employee's knowledge, courtesy and the ability of the firm and its employees to inspire trust and confidence in their customers. This dimension is important in banking services because customers feel uncertain about their ability to evaluate outcome. In banking services, this dimension focuses on job knowledge and skill, accuracy, courtesy of employees and security ensured by the banks. (v) Empathy is defined as the caring, individualized attention provides to the customers by their banks or service firms. This dimension tries to convey the meaning through personalized or individualized services that customers are unique and special to the banks or firms. The focus of empathy is on the services' diversification that satisfies different needs of customers, personalized services, etc. Therefore, the service providers need to understand customers personal needs and preferences.

In microfinance sector, Jain (2017) found that service quality has been considered as an important tool to gain success and to sustain in the business world. The MFIs have been facing various challenges in retaining their customers because of aggressive competition as well as their weakness to satisfy clients or customers. The microfinance clientele is becoming more sophisticated concerning the quality of service they require or expect from these institutions. For the study, five dimensions of service quality have been taken i.e., tangibility, reliability, empathy, responsiveness and assurance. The study results showed that the customers of MFIs are most satisfied with the tangibility dimension. Reliability, assurance and empathy holds third, fourth and fifth position respectively to make the customers feel satisfied. This result indicated that there was a significant difference in the perception of customers regarding various dimensions in MFIs.

The study of Mary and Musa (2018) examined the influence of MFIs' service quality dimensions on customers' satisfaction. The results of the study showed that customers were satisfied with the service quality attributes such as service tangible, service reliability, bank responsiveness and service assurance. However, the customers were dissatisfied with MFIs

empathy towards their customers. The results also showed there was significant relationship between customers satisfaction with MFIs' service quality dimensions and their satisfaction with service quality provided. However, customers satisfaction with MFIs' service quality dimensions provided by MFIs did not significantly influence their satisfaction of the service quality offered.

### 3. RESEARCH METHODOLOGY

The impact of five service quality dimensions on customer satisfaction was significant in the banking and microfinance sectors. The microfinance customers indicated high satisfaction with the five dimensions of service quality examined in many studies, i.e., Tangibility, Reliability, Responsiveness, Empathy, and Assurance. This study utilized five broad dimensions to measure the quality of outreach in microfinance. In other words, it used five broad dimensions to ascertain customer satisfaction with microfinance outreach in Vietnam. They are five independent variables including Tangibility, Reliability, Responsiveness, Assurance and Empathy. The dependent variable is the customer satisfaction towards microfinance outreach as can be seen in Table 2.

**Table – 2:** Independent and Dependent variables in the research

No.	Code	Item
<b>Tangibility</b>		
1	Tang1	The transaction offices are conveniently located
2	Tang2	The MFIs have a wide range of the branches systems
3	Tang3	There are many points to outreach customers
4	Tang4	The transaction offices provide variety of services
5	Tang5	The technology and equipment used by the MFIs are modern
6	Tang6	The guidance information are fully listed for customers
7	Tang7	The forms are conveniently designed and fully provided for the customers
8	Tang8	The MFIs have enough staff to serve the customers
<b>Reliability</b>		
9	Reli1	The microfinance services provided by the MFIs are reliable
10	Reli2	The process of microfinance service transaction is done clearly
11	Reli3	The MFIs ensure the security of customers' transaction informations
12	Reli4	The online transaction system provides full information for customers
13	Reli5	The MFIs perform microfinance services accurately for customers
14	Reli6	The MFIs are always ready to solve customer problems
<b>Responsiveness</b>		
15	Resp1	The procedure for microfinance services transaction is convenient
16	Resp2	The MFIs perform microfinance services quickly and promptly for customers
17	Resp3	The MFIs grant a credit line to meet the needs of the customer fully
18	Resp4	The employees are always willing to serve customers
19	Resp5	The MFIs feedback to customers' transactions immediately
20	Resp6	The employees have the ability to perform professional microfinance services
21	Resp7	The online transaction system meets all customers' needs
22	Res8	The MFIs always solve to emergency cases for customers
<b>Assurance</b>		
23	Assu1	The microfinance services provided by MFIs are satisfactory for

		customer
24	Assu2	The MFIs secure the online transactions for customer
25	Assu3	The MFIs secure the offline transactions for customer
26	Assu4	The employees are always polite in dealing with customers
27	Assu5	The MFIs ensure the appropriate transaction costs for customers
28	Assu6	The MFIs ensure to apply the competitive interest rates for customers
<b>Empathy</b>		
29	Empa1	The online transaction system has an easily accessible for customers
30	Empa2	The customers receive prompt attention from the employees of the MFIs
31	Empa3	The employees are very friendly in transaction with customers
32	Empa4	The employees are always listening to customer needs
33	Empa5	The employees are enthusiastically guide for customers
34	Empa6	The MFIs are trying to give customer the best they can
<b>Customer Satisfaction</b>		
35	Sati1	Customer satisfaction towards microfinance services provided by MFIs
36	Sati2	The MFIs' customers will continue to use the microfinance services
37	Sati3	The MFIs' customers will recommend microfinance services to friends and relatives
38	Sati4	The MFIs' customers will use a variety and diversity of microfinance services
39	Sati5	The MFIs' customers appreciate highly for microfinance outreach

*Source:* Own study.

Explanatory research design will be used to analyze the data which collected from the microfinance customers in Vietnam. A sample of 450 customers (150 customers from low-income households, 250 customers from poor and 50 customers from microenterprises) were taken on judgmental basis and 392 useable questionnaires were analyzed. Those 392 responses that collected 216 from low-income households, 148 from poor and 28 from microenterprises. The parameters of service quality were identified after analyzing the extensive literature review of the related to work done in the past.

The appropriate sample size is very important part of the study. According to Green (1991), a study in behavior statistic should have medium effect size, and the minimum number of subjects required for study with the number of predictors which is between range of 30-40, a sample size of 187 to 213 objects is sufficient to create an effective study. Beside sample size required to test the hypothesis that the population multiple correlations equal Zero with a Power of 0.80 (Alpha = 0.05). This research studies 39 indicators as can be seen in Table 1.2, and a sample of 392 is sufficient and covering to create an effective study.

The questionnaire has two parts and structured questionnaire will be used to collect data. The first part of the research is about the demographic characteristics of customers including age range, gender, income range, education level. The second section designed to measure the microfinance service quality, customers satisfaction about the microfinance service delivery system.

The measurement scales have eight items in the tangibles dimension, six items in the reliability dimension, eight items in responsiveness dimension, six items in assurance dimension and six items in empathy dimension. This study uses 5 points Likert scale to measure the variables in which there are 5 levels of satisfaction, 1 is lowest and 5 is highest.

This study uses Stata 15.0 software and this software will be used to evaluate the quality of scale, reliability analysis with Cronbach's Alpha, analyze the exploratory factors, matrix rotation, test the appropriateness of the model. At the same time, multiple regression analysis will be used to investigate the effect of five independent variables including Tangibility, Reliability, Responsiveness, Assurance and Empathy on dependent variable is the customer satisfaction towards microfinance outreach. The basic objective of using regression equation on this study is to make the study more effective at describing, understanding, predicting, and controlling the stated variables. The regression equation of this study is as follows.

$$y_i = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5$$

Where,

$y$  is the dependent variable, customer satisfaction towards microfinance outreach.  $x_1, x_2, x_3, x_4,$  and  $x_5$  are the independent variables.  $\beta_0$  is the intercept term, it gives the mean or variables excluded average effect on  $y$  of all the form the equation and its mechanical interpretation is the average value of  $y$  when variables  $\beta_1, \beta_2, \beta_3, \beta_4,$  and  $\beta_5$  are set equal to zero. Variables  $\beta_1, \beta_2, \beta_3, \beta_4,$  and  $\beta_5$  refer to the coefficient of respective independent variable which measures the change in the mean value of  $y$ , per unit change in their respective independent variables.

## 4. RESEARCH RESULTS

### 4.1 Demographic Profile of the Microfinance Customers and Item Reliability Test

There are 392 respondents are microfinance customers who completed the whole survey in 2022. The respondents age ranges from 22 to 56 and 56.72% of them are female. Respondents income range is from 620 USD to 1,720 USD per year. Seven-six percent of them have a high school graduation, seventeen percent of them have graduated from secondary school and the rest earns an intermediate degree.

The correlation coefficient is a measure of the strength of the straight-line or linear relationship between two variables, and this coefficient takes on values ranging between 1 and -1. The points are the accepted guidelines for interpreting the correlation coefficient: 0 indicates no linear relationship. A correlation coefficient of 1 indicates a perfect positive linear relationship, and a correlation coefficient of -1 indicates a perfect negative linear relationship. The values of correlation coefficient between 0 and 0.3 (0 and -0.3) show a weak positive (negative) linear relationship via a shaky linear rule. The values of correlation coefficient between 0.3 and 0.7 (-0.3 and -0.7) describe a moderate positive (negative) linear relationship via a fuzzy-firm linear rule. Values between 0.7 and 1.0 (-0.7 and -1.0) indicate a strong positive (negative) linear relationship via a firm linear rule (Ratner, 2009). The total correlation coefficient is the correlation coefficient of a variable with the average of other variables in the same scale. After reliability test the factors by Cronbach's Alpha reliability coefficient test, the results show that the variable Tang2 has a total correlation coefficient that is smaller than 0.3 so, it must be excluded from the model.

Cronbach's coefficient alpha is used to test the internal consistency and reliability of the multiple item scales, and this coefficient was used to measure an underlying construct for every item. A general accepted rule is that alpha coefficient of 0.6 - 0.7 indicates an acceptable level of reliability, and 0.8 or greater a very good level (Hulin et al., 2001). So that, it is statistically reliable and valid if the alpha coefficient is more than 0.60.

After removing Tang2, Tang7, Tang8 and Empa6 from the model, the study re-tested the scales. The scale test results through the reliability accreditation of Cronbach's alpha coefficient. This result show that the variables have an alpha coefficient greater than 0.6 and the total correlation coefficient is greater than 0.3 as can be seen in Table 3. This shows that all scales are qualified

as good, highly reliable scales. So, the scale in the study is qualified to perform the exploratory factor analysis. From the original 39 variables, the rest 35 variables are eligible variables that will use in the exploratory factor analysis steps.

**Table – 3: Item reliability test**

Item	Obs	Sign	Item-test correlation	Item-rest correlation	Average interitem covariance	Alpha
<b>Tangibility - The first time</b>						
Tang1	392	+	0.5639	0.4150	.0920048	0.5858
Tang2	392	+	0.5100	0.2249	.0958598	0.6453
Tang3	392	+	0.6409	0.4824	.0823376	0.5625
Tang4	392	+	0.6426	0.4856	.082286	0.5619
Tang5	392	+	0.6769	0.5459	.0812657	0.5524
Tang6	392	+	0.6266	0.4775	.0851176	0.5675
Tang7	392	+	0.4359	0.1444	.105573	0.6695
Tang8	392	-	0.2938	0.0838	.1157317	0.6598
Test scale					.092522	0.6340
<b>Tangibility - The second time (After removing Tang2, Tang7 and Tang8)</b>						
Tang1	392	+	0.6618	0.4806	.1801471	0.7595
Tang3	392	+	0.7534	0.5739	.1526893	0.7297
Tang4	392	+	0.7257	0.5341	.1599053	0.7438
Tang5	392	+	0.7776	0.6321	.1518923	0.7107
Tang6	392	+	0.7214	0.5441	.1635665	0.7396
Test scale					.1616401	0.7781
<b>Reliability</b>						
Reli1	392	+	0.6896	0.5338	.1109133	0.7269
Reli2	392	+	0.6393	0.4623	.1164805	0.7445
Reli3	392	+	0.6874	0.5019	.1078912	0.7355
Reli4	392	+	0.7129	0.5593	.107197	0.7199
Reli5	392	+	0.6684	0.4966	.1124478	0.7359
Reli6	392	+	0.6826	0.5087	.1098648	0.7329
Test scale					.1107991	0.7668
<b>Responsiveness</b>						
Resp1	392	+	0.7671	0.6749	.5351454	0.8791
Resp2	392	+	0.7480	0.6442	.5355456	0.8829
Resp3	392	+	0.7556	0.6804	.5654659	0.8788
Resp4	392	+	0.6796	0.5867	.5860279	0.8867
Resp5	392	+	0.7581	0.6785	.5577026	0.8786
Resp6	392	+	0.7893	0.7075	.5323791	0.8755
Resp7	392	+	0.8119	0.7372	.5247304	0.8725
Resp8	392	+	0.7507	0.6745	.5672517	0.8793
Test scale					.5505311	0.8927
<b>Assurance</b>						
Assu1	392	+	0.7757	0.6429	.2646126	0.7575
Assu2	392	+	0.5963	0.4459	.3312719	0.8002
Assu3	392	+	0.8067	0.6864	.2537248	0.7464
Assu4	392	+	0.6703	0.5023	.2996144	0.7905
Assu5	392	+	0.7374	0.5898	.277399	0.7704
Assu6	392	+	0.6741	0.5202	.3025204	0.7859

Test scale					.2881905	0.8064
<b>Empathy - The first time</b>						
Empa1	392	+	0.6999	0.5306	.1074123	0.7270
Empa2	392	+	0.7063	0.5530	.1083897	0.7217
Empa3	392	+	0.8027	0.6864	.0959947	0.6859
Empa4	392	+	0.6999	0.5319	.1075428	0.7266
Empa5	392	+	0.8492	0.7524	.0889928	0.6656
Empa6	392	-	0.3216	0.0806	.1564284	0.8331
Test scale					.1107934	0.7668
<b>Empathy - The second time (After removing Empa6)</b>						
Empa1	392	+	0.7447	0.5828	.1610916	0.8140
Empa2	392	+	0.7278	0.5724	.1674485	0.8158
Empa3	392	+	0.8173	0.7000	.1491868	0.7808
Empa4	392	+	0.7218	0.5512	.1660697	0.8227
Empa5	392	+	0.8629	0.7669	.1383456	0.7604
Test scale					.1564284	0.8331
<b>Customer Satisfaction</b>						
Sati1	392	+	0.7978	0.6466	.1865431	0.7419
Sati2	392	+	0.7737	0.6314	.2010793	0.7484
Sati3	392	+	0.7806	0.6267	.193896	0.7487
Sati4	392	+	0.8240	0.7075	.1875261	0.7248
Sati5	392	+	0.5515	0.3302	.2624909	0.8350
Test scale					.2063071	0.8009

*Source:* Authors' calculation from Stata 15.0

#### 4.2 Exploratory Factor Analysis

Exploratory Factor Analysis for independent variables: Factor analysis/correlation and the results of exploratory factor analysis for independent variables following:

Number of observations = 392; Rotation: (unrotated); Method: principal-component factors; Retained factors = 6; Number of params = 165.

The results of exploratory factor analysis for independent variables show there were six factors (Retained factors = 6). Beside the factor that its eigenvalue was smallest and greater than 1 is factor6 (Eigenvalue = 1.02465). Thus, there were six factors that were define in the mode as can be seen in Table 4.

Exploratory Factor Analysis for dependent variables: Factor analysis/correlation and the results of exploratory factor analysis for dependent variable. Number of observations = 392; Method: principal-component factors; Rotation: (unrotated); Retained factors = 1; Number of params = 5. The results of exploratory factor analysis for dependent variables show there is one factor (Retained factors = 1). Beside the factor that its eigenvalue was smallest and greater than 1 was factor1 (Eigenvalue = 2.84391). Thus, there was one factor that is define in the model as can see in Table 4.

**Table – 4:** Exploratory Factor Analysis

Factor	Eigenvalue	Difference	Proportion	Cumulative
<b>Exploratory Factor Analysis for independent variables</b>				
Factor1	6.17061	3.03542	0.2057	0.2057
Factor2	3.13518	0.19421	0.1045	0.3102
Factor3	2.94097	0.75253	0.0980	0.4082
Factor4	2.18844	0.11801	0.0729	0.4812

Factor5	2.07043	1.04578	0.0690	0.5502
Factor6	1.02465	0.07052	0.0342	0.5843
Factor7	0.95414	0.06489	0.0318	0.6161
Factor8	0.88924	0.03524	0.0296	0.6458
Factor9	0.85400	0.07696	0.0285	0.6743
Factor10	0.77704	0.04885	0.0259	0.7002
Factor11	0.72820	0.03830	0.0243	0.7244
Factor12	0.68989	0.01479	0.0230	0.7474
Factor13	0.67510	0.02272	0.0225	0.7699
Factor14	0.65239	0.02389	0.0217	0.7917
Factor15	0.62850	0.05291	0.0209	0.8126
Factor16	0.57559	0.00463	0.0192	0.8318
Factor17	0.57096	0.06624	0.0190	0.8508
Factor18	0.50472	0.02969	0.0168	0.8677
Factor19	0.47502	0.02292	0.0158	0.8835
Factor20	0.45210	0.03711	0.0151	0.8986
Factor21	0.41498	0.02257	0.0138	0.9124
Factor22	0.39242	0.01013	0.0131	0.9255
Factor23	0.38228	0.01211	0.0127	0.9382
Factor24	0.37017	0.01311	0.0123	0.9506
Factor25	0.35706	0.02806	0.0119	0.9625
Factor26	0.32900	0.04644	0.0110	0.9734
Factor27	0.28256	0.06798	0.0094	0.9829
Factor28	0.21459	0.04088	0.0072	0.9900
Factor29	0.17371	0.04767	0.0058	0.9958
Factor30	0.12604	.	0.0042	1.0000
LR test: independent vs. saturated: $\chi^2(435) = 4894.87$ Prob> $\chi^2 = 0.0000$				
<b>Exploratory Factor Analysis for dependent variables</b>				
Factor1	2.84391	1.99616	0.5688	0.5688
Factor2	0.84775	0.35819	0.1695	0.7383
Factor3	0.48956	0.04607	0.0979	0.8362
Factor4	0.44349	0.06818	0.0887	0.9249
Factor5	0.37530	.	0.0751	1.0000
LR test: independent vs. saturated: $\chi^2(10) = 633.86$ Prob> $\chi^2 = 0.0000$				

**Source:** Authors' calculation from Stata 15.0

The next step was to rotate the matrix to determine the factors in the model. After rotate, varimax blanks for independent variables showed that six factors and cumulative coefficient reach 0.5843 as can see in Table 1.5 that was greater than 0.05. Thus, there was new factor to be explored in addition to five factors Tangibility, Reliability, Responsiveness, Assurance and Empathy. At the same time, rotate, varimax blanks for dependent variable show that one factor and cumulative coefficient reach 0.5688 as can see in Table 5 that was greater than 0.05 and there were no new factors to be explored in addition to one factor customer satisfaction.

**Table – 5:** Rotate, varimax blanks

Factor	Variance	Difference	Proportion	Cumulative
Rotate, varimax blanks for independent variables				
Factor1	4.70828	1.55504	0.1569	0.1569
Factor2	3.15325	0.02810	0.1051	0.2621

Factor3	3.12514	0.35940	0.1042	0.3662
Factor4	2.76575	0.02368	0.0922	0.4584
Factor5	2.74206	1.70627	0.0914	0.5498
Factor6	1.03579	.	0.0345	0.5843
LR test: independent vs. saturated: $\chi^2(435) = 4894.87$ Prob> $\chi^2 = 0.0000$				
Rotate, varimax blanks for dependent variables				
Factor1	2.84391	.	0.5688	0.5688
LR test: independent vs. saturated: $\chi^2(10) = 633.86$ Prob> $\chi^2 = 0.0000$				

*Source:* Authors' calculation from Stata 15.0

Rotated factor loadings (pattern matrix) and unique variances for independent variables find out Factor1 is Responsiveness (x1), Factor2 is Assurance (x2), Factor3 is Empathy (x3), Factor4 is Tangibility (x4), Factor5 is Reliability (x5) and new Factor (x6) is called Online Microfinance Outreach (That is microfinance outreach via the Internet, and the information technology application platforms). Rotated factor loadings (pattern matrix) and unique variances for dependent variables point out Factor1 is customer satisfaction (y) as can see in Table 6.

**Table – 6:** Rotated factor loadings and unique variances

Variab le	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Uniqu eness
Rotated factor loadings (pattern matrix) and unique variances for independent variables							
Tang1				0.6304			0.5184
Tang3				0.7453			0.4207
Tang4				0.7056			0.3809
Tang5				0.7891			0.3702
Tang6				0.7301			0.4402
Reli1					0.7059		0.4876
Reli2					0.6746		0.4472
Reli3					0.6528		0.5197
Reli4						0.6650	0.3695
Reli5					0.6535		0.4967
Reli6					0.5863		0.4617
Resp1	0.7193						0.4276
Resp2	0.6892						0.4649
Resp3	0.7652						0.3903
Resp4						0.6138	0.4190
Resp5	0.7859						0.3543
Resp6	0.7646						0.3893
Resp7	0.7957						0.3382
Resp8	0.7859						0.3482
Assu1		0.7364					0.3750
Assu2		0.5761					0.5684
Assu3		0.7950					0.3338
Assu4		0.6310					0.4360
Assu5		0.7297					0.3745
Assu6		0.6358					0.3823
Empa1			0.7229				0.4692
Empa2			0.7266				0.4620
Empa3			0.8360				0.2883
Empa4			0.6910				0.5102

Empa5			0.8719				0.2255
Rotated factor loadings (pattern matrix) and unique variances for dependent variables							
Sati1	0.8055						0.3511
Sati2	0.7892						0.3772
Sati3	0.7932						0.3708
Sati4	0.8458						0.2847
Sati5	0.4773						0.7722
(blanks represent abs(loading)<.3)							

*Source:* Authors' calculation from Stata 15.0

### 4.3 Testing the Appropriateness of the Model and Regression Analysis

Kaiser-Meyer-Olkin Measure of Sampling Adequacy with KMO = 0.812. The result of testing the appropriateness of the model by Kaiser-Meyer-Olkin Measure of Sampling Adequacy find out coefficient KMO reach 0.812 that is greater 0,05. Therefore, the model was suitable for this study. The analysis results of the correlation between variables in the model indicate a very low degree of correlation among the variables, the presence of any multicollinearity was neglected. According to the results of regression analysis, P-values was less than the significance level of 5% (P-value = 0.000), so the regression model was statistically significant at the significance level of 5 %. Variables x1, x2, x3, x5 and x6 have positive impacts on the variable y at the significance level of 1%, variable x4 had a positive impact on the variable y, but this variable was not statistically significant as can see in Table 7.

**Table – 7:** Regression analysis

y	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
x1	.5383435	.0344827	15.61	0.000	.4705456	.6061415
x2	.379927	.0344827	11.02	0.000	.3121291	.447725
x3	.210438	.0344827	6.10	0.000	.1426401	.278236
x4	.0197298	.0344827	0.57	0.568	-.0480681	.0875278
x5	.2397587	.0344827	6.95	0.000	.1719607	.3075566
x6	-.0767957	.0344827	-2.23	0.027	-.1445936	-.0089977
_cons	7.6709	.0344387	0.00	1.000	-.0677114	.0677114

*Source:* Authors' calculation from Stata 15.0

The multicollinearity test of the model with Mean VIF 1.00, this result shows no serious multicollinearity in this model. Test for variance change of the model, P-value = 0. 00116 was smaller than 0.05, therefore, this model had variance change phenomenon. So that, the study must be overcome the variance change phenomenon.

After overcoming the variance change phenomenon, the results show that Variables x1, x2, x3 and x5 had positive impacts on the variable y at the significance level of 1%, 1%, 1% and 1%, respectively; variable x6 had a negative impact on the variable y at the significance level of 10%; variable x4 had a positive impact on the variable y, but this variable was not statistically significant as can see in Table 8.

**Table – 8:** The Estimation Results for Factors Affecting customer satisfaction

Independent variables	Dependent variable (y)
x1	0.538*** (16.06)
x2	0.380*** (11.32)
x3	0.210*** (6.48)

x4	0.0197 (0.44)
x5	0.240*** (5.74)
x6	-0.0768* (-2.09)
_cons	7.6709
P-value	0.0000
N	392

*Source:* Authors' calculation from Stata 15.0

The research found out the regression equation of this study was as follows.

$$y = 7.6709 + 0.538 x_1 + 0.380 x_2 + 0.210 x_3 + 0.240 x_5 - 0.0768 x_6$$

## 5. DISCUSSIONS

The results of the study model in Table 8 reflected that variables Responsiveness (x1), Assurance (x2), Empathy (x3), Tangibility (x4) and Reliability (x5) had positive effects on customer satisfaction (y). This result agreed with the analysis results of the Five Broad Dimension of Service Quality of Parasuraman et al. (1990). At the same time, this research result was consistent with the study of Jain (2017), Mary and Musa (2018) in microfinance sector. However, Tangibility variable was not statistically significant in the model. Because, the MFIs in Vietnam had a wide range of the branches systems, there were many points to reach customers, the transaction offices provide variety of services, the transaction offices were conveniently located, and they had enough staff to serve customers. Therefore, most of the customers focus on paying attention to other factors when using microfinance services. On the other hand, a new factor was Online Microfinance Outreach (x6) had a negative effect on customer satisfaction (y) this model.

The variable Responsiveness had a positive impact on customer satisfaction with coefficient 0.538 and with the significance level of 1%, indicating that Responsiveness had a strong impact on customer satisfaction. This was the factor that strongly affected customer satisfaction towards microfinance outreach and showed that the greatest care of customers for this factor. Because, the customers use easier microfinance outreach when the MFIs established the procedure for transaction was convenient, perform microfinance services quickly and promptly for customers, grants a credit line to meet the needs of the customers fully, feedback to customers' transactions immediately and solved to emergency cases for customers. Therefore, reliable and valid measures of microfinance outreach quality were essential to achieve, and as a result microfinance outreach quality programs should become high priority of the MFIs in Vietnam.

The variable Assurance had a positive impact on customer satisfaction with coefficient 0.380 and with the significance level of 1%, indicating that Assurance had a strong impact on customer satisfaction. This was a second factor that strongly affected customer satisfaction towards microfinance outreach and points out the great interest of customers in this factor. Because, Customers were assured in the microfinance outreach when the microfinance services provided by the MFIs were satisfactory for customer. Beside the MFIs have ensured the appropriate transaction costs and applied the competitive interest rates for customers. Thus, this was the important issue MFIs in Vietnam have to pay attention in order to improve customer satisfaction towards microfinance outreach. Thereby, customers feel safe and confident in the microfinance outreach.

The variable Empathy had a positive impact on customer satisfaction with coefficient 0.210 and with the significance level of 1%, indicating that Empathy had a strong impact on customer satisfaction. This was a third factor that strongly affected customer satisfaction towards microfinance outreach and expresses the great interest of customers in this factor. Because, the customers received prompt attention from the employees of MFIs. Thus, the MFIs should continue to give customer the best they can and customers feel satisfied with the benefits MFIs offer together with the microfinance services.

The variable Reliability had a positive impact on customer satisfaction with coefficient 0.240 and with the significance level of 1%, indicating that Reliability had a strong impact on customer satisfaction. This was a fourth factor that strongly affected customer satisfaction towards microfinance outreach and found out the great interest of customers in this factor. Because, the customers trusted in the microfinance outreach when the process of microfinance service transaction was done clearly, the transaction information ensured the security for customers, the online transaction system provided full billing statements for customers. At the same time, the MFIs perform microfinance services accurately for customers, and they were ready to solve customer problems. Therefore, the MFIs should continue to improve their responsiveness and make it easier for customers to use microfinance services.

The variable Online Microfinance Outreach had a negative impact on customer satisfaction with coefficient -0.0768 and with the significance level of 10%. This was a fifth factor that affected customer satisfaction towards microfinance outreach and expressed the interest of customers in this factor. Because, Online Microfinance Outreach was a modern Microfinance Outreach method in which the transfer of fund or money happened online over electronic fund transfer. Online transaction process was secure and password protected, and the MFIs were always ready to solve customer problems. However, many poor and low-income customers had difficulty and lack of conditions in the online microfinance outreach due to investment in equipment and knowledge in online transactions. Thus, the MFIs should continue to give customer the best they can and customers feel satisfied with the benefits MFIs offer together with the microfinance services through online transactions. The customers feel caring and interested in the online microfinance outreach when the online transaction system had an easily accessible for customers.

## **6. CONCLUSIONS AND RECOMMENDATIONS**

The present study has critically examined the quality of outreach, i.e., customer satisfaction towards microfinance outreach in Vietnam. The customer satisfaction towards microfinance outreach has been compared with respect to each of the Five Broad Dimension of Service Quality. The finding of the study indicated that customers were satisfied by only four service quality dimensions (Responsiveness, Assurance, Reliability, and Empathy) in addition to new factor of online microfinance outreach. From the customer perceptions of microfinance outreach, the factors including Responsiveness, Assurance, Reliability, Empathy and online microfinance outreach appeared to contribute more in customer satisfaction, factor Tangibility appeared not to contribute to customer satisfaction.

This study has some important managerial implications. In particular, the MFIs are having a significant investment prospect in many regions of the country. This study helps researchers, managers to develop their expertise, and the approach taken in this study may prove diagnostically useful to the MFIs regarding investigating the importance of process and outcome quality attributes that influence choice. At the same time, on the basis of the research results, the article recommends key content to increase quality of outreach, improve customer satisfaction towards microfinance outreach of MFIs in Vietnam as follows.

Firstly, responsiveness dimension was considered as one of the important factors influences quality of outreach, i.e., customer satisfaction towards microfinance outreach. This is an important factor that affects customer satisfaction towards microfinance outreach, so providing a high service quality is a one of the best ways for MFIs to respond to competition. At the same time, the MFIs' management should focus on factor Assurance, Reliability and Empathy to maximize customer satisfaction and the MFIs' management should adopt the service quality strategies regarding Assurance, Reliability, Empathy and Online Microfinance Outreach.

Secondly, the MFIs' management should pay attention to potential failure points of the customer retention programs, and that they should be responsive to problems quickly and promptly for customers. Beside this management should put sincere efforts to match the expected service quality to the offered service quality, so that commitment and loyalty of the customers can be achieved in microfinance outreach.

Thirdly, the MFIs' management should make investment in research to understand customer needs and expectations at all stages in the microfinance outreach process to determine the key components of microfinance outreach quality. At the same time, this management should pay attention to determine which process and outcome quality attributes of microfinance outreach quality has the greatest impact on choice. Thereby, the MFIs could develop a marketing program that emphasizes the most important attributes, and they could use the findings of present study to predict choice of market segment to improve microfinance outreach quality.

Fourthly, the MFIs should be designing strategies of staff training and development to build the knowledge and courtesy of the MFIs' employees and their ability to inspire trust and confidence for customers in microfinance outreach. The MFIs should conduct frequent training programs in areas like prompt payments and receipts, billing statements, credit application decision, prompt collections and remittance services, customer problems solving. All these activities also have direct impact on customers' perception towards microfinance outreach quality. In addition, the MFIs should make the best use of condition in microfinance outreach, improve the appropriate online microfinance outreach system to the conditions of microfinance customers and the practical environment to improve quality of outreach, increase customer satisfaction towards microfinance outreach.

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**EXEMPTION FROM CRIMINAL LIABILITY IN CRIMINAL LAW****Prof. Dr. Jetmire Zeqiri and Ass. Prof. Dr. SC. Agim Beqiri****ABSTRACT**

*This paper analyzes the institute of insanity, incapacity because of a mental disorder, as one of the main causes of exemption from criminal liability, in order to present a more comprehensive configuration of this institute.*

*The institute of insanity presents sufficient interest, as much as unclear points. The uncertainty that characterizes the field, the fact that different thesis and orientations are radically at odds with each other, necessarily requires reflection, grounding and continuous proposals from the doctrine and practice as well. There are numerous uncertainties, especially those dealing with the impeachment of insane subjects and their final legal treatment. In terms of risks, we are dealing with an area where criminal law, inevitably, interacts with other disciplines (psychiatry), due to which lawyers must be careful not to infringe balances already established from both criminal and forensic sciences in solving cases of exemption from criminal liability because of a mental disorder.*

*The following paper tries to give an overview of the different orientations that characterize the problem in question, to underline the conclusions achieved from the jurisprudence, to reason not only on the basis of the effective normative, but also on the basis of perspective and the capacity of reformation, seeking to develop points of reflection and also to avoid unreasonable controversies. The main issue, as well as the most controversial one, deals with the question: What does insanity mean and whom it serves?*

*Keywords: mental capacity, insanity, legal criterion, diminished mental capacity, medical measures, forensic expertise.*

**1. Liability in Criminal Law**

Criminal law is part of public law, as long as the goods and rights it protects are attributed to individuals (life, property, morality and dignity, etc.) and as long as they are protected by the state from the point of view of a common and collective interest. Criminal law calls facts criminal offenses and perpetrators subjects. The facts belong to human behavior and the legally important consequence, while the subjects are the persons who commit these facts<sup>1</sup>.

Therefore, the basis of criminal responsibility consists of the set of objective and subjective elements provided for in the criminal legislation, sufficient for the person to be held criminally responsible. Criminal liability arises from the moment of committing the criminal offense and ends or ceases when the legal relations between the subjects, the state and the defendant also cease. In terms of criminal responsibility, the fact that it is only individual is very important. Criminal liability ends when the specified term of serving the sentence passes, implementing educational measures, due to the change of circumstances, with the prescription of the criminal offense, amnesty and forgiveness<sup>2</sup>.

The commission of a criminal offense means the application of punishment or other measures to its author, as a necessary reaction of society and the state to the damage caused or the endangering of protected values, as a result of violating the norms of the legal order. In order for the punishment to be applied, it is necessary for the perpetrator to be responsible for the

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<sup>1</sup>I. Elezi, S. Kaçupi, M. Haxhia “Comentary on the Criminal Code 2001. Pagei .12 ”,

<sup>2</sup> Shefqet Muçi “Criminal law part”, 2007, p. 93.

committed crime, i.e. to have a certain psychic relationship with the committed crime as its author. Therefore, for the implementation of the punishment, it is necessary that, in addition to the existence of the criminal offense, the criminal responsibility of the author of the offense also exists. From this it can be concluded that the existence of criminal liability is a necessary condition for determining the punishment for the perpetrator of the criminal offense.

According to this worldview, criminal liability consists of two elements:

- 1) Criminal offense (objective element);
- 2) Guilt and mental capacity (subjective element).

Criminal liability really presupposes the existence of a criminal offense, because the problem of determining criminal liability arises after a socially dangerous and illegal offense has been committed, which is defined by law as a criminal offense for which punishment is provided. Without the existence of a criminal offense, the issue of criminal responsibility cannot be raised. This fact shows that criminal responsibility can be viewed from an objective-subjective point of view.

In the theory of criminal law, we can also come across such opinions according to which the central institute of this field is the "real" culprit, while criminal responsibility represents only the finding, the determination that an individual fulfills the conditions for guilt. Criminal responsibility is thus only a consequence of the commission of a criminal offense, as legal-civil liability is only a consequence of the commission of a legal-civil delict or a civil delict (causing damage). So, criminal responsibility is only a technical term which indicates that an individual has committed a criminal offense and that he is responsible for that offense. This means that the notion of criminal responsibility has only a declarative and non-essential character<sup>3</sup>.

Criminal responsibility is nothing but the obligation of the author of the criminal offense to submit to legal requirements and the punishment assigned to him for the criminal offense committed. It is related to the person's responsibility, that is, to the ability to understand his behavior. On the other hand, its birth obliges the competent bodies to start criminal proceedings, in accordance with the rules provided in the Code of Criminal Procedure, in order to materialize this responsibility. In the essential aspect, the basis of criminal responsibility is the criminal offense, within which the social dangerousness of the criminal action or inaction is expressed. Knowing and applying the principles and requirements of criminal responsibility is in itself the application of the principle of legality. Criminal liability does not apply to minors who have not reached the age provided by law, to persons who are irresponsible due to their mental state and in the case of other circumstances that lead to exemption from criminal liability.

Two of the main elements of the picture of the criminal offense that bring criminal responsibility are the subject, with its characteristics, specifically, the age for criminal responsibility and responsibility, as well as the subjective side, with guilt, motives and purpose. The subject is a necessary element of the criminal offense, by which is understood the person who committed the criminal offense and who will be responsible for its commission, but to be criminally responsible as the author of the criminal offense must maintain two qualities, age and be responsible. The age criterion is provided by the legislator as a condition for having awareness and the ability to judge and distinguish between good and bad. The age of criminal responsibility is related to the time of the commission of the crime or criminal misdemeanor and not to the age of initiation of the proceedings. This is important for holding the person criminally responsible and for determining the punishment. In addition to age, a necessary

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<sup>3</sup> Yes there.

feature of the subject of the criminal offense is responsibility, which consists in the person's ability to understand and control his behavior and the consequences<sup>4</sup>.

### 1.1 Exemption from Criminal Liability

In our Criminal Code, the exemption from criminal liability is provided in 10 articles, starting with age, causation, guilt and irresponsibility due to mental state, necessary protection, extreme need, etc.

Referring to the legislator's provision on the two main conditions for taking criminal responsibility, namely age and responsibility due to mental state, the subjects that are subject to criminal law can be identified.

The age for taking criminal responsibility has to do with the time in which the subject manages to understand the importance of actions and omissions and at the same time manages to control them, to understand that he is committing a criminal offense. Age determination is directly related to the understanding of illegal action and socially dangerous behavior. In the same vein, irresponsibility due to mental state also follows, given that the person affected by a mental disorder at the time of committing the criminal offense did not have what is legally known as the ability to understand actions and inactions and to wish the arrival of the consequence.

The conditions of the development of the society make it possible for the person who has reached the age of 14 at the time of committing the criminal offense to have acquired sufficient knowledge and to understand what is good and bad, and consequently also what is a crime and what is not. Meanwhile, the person affected by a mental disorder does not perceive the reality and therefore the illegal action, at any moment of his life. There are hypotheses for exemption from criminal liability. The law provides that the subject cannot be held criminally responsible whenever he suffers from mental disorders and pathological intoxication, such as to completely or partially disrupt the ability to understand actions and to desire the consequences. For minors under 14 years of age, there is an absolute presumption of exemption from criminal liability<sup>5</sup>.

This list of reasons for exemption from criminal responsibility is not taxing in nature, but is limited to predicting some hypotheses. It is not a question of reasons for automatic exemption from criminal liability, but of case-by-case verification<sup>6</sup>. What is important in our paper is the legislator's assessment of mental disorder, the general definition within which different causes are foreseen, each with its own importance. Regarding the definition of mental disorder, Marini identifies it as "any change in intellectual or volitional ability, or both, encountered in the subject"<sup>7</sup>.

This mental state is not necessarily permanent, but can also be a transitory state. On the other hand, the term "mentally ill" was included in the penal codes of the Middle Ages, according to which non-punishment was provided for the person who had committed a criminal offense in this state.

Despite the exemption from criminal responsibility and the imposition of criminal punishment, for persons who have not reached the age or who are irresponsible there is a special treatment outside the penal system, namely educational measures and medical measures.

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<sup>4</sup> Yes there.

<sup>5</sup> F. Antolisei "Manuale di diritto Penale, parte generale", 1985, pg. 521.

<sup>6</sup> F. Antolisei "Manuale di diritto Penale, parte generale", 1985, f. 280

<sup>7</sup> G. Marini "Imputabilità, in digesto delle discipline penalistiche", 1988, pf. 255

### 1.2 Irresponsibility as a Condition for Exemption from Criminal Liability

In criminal law, responsibility is defined as the existence of sufficient conditions to attribute a criminal offense to a subject and to consider the legal consequences. No one can be held criminally responsible if at the time of the offense he was unable to understand and control his actions or to desire the consequences, but incapacity does not exclude responsibility when it is a consequence of the subject's culpable actions ( for example drunkenness)<sup>8</sup>.

The concept of irresponsibility, in today's times, when it has lost the connection it had in the past with the term "mentally ill", has faded and become undefined, losing any value it had for psychiatry in the past. Moreover, awareness has been created that mental disorder is not only a mental illness, but constitutes a complex and indefinable entity, being the result of many factors such as genetic factors, stress, etc. Today there is no longer mental illness in the ancient sense of the term, today there is a different vision of mental illness, consisting of many factors integrated together. The doctrine of criminal law does not actually define the notion of mental capacity, but the notion of mental incapacity. Mental incapacity is defined as the inability to understand or control the performance or non-performance of an action, as well as the inability to understand that one is committing a criminal offense due to a temporary or permanent illness, mental disorder or retardation in mental development.

Irresponsibility due to mental state is provided for in Article 17 of the Criminal Code, according to which:

"There is no criminal liability for a person who, at the time of the commission of the criminal offense, suffered from a mental or neuropsychic disorder that completely disturbed his mental balance, and as a result was not able to control his actions or omissions, nor to understand that he committed a crime criminal.

The person who at the time of committing the criminal offense suffered from a mental or neuropsychic disorder that has reduced his mental balance to fully understand and control his actions and omissions is responsible, but this circumstance is taken into account by the court in determining the amount and type of punishment. punishment."

The issue of whether the person was irresponsible at the time of committing the criminal offense, whether or not he was able to contain himself and manifest his will, is verified for each person taken as a defendant.

Responsibility is presumed, while irresponsibility is proven and declared in court. A person who has reached the age of majority is considered responsible until the contrary is proven<sup>9</sup>.

It should be specified that responsibility is investigated during the development of the criminal process, it always refers to the moment in which the criminal act for which the proceedings are being carried out was committed. Responsibility is conceived as the ability to understand and enable the performance of an illegal action, so it means the tendency of the subject to recognize reality, what happens around him, as well as the ability to take the positive and negative values of this reality. It presupposes a mental state that consists in understanding and judging his actions and inactions. The ability to act is the ability of the subject to decide autonomously, to distinguish between legal and illegal based on a reasonable opinion, as well as to resist negative external stimuli and to manage them well. So, the premise of the model on which the foundation

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<sup>8</sup> Shefqet Muçi "Criminal law part", 2007, pg. 131

<sup>9</sup> Item - Giancarlo Zappa, Carlo Alberto Romano "Infermità mentale, pericolosità sociale e misure di sicurezza alla prova degli anni duemila"; can be found on the website [www.rassegnapenitenziaria.it](http://www.rassegnapenitenziaria.it).

of the cultural, legal and moral system rests is clearly visible, in which responsibility has as a precondition the freedom of the author and of the criminal action. If it were not so, sanctions, social disapproval, the idea of guilt, justice and right would have no meaning. It is important to differentiate criminal responsibility, which is a legal concept and as such contributes to the field of law, with the use that finds as a primary need the formation and socialization of man and his abilities in every field. From the responsibility of the subject also derives its criminality, with its consequences such as the application of security measures. From this double element derives the social dangerousness. The law connects irresponsibility with the loss of two elements, intellectual and volitional<sup>10</sup>.

The Penal Code does not recognize the relationship between the affective sphere and the intellectual and volitional sphere, and as such, under the influence of criminal policies for the prevention of criminal offenses, denies the influence of the emotional and passionate state in taking criminal responsibility. The legislator has disciplined irresponsibility by considering it as a differentiation between pathological and non-pathological cases, excluding or schematizing special states such as passionate emotional states and based on the expression that 'if a person is not sick, he must control his instincts'. So nosography, which was supposed to create a situation of clarity and unify judgments, has actually led to the possibility of re-introducing some situations that should have been excluded from the law. The fact that on the one hand nosography is very broad and risks not being easily practicable in the psychiatric-forensic field, and on the other hand very narrow in non-obvious situations, has brought strong criticism towards psychiatric nosography<sup>11</sup>. Jurisprudence has emphasized the three psychic factors which characterize the action in the subjective aspect: feeling, intelligence and will. The Penal Code, bordering on irresponsibility, considers only the last two and not the first. Meanwhile, character anomalies and insufficiency of ethical and social feelings cannot be considered as indicators of irresponsibility due to mental state, as long as they are not associated with disorders of the intellectual or volitional sphere, i.e. of a pathological nature.

The doctrine agrees that irresponsibility cannot be limited only within clearly defined frameworks, but it expresses a broader concept than the concept of mental illness, and therefore its content can be determined on the basis of the ratio, the index of the rules for irresponsibility. The concept of irresponsibility is broader than that of mental disorders, provided for in our Criminal Code, given that not all mental disorders are classified as causes that bring about irresponsibility. Criminal responsibility is the obligation to be subject to the penalties determined by the Criminal Code in relation to the commission of a criminal offense<sup>12</sup>.

## CONCLUSION

Although the issue of criminal irresponsibility is regulated in the Criminal Code with the aim of satisfying the needs of the law once and for all, being enriched with doctrinal and jurisprudential orientations regarding the concept of the ability to act and to desire the consequences and mental disorder, very soon the codification in question showed the impossibility of satisfactorily solving the cases faced by the practice, making the interpretive lines that permeate until today the entire debate on mental illness, as a reason for exemption from criminal responsibility ,

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<sup>10</sup> Fiandaca G., Musco E. "Diritto penale, parte generale", 1989, pg. 252

<sup>11</sup> Nosography is the systematic classification or description of mental illnesses.

<sup>12</sup> Item - Giancarlo Zappa, Carlo Alberto Romano "Infermita mentale, pericolosita sociale e misure di sicurezza alla prova degli anni duemila"; mund të gjendet në faqen e internetit [www.rassegnapenitenziaria.it](http://www.rassegnapenitenziaria.it).

began to lose their sharpness under the influence of alternative orientations, which include in the debate not only legal sciences but also medicine, psychiatry, psychology and criminology.

Currently, according to the unanimous opinion of the doctrine, the concept of criminal irresponsibility due to mental state is in the conditions of a crisis, which in short is summed up in the impossibility to answer precisely the question: When can a subject be declared irresponsible? This is due to the fact that the concepts that should serve the definition of the article, such as "the ability to understand the actions and to desire the consequences" and "mental disorder" turned out to be extremely general and difficult to interpret. The uncertainties that made the interpretation of Article 17 of the Criminal Code problematic are related to many factors of different natures, although they depend mainly on the evolution of psychopathological sciences, which on the one hand made the discipline of the code inappropriate and outdated, and on the other hand brought about the loss of the limits of the definition of irresponsibility due to the mental state, through the elaboration of concepts on the disease carried by the jurisprudence, often of opposite orientations, as in terms of the mental disorder that excludes the ability to understand, also in terms of the very structure of the judgment of irresponsibility.

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## A STUDY OF CUSTOMER AWARENESS OF GOVERNMENT SCHEMES WITH REFERENCE TO ULHASNAGAR CITY

Deepika Valecha

### ABSTRACT

The Indian government is providing different incentives and implementing various programmes to improve society. Every developing country in the world is making progress toward becoming a developed nation. In India, too, the government has legislated a slew of programmes aimed at promoting equality and justice in all aspects of life for people with disabilities. In light of this, the current study "Government Programmes and Status of Awareness among People in Ulhasnagar City" was undertaken to determine the level of public awareness of government schemes. A questionnaire survey with 67 respondents was used to acquire the data. Primary data is gathered using questionnaires, while secondary data is gathered through surveys, and secondary data is gathered through articles, books, and websites. The study employs a practical sample procedure as well as basic percentage and chart analysis tools. 87 percent of respondents are aware of various government programmes, with the majority preferring covid suraksha schemes and 32.8 percent preferring the Pradhan Mantra Vaya Vandana Yojana. Currently, the majority of respondents (85.1%) agree that government initiatives are vital.

*Keywords: Government Schemes, agricultural and rural development.*

### I. INTRODUCTION

The government of India launches government schemes to address the social and economic well-being of its population. These programmes are critical in addressing many of the socio-economic issues that plague Indian culture, thus everyone should be aware of them. India's Finance Minister delivered the Union Budget 2021-22 on February 1, 2021, and made new announcements about government initiatives in India. Under the PM GaribKalyanYojana, a relief package costing Rs 1.70 lakh crore was announced in 2020 to address the financial issues caused by the COVID-19 epidemic. The government unveiled the Atma Nirbhar package this year, worth Rs. 27.1 lakh crores, to combat the effects of coronavirus. The government of India launches government schemes to address the social and economic well-being of its population. These programmes are critical in addressing many of the socio-economic issues that plague Indian culture, thus everyone should be aware of them.

#### I.1 List of Social Security Schemes in India 2022:-

1. Atmanirbhar Bharat Abhiyan
2. Mission Karmayogi
3. Samarth Scheme
4. Savya Shiksha Abhiyaan
5. PM-KISAN (PradhanMantriKisanSammanNidhi) Scheme
6. Pradhan Mantri Kisan MaandhanYojana
7. PM GaribKalyanYojana (PMGKY)
8. Pradhan Mantri Shram Yogi Maan-Dhan
9. National Digital Health Mission

## 1.2 Types of Government Schemes:-

1. **PradhanMantri Jan DhanYojana:** - PradhanMantri Jan DhanYojana is a National Mission on Financial Inclusion that takes an integrated strategy to achieve robust financial inclusion and, ultimately, provides banking services to all households in the country.
2. **Make in India:** - Prime Minister Narendra Modi announced the "Make in India" programme, which aims to promote investment, foster innovation, strengthen intellectual property protection, and construct the best manufacturing infrastructure in the world.  
Make in India' has designated 25 manufacturing, infrastructure, and service industries, with extensive information supplied via an interactive web page and professionally created pamphlets.
3. **Swachh Bharat Mission:** - The Swachh Bharat Mission was launched as a nationwide movement across the country. By October 2nd, 2019, the campaign aspires to fulfil the objective of a "Clean India." The Swachh Bharat Abhiyan is the Indian government's most significant sanitation effort.

## 1.3 Objectives of the Union Government Schemes in India

The Union Government's several Ministries have launched a number of different schemes. Every scheme has its own set of goals. However, the primary goal of these schemes is to deliver social, financial, and economic benefits to Indian citizens. The following are the general goals of the social-economic and financial schemes:

Pensions, insurance, maternity benefits, and housing are examples of social security initiatives.

- To create job opportunities.
- To provide education and training to the most vulnerable members of society.
- To give financial security to society's most vulnerable members.
- To provide financial support to women, small enterprises, and people from under privileged backgrounds.

## 1.4 Education Scheme

Elementary Education Schemes With the development of the National Policy on Education, India launched a slew of initiatives aimed at accomplishing the UEE target, including:

### Sarva Shiksha Abhiyan

India's principal programme for universalizing elementary education is the Sarva Shiksha Abhiyan (SSA). Its broad objectives include universal access and retention, closing educational gender and socioeconomic class inequities, and improving children's learning levels.

### ● Schemes for Secondary Education

Secondary education is the most important level of education since it prepares students for higher education and the workforce. The current policy is to make high-quality secondary education available, accessible, and cheap to all young people aged 14 to 18. The following schemes are currently being implemented as Centrally Sponsored Schemes for secondary school students (classes IX to XII).

## 1.5 Recently Announced Scheme

The 10th tranche of financial aid under the PM-KISAN scheme was distributed on Saturday by Prime Minister Narendra Modi to around 10.09 crore farmers throughout India. During a video conference, Modi distributed the funds to the recipients.

The PradhanMantriKisanSammanNidhi (PM-KISAN) scheme provides qualifying farmer families with a financial reward of Rs 6,000 per year, payable in three equal installments of Rs 2,000. The funds have been transferred.

Nine chief ministers, several ministers from other states, and officials from agricultural institutes attended the virtual event. In August 2021, the 9th instalment of PM-KISAN was released.

The current instalment has brought the total amount granted under the plan to almost Rs 1.8 lakh crore.

## II REVIEW OF LITERATURE

**Priyadarsini and Vijayaratnam (2016)** examined the nine pillars of Digital India, the adaptation of the "Look at Villages" strategy, and the smart villages driving towards smart India, as well as the conditions for a smart villages cluster. Basic needs like health care, sanity, and education must be prioritised in Indian villages..

**Gulati (2016)** looked into and highlighted domestic concerns that could stymie the program's effectiveness, as well as potential remedies. The study also highlighted the opportunities that will help the programme achieve its goal of making India the preferred destination for digital activities among both global and domestic investors, as well as the extent to which the "Digital India" model can entice investors to invest in sectors that have yet to realise their full potential in India.

**GShamim (2016)** investigated the notion of Digital India, government measures to promote it, and Digital India pillars that aid smart governance. The study also looked at the influence of digitization on society and governance. Finally, the challenges of digitization are examined.

**Gupta and Arora (2015)** studied the impact of digital India project on India's rural sector. The study found that many schemes have been launched in digital India to boost agriculture sector and entrepreneurship development in rural areas. Digital India programme has also set the stage for empowerment of rural Indian women.

In their study, **Farr Wharton and Brunetto (2007)** discovered that competent WEs keep a watch on government schemes to create relationships and use these possibilities efficiently to expand their firm. They've also revealed that the government hasn't done a good job of publicising its programmes to women entrepreneurs.

According to **Singh and Beiwai (2008)**, the government may establish several strategies and plans for WEs, but there is a disconnect between aim and execution.

In their study, **Rizvi and Gupta (2009)** believe that government-supported advancement activities benefit only urban and middle-class female members due to their access to information and level of education.

## III RESEARCH OBJECTIVES

1. To measure the perception of the people about the Government schemes in Ulhasnagar City.
2. To analyse the perception of people in selecting Government schemes.
3. To find out the Satisfaction level of People in relation to Government Scheme.

## IV RESEARCH METHODOLOGY

The current study's research framework is defined by the research technique. In this section, the size of the research sample and the method for choosing participants for the study are explained.

The investigation was carried out utilising primary data sources. The reliability of research equipment was used to establish its suitability.

#### 4.1 Sources of Data Collection

**4.1.1 Primary Data:** - The current study is an empirical survey that uses a questionnaire to collect data. The convenience sampling approach is used, which is one of the non-probability sampling techniques, and the survey sample is made up of 67 respondents from Ulhasnagar City.

**4.1.2 Secondary data:** - Secondary sources were utilized to provide context for the study and to analyze existing research in the field. Secondary sources include scientific journals, working papers, books, and other published and unpublished reports and knowledge areas.

**4.2 Selection of the field:**-The study has been undertaken only in Ulhasnagar city.

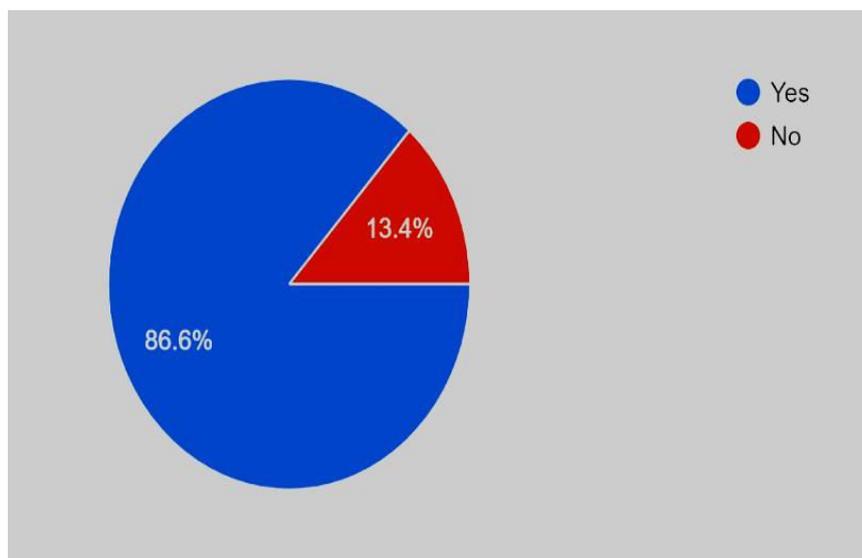
#### V Data Analysis & Interpretation

The researcher looked at data by gender, age, occupation, and annual income in this area. The researcher analyses data by groups as part of the main data gathering.

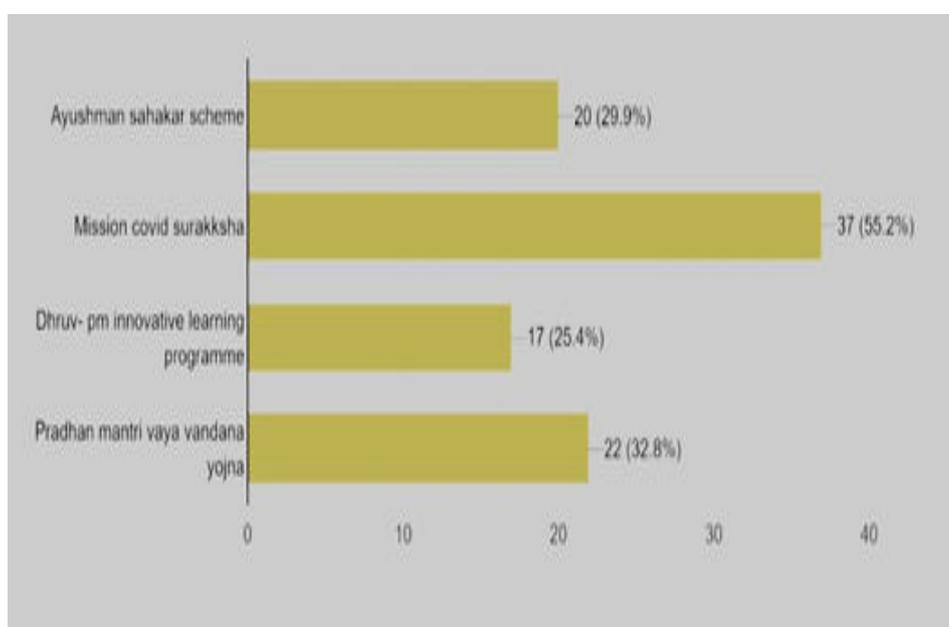
**Table No. 1 - Socio Economic Status of Respondents**

Occupation			Annual Income		
Particulars	No. of Respondents	%	Particulars	No. of Respondents	%
Student	47	70.1%	Below 200000	56	83.6%
Employed	10	14.9%	200000 to 500000	8	11.9%
Unemployed	5	7.5%	500000 and Above	3	4.5%
Housewife	5	7.5%	<b>Total</b>	67	100%
Total	67	100%	Age (In Years)		
Gender			Particulars	No. of Respondents	%
Particulars	No. of Respondents	%	18 to 25 years	51	76.1%
Male	42	62.7%	25 to Years	8	11.9%
Female	25	37.3%	Above 35 years	8	11.9%
Total	67	100%	<b>Total</b>	67	100%

**Interpretation:-** As per the table no. 1, The result shows that the majority of respondents i.e. 62.7% are female who are aware about the latest government schemes & 37.3% are the males. the majority of respondents i.e. 76.1% fall under the category of 18 to 25 years, 11.9% falls under the category of both 25 to 35 years & Above 35 years. 70.1% respondents are student, 14.9% respondents are Employed and 7.5% respondents are both unemployed and Housewife. 83.6% respondents earn below 200000, 11.9% respondents earn between 200000-500000, and 4.5% respondents earn Above 500000

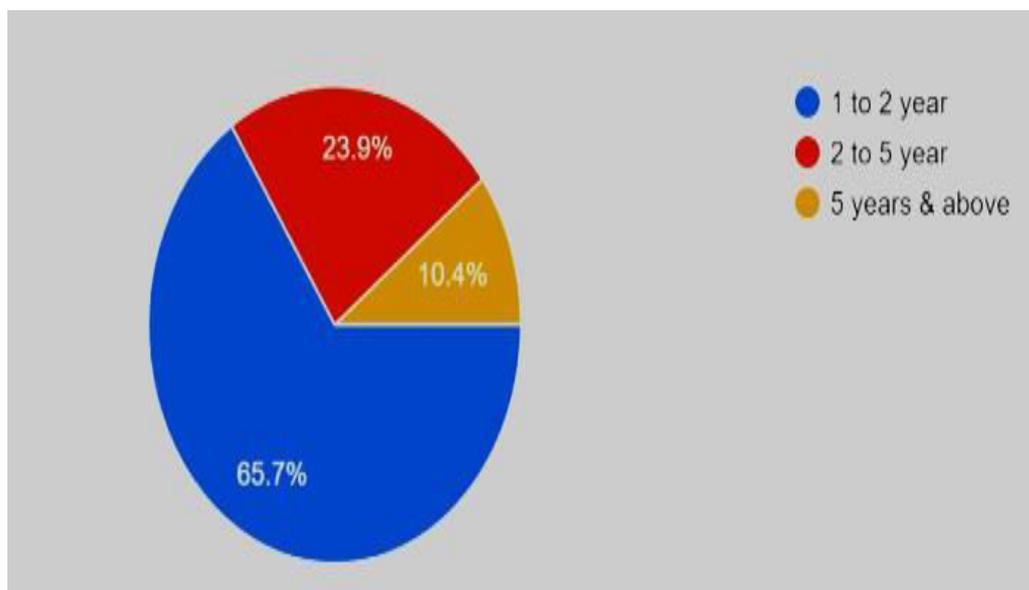
**Q. 1 Are you aware about Government schemes?****Figure No.1 – Awareness About Government Scheme**

**Interpretation:** - As per the figure no. 1, According to the survey, 86.6 percent of people are aware of Government schemes. and 13.4% of those polled are unaware of government initiatives.

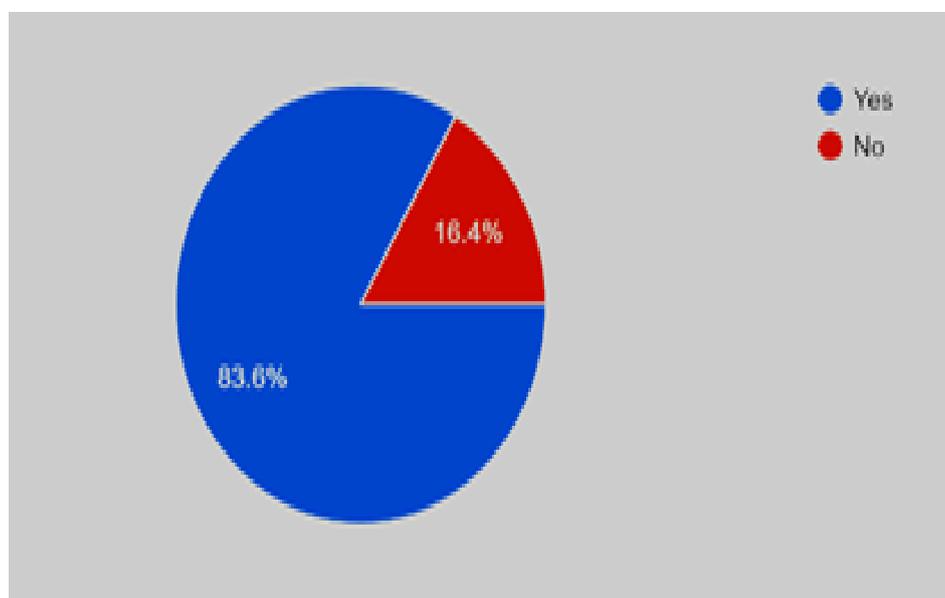
**Q2. If Yes, Which Scheme You Prefer ?****Figure No. 2**

**Interpretation:-**As per the figure no.2, According to the poll, 55.2 percent of respondents choose mission covid suraksha schemes, 32.8 percent prefer pradhan mantri vayo vandana yojna,

29.9 percent prefer Ayushman sahar scheme, and 25.4 percent like Dhruv- pm innovative learning programme scheme.

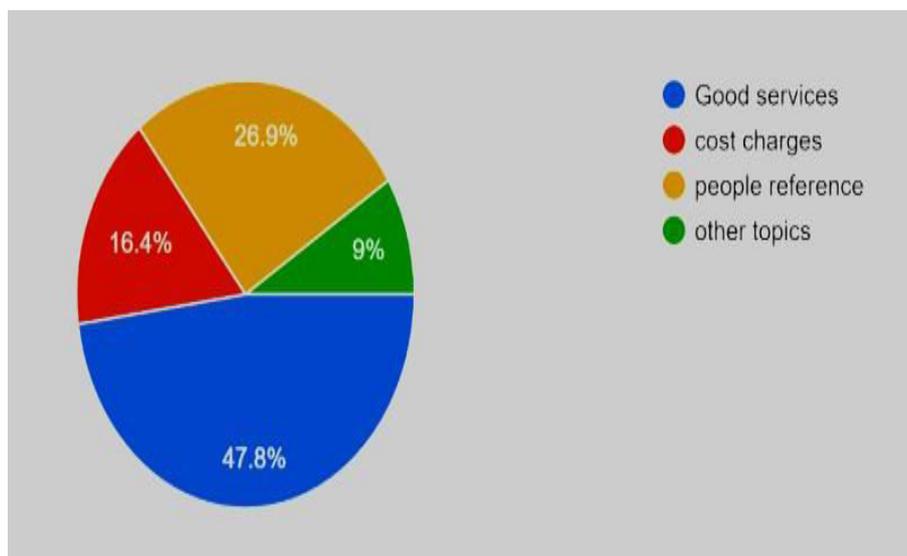
**Q3 How Often do you use Government Schemes?****Figure No. 3** Frequency of using Government Schemes

**Interpretation:-** As per the figure No.3, According to the survey, 67.5 percent of respondents use government schemes on a regular basis for one to two years, 23.9 percent of respondents use government schemes on a regular basis for two to five years, and only a small percentage of respondents use government schemes for more than five years.

**Q4. Do you Like Government Schemes ?****Figure No. 4 - Preference of Government Schemes**

**Interpretation:-**As per the figure no.4, 83.6 percent of respondents like government schemes, whereas a minor percentage of respondents dislike Government scheme.

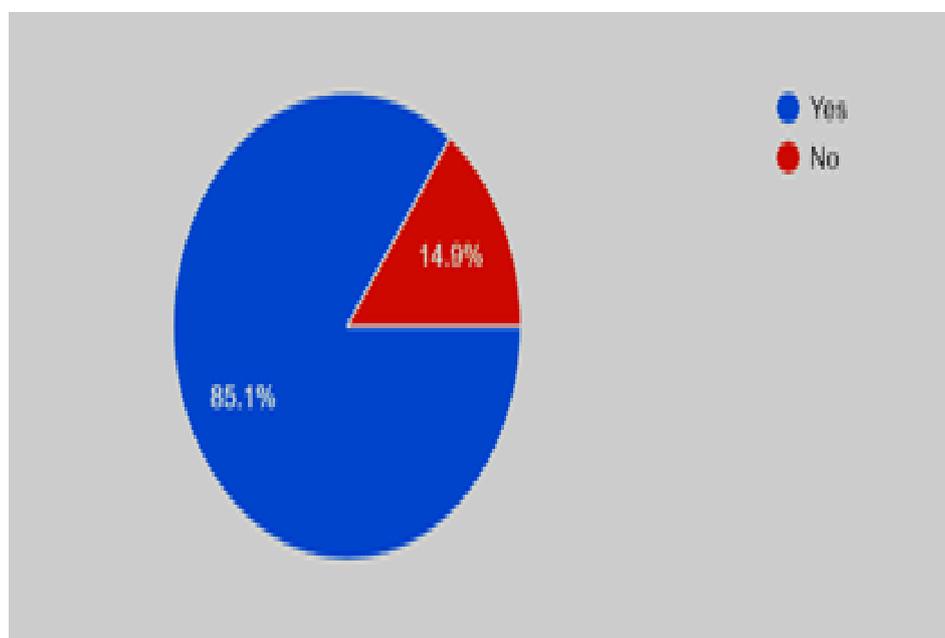
**Q5. Which Factor do you Consider While Selecting Government Schemes?**



**Figure No. 5 - Factors in selection of Government Schemes**

**Interpretation:-** As per the figure no. 5, According to this survey, While choosing government schemes, 47.8% of respondents choose good services, 26.9% prefer people references, 16.4% favour cost charges, and the other respondents are interested in other themes.

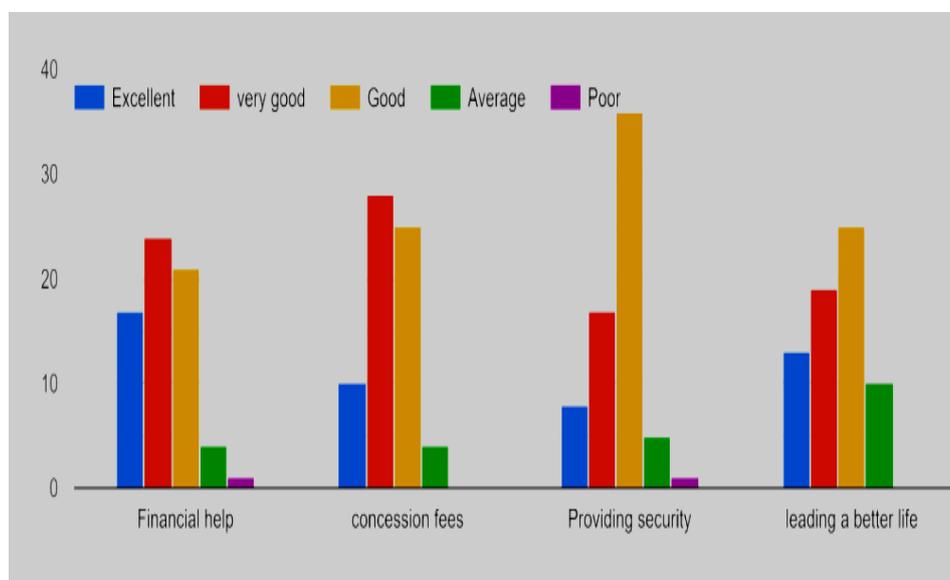
**Q6 Do you think government schemes are helpful for upliftment of underprivileged class of society?**



**Figure No. 6 Perception about Usefulness of Schemes**

**Interpretation:-** As per the figure no. 6, According to this survey, The majority of respondents (85.1%) believe that government plans are helpful for upliftment of underprivileged people in the society.

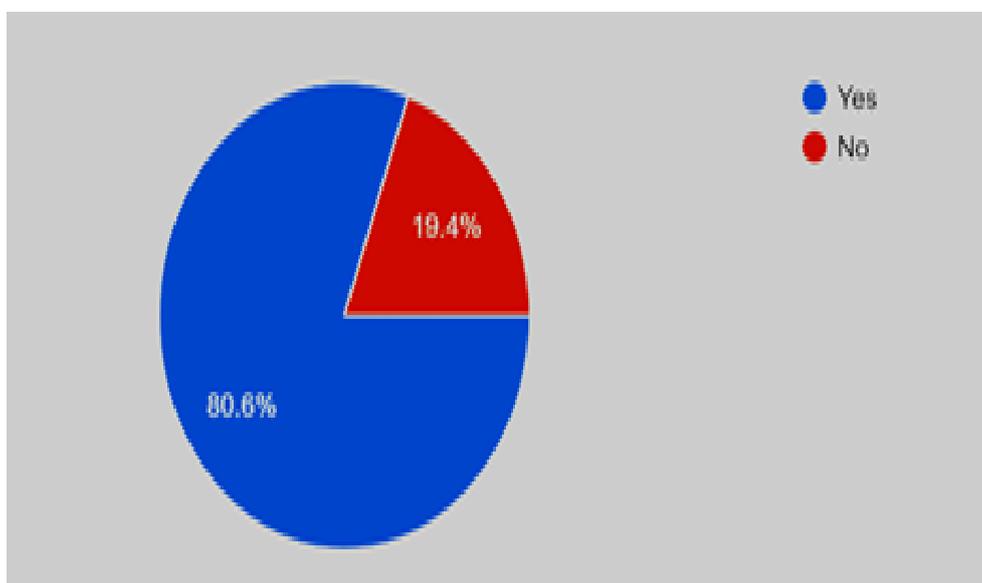
**Q7 Rate the impact of Government Schemes with reference to the factors mentioned below.**



**Figure No 7 - Impact of Government Schemes on given factors**

**Interpretation:-As per the figure no.7,** According to this survey, respondents were asked to score a variety of factors that indicate their level of satisfaction with government scheme services. In terms of facilities, respondents are satisfied with the Government schemes services facility offered by their respective sources. Financial assistance, concession fees, providing security, leading a better life.

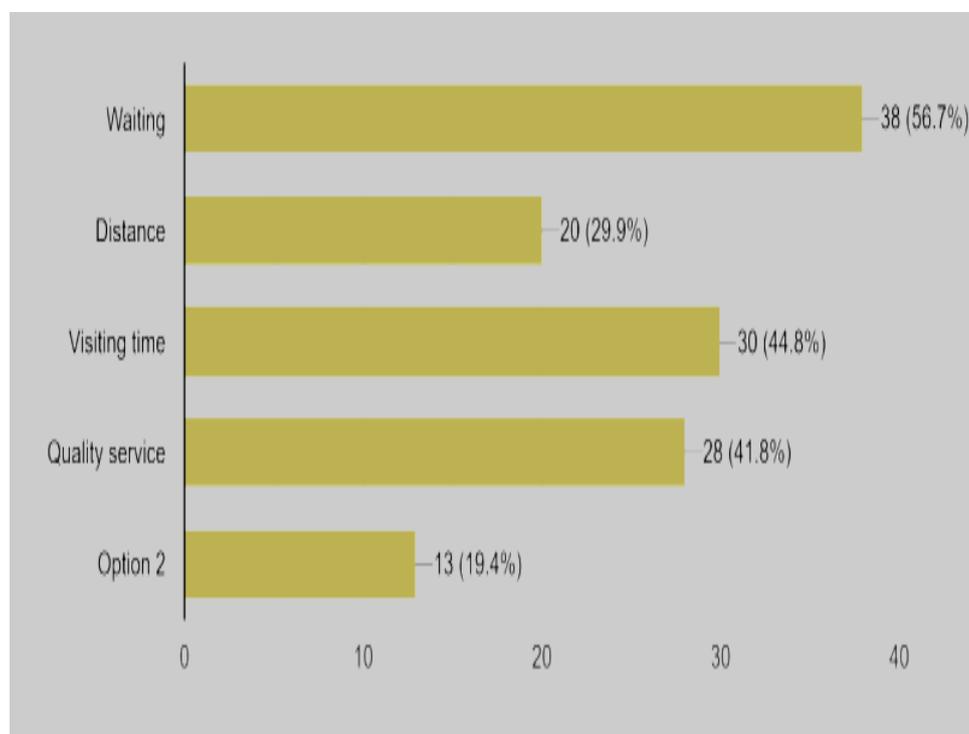
**Q8 Would you recommend this government scheme to your friends, relatives, associates.**



**Figure No. 8 Recommendation to Family & Friends**

**Interpretation:- As per the figure no. 8,** According to this survey, 80.6% of respondents are willing to recommend this government schemes to friends, while 19.4% of respondents are unable to do so.

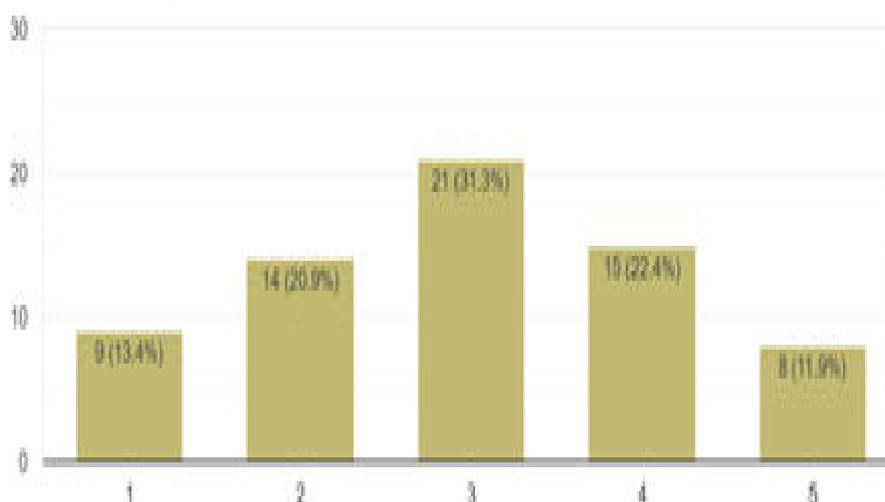
**Q9 Select the most appropriate option in relation to limitations about Government schemes**



**Figure No. 9 – Limitations about Government Schemes**

**Interpretation:-** As per the figure no.9, According to this survey, the most common Limitations of government schemes cited by customers are waiting and visiting times, quality service (41.8%), and distance (29.9%).

**Q10 Rate the overall opinion about this survey (1 = satisfied; 5 = unsatisfied)**



**Figure No. 10 - Overall Opinion about the survey**

**Interpretation:-**As per the figure no. 10, According to this survey, utilized a five-point scale(5 – highest rating, 1 – lowest rating) (31.3%) have given highest rating of satisfaction in terms of government scheme services. And (11.9%) have given lowest rating of satisfaction in terms of government scheme services.

## 5.1 FINDINGS

- The majority of respondents i.e. 62.7% are female who are aware about the latest government schemes & 37.3% are the males.
- 70.1% respondents are student, 14.9% respondents are Employed.
- 83.6% respondents earn below 200000, 4.5% respondents earn Above 500000.
- 86.6 percent of people are aware of government programmes.
- 55.2 percent of respondents choose mission covid suraksha schemes, 32.8 percent prefer pradhan mantra vayavandana yojna.
- Most of respondents use government schemes on a regular basis for one to two years.
- 83.6 percent of respondents like government scheme services.
- While choosing government schemes, 47.8% of respondents choose good services.
- The majority of respondents (85.1%) believe that government plans are necessary in the present.
- The most common disadvantages of government schemes cited by customers are waiting and visiting times.
- Highest rating of satisfaction in terms of government scheme services.

### ● RECOMMENDATIONS & SUGGESTIONS

More awareness campaigns about the terms associated with the digital India should be introduced by the government. Government and business should work together to implement this plan on a large scale as soon as practicable. In schools, colleges, and universities, training and awareness workshops should be held. Conferences, seminars, and workshops can be held to discuss and raise awareness about the digital India programme among youth.

## VI CONCLUSION

Females had the highest level of awareness about government programmes, at 86.6 percent. There was no discernible gender difference in terms of social service awareness and utilisation. The majority of respondents preferred mission covid suraksha plans, with 32.8 percent preferring the pradhan mantra vayavandana yojna. Only the systematic documentation process needs to be improved for easy scheme processing. The government initiative has a good impact on the working class.

### Limitations of the Study

1. This research employs both primary and secondary data sources. These sources have many limitations that are important to our investigation.
2. The sample size for this study is merely 67 persons.
3. This study is based on the premise that no responder bias exists.
4. Because the study focuses exclusively on Ulhasnagar City investors, the results may change if the same research is undertaken in a different geographic location. As a result, the results of the same study conducted in various geographical locations may differ.

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## IMPACT OF MERGER ON THE PERFORMANCE OF INDIAN PUBLIC SECTOR BANKS MERGED IN 2020 USING THE CAMEL MODEL ANALYSIS: EMERGING NATIONS PERSPECTIVE

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### ABSTRACT

*This research aims to look at the influence of mergers on the performance of public sector banks merged in 2020 before and after the mergers. On April 1, 2020, ten public sector banks in India were combined into four, marking the largest consolidation activity in the banking industry. The banks under study in this paper are the acquiring banks – Punjab National Bank, Indian Bank, Canara Bank, and Union Bank of India. The CAMEL Model was used to evaluate the financial position of the above-mentioned sample institutions. A paired sample T-test and Weighted Scores were also used for the analysis and the ratios were interpreted. CAMEL ratings were assigned to determine which of these banks performed the best. The findings of the study show that the best performer after merger was Union Bank, and the bank with the most decline in its ratios was Indian Bank. The mergers led to a significant impact on the management efficiency and the earning ability of the banks. However, no overall significant impact was observed mainly due to the Covid-19 pandemic.*

*Keywords: Ratios; performance; merger; public sector banks; CAMEL ratings; weighted scores; t-test.*

### 1 INTRODUCTION

The banking system is crucial to a country's economic condition because it provides credit to people from all over the country. The expansion of banking adds to the economic growth (Ferreira, 2008; Guru & Yadav, 2019; Elmawazini et al., 2020). The financial system of a nation is a barometer of the economy's health, that is dependent on solid banking rules and procedures. Mergers and acquisitions are an important aspect of a company's growth strategy (Lin et al., 2006; Alaraj et al., 2018), and they have become one of the most widely used ways of business restructuring. Banks are entering the era of mergers and acquisitions (Lambkin & Muzellec, 2008), which will help them grow their businesses and make the banking sector more efficient (Shanmugam & Nair, 2004; Kuriakose & Paul, 2016). In the past few years, the banking industry in India has been witnessing too many mergers (Zaman & Bhandari, 2022).

A sound banking system stimulates economic efficiency (Adenutsi, 2011). This is evidenced by the various initiatives taken by public sector banks and private sector banks. One initiative is the launch of the CAMEL Model, which was refined during the 1980s by the US authorities. The CAMEL Model is a global bank rating system in which bank regulators and supervisory bodies assess a bank's overall performance. CAMEL – this abbreviation stands for C- Capital Adequacy, A - Asset Quality, M - Management Quality, E - Earnings Quality, and L- Liquidity Position. These five components indicate the banking institution's financial performance, financial condition, and operating soundness. CAMEL model possesses predictive power to recognize banks in distress and this model or a similar variants thereof, have been widely used by researchers worldwide (Maghyreh & Awartani, 2014; Rodica-Oana, 2014; Chiamonte et al., 2015; Shaddady & Moore, 2019). The Government of India merged ten public sector banks into four. Finance Minister of India announced the news of this mega-merger in 2019. However, the Reserve Bank of India (RBI) confirmed in late March informing of its intention to merge these banks in the new fiscal year (April 1, 2020). According to the finance minister, this merger was intended to aid in more effective capital management. The PSBs were merged based

on the severity of bad loans, reduction in lending costs, increasing credit capacity, improved technology, and regional variables. With this decision, India now has twelve banks in the public sector, together with State Bank of India and Bank of Baroda. The decision taken by the government to cut down the number of banks belonging to the public sector from 27 to 12 was intended for the purpose of creating three to four global-sized banks.

List of the mergers that took place on 1<sup>st</sup> April, 2020:

Acquirer Banks	Acquired Banks
Punjab National Bank (PNB)	United Bank of India and Oriental Bank of Commerce
Canara Bank	Syndicate Bank
Indian Bank	Allahabad Bank
Union Bank of India	Andhra Bank and Corporation Bank

### ABOUT THE MERGERS

- i. **Punjab National Bank:** Punjab National Bank (PNB) acquired Oriental Bank of Commerce and United Bank of India as an anchor bank. It became 2nd largest bank of India after SBI, with a business of Rs 17.94 lakh crore. With effect from April 1 2020, United Bank of India and Oriental Bank of Commerce merged with PNB, unveiling a new logo.
- ii. **Canara Bank:** Canara Bank acquired Syndicate Bank and became 4th largest bank of India in the public sector. Rs 15.20 lakh crore is the worth of the merged business. The government provided the bank with Rs. 6,500 crore in capital to complete the merger due to a comparatively low gross nonperforming assets (NPA) ratio of 8.77 percent.
- iii. **Union Bank of India:** Both Andhra Bank and Corporation Bank were taken over by Union Bank. This merger allowed Union Bank to become the 5th largest bank in this sector. The merging bank's total business base is Rs 14.59 lakh crores. Union Bank has a higher Net Nonperforming Asset (NPA) level of 6.85 percent. Union Bank received Rs 11,700 crore from the government to help with the merger.
- iv. **Indian Bank:** Allahabad Bank and Indian Bank amalgamated, resulting in a combined company worth Rs. 8.07 lakh crore. After the merger, it grew and became the seventh largest public sector bank. The net nonperforming assets (NPA) ratio of Indian Bank was 3.75 percent. The government provided the bank with Rs 2,500 crore in capital to finalise the merger.

## 2 LITERATURE REVIEW

CAMELS system or its variants have been used by researchers all over the world for the purpose of gauging financial stability of banks (Betz et al.,2014) , and measuring bank's performance and efficiency (Moradi-Motlagh & Saleh,2014;Jagtiani et al.,2016; Wanke et al.,2016; Naqvi et al.,2018; Pérez-Cárceles et al.,2019)

**Paul (2017)** has made the use of CAMEL ratios for analysing the post-merger financial condition of acquiring banks over the 2000-2012 period. 10 commercial bank mergers in India were chosen for this purpose. As per the research, although the acquiring banks' capital adequacy and asset quality improved post-merger, while management efficiency and profits quality failed to represent the ability of the bank to efficiently utilise the assets in generating income. Even the liquidity position remained unchanged after the merger, indicating that the banks are able to meet their responsibilities.

**Kaur & Priya (2017)** used the "CAMEL model" to evaluate Bank of Baroda (BOB) and Punjab National Bank (PNB). The research was based on secondary data collected over a 5-year period from 2011-12 to 2015-16 and analysed to calculate six ratios. The financial position of these 2

selected banks was evaluated with the statistical technique t-test. Overall, the researchers found that BOB outperformed PNB in terms of overall performance.

**Purohit & Bothra (2018)** have conducted this study for the purpose of assessing the financial status of India's top two main banks. As the sample for the research, a public sector bank (SBI), and a private sector bank (ICICI Bank) were chosen for 5 years from 2012-13 to 2016-17. This study was conducted using CAMEL ratios. The study revealed that, while the ICICI and SBI banks' ratio rankings differ, the CAMEL ratios show no statistically significant difference. It means that total performance of these banks was improved by the employment of contemporary technology, banking reforms, and recovery mechanisms.

**Dudhe (2018)** made the use of CAMEL approach to examine the operational performance and financial position of specified private sector banks like ICICI, HDFC, and Yes Bank between the year 2013 to the year 2017. The method adopted in this research was one-way ANOVA. In the selected CAMEL ratios, it was discovered that as per the average, ICICI was at the top and Yes Bank was at the bottom.

**Aruna P & Bharadwaj (2019)** have conducted a research that focuses on the causes for the mega-merger that occurred on April 1, 2017, as well as the monetary performance of the SBI prior to as well as after the merger. CAMEL model and paired t-test were employed for the purpose of this research. The results plainly reveal that the merger has had no substantial impact on financial performance. The researchers claim that this information can help decision-makers focus on planning a merger and making the merger a success.

**Mathur (2020)** uses the CAMEL Model to assess the profitability of SBI Bank. The current study uses the CAMEL Model to examine SBI bank's pre- and post-merger financial position from 2014-2015 to 2018-2019. According to the findings of the study, capital adequacy ratios were positively affected after the merger, excluding the debt equity ratio, and the bank's asset quality worsened after the merger, besides a betterment in the slippage ratio. Nevertheless, management quality, earning ability, and liquidity components all continued to improve after the merger.

**Gandhi, Mehta & Chhajjer (2020)** in this research investigated the four mergers undertaken by ICICI Bank, which belongs to the largest banks in the private sector. ICICI Bank's merger with Sangli Bank (2008), Bank of Madura (2001), Bank of Rajasthan (2011) and ICICI Ltd. (2002) are among the mergers studied. The CAMEL model was used to analyse the mergers. Three years of data prior to the merger and three years of data after merger was used for the research. Following these mergers, it was discovered by the researchers that ICICI Bank's financial performance did not improve significantly.

**Jang & Yadav (2021)** conducted a research to look at effect of the merger on HDFC Bank's financial performance post-merger using CAMEL Model. Secondary data was used that spans a ten-year period, including a 5-year pre-merger period (2003-08) and a 5-year post-merger period (2009-14). With a paired sample T-test, the statistical significance of difference between the CAMEL ratios before and after the merger was found out, as well as the effect of the merger on performance of the bank was evaluated. The outcome revealed that HDFC's financial performance improved following the merger.

### 3 DATA AND RESEARCH PROBLEM

**Statement of Problem:** In developed countries, performance has improved after mergers, but in emerging countries, the contrary is prevalent. Despite this, in 2019, the government of India announced four mega-mergers in public sector banks. These mergers were intended to aid in more effective capital management, and the PSBs were merged based on the severity of bad loans and regional variables. As a result, it is necessary to compare financial performance

before and after the merger to discover if the situation is as anticipated, and if there is any difference or improvement due to the merger. Although this decision is made in the public interest, this helps to know if the merger led to any change or mergers in public sector banks should be avoided.

**Research Gap Analysis:** The researcher found a significant number of researches on performance analysis of banks with the help of CAMEL model, as well as a lot of research on why mergers occur and what effect they have on the banks. However, little has been written about change in performance of banks after merger, particularly in relation to India. The ones found were mainly conducted on State Bank of India (SBI) and ICICI Bank. However, no research was found on merger study of the public sector banks merger in 2020. A research found on the all the merged PSUs lacked the comparison between the before and after effects of the merger. This research has aimed at removing this gap.

**Type of Research:** This study is quantitative in nature because it attempts to study the pre- and post-merger financial performance of public sector banks merged in 2020. The financial statements of PSU banks have been analysed by means of the CAMEL model, the required ratios have been calculated, the hypotheses have been tested, and the ratings have been assigned in order to derive a conclusion on the performance of the selected banks.

**Research Design:** Descriptive research as a term can be used to describe this research. Descriptive research is a quantitative research method that attempts to collect quantifiable information for statistical analysis of the sample or data. Since this analysis often deals with numerical values, it is necessary to collect appropriate quantifiable information. It classifies, describes, compares, and measures data. This research is descriptive in nature because it analyses the financial statements of the banks and compares their performance before and after the mergers.

**Sampling Size:** Four public sector banks merged in 2020 were considered for the study of before and after merger performance of the banks.

**Type of Data:** Secondary data - Annual reports, balance sheets, and P&L statements of Punjab National Bank, Union Bank of India, Indian Bank and Canara Bank, as well as RBI guidelines and circulars were used to collect information. The news articles about the mergers have also been analysed in order to come to a conclusion.

**Period of the Study:** The four public sector banks were merged in April 2020, and hence the pre-merger year has been taken FY2019-20, and the post-merger year has been taken as FY2020-21.

### **OBJECTIVES OF THE STUDY**

- To study and analyse the financial performance of the public sector banks merged in 2020 in India before and after merger.
- To compare the percentage change in the CAMEL ratios in terms of improvement/decline of the four banks.

### **RESEARCH HYPOTHESIS**

At first, the study addresses the problem with the help of the main hypothesis:

$H_0$  = There is no statistically significant difference between the pre-merger and post-merger performance of public sector banks merged in 2020.

The main hypothesis led to the formation of five hypotheses which can be given as follows:

**Hypothesis 1:** There is no statistically significant difference between the pre-merger and post-merger capital adequacy of public sector banks merged in 2020.

**Hypothesis 2:** There is no statistically significant difference between the pre-merger and post-merger asset quality of public sector banks merged in 2020.

**Hypothesis 3:** There is no statistically significant difference between the pre-merger and post-merger management efficiency of public sector banks merged in 2020.

**Hypothesis 4:** There is no statistically significant difference between the pre-merger and post-merger earnings quality of public sector banks merged in 2020.

**Hypothesis 5:** There is no statistically significant difference between the pre-merger and post-merger liquidity position of public sector banks merged in 2020.

#### 4 METHODOLOGY AND TOOLS

- i. **CAMEL Model:** The CAMEL Model is employed in this study to evaluate the merged banks' post-merger financial performance. Mergers of Punjab National Bank, Canara Bank, Indian Bank, and Union Bank of India have been evaluated with the help of CAMEL ratios. Pre-merger data (2019-20) and post-merger data (2020-21) of these four banks have been used to calculate the mean of each ratio under each parameter. The two groups have been compared to see if financial performance has changed since the merger.
- ii. **T-test:** A paired sample t-test (two tailed) with a level of significance of 5% (= 0.05) is used to test the statistical significance of the ratios before and after merger. In a paired t-test, the means of different groups or items in two different contexts are compared. The variance in this test is not presumed to be equal. It determines whether the means of two groups are statistically different from each other. This analysis is appropriate when a comparison of the means of two groups is to be made. In this research, the difference between two groups (pre-merger and post-merger) is being compared, and hence the t-test has been used.
- iii. **Weighted Scores:** Weighed Scores were then used to determine the change in performance of public sector banks. If the ratio is statistically significant as per the t-test, it is given a score of '1'; otherwise, it is given a value of '0.' Depending on the weights given, weighted scores (WS) have been produced for every ratio. The significance of each ratio in analysing the financial performance is used to assign weights to each ratio under each parameter. Each parameter's weighted scores are then added together. The Cumulative weighted score is the resultant figure (CWS). The CWS of the ratio is used to determine whether or not the ratio has considerably improved. For a parameter to be labelled as 'Changed Significantly,' it must have a minimum CWS of 0.50. (Reddy, 2012). The CWS of each parameter has been totalled, which resulted into the Cumulative weighted score of the model (CWSM).

#### 5 Conceptual Framework

The ratios computed in this research under CAMEL model along with their evaluation criteria can be given below:

**Table 5.1:** Evaluation Criteria for CAMEL Ratios

Parameter	Ratios	Evaluation Criteria
<b>C – Capital Adequacy</b>	Capital Adequacy Ratio	Higher the better
	Debt-Equity Ratio	Lower the better
	Total Advances to Total Assets	Higher the better
	Government Securities to Total Investments	Higher the better
	Proprietary Ratio	Higher the better
<b>A – Asset Quality</b>	Net NPA to Net Advances	Lower the better
	Gross NPA to Gross Advances	Lower the better
	Total Investments to Total Assets	Higher the better
<b>M – Management</b>	Business Per Employee	Higher the better
	Profit Per Employee	Higher the better

<b>Efficiency</b>	Total Advances to Total Deposits	Higher the better
	Asset Turnover Ratio	Higher the better
	Operating Expenses to Total Assets	Lower the better
<b>E – Earnings Quality</b>	Operating Profit to Total Assets	Higher the better
	Return on Assets	Higher the better
	Return on Equity	Higher the better
	Spread Ratio	Higher the better
	Operating Profit to Average Working Funds	Higher the better
<b>L- Liquidity Position</b>	Interest Income Earned to Total Income	Higher the better
	Liquid Assets to Total Assets	Higher the better
	Liquid Assets to Total Deposits	Higher the better
	Government Securities to Total Assets	Higher the better
	Liquid Assets to Demand Deposits	Higher the better

*Source:* Compiled by the author

## 6 ANALYSIS AND INTERPRETATION

### Capital Adequacy Ratios:

**Table 6.1:** Summary of Capital Adequacy Ratios

Ratios	PNB		Canara Bank		Indian Bank		Union Bank	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Capital Adequacy Ratio (%)	14.14	14.32	13.65	13.18	14.12	15.17	12.81	12.56
Debt - Equity Ratio (times)	12.32	12.86	17.42	18.59	13.01	15.30	15.30	15.62
Total Advances to Total Assets (%)	56.80	53.48	59.70	55.39	63.94	58.15	57.21	55.14
Government Securities to Total Investments (%)	84.65	87.48	91.28	92.02	85.78	90.55	70.39	72.92
Proprietary Ratio (%)	7.51	7.21	5.43	5.10	7.14	6.14	6.14	6.02

*Source:* Author's calculations

**Table 6.2:** T-test for Capital Adequacy

Ratios	Period	Mean	SD	t-Stat	P-value	S/NS	Weights	Scores	WS
Capital Adequacy Ratio (%)	Pre	13.68	0.62	0.38	0.365	NS	0.70	0	0.00
	Post	13.81	1.16						
Debt - Equity Ratio (times)	Pre	14.51	2.32	2.45	0.046	S	0.10	1	0.10
	Post	15.59	2.35						
Total Advances to Total Assets (%)	Pre	59.41	3.28	-4.91	0.008	S	0.07	1	0.07
	Post	55.54	1.93						
Government Securities to Total Investments (%)	Pre	83.03	0.09	3.29	0.023	S	0.07	1	0.07
	Post	85.74	0.09						
Proprietary Ratio (%)	Pre	6.55	0.95	-2.24	0.056	NS	0.07	0	0.00
	Post	6.12	0.86						
Cumulative Weighted Score									0.24
<b>Significance</b>									<b>NS</b>

*Source:* Author's calculations

The Capital Adequacy parameter's results are shown in Table 6.2. The CAR is the ratio with most significance in this parameter. Hence, it has been given a 70 percent weightage. The Debt-

Equity Ratio, which has a weightage of 10 percent, is another relatively relevant ratio. The remaining items are given a weight of 6.67% each. CAR of the four banks combined together i.e., merged in 2020, has not shown much difference, but has increased by a very small percentage after the merger. This is evident from the p-value (0.365) that is way higher from the significance level ( $\alpha > 0.05$ ), as well as the t-stat (0.38) which indicates a positive as well as very small difference. All the banks have maintained the ratio well above the RBI guidelines. The t-statistic is used to measure the difference between the means for each test, and p-value is the probability of getting a t-statistic with an absolute value as great as what we can see in a data if the null hypothesis is accepted. Hence, the greater the t-value, the lower the p-value, and the stronger is the evidence against null hypothesis.

When we look at the debt-equity ratio and the government securities to total investments ratio, the p-values of both these ratios (0.046 and 0.023 respectively), show a significant difference at the significance level ( $\alpha \leq 0.05$ ), and the t-stat values of both these ratios are positive and high (2.45 and 3.29 respectively) which prove that all the values have increased significantly. However, a higher debt-equity ratio shows a bad performance after the merger, as opposed to the government securities to total investments ratio which shows a good performance.

On the contrary, the ratio of total advances to total assets has a statistically significant p-value (0.08) and t-stat (-4.91) which show a significant difference at the significance level ( $\alpha \leq 0.05$ ) and a huge decline in the ratio. This, again, indicates a bad performance after the merger as per the evaluation criteria (Table 5.1). The pre and post t-stat (-2.24) and p-values (0.056) of the Proprietary Ratio show a decrease in the ratio, which is not regarded to be significant, although the value is close to the significance level.

Table 6.2 shows that the Cumulative WS (0.24) is quite low, indicating that no significant difference can be observed when Capital Adequacy is considered. As a result, the null hypothesis can't be rejected. However, as per the evaluation criteria in Table 5.1, we can say that capital adequacy of the banks merged in 2020 has decreased insignificantly.

#### Asset Quality Ratios:

**Table 6.3:** Summary of Asset Quality Ratios

Ratios	PNB		Canara Bank		Indian Bank		Union Bank	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Net NPA to Net Advances (%)	5.77	5.72	4.22	3.82	3.13	3.37	5.49	4.62
Gross NPA to Gross Advances (%)	14.21	14.12	8.21	8.93	6.87	9.85	14.15	13.74
Total Investments to Total Assets (%)	28.95	31.17	24.35	22.68	26.25	28.20	27.68	30.93

*Source:* Author's calculations

**Table 6.4:** T-test for Asset Quality

Ratios	Period	Mean	SD	t-Stat	P-value	S/NS	Weights	Scores	WS
Net NPA to Net Advances (%)	Pre	4.65	1.22	-1.13	0.342	NS	0.40	0	0.00
	Post	4.38	1.03						
Gross NPA to Gross Advances (%)	Pre	10.86	3.87	1.05	0.373	NS	0.30	0	0.00
	Post	11.66	2.65						
Total Investments to Total Assets	Pre	26.81	1.97	1.35	0.272	NS	0.30	0	0.00
	Post	28.25	3.95						

(%)									
Cumulative Weighted Score									0.00
Significance									NS

*Source:* Author's calculations

The Asset Quality parameter's results are shown in Table 6.4. The Net NPA to Net Advances ratio is an important ratio in this parameter and largely depicts the asset quality, hence it has been given a 40% weightage. The remaining ratios have been given equal weights of 30% each. The combined Net NPA to Net Advances ratio of these public sector banks did not show much variation, but it did reduce by a little percentage after the merger. This can be seen from the p-value (0.342) which is higher than the significance level ( $\alpha > 0.05$ ), as well as the t-stat (-1.13) which indicates a negative difference.

The p-values for the Gross NPA to Gross Advances and the total investments to total assets ratios are 0.373 and 0.272 respectively, which don't show a significant difference at the significance level ( $\alpha > 0.05$ ), and the t-statistic values of both these ratios are positive and low (1.05 and 1.35 respectively).

Table 6.4 shows that when Asset Quality is considered, the Cumulative WS is 0.00, indicating that no significant difference can be observed in the performance between before and after merger. As a result, the null hypothesis is accepted. Nonetheless, based on the evaluation criteria in Table 5.1, it can be concluded that the asset quality of the merged banks in 2020 has improved slightly, but not significantly.

#### Management Efficiency Ratios:

**Table 6.5:** Summary of Management Efficiency Ratios

Ratios	PNB		Canara Bank		Indian Bank		Union Bank	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Business Per Employee (Cr. Rs.)	18.14	18.85	17.63	18.14	24.62	22.17	20.06	19.23
Profit Per Employee (Cr. Rs.)	0.005	0.02	-0.04	0.03	0.04	0.07	-0.08	0.04
Total Advances to Total Deposits (%)	67.04	60.94	69.11	63.22	76.04	67.65	69.91	63.97
Asset Turnover Ratio (Times)	0.076	0.074	0.078	0.073	0.080	0.072	0.077	0.075
Operating Expenses to Total Assets Ratio (%)	1.44	1.61	1.60	1.68	1.43	1.65	1.36	1.56

*Source:* Author's calculations

**Table 6.6:** T-test for Management Efficiency

Ratios	Period	Mean	SD	t-Stat	P-value	S/NS	Weights	Scores	WS
Business Per Employee (Cr. Rs.)	Pre	20.11	3.18	-0.71	0.531	NS	0.15	0	0.00
	Post	19.60	1.77						
Profit Per Employee (Cr. Rs.)	Pre	-0.02	0.05	2.61	0.040	S	0.15	1	0.15
	Post	0.04	0.02						
Total Advances to Total Deposits (%)	Pre	70.52	3.87	-10.84	0.001	S	0.40	1	0.40
	Post	63.95	2.79						
Asset Turnover Ratio (Times)	Pre	0.078	0.001	-3.1	0.027	S	0.15	1	0.15
	Post	0.074	0.001						

Operating Expenses to Total Assets Ratio (%)	Pre	1.46	1.10	5.19	0.014	S	0.15	1	0.15
	Post	1.63	0.05						
Cumulative Weighted Score									0.85
Significance									S

*Source:* Author's calculations

Management Efficiency ratios are shown in Table 6.6. The Total Advances to Total Deposits is the most significant ratio in this parameter, and hence it has been given a 40 percent weightage. This ratio signifies the top line of the income statement of a bank and therefore should be given more weight. All the other ratios have been given an equal weight of 15 percent each.

Business Per Employee hasn't changed significantly since the merger, however it has reduced by a little amount, as its p-value (0.531) is higher than the significance level ( $\alpha > 0.05$ ), and so is the t-stat (-0.71), which suggests a negative and very minor difference. Profit Per Employee, Total Advances to Total Deposits, Asset Turnover Ratio, Operating Expenses to Total Asset Ratio, all these four ratios are significantly different at the significance level ( $\alpha \leq 0.05$ ) with p-values of 0.040, 0.001, 0.027, and 0.014 respectively.

The t-stat value of Profit Per Employee (2.61) represents a positive difference, which means that the banks have improved on their profits per employee after the mergers. The t-statistic of Total Advances to Total Deposits ratio is very high and negative (-10.84), which means that the ratio has decreased significantly and the performance of the banks has tremendously deteriorated on this ratio.

The t-stat values of Asset Turnover Ratio and Operating Expenses to Total Assets Ratio (-3.1 and 5.19), both indicate that the performance of the banks as per these ratios has deteriorated after the merger, since the t-stat for the Asset Turnover ratio is negative, which is bad as it shows a decrease, and t-stat for the Operating Expenses to Total Assets ratio shows an increase (decline), which is also not good.

Table 6.6 shows that the Cumulative WS (0.85) is very high, which specifies that there is a significant difference when Management Efficiency is considered. As a result, we can reject the null hypothesis. However, as per the evaluation criteria in Table 5.1, we can say that the management efficiency of the banks merged in 2020 has declined.

### Earnings Quality Ratios:

**Table 6.7:** Summary of Earnings Quality Ratios

Ratios	PNB		Canara Bank		Indian Bank		Union Bank	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Operating Profit to Total Assets (%)	1.77	1.82	1.29	1.73	2.10	1.82	1.67	1.80
Return on Assets (%)	0.04	0.16	-0.32	0.23	0.2	0.5	-0.53	0.27
Return on Equity (%)	0.67	2.88	-8.05	6.71	3.94	11.88	-12.52	6.68
Spread Ratio (%)	2.10	2.42	1.81	2.09	2.46	2.50	2.08	2.30
Operating Profit to Working Funds (%)	1.70	1.73	1.34	1.81	2.20	1.91	1.68	1.78

Interest Income to Total Income (%)	85.30	86.31	86.23	81.92	86.60	86.55	87.62	85.85
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*Source:* Author's calculations

**Table 6.8:** T-test for Earnings Quality

Ratios	Period	Mean	SD	t-Stat	P-value	S/NS	Weights	Scores	WS
Operating Profit to Total Assets (%)	Pre	1.71	0.33	0.57	0.303	NS	0.17	0	0.00
	Post	1.79	0.04						
Return on Assets (%)	Pre	-0.14	0.35	2.77	0.035	S	0.17	1	0.17
	Post	0.29	0.14						
Return on Equity (%)	Pre	-3.99	7.61	2.95	0.030	S	0.17	1	0.17
	Post	7.04	3.70						
Spread Ratio (%)	Pre	2.44	0.26	3.60	0.037	S	0.17	1	0.17
	Post	2.73	0.18						
Operating Profit to Working Funds (%)	Pre	1.73	0.001	0.50	0.653	NS	0.17	0	0.00
	Post	1.81	0.004						
Interest Income to Total Income (%)	Pre	86.44	0.96	-1.10	0.350	NS	0.17	0	0.00
	Post	85.15	2.18						
Cumulative Weighted Score									0.50
<b>Significance</b>									<b>S</b>

*Source:* Author's calculations

The Table 6.8 shows the Earnings Quality ratios. Since all the ratios in this parameter are equally important, they have been given an equal weightage of 17% each. The Operating Profit to Total Assets, and the Operating Profit to Working Funds ratios of the banks merged in 2020, haven't changed much, however, they have increased by a little proportion after the merger. This is evidenced by the p-values of both the ratios (0.303 and 0.653 respectively), which are not significant considering the significance level ( $\alpha > 0.05$ ), as well as the t-stat values (0.50 and 0.51), which suggests a positive but too minor of a difference.

The interest income to total income doesn't indicate a statistically significant difference between the before and after merger values, as the p-value of this ratio is 0.350 which doesn't show a significant difference, and the t-stat value of this ratio is negative and low (-1.10) which proves that the value has decreased but insignificantly.

On the contrary, the ROA, ROE as well as the spread ratios of the banks have statistically significant p-values (0.035, 0.030, and 0.037 respectively) and t-statistic values (2.77, 2.95, and 3.60 respectively), all of which are significantly different at the significance level ( $\alpha \leq 0.05$ ) and a significant increase in all of these ratios. This, again, indicates an improved performance after the merger as per the evaluation criteria.

However, as per the evaluation criteria in the Table 6.8, all these six ratios in the earnings quality parameter are considered to be 'higher the better'. Hence, it can be said that considering the ratios with a significant difference, the ROA, ROE, and spread ratios have shown an increase in the earnings quality of the banks post-merger. The Operating Profit to Total Assets and Operating Profit to Working Funds ratios have shown a slight insignificant increase, but the interest to income ratio has shown an insignificant decrease.

Table 6.8 shows that the Cumulative WS is 0.50 which demonstrates that there exists a significant difference as per Earnings Quality. As a result, the null hypothesis can't be rejected. However, as per the evaluation criteria in Table 5.1, we can say that the Earnings Quality of the banks merged in 2020 has increased.

**Liquidity Ratios:****Table 6.9:** Summary of Liquidity Position Ratios

Ratios	PNB		Canara Bank		Indian Bank		Union Bank	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Liquid Assets to Total Assets (%)	9.15	8.83	9.43	15.46	4.50	8.64	10.01	7.88
Liquid Assets to Total Deposits (%)	10.80	10.06	10.92	17.65	5.35	10.05	12.23	9.14
Government Securities to Total Assets (%)	24.51	27.27	22.22	20.87	22.52	25.54	19.48	22.56
Liquid Assets to Demand Deposits (%)	147.4	166.2	361.3	258.0	167.1	102.8	132.7	208.6

*Source:* Author's calculations

**Table 6.10:** T-test for Liquidity Position

Ratios	Period	Mean	SD	t-Stat	P-value	S/NS	Weights	Scores	WS
Liquid Assets to Total Assets (%)	Pre	8.27	2.54	1.02	0.384	NS	0.25	0	0.00
	Post	10.20	3.53						
Liquid Assets to Total Deposits (%)	Pre	9.82	3.05	0.83	0.468	NS	0.25	0	0.00
	Post	11.72	3.97						
Government Securities to Total Assets (%)	Pre	22.18	2.07	1.74	0.180	NS	0.25	0	0.00
	Post	24.06	2.88						
Liquid Assets to Demand Deposits (%)	Pre	202.1	1.07	-0.45	0.683	NS	0.25	0	0.00
	Post	183.9	0.66						
Cumulative Weighted Score									0.00
<b>Significance</b>									<b>NS</b>

*Source:* Author's calculations

The Liquidity Position parameter's results are shown in Table. All the four ratios are equally important in order to determine a company's liquidity position, and hence they have been given a weightage of 25% each. The combined Liquid Assets to Total Assets ratio did not show much variation, but it did increase by a small percentage after the merger. This can be demonstrated from the p-value (0.384), that is higher than the significance level ( $\alpha > 0.05$ ), as well as the t-stat (1.02), which indicates a positive change. The Liquid Assets to Total Deposits, Government Securities to Total Assets, as well as Liquid Assets to Demand Deposits ratios have p-values of 0.468, 0.180, and 0.683 respectively, which also don't show a statistically significant difference. The t-stat values of Liquid Assets to Total Deposits ratio, and Government Securities to Total Assets ratio are positive and low (0.83 and 1.74 respectively) which prove that these values have increased but not significantly. Nevertheless, the t-statistic of Liquid Assets to Demand Deposits ratio is -0.45, which shows an insignificant decrease in the ratio.

It is evident from Table 6.10 that the Cumulative WS is Nil (0.00), indicating that there is an absence of a statistically significant difference in the performance of the banks after merger when Liquidity Position is considered. As a result, the null hypothesis is accepted. Nonetheless, based on the evaluation criteria in Table 6.10, it can be concluded that the asset quality of the merged banks in 2020 has improved slightly, but not significantly.

**Table 6.11:** Summary of Improvement/ Decline and Significance

Ratios	Increase/ Decrease	Improved/ Declined	Significance
<b>Capital Adequacy Ratios</b>			
Capital Adequacy Ratio (%)	Increase	Improved	Not Significant
Debt - Equity Ratio (times)	Increase	Declined	Significant
Total Advances to Total Assets (%)	Decrease	Declined	Significant
Government Securities to Total Investments (%)	Increase	Improved	Significant
Proprietary Ratio (%)	Decrease	Declined	Not Significant
<b>Asset Quality Ratios</b>			
Net NPA to Net Advances (%)	Decrease	Improved	Not Significant
Gross NPA to Gross Advances (%)	Increase	Declined	Not Significant
Total Investments to Total Assets (%)	Increase	Improved	Not Significant
<b>Management Efficiency Ratios</b>			
Business Per Employee (Cr. Rs.)	Decrease	Declined	Not Significant
Profit Per Employee (Cr. Rs.)	Increase	Improved	Significant
Total Advances to Total Deposits (%)	Decrease	Declined	Significant
Asset Turnover Ratio (Times)	Decrease	Declined	Significant
Operating Expenses to Total Assets (%)	Increase	Declined	Significant
<b>Earnings Quality Ratios</b>			
Operating Profit to Total Assets (%)	Increase	Improved	Not Significant
Return on Assets (%)	Increase	Improved	Significant
Return on Equity (%)	Increase	Improved	Significant
Spread Ratio (%)	Increase	Improved	Significant
Operating Profit to Working Funds (%)	Increase	Improved	Not Significant
Interest Income to Total Income (%)	Decrease	Declined	Not Significant
<b>Liquidity Ratios</b>			
Liquid Assets to Total Assets (%)	Increase	Improved	Not Significant
Liquid Assets to Total Deposits (%)	Increase	Improved	Not Significant
Government Securities to Total Assets (%)	Increase	Improved	Not Significant
Liquid Assets to Demand Deposits (%)	Decrease	Declined	Not Significant

**Source:** Author's calculations

Table 6.11 gives a summary of the ratios as per the performance of the banks, i.e., improvement or decline in the five parameters.

**Table 6.12:** Cumulative Weighted Score for CAMEL Model (CWSM)

Parameter	CWS	Weights	Scores
Capital Adequacy	0.24	0.20	0.048
Asset Quality	0.00	0.25	0.00
Management Efficiency	0.85	0.20	0.17
Earnings Quality	0.50	0.25	0.125
Liquidity Position	0.00	0.10	0.00
<b>Final Total Score</b>			<b>0.34</b>

*Source:* Author's calculations

Asset quality and Earnings quality have been assigned a 25% weightage because these parameters are considered particularly essential in CAMEL model since the quality of the assets of a bank signals its growth and its survival is ensured by its earnings efficiency. The next two crucial factors are capital adequacy, which guarantees depositor safety, and management quality, that reflects a bank's productivity. These two parameters have been assigned weights of 20% weights each.

Although liquidity is critical, it has been given the least weightage because excessive liquidity reduces bank profitability and has a negative impact on overall performance, which is why it has been assigned the least weight of 10%.

To determine that a merger has caused a difference in the acquiring bank's financial performance, the CWSM must be more than 0.50. (Reddy 2012). Here, CWSM is 0.34, that is lesser than 0.50, and hence, overall, the null hypothesis can't be rejected. Hence, it can be concluded that the financial performance of the four banks merged in 2020 shows no significant difference after the mergers.

**Table 6.13:** Null Hypothesis: Acceptance and Rejection

Hypotheses	Weights	Decision
H0 - There is no statistically significant difference between the pre- and post-merger performance of public sector banks merged in 2020.	0.34	Accepted
H1: 0 - There is no statistically significant difference between the pre- and post-merger capital adequacy of public sector banks merged in 2020.	0.24	Accepted
H2: 0 - There is no statistically significant difference between the pre- and post-merger asset quality of public sector banks merged in 2020.	0.85	Rejected
H3: 0 - There is no statistically significant difference between the pre- and post-merger management efficiency of public sector banks merged in 2020.	0.50	Rejected
H4: 0 - There is no statistically significant difference between the pre- and post-merger earning ability of public sector banks merged in 2020.	0.00	Accepted

H5: 0 - There is no statistically significant difference between the pre- and post-merger liquidity position of public sector banks merged in 2020.	0.00	Accepted
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*Source:* Author's calculations

As explained in the analysis of individual parameters and methodology, table 6.13 shows that the null hypotheses of the parameters with scores of less than 0.50 have been accepted i.e., main hypothesis, capital adequacy, earning ability and liquidity position, and that with a score of 0.50 and higher have been rejected, i.e. asset quality and management efficiency.

### **Ranking the percentage change in the CAMEL ratios of the four banks – Punjab National Bank, Canara Bank, Indian Bank, and Union Bank of India.**

The banks were ranked to determine which bank has showed the most improvement/least decline in its ratios after the merger, and which bank had the least improvement/most decline. For the purpose of ranking the banks according to their performance after merger, the percentage change was calculated between the pre-merger and post-merger ratios of all four banks. For the ratios that went from negative before merger to positive after merger (ROA, ROE, Profit Per Employee), there is no specific way for calculating the actual percentage change. For this purpose, it is recommended to use the "Absolute" or "ABS" formula in Microsoft Excel under some cases, but in the case of financials, it shows inaccurate results. Therefore, in such cases, both the pre-merger and post-merger ratios were added with equal values as much as to bring the pre-merger value to the closest 1.

For example, Profit Per Employee for Canara Bank (in Cr Rs.):

Pre = -0.04 and Post = 0.03. For getting -0.04 to the closest 1, 0.05 was added on both the sides.

Hence, percentage change =  $((0.08 - 0.01) / 0.01) * 100 = 700\%$

However, this method doesn't provide a completely accurate value, but accurate enough to rank the ratios in the correct manner.

**Table 6.14:** Capital Adequacy Ranks as per Most Improvement/Least Decline Post-Merger

Ratios	PNB		Canara Bank		Indian Bank		Union Bank	
	% change	Rank	% change	Rank	% change	Rank	% change	Rank
Capital Adequacy Ratio (%)	1.3%	2	-3.4%	4	7.4%	1	-1.9%	3
Debt - Equity Ratio (times)	4.4%	2	6.7%	3	17.6%	4	2.1%	1
Total Advances to Total Assets (%)	-5.8%	2	-7.2%	3	-9.1%	4	-3.6%	1
Government Securities to Total Investments Ratio (%)	3.3%	3	0.8%	4	5.6%	1	3.6%	2
Proprietary Ratio (%)	-3.9%	2	-6.0%	3	-14%	4	-1.9%	1
Average Rankings	2.2		3.4		2.8		1.6	
<b>Final Rankings</b>	<b>2</b>		<b>4</b>		<b>3</b>		<b>1</b>	

*Source:* Author's calculations

**Capital Adequacy:**

Table 6.14 shows that Capital Adequacy Ratio of Indian Bank increased the most after its merger in 2020, which indicates an improvement, and the same for Canara Bank decreased the most, which indicates a bad performance. Punjab National Bank (PNB) and Union Bank were given 2<sup>nd</sup> and 3<sup>rd</sup> rankings respectively. However, the ratio improved for PNB, but declined for Union Bank.

However, Union Bank was on the top with the least decline in debt-equity ratio, since a low ratio is preferable, followed by PNB and Canara Bank on the 2<sup>nd</sup> and 3<sup>rd</sup> positions respectively. Indian Bank had the most decline (increase) in the ratio.

For Total Advances to Assets Ratio as well as Proprietary Ratio, Union Bank again had the least decline in the ratios. PNB and Canara bank were ranked 2<sup>nd</sup> and 3<sup>rd</sup> respectively for both the ratios, and Indian Bank had the most decline (decrease) again. At last, Indian Bank had the greatest percentage increase in Government Securities to Total Investments Ratio after its merger, which was followed by Union Bank, PNB, and then Canara Bank with the least increase.

Overall, Union Bank had the least decline in its Capital Adequacy ratios after the merger, except for an improvement in just the government securities to total investments ratio. However, Canara Bank had the highest decline/least improvement in all the ratios.

**Table 6.15:** Asset Quality Ranks as per Most Improvement/Least Decline Post-Merger

Ratios	PNB		Canara Bank		Indian Bank		Union Bank	
	% change	Rank	% change	Rank	% change	Rank	% change	Rank
Net NPA to Net Advances (%)	-0.8%	3	-9.5%	2	7.7%	4	-15.8%	1
Gross NPA to Gross Advances (%)	-0.7%	2	8.8%	3	43.4%	4	-2.9%	1
Total Investments to Total Assets (%)	7.7%	2	-6.8%	4	7.4%	3	11.8%	1
Average Rankings	2.3		3		3.7		1	
<b>Final Rankings</b>	<b>2</b>		<b>3</b>		<b>4</b>		<b>1</b>	

*Source:* Author's calculations

**Asset Quality**

According to table 6.15, the Net NPA to Net Advances Ratio of Union Bank of India decreased the most after its merger in 2020, indicating a huge improvement in the ratio, while the same for Indian Bank increased the most, indicating a poor performance. Canara Bank and PNB came in second and third place, respectively. Both PNB and Canara Bank's ratio improved post-merger.

Union Bank of India was ranked first in both Gross NPA to Gross Advances as well as Total Investments to Total Assets ratios. Its Gross NPA to Gross Advances ratio decreased, which indicates an improvement, and the other ratio increased, which also indicates it strengthened. Punjab National bank took the second place in both the ratios, showing an improvement. Canara Bank and Indian Bank were ranked on the 2<sup>nd</sup> and 3<sup>rd</sup> positions respectively for Gross NPA to Gross Advances Ratio, both with a declining performance. Indian Bank's ratio deteriorated tremendously after the merger. For Total Investments to Total Assets Ratio, Indian Bank was ranked 3<sup>rd</sup> with an improvement (increase) in the ratio, and Canara Bank was ranked last with a decline (decrease) in the ratio.

Overall, Union Bank had the highest improvement in its Asset Quality ratios after the merger.

Indian Bank had the highest decline/least improvement in all the ratios.

**Table 6.16:** Management Efficiency Ranks as per Most Improvement/Least Decline Post-Merger

Ratios	PNB		Canara Bank		Indian Bank		Union Bank	
	% change	Rank	% change	Rank	% change	Rank	% change	Rank
Business Per Employee (Cr. Rs.)	3.9%	1	2.9%	2	-10%	4	-4.1%	3
Profit Per Employee (Cr. Rs.)	300%	3	700%	2	79.7%	4	1200%	1
Total Advances to Total Deposits (%)	-9.1%	3	-8.4%	1	-11%	4	-8.5%	2
Asset Turnover Ratio (Times)	-2.3%	1	-6.5%	3	-9.6%	4	-3.1%	2
Operating Expenses to Total Assets Ratio (%)	11.8%	2	4.8%	1	15.7%	4	14.6%	3
Average Rankings	2		1.8		4		2.2	
<b>Final Rankings</b>	<b>2</b>		<b>1</b>		<b>4</b>		<b>3</b>	

*Source:* Author's calculations

### Management Efficiency

Table 6.16 shows that Business Per Employee of Punjab National Bank and Canara Bank increased after their mergers in 2020, which indicates a slight improvement, ranking 1<sup>st</sup> and 2<sup>nd</sup> respectively. This means that they generate efficient revenue by utilising their employees. The same for Union Bank of India as well as Indian Bank declined after merger, ranking third and last respectively.

Profit Per Employee for all the banks increased post-merger, with the most increase being for Union Bank, Canara Bank and PNB ranking 2<sup>nd</sup> and 3<sup>rd</sup> respectively, and Indian Bank in the last position with the least improvement.

The Total Advances to Total Deposits Ratio and Asset Turnover Ratio decreased (declined) for all the banks after their mergers, with Union Bank of India ranking second and Indian Bank at the last position with the highest decline. However, Canara Bank had the least decline in Total Advances to Total Deposits ratio, while PNB had the least decline in Asset Turnover Ratio.

The Operating Expenses to Total Assets ratio for all these four banks increased as well, which means they all declined in performance terms for the ratio and operating expenses of the banks increased more than their assets post-merger. Canara Bank had the least decline, while Indian Bank had the most decline in this ratio. PNB and Union Bank were at the second and third positions respectively.

Overall, Canara Bank had the least decline and most improvement in the Management Efficiency parameter after the merger. Indian Bank, again, had the highest decline/least improvement in all the ratios.

**Table 6.17:** Earning Ability Ranks as per Most Improvement/Least Decline Post-Merger

Ratios	PNB		Canara Bank		Indian Bank		Union Bank	
	% change	Rank	% change	Rank	% change	Rank	% change	Rank
Operating Profit to Total Assets (%)	2.7%	3	34%	1	-13%	4	7.8%	2
Return on Assets (%)	297%	3	425%	2	97%	4	592%	1
Return on Equity (%)	330%	3	1395%	2	202%	4	1920%	1
Spread Ratio (%)	15%	2	15.2%	1	1.8%	4	11%	3
Operating Profit to Working Funds (%)	1.8%	3	35%	1	-13.2%	4	5.9%	2
Interest Income to Total Income (%)	1.2%	1	-5%	4	-0.1%	2	-2%	3
Average Rankings	2.5		1.83		3.7		2	
<b>Final Rankings</b>	<b>3</b>		<b>1</b>		<b>4</b>		<b>2</b>	

*Source:* Author's calculations

#### Earning Ability:

From Table 6.17 of Earning Ability parameter, it can be seen that Operating Profit to Total Assets Ratio of Canara Bank increased the most after its merger in 2020, which indicates 34% improvement, and the same for Indian Bank decreased the most, which indicates a bad performance. It is the only bank with a decrease in the ratio. Union Bank of India and PNB were assigned 2<sup>nd</sup> and 3<sup>rd</sup> rankings respectively. Union Bank was on the top with the most improvement (increase) in its ROA and ROE ratios, All the four banks improved largely on these ratios after the merger. For both the ratios, Canara Bank ranked second, Punjab National Bank ranked third, and Indian Bank had the least improvement in the ratios.

It is evident from the table that Spread Ratio and Operating Profit to Average Working Funds Ratio of Canara Bank increased the most, while Indian bank had the least improvement in the Spread Ratio and the least decline in the latter. With an improvement, PNB and Union Bank of India ranked 2<sup>nd</sup> and 3<sup>rd</sup> respectively for Spread ratio, and vice versa for Operating Profit to Average Working Funds ratio.

The Interest Income to Total Income Ratio declined (decreased) for three banks except Punjab National Bank, which hence was ranked first. Canara Bank's ratio declined the most, however, not by a huge percentage.

Overall, Canara Bank had the most improvement in its Earning Ability ratios after the merger, except for the highest decline in just the interest income to total income ratio. The bank with the highest decline/least improvement in all the ratios after the merger was Indian Bank.

**Table 6.18:** Liquidity Position Ranks as per percentage Improvement/Least Decline

Ratios	PNB		Canara Bank		Indian Bank		Union Bank	
	% change	Rank	% change	Rank	% change	Rank	% change	Rank
Liquid Assets to Total Assets (%)	-3.5%	3	64%	2	92%	1	-21%	4
Liquid Assets to Total Deposits (%)	-6.8%	3	61.6%	2	87.8%	1	-25%	4
Government	11.3%	3	-6.1%	4	13.4%	2	15.8%	1

Securities to Total Assets (%)								
Liquid Assets to Demand Deposits (%)	12.7%	2	-38%	4	-29%	3	57%	1
Average Rankings	2.75		3		1.75		2.5	
<b>Final Rankings</b>	<b>3</b>		<b>4</b>		<b>1</b>		<b>2</b>	

*Source:* Author's calculations

### Liquidity Position:

Table 6.18 depicts that Liquid Assets to Total Assets and Liquid Assets to Total Deposits Ratios have the same rankings for the banks. Indian Bank and Canara Bank were ranked first and second respectively since their ratios increased the most post-merger, which indicates an improvement, and the same for Punjab National Bank and Union Bank (third and last respectively) are negative and decreased the most, which indicates a bad performance.

Union Bank of India was given the first rank with the most improvement (increase) in its Government Securities to Total Assets and Liquid Assets to Demand Deposits ratios. For the former, all the banks improved on this ratio after the merger, except for Canara Bank which declined by 6.1% and was hence ranked last. For the latter, Canara Bank was again ranked the last with a 38% decrease (decline), and Indian Bank ranked third with a 29% decrease. Punjab National Bank had a 12.7% improvement in the ratio and was hence ranked second after Union Bank.

Overall, Indian Bank had the most improvement in its Liquidity ratios after the merger, except for a decline in the Liquid Assets to Demand Deposits ratio. However, Canara Bank, after the merger, had the highest decline/least improvement in all the ratios.

**Table 6.19:** Final Ranks as per percentage Improvement/Least Decline

Parameter	PNB	Canara Bank	Indian Bank	Union Bank
	Rank	Rank	Rank	Rank
C – Capital Adequacy	2	4	3	1
A – Asset Quality	2	3	4	1
M - Management Efficiency	2	1	4	3
E – Earning Ability	3	1	4	2
L – Liquidity Position	3	4	1	2
Average Rankings	2.4	2.6	3.2	1.8
<b>Final Rankings</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>

*Source:* Author's calculations

As per Table 6.19, Union Bank of India was the best performer after the merger. It witnessed the most improvement in some ratios, and the least decline in some ratios, while compared to other three banks. However, Indian bank was ranked last in terms of overall performance. Its performance deteriorated in the most number of CAMEL ratios. All its improved ratios had only a slight improvement after the merger, except for Profit Per Employee, Liquid Assets, ROA and ROE. Even when Punjab National Bank was ranked second as per the percentage of improvement, it improved on more ratios than Union Bank of India, although the improvement was less than Union Bank of India. There was not a huge difference between any of the ratios for Punjab National Bank after the merger except Profit Per Employee, ROA and ROE. Canara Bank was ranked third since its performance declined with respect to most of the ratios.

Nevertheless, it had lesser number of declined ratios than Indian Bank.

## 7 FINDINGS

- 1) From the hypothesis testing, it was found out that there is an absence of statistically significant difference in the Capital Adequacy, Asset Quality, and Liquidity parameters of the four banks together after their mergers. Hence, the null hypotheses for these parameters were accepted and the alternative hypotheses have been rejected.
- 2) However, there is a presence of a statically significant difference in both the Management Efficiency as well as Earning Ability of the banks post-merger. Hence, the null hypotheses for these two parameters can be rejected and the alternative hypotheses can be accepted.
- 3) Overall, the 2020 merged banks had no statistically significant difference caused by the merger on their financial performance, except for the significant difference in two out of three parameters. Hence, the null hypothesis was rejected. Out of the two parameters, the overall management efficiency of the banks declined post-merger, except for an improvement in Profit Per Employee. The overall Earnings Ability of the banks increased after the merger, with an improvement in all these ratios for the banks, except for Indian Bank with less operating profit. All the merged public sector banks improved by a huge percentage with respect to their profitability, ROA and ROE ratios.
- 4) When these banks were compared as per the percentage change in their ratios after merger as per the CAMEL ratings, it was discovered that Union Bank of India was the best performer after the merger since it improved tremendously on most of the ratios. However, Indian bank was the worst performer. Even though Indian Bank had the highest profit for the year 2020-21, most of the bank's CAMEL ratios declined after the merger. Punjab National Bank was ranked second despite the huge Rs.14000 crore scam faced in 2018. The merger helped PNB overcome its losses and make profits. Canara Bank was ranked third overall, however, it was ranked first in terms of ratios that changed significantly, i.e., management efficiency and earning ability.

## 8 CONCLUSION

Mergers started in India in the 1960s to secure weak banks and preserve client comfort, and are considered to be one of the most effective growth strategies. The research shows that Union Bank of India was the most stable and had the most improvement after the merger, and that the mergers didn't have a significant effect on the public sector banks as a whole. But when we consider all the factors, it can be noticed that the ratios that declined or remained unchanged were mostly because of increased NPAs and decreased advances as well as liquidity. This was because Covid-19 pandemic in 2020 resulted into high NPAs since people were not able to repay their loans, and also into the declining liquidity and credit delivery of the banks. This was seen in the Advances ratios of the banks, all of which declined. Most public sector banks were engaged with the merger implementation and also facing the pandemic throughout the year. Both of these reasons led to bank restructuring.

Most of the CAMEL ratios improved after the merger, with the highest significant improvement in earning ability of the banks. Hence, it can be said that had it not been for the pandemic, the banks would've improved significantly in most of the ratios. The banks have been able to keep up with their performances even during an unusual year like 2020, and the mega mergers were one of the reasons for their stability and huge improvement in profits. The bad credit cycle involving large business loans was largely seen on PSB balance sheets from FY 2016 to FY 2019. Several banks had their capital fall under the regulatory minimum and mergers among the public sector banks were regarded to be the only solution. With the global economy showing signs of growth, larger gains are expected for public sector banks in the next 1-2 years.

### **9 Limitations of the Study and Scope for Further Research**

This research is limited to data of two years (FY2019-20 and FY2020-21). This research is limited to the public sector banks that merged in 2020. This study is descriptive in nature and doesn't aim to research on the "why" of the findings in depth.

Further study on this topic can be done, and if evaluated with data of further years after the merger, it may produce different results, since the year 2020 was greatly impacted by the Covid-19 pandemic for the banking sector. An analytical research can be carried out for an in depth research and to determine the causes of each decline or improvement.

### **10 Practical Implications**

The study is of particular importance to the financial sector regulators and Government officials in emerging economies, as evident by the large number of Government controlled banks in these nations. Also, Governments in these economies including India have grand plans for merger of these banks. The paper throws light on the financial and economic consequences post merger.

### **Conflict of Interest**

The authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest, or non-financial interest in the subject matter, or materials discussed in this manuscript.

### **Ethics Statement**

- This material is the authors' own original work, which has not been previously published elsewhere.
- The paper is not currently being considered for publication elsewhere.
- The paper reflects the authors' own research and analysis in a truthful and complete manner.
- The paper properly credits the meaningful contributions of co-authors and co-researchers.
- The results are appropriately placed in the context of prior and existing research.
- All sources used are properly disclosed.
- The authors have been personally and actively involved in substantial work leading to the paper, and will take public responsibility for its content.

### **Authors' Contribution**

Dr. Rajeev Sengupta developed the idea for this particular research, verified the methods of the study, analyzed the data using Microsoft Excel and supervised the entire process. Dr. Ameya Patil, with consultation from Dr. Rajeev Sengupta, identified the implications, limitations, as well as the future scope of this study.

Dr. Ameya Patil, collected the relevant research literature of the studies already carried out in this topic, developed the research methodology suitable for this particular study, and interpreted the results in order to come to a conclusion for the research.

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## ECO-EFFICIENT PROTOTYPE OF WASTEWATER TREATMENT PLANT APPLYING CLEAN DEVELOPMENT MECHANISM METHODOLOGIES – MEDITERRANEAN COUNTRIES

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### ABSTRACT

*Municipal wastewater treatment is committed reducing greenhouse gases emissions in line with United Nations Framework Convention on Climate Change (UNFCCC) norms in order to preserve Earth's blanket and lower climate acute changes. Greenhouse gases emissions reduction is the avant-garde of municipal wastewater treatment technologies; however, the process requires particular segmentation of all phases to contain the excessive energy required for treatment. Consequently, Energy analysis is endorsed as essential to sustain a thermodynamic equilibrium of the treatment plant with its environment. Decarbonization, denitrification & phosphorus removal urge the exploitation of sustainable energy whether recovered or renewable to engine the treatment facility. This literature values compile the eco-design of wastewater treatment plant with the avant-garde technologies of greenhouse gases emissions reduction, considering environmental aspects at all stages of treatment process, targeting the lowest possible environmental impact throughout the plant life cycle to create a CO<sub>2</sub>-free facility prototype. UNFCCC introduced the greenhouse gases emissions definition in wastewater plants as a project design document for the Clean Development Mechanism (CDM) project AM00801 activity. The literature adopted this project and submitted it as a friendly user interface or a Software to model an Eco-efficient management strategy for wastewater treatment plant aerobic activated sludge type with the offset of environmental footprint measures based on decision making analysis, Input-output analysis, benchmarking and energy balance, net negative emissions including environmental declaration assessing the life cycle from costing, management, and sustainability perspectives.*

*Keywords: WWTP, Energy consumption, Aerobic Activated sludge, Life Cycle Assessment, Decision-Making, Data Acquisition, Greenhouse Gas Emissions*

### 1 INTRODUCTION

The United Nations (UN) declared in the emissions gap report the GHG emissions approximately 58.1 gigatons of CO<sub>2</sub> equivalent (GtCO<sub>2</sub>e) in 2019 [17], which leads to a significant indication of surface waters runoff and wastewater discharge pollution specifically. However, UN through UNFCCC affirmed environmental policy shifting in order to decrease waterways pollution. Under Kyoto Protocol, emission caps were set for each Annex-I countries [18], amounting in total to an average reduction of 5.2% below the aggregate emission level in 1990. Each country has a predetermined target of emission reduction as compared to 1990 level. No emission cap is imposed to Non-Annex I countries [18]. However, to encourage the participation of Non-Annex I in emission reduction process a mechanism known as Clean Development Mechanism (CDM) has been established. The carbon markets are a prominent

part of the response to climate change and have an opportunity to demonstrate that they can be a credible and central tool for future climate mitigation. Therefore, developed countries agreed to limit their GHG emissions, relative to the levels emitted in 1990 or to substitute the excess emissions with carbon trading by investing in emissions reduction in non-developed countries (such as Morocco & Lebanon subject matter of literature's case study). Municipal wastewater utilities are a direct and effective target for regulation and control, the matter that has been reflected in Kyoto Protocol and all ensuing conventions and agreements so as GHG emissions reduction process integration. Table 1 shows all emissions that currently are in common practice for municipal WWTPs

**Table 1:** The global warming potential of six major greenhouse gases [19]

Name of the Gas	Global Warming Potential	Atmospheric Life ( years)
Water Vapor (H <sub>2</sub> O)	0.1 to 0.23	Few days
Carbon dioxide (CO <sub>2</sub> )	1	5 to 200
Methane (CH <sub>4</sub> )	21	12
Nitrous oxide (N <sub>2</sub> O)	310	114
Hydrofluorocarbons (HFC)	140 to 11,700	1.4 to 260
Perfluorocarbons (PFC)	6,500 to 9,200	10,000 to 50,000
Sulfur hexafluoride (SF <sub>6</sub> )	23,900	3200

GHG emissions reduction methods primarily facilitate the decarbonization in all treatment processes from preliminary to tertiary mainly aeration at secondary phase and require energy in form of electricity thus exploited methods should account to decrease biological oxygen demand for all point of sources, treatment and GHG emissions reduction. CDM Mechanisms consider a baseline project and leakage emissions from electricity consumption and monitoring of electricity generation for all influential detected types of emissions throughout the treatment process (carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O)). This literature is concerned mainly to develop the AM0080 Project (Mitigation of greenhouse gases emissions with treatment of wastewater in aerobic wastewater treatment plants) into an Eco-efficient project where an application of sustainability assessment tools is translated into a user-friendly interface (1) resuming the techno-economic analyses, (2) systematically examining the sustainability aspects of WWT processes, (3) assessing all environmental, social and economic dimensions, (4) recovering energy required for both treatment functional processes and emissions reduction processes through management of resulting biosolids. The methodology adopted a support informed decisions making via data acquisition, filtration, benchmarking and decision-making tools in order to assure the execution of WWTP eco-design and instantaneous improvement actions enhancing sustainability, without burden shifting. The main focus in the literature is to develop, upgrade, simulate and model the proposed baseline project into a prototype exploiting most available technologies of wastewater treatment in Mediterranean Countries specifically Non-Annex I countries (or non-developed countries).

## 2 METHODS

### 2.1 Goal and Scope Definition

The goal of this study is to (1) innovate a user-friendly interface (2) where embedded all simulated models for an eco-efficient prototype WWTP (3) involving all available technologies and environmental analysis (4) comparing the life cycle impacts to baseline project referring to CDM mechanism (5) using applicable mathematical algorithms and methods.

We shall evaluate four different management strategies in that context for the purpose of generating such software: (1) Data Acquisition (2) Energy Balance (3) Life Cycle Assessment (4) GHG emissions Definition & Reduction.

Life cycle inventories involved both baseline and project data on process simulation creating a record of input and output flows for plants in Morocco (UNFCCC Case study), Lebanon (All country's functional plants), Greece (the most advanced AAS plants) & France (Self-sufficient WWTPs AAS). Such sampling included inputs of wastewater parameters, energy consumption, and emissions releases based on comparable data (Mediterranean countries) of both industrial, developing and non-developed countries. This study is innovative inaugurating, for further expansion of focused economic and energy performance, a valid referential comparative of WWTPs in countries at Mediterranean coasts using types and technologies other than the study subject matter (AAS).

In line with UN regulations, Mediterranean municipalities are mandated to implement GHG emissions reductions guidelines that are ultimately on paper with the goal of protecting Mediterranean surface water and improving environmental quality that entails eventually the exploitation of novel treatment technologies [20]. However, the cost of implementation is typically the major factor for decision making. Accordingly, technologists and legislators shall benefit of the current literature outcomes either the environmental impacts fallouts using LCA or the economical results using CDM project accreditations through CO<sub>2</sub>e savings or CER (certified emission reduction or carbon Credit which is the reduction of 1 ton of CO<sub>2</sub> emission from the baseline project activity) which can be evaluated in terms of energy saving. This study is based on a set of equations extracted from CDM mechanisms and algorithms formulated on JMP Pro14, rendered and simulated into models on MATLAB.

The outcome is gathered up on a user-friendly interface which is the resulting Software of the literature out of flexibility and ease of use considerations with commercial intents. The target of the literature defined in the submitted proposal to CDM committee embodied in the resulting software, is to enhance the Carbon Trading through different approaches included and implemented in the submission. The current submission concerns are the following: (1) Energy efficiency for new or makeover projects (existing or proposed baseline plant) by means of energy recovery and exploitation of allowable renewable energy (including and not limited to: Cogeneration, installing an anaerobic digester, improvements or switching to less carbon intensive energy sources, solid management, Reducing the frequency of the transport activity) (2) Environmental Impact (including and not limited to: LCA, LCI, LCAI) (3) Resulting reduction of any category of greenhouse gas emissions.

In this study, the mined for performing data to be incorporated into a master list establishing the adopted scenarios, are: (1) the baseline set by UNFCCC at Fès Morocco, (2) the mean WWTP in Lebanon (referring to CDR study), (3) Greece self-sufficient plant parameters [21], (4) France Neutral plant parameters [22]. All reported data from sample WWTPs were given equal weight in this study and reference was always the CDM mechanisms listed baseline parameters to develop an eco-efficient prototype with three different levels of energy efficiencies (listed scenarios). In condensing this grouping to one prototype WWTP processes for an Open input-output LCA adjustment, the resulting linear mean of values was used for the process inventory. The intention of this method was to create a process representative of the project set by CDM program by taking surveyed data of Mediterranean countries from multiple significant plants. This assumes that studied and surveyed plants are representative of plants as a whole and that the data acquisition method has comparable results to the set baseline.

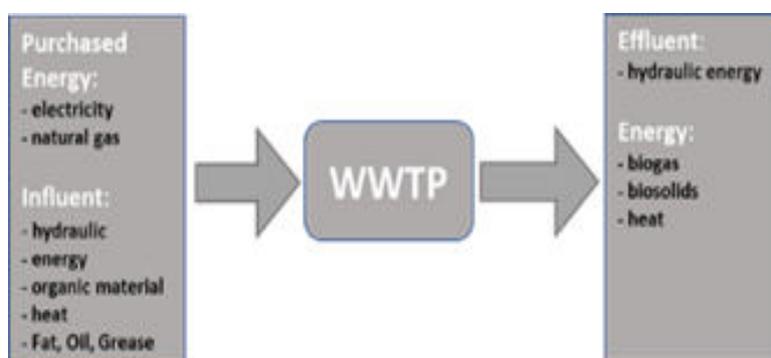
Uncertainty analysis for discussion characterized the potential impacts of the variability in literature values and addressed possible alternative assumptions. Values from adopted scenarios are used to put boundaries and deduce benchmarks on emissions and energy consumptions for baseline used technologies and proposed project submission CDM-PDD. No alternatives were addressed as all varied operating conditions and necessary inputs as suggested in baseline and from modeled acquired parameters and variables, were included and simulated without detected

flaws. The outcome of modeled values was proposed for the new inventories and reassessed for the environmental impact study applied to baseline project. Differences between proposed scenarios were highlighted in models with mention to potential grounds and odds and adjustment coefficient was integrated to emissions equations to unify the study of different means.

**2.2 System Boundaries**

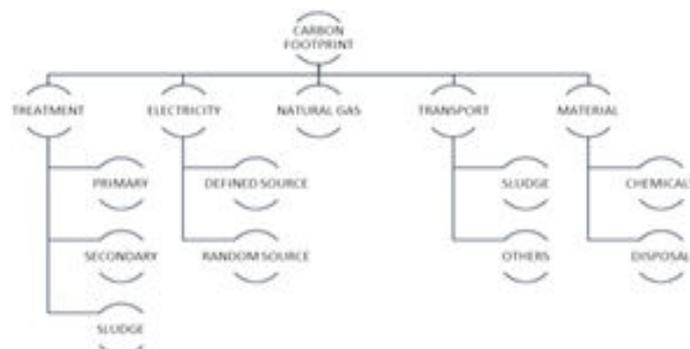
The current study implemented a combination of novel technologies in WWT sector with the intention of meeting GHG emissions reduction goal set by CDM mechanism and as such uses the best mechanical, chemical & biological practices to assure energy self-sufficiency or neutrality of the project plant; which allows decision-makers to easily compare the estimated financial & environmental impacts incurred by meeting the set goals.

The functional unit for comparison in this study is kilogram (kg) of CO2 equivalent removed or saved.



**Figure 1:** System Boundaries – Energy Weight in & out

Comparisons were performed based on total supply chain environmental impacts, with highlights on the local energy consumption and fugitive emissions due to their high impacts. The approved methodology included in PDD-CDM submission assumed high energy consumption and fugitive emissions that have relatively simple computation and expected to have useful lifetime of 20 years as per baseline definitions. In order to tender a set of algorithms adjusting to parameters' variations to define an immediate precise carbon footprint computation, data acquisition method, energy balance process and LCA of baseline WWTP, comparable scenarios should be well investigated accordingly.



**Figure 2:** Carbon Footprint Calculation Scheme ISO14067

**2.3 Scenarios Description**

The default scenario is a simple AAS WWTP at Fès Morocco with defined parameters and variants through AM0080 program. the bar against which all other scenarios are compared have been selected based on variables that should be controlled with both lower and higher limits.

	Lowest BOD <sub>5</sub>	Lowest COD	kWh/m <sup>3</sup> -billing	Highest BOD <sub>5</sub>	Highest COD
WWTP1 (France)	137.98	289.07	0.842	294.55	644.4
WWTP2 (France)	82	238	1.77	449	707
WWTP3 (Greece)	192	521	1.58	491	1375
WWTP4 (Greece)	164	468	0.24	515	1181
WWTP5 (Morocco)	42	321.5	8.68	241.33	496.5
WWTP6 (Morocco)	35	273	2.6	310.67	651.8
WWTP7 (Lebanon)	87.25	298.63	1.17	404.5	765.38
WWTP8 (Lebanon)	307.36	784.8	0.8	633	1990.4

**Table 1:** default scenario of WWTPs AAS Parameters & Indicators

The approved scenarios by CDM committee were restricted to single mean sample from each of France, Greece, Morocco & Lebanon. Knowing that parameters extracted from France & Greece plants represent factual data acquisition from the year 2020 along with listed parameters for Morocco Fès plant (baseline) and mean parameters from Lebanon plants also for year 2020.

## 2.4. Process Description

### 2.4.1. Data Acquisition & Fault Detection Method

Data validation, online monitoring of difficult-to-measure variables, predictive maintenance, system and energy optimization, and targeted water reuse are the essentials of big data focus to improve WWTP operations. Therefore, big data integration will have the greatest influence on process control at the WWTP to monitor and manage treatment operations, for both upper and lower limits of process variables. Data from case study WWTPs is collected at various times, ranging from continuous online sensor measurements to quarterly laboratory results. Due to the difficulty of combining data of multiple frequencies and formats, traditional data management separates data by source. Scaling data to a single time period is a popular mathematical strategy for dealing with varied data frequencies. However, because WWTP data are time-dependent, co-correlated and the relationships among variables are related to one another, and nonlinearly related, this method cannot be used for datasets with a considerable difference in frequencies. Effluent quality variables can change differently over time (Table 2), and they frequently change nonlinearly in connection to other process variables, making it difficult to pinpoint the reason of change between sample events. The frequency with which the treatment process is monitored is highly dependent on the analysis' purpose and the process' parameters.

Timescale	Feature
Slow (days-weeks)	Solids retention time (SRT)
	Hydraulic retention time (HRT)
	Transmembrane pressure (TMP)
Fast (seconds-minutes)	Dissolved oxygen (DO)
	Nutrient concentrations
	Turbidity
	Conductivity
	Flowrate

**Table 2:** Time Lap of WWTP AAS Pollutant Proceeding

Due to all aforesaid, the combination between MCDM (Multicriteria Decision Making) and stepwise regression methods has been found the best method to represent the irregular nonlinearity of WWTPs case study behaviour and achieve a correlation that can be read by the indicator model itself and through the established bridge model between different correlated

parameters on loophole basis [11]. All models of the study hereinafter basically are likewise based and all nonlinear trends reflected thru the models and bridge models. If nonlinear and nonstationary activity is found, modelling nonstationary behaviour can be done in one of two ways: accounting for a known, or predicted, underlying trend, or limiting the temporal window over which a model is trained. Given the difficulty of modelling nonstationary behaviour in the WWTP (Table 3) small time frames may be the best option for achieving approximation stationary and normal behaviour, which is the case of analysed prototype.

Feature	Frequency	Structure	Proceeding
Water quality	Daily-Monthly	Numeric	5-day biochemical oxygen demand, alkalinity, nutrients
Water quality	Second-Minute	Numeric	Temperature, dissolved oxygen, pH, nutrient concentrations: sensors
Equipment monitoring	Second-Minute	Categorical	Power status
Equipment monitoring	Second-Minute	Numeric	Operating speed, flowrate, pressure
Operating setpoints	Second-Minute	Categorical	Peak or normal operation for flow
Operating setpoints	Second-Minute	Numeric	Runtime for batch operations

**Table 3:** Monitoring Proceedings in WWTPs Sampling with Data Acquisition Frequency and Model

Model-based control could be used to forecast what a variable value should be under particular situations. Model predictive control contrasts predictions from mechanistic models with real process observations. Then defects are discovered as deviations from the model. The model can be derived from theory or empirical trends and can be used to approximate new process variables. Instead of directly monitoring the variable of interest, a relationship between variables can be discovered, which exactly was the basis of the current study models' connection due to the complexity and variability of parameters and indicators. Therefore, it is essential to comprehend the entire strategy of data acquisition and clustering process, in order to proceed in a planned, target-oriented method and to secure the utmost possible conclusion. Consequently, frameworks for formalizing the knowledge encounter process have been developed thru experimental feedback and mathematical applicable processes. These process models explain the knowledge outcome project's life cycle and give a roadmap for executing similar project under any comparable circumstances. UNFCCC AM0080 Pilot project depicts the process model used in the procedures discussed in the submission. The model, that can be generalized at the scale of standardization to all WWTPs subject matter, is based on a combination of an industry-oriented standard process for DA model and created by a consortium of significant proven algorithms reflecting models of all required and necessary applicable KPI's for AAS WWTPs type. Hereafter a detailed elaboration shows the adopted algorithms and models of all indicators leading to GHGs emissions arithmetical definition. The process is engineered of six interconnected, highly participatory, and iterative phases: (1) A thorough understanding of the issue defining problems and setting objectives are the start in this stage based on strong relativity indicators. (2) Data comprehension after all data is collected, verified, and merged, is essential to acquire prior knowledge of raw data extracted from plants management. The data's relevance in relation to the objectives shall be confirmed at that stage. (3) Preparation of data at that phase determines which data will be used and in what format. As a result, this step includes

significance testing, data cleansing, deriving new attributes, and feature selection and extraction. The data is now in a format that can be used with the tools chosen in the first stage. Bugs are being filtered with a specific regression model as shown hereinafter. (4) Many approaches could be used to extract knowledge from the pre-processed DA. Extracted knowledge can take any shape, such as a list of rules or a model which is the case witnessed after generating all KPI's models. This phase evaluates accuracy and generality. (5) Assessment of newly acquired information is the process to interpret and segregate outcomes between normal feedback (Déjà vu) and new data requiring further assessment. If there are any new or intriguing patterns, they shall be recorded and the model notes here a looping to rectify according to the corrected pattern. Within the guidelines noted in CDM mechanisms, all feedback should be processed as repetitive knowing all parameters. (6) The deployment of the system is all about deciding on a distribution strategy: What should be done with the newfound information? and where should it be applied? Upon trials and debugging the answers shall apply in due course and reflected in generated models. Briefly, Process abnormalities in WWTPs case study subject matter can be caused by a variety of system failures or changes in circumstances. A change in influent quality, an outbreak of treatment-inhibiting microorganisms, irregularities or damage to treatment units, mechanical failures, or sensor failure are all examples to crucial circumstances that might undergo the DA and modelling/modelled process. When creating a fault detection algorithm/software, it's fundamental to think about how versatile an analytical technique is, and what kind and range of errors should be recognized. Many variables could be changed if a sensor fails especially that the sensor's measurements are used in a control loop which would duplicate the error at every chain of data processing. A sensor malfunction, on the other hand, may only influence the measured sensor variable if the sensor's measurements are not included in a control loop. Control charts are the most important tools for determining whether a process is in control at a glance. As well as the principal component analysis method that is a widely used statistical method for continuous monitoring of wide range of variables. It captures the correlations between linear combinations of variables rather than the variables themselves. Beside the main statistical role, the partial least squares method can detect errors in a separate linear combination of the measured variables in the same way as executing the initial data pool of extrapolated WWTPs [15].

Decision Making is the adaptive or flexible decision method that can be used in the uncertain conditions, as due to the fact that future of WWTPs is uncertain and unpredictable, robust options tend to be more recommended than optimal options. On the other hand, the best option is more suitable when the future can be predicted [14]. The purpose of decision making is to identify full-bodied strategies, which can adapt or perform well under uncertain situations in the future. The method is helpful for decision makers in long-term consequences. The fundamental steps for automated decision making are to: (1) identify the issues and set a goal; (2) find information, strategies, risks and select a robust strategy; (3) take an active towards the goals; (4) determine whether the strategy is effective; and (5) update and resolve the strategy. The last step is an essential one because if the strategy is not effective, decision makers can change strategies until they meet their goals [12]. Pilot project didn't adopt any automated decision-making methodology, therefore the PDD submission had to assure MCDM as the decision-making methodology to be followed for all ascended uncertainties along with stepwise regression logic where necessary and control charts logic for fault detection. Finally, the summarization logic is used to gather all models to extract the GHGs emissions as a linear trend according to all variabilities imposed by change of parameters.

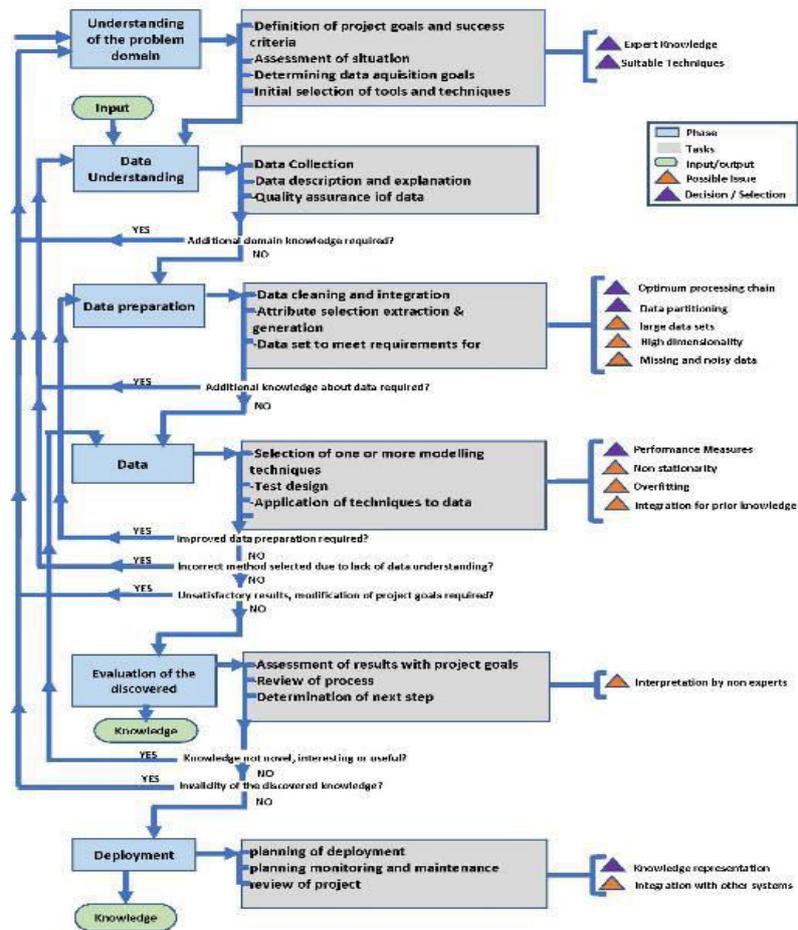
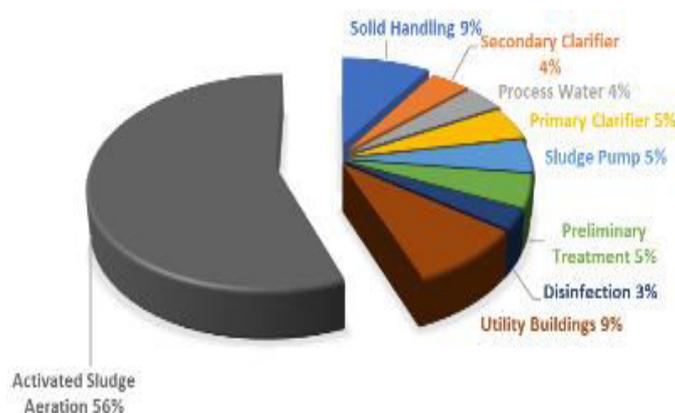


Figure 3: Framework of Data Acquisition & Method Selection

**2.4.2 Energy Balance Process**

Wastewater utilities consume approximately 2% to 4% of the power at national level as an average at all Mediterranean case study countries, which is typically obtained from the grid. WWTP’s secondary treatment phase is the processes consuming the largest quantities of power. Reducing process energy consumption in WWTP starts with a process energy survey. The mission of this study is to provide all conceivable aspects that may help in the transition to energy neutrality in WWTPs with comparable examples from industrial developed countries (France in our case study), which will be expanded further in this literature using arithmetic models based on UNFCCC methodologies. The sources of energy in wastewater were explored, as well as several indicators for expressing energy consumption, using experimental cases of operational WWTPs in the Mediterranean countries: Lebanon (non-developed countries’ sample), Morocco (baseline case as indicated in AM0080 project), Greece (Developed country with high potentials of sustainability) and France (Industrial developed country with energy neutral plants comparable case study). The operational methods and technology upgrades of the WWT processes were assessed, as well as the different lanes for energy consumption reductions. The methods for recovering the potential energy hidden in wastewater, as well as the use of renewable energies in WWTPs, were then explained and modelled. The available assessment methodologies were introduced, which may support the analysis and comparison of WWTPs in terms of energy and GHG emissions. Finally, successful case studies on WWTP energy self-sufficiency were listed in a threshold prototype comparable to baseline project and its potential advancement. The literature’s innovative project, the Software, was presented after

analysing the results and discussing energy saving strategies and energy conservation measures in order to reach the GHG emissions computation thru the models simulating energy requirements and potential savings for WWTPs. for this purpose, wastewater industry's energy demand, distribution and performance were projected to account for an average of 1.8% of all electricity consumed at the national level for developed Mediterranean countries depending always on country's energy sustainability approaches with differences in relativity and data availability. However, WWT and transportation sectors consume approximately 3% of total electrical power produced in a non-developed country according to the annual report of energy consumption worldwide published by UN Stats the statistics division of UN [2]. nevertheless, all studies anticipated an increase of at least 20% within the next decade to the amount of power required for WWT in non-developed and newly developed countries, leading to a significant increase in CO<sub>2</sub> emissions and resource consumption. The amount of energy used to treat wastewater is influenced by a variety of factors and determined by the following: the location of the plant, its size, the type of treatment process and aeration system used, the effluent quality criteria, the facility's age and lifetime and the operators' expertise and abilities. Despite the fact that the average energy consumption per cubic meter of treated wastewater (kWh/m<sup>3</sup>) is rather consistent between countries, the amount of energy required for operations varies greatly amongst WWTPs and require more accurate indicators to reflect the actual status. For analysed WWTPs, the reported figures on specific energy consumption range from 0.25 kWh/m<sup>3</sup> to 0.50 kWh/m<sup>3</sup> [2] . For WWTPs using modern biological removal systems with multiple energy-saving techniques, the reported figures on specific energy consumption can be as low as 0.25 kWh/m<sup>3</sup> [7]. The climate in which the WWTPs were run proved to have only a slight impact on energy consumption, with colder temperate circumstances possibly resulting in lower energy consumption than hot and humid environments [15]. Consequently, the provided results from CDM baseline indicated that the target average energy consumption of WWTPs was around 0.06 kWh/m<sup>3</sup> to 0.20 kWh/m<sup>3</sup> without being able to precise a threshold due to the lack of benchmark, which was much lower in certain more developed countries. Regardless of the size of the WWTP, the biological treatment phase consumes the majority of energy required for the whole plant, which can account for up to 75% of total consumption [15].

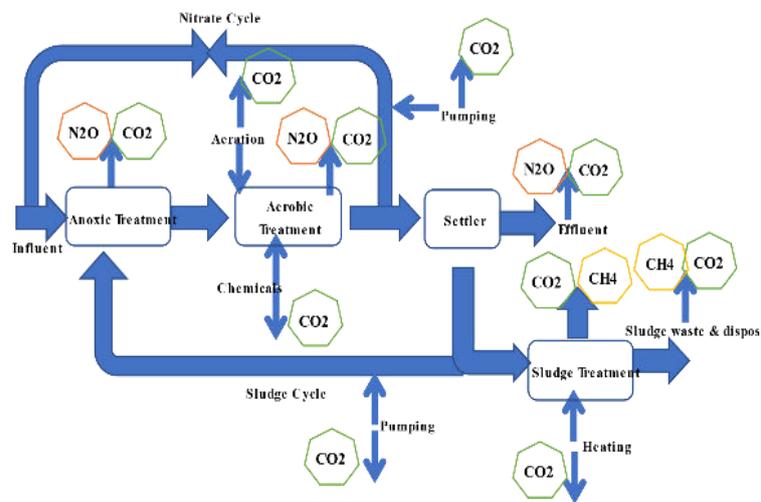


**Figure 4:** AAS WWTP Power Consumption Distribution

#### **Approaches to Energy Balance in AM0080 Pilot Project:**

wastewater contains a quantity of energy that can be recovered, proven thermal energy content estimated at 75kWh/P.E./a, proven energy potential from organic matter estimated at 153kWh/P.E./a [9], and proven hydraulic potential energy depending on inflow rate and available hydraulic height. Moreover, wastewater energy consumption is relevant to national electric energy consumption accounting approximately for 30% of total energy consumption of municipalities. the electric energy saving potential is high and proven estimated at around

25% [15]. the proven recovery from biogas production is around 17kWh/P.E./a of electric energy and 27kWh/P.E./a of recuperable thermal energy [2]. detailed analysis of the applicability of these facts of energy consumption, saving and balance to AM0080 pilot project are well elaborated in the generated models and simulation. Figure 5 below shows the typical energy flows produced by AAS digestion in Fès WWTP, that convert the chemical energy content of COD to electricity and thermal energy. Consequently, the biogas energy recovery can cover up to 62% of total energy requirements. (Refer to biogas model renewable energy section hereafter). the energy balance of conventional WWTPs shows that the most important energy consumers are the aeration system (60%), wastewater pumping (12%) and anaerobic digestion (11%), which together account for the 83% of global energy consumption of the plants [10]. The main purpose of determining the role of energy efficiency in sustainable WWT processes for AM0080 is to reach an optimum prototype AAS WWTP where all energy recovery and external renewable resources are ultimately used and GHGs emissions are diminished to the maximum possible [8].

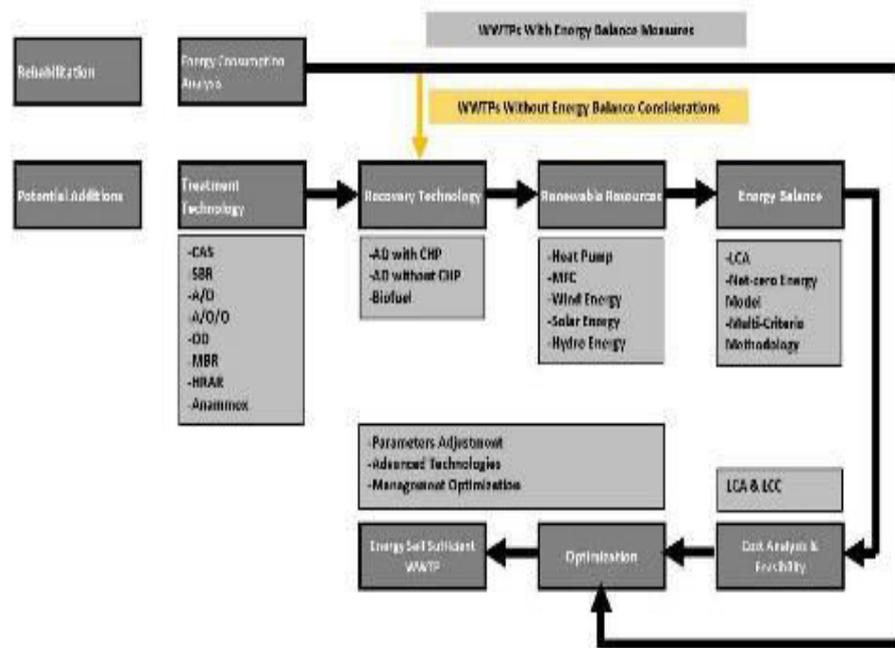


**Figure 5:** GHG emissions during treatment process at Fes WWTP

This study adopts proven theoretical methods to produce models on energy efficiency, evaluating appropriate sustainable WWT technologies, and applying to the pilot project. Energy efficiency plays multiple roles such as sustainable growth and advancement, and economic development through the application of the set mechanism. It can also lead to carbon minimization resulting in reducing climate change however many exclusions for the sake of simplification were applied by CDM avoided an optimum GHG emissions reduction.

A- Design Process Guidance: is a circular process that aims at continual development over time and require beside a robust methodology, starting with predesign operational advanced technologies (mechanical, biological & chemical), accurate DA, steady LCA and LCC, some technologies that provide a fast data input combination and decision making that would be achieved through IoT. Relying to a complete structure of control, WWTP function should follow a complex hierarchy based on both input data and results at the same time. All predesign measurements were reported by CDM as included in Fes's pilot project AM0080, the current mechanism according to both tender document, execution and operational records. Some of the main design measures audited, surveyed, simulated and modelled in this literature are: (1) Pumping: pumps selection, pumping system peak, Continuous calculation of system energy performance, Evaluation of cost assessment including energy, operation and maintenance costs, Equipment management. All these factors were considered in AM0080 methodologies and

included in related framed equations and tools [4]. (2) Aeration systems of Fès facility in the secondary treatment process account require up to 30-60% of total energy used at the conventional AS WWT system [7]. Adding dissolve oxygen sensors and automatic controller, fine bubble diffusers, proper blowers, and variable speed motors, assure constant evaluation of oxygen need and DO control all over the clock. All these factors were translated into equations and algorithms than models to be incorporated in software. (3) Solids Handling: Solid volume reduction ensues energy requirement and solid handling. Anaerobic digestion is the method implemented in this pilot project generating biogas production and heat. All mentioned factors were translated into equations and algorithms than models to be incorporated in software. (4) Ultraviolet system method is partially used at the need of tertiary treatment so disinfection system takes place at WWT facility. The upgrade of this option further than baseline conditions was disregarded.

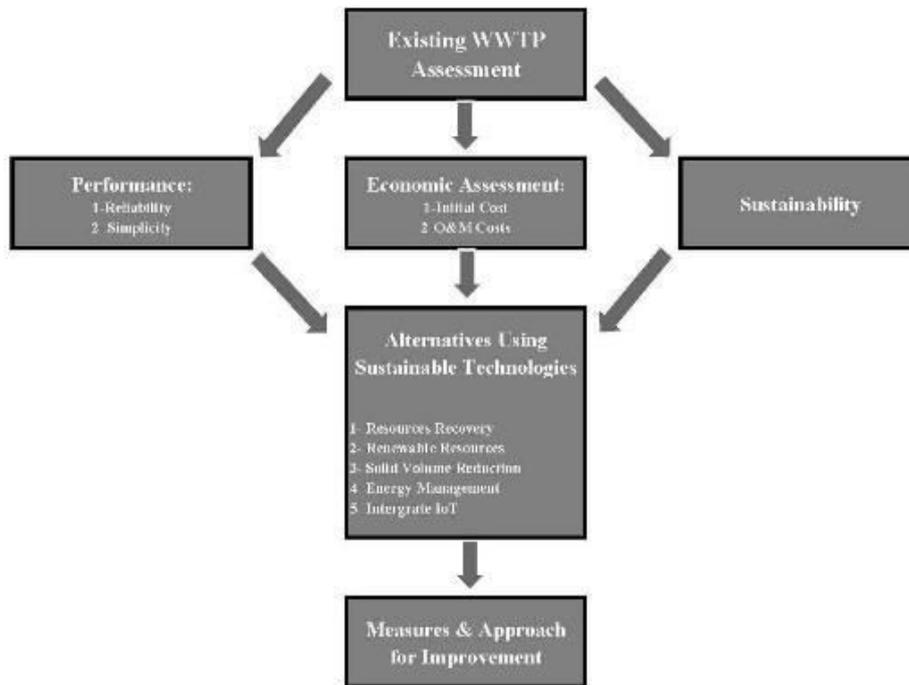


**Figure 6:** Energy self-sufficient WWT Process, Theoretical Analysis to Practice

Each technology has different removal efficiency and can be evaluated on past experience, full-scale, or pilot studies. Existing pilot project is a baseline considered as the reference to the additions made.

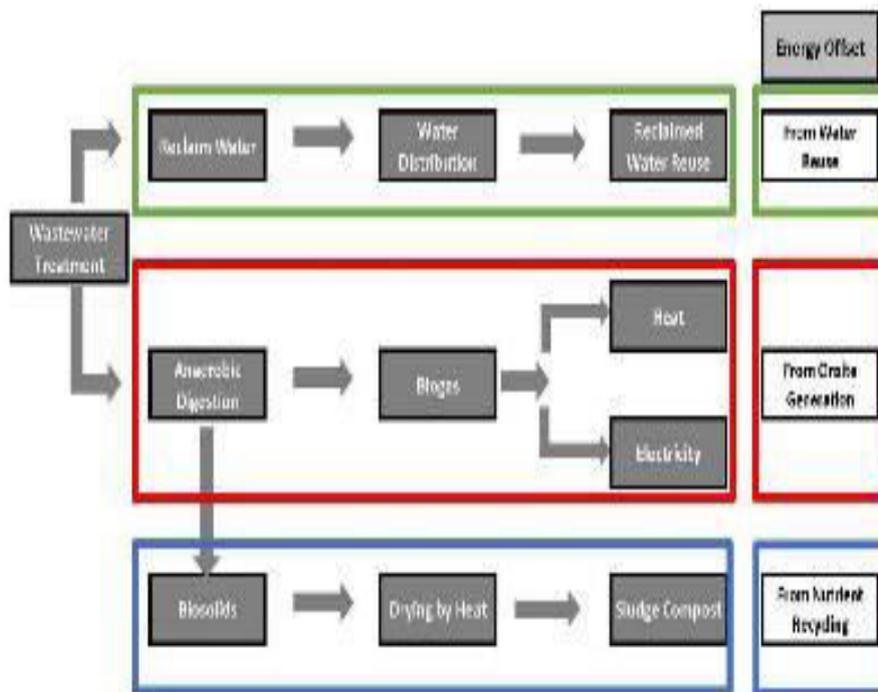
Process	Recommendations	Energy Savings (%)
Influent Pumping	Pump Control based on flow	10%
	Conducting Inflow & Infiltration long term analysis	35%
	Rehabilitation of Pumps	20%
Aeration	Short Term strategy: Mixers off with Aerator On	90%
	Short Term strategy: Replace DO meter	10%
	Long Term strategy: integrate DO meter to control	40%
UV disinfection	Short Term strategy: Replacing Bulbs with low emissions	50%
Solid Handling	Retrofitting sludge feeding network from thickener	100%

**Table 4:** Energy Saving Recommendations on Mechanical Process

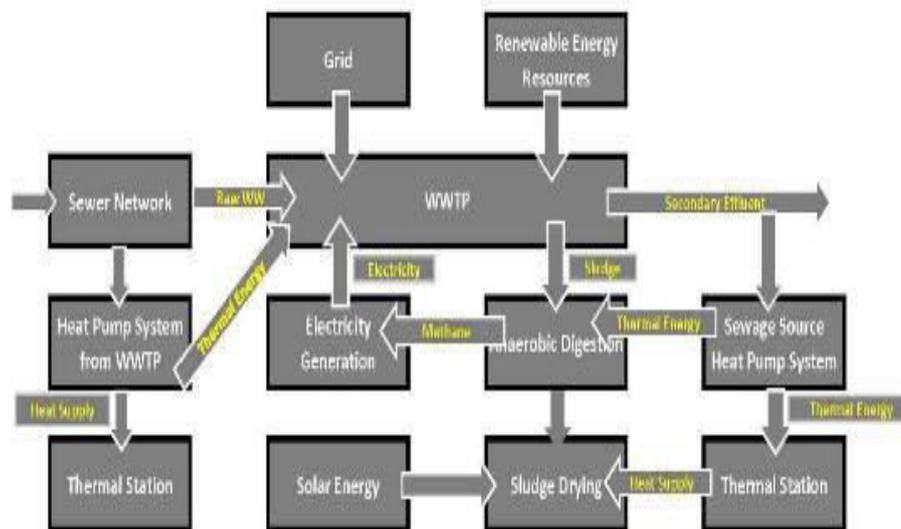


**Figure 7:** Initial Model Scope of Work

B- Resource Recovery: Two nutrients in wastewater are phosphorus and nitrogen can be used to produce fertilizer and reduce GHGs emissions. Furthermore, landfill gas technologies can capture methane or biogas using anaerobic digesters. These technologies should be applied for resource recovery in WWTPs [15]. The pilot project disregarded these two essential energy recovery factors that have been added to the PDD submission after being simulated and modelled.



**Figure 8:** Recovery Diagram in Fès WWTP



**Figure 9:** Energy utilization diagram of Fes WWTP

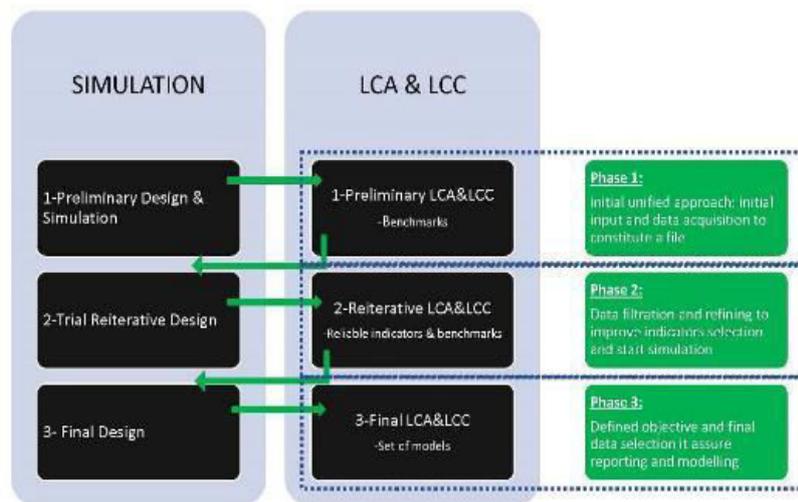
C- Renewable Energy Exploitation: The WWTSs should save energy consumption by reducing energy used and implementing technologies that can produce renewable energy [16]. Local governments should consider applying energy-saving measures in WWT facilities [11]. The goal is to improve energy efficiency in the plant. WWTP at Fès considered developing less energy consuming equipment however no renewable energy has been exploited to make Fès zero energy plant. PDD considered this criterion as an essential factor of developing additions whether solar or wind that are both simulated and modelled.

#### 2.4.3. Life Cycle Assessment & Life Cycle Costing

Technological advancements highlighted in CDM mechanisms are paving the way for new behaviours to support the circular economy by recovering resources from wastewater. The use of LCA and LCC in the development of technical solutions for treating wastewater and recovering by-products is a prerequisite by UNFCCC pilot project submission which is evaluated based on employing unique novel technology configuration to process and recover wastewater. Therefore, the current assessment focuses on finding hotspots and potential design improvements. Furthermore, the construction of a unified strategy for projected LCA and LCC is demonstrated in order to improve the robustness and consistency of the project pilot systems' analysis. The impact and cost of treatment are significantly depending on the effluent composition, according to the investigation specifically, whether the recovery of biogas and treatment of wastewater can offset the treatment systems' impact and expense. preliminary analysis indicated that this is achievable. For the baseline study, estimates of GHG emissions were acceptable with many exclusions considered. however, adding all excluded sources of GHG emissions to the baseline, it is predicted to reduce at full scale the energy consumption, as well as operational costs and increase revenues at the level of emissions CERs and expenses saving.

LCA technique adopted follows ISO 14040 and 14044 as recommended by AM0080 program guidelines [6]. As a result, it is believed that comparable available resources are much cheaper at the level of emissions yet the energy neutrality of WWTP necessitate the neutrality of environmental impact, accordingly a project-wide methodology has been established out of the existing pilot project. The initial stage's goals are to compare each of baseline set by CDM to the reference case or simulated baseline formulated in that study, while the project's ultimate and final goal is to compare each of the baseline and monitoring for both DA (with and without exclusions). Background data was gathered from the CDM methodologies and tools. Additional

data is based on bench scale measurements and simulations with the addition the study proposed to UNFCCC program. The simulation achieved in the current analysis can calculate a variety of geochemical processes involving wastewater and biogas emissions, beside sludge management. the technology units employed in the pilot project from which data was obtained are well defined referring to ISO 14040 and 14044 [6]. The scope of this study is limited to the major actor of financial and environmental LCC, which comprised listed purchase costs (CAPEX) by CDM in tender project, operational costs such as energy and other resource consumption, maintenance and repair expenses (OPEX), and end-of-life costs such as collection and recycling costs. Revenues from recovered by-products are also accounted for as negative costs (except recovered energy) [1]. The pilot project is indicated to have a 20 years life span as a functional plant (15 years is the standard lifetime set for WWTP). Nonetheless, the project's next steps (UNFCCC submission) are to be conducted with a comprehensive environmental LCC, which will include both internal and monetized external environmental costs, such as those related to global warming once defined by the Software subject matter. The chain of process below represents the integrated Method approaching LCA & LCC with the goals of aligning the overall approach and main LCA components; develop an understanding of the project pilot, technologies, data, and simulation challenges; provide an initial LCA and LCC and identify the main hotspots; and identify preliminary design implications and where additional efforts to improve data quality may be required.



**Figure 10:** Flowchart of LCA & LCC Approach Phases

The AS treatment system has substantially higher energy requirements than any other treatment type due to the aeration machinery operating almost all day [2].

Equipment	Power kW	Operation Time	Control
Aerator	56	Continuous	VFD fixed speed
Centrifuges	30	10 to 20 hrs./week	VFD flow speed
Influent Pumps	13	Continuous	VFD flow speed
Blowers	11	Intermittent	Fixed Speed
Mixers	3	Continuous	Fixed Speed
UV System	7	Continuous	Fixed Bank

**Table 5:** Major Energy Consumers for WWTP AAS

These findings are consistent with pilot project operations factsheets. The biggest contributor to the effect categories of abiotic depletion and global warming is energy consumption by fossil fuel and electricity, which explains why AS has a higher impact among all categories [13]. The

objective of the study beside the software, is the background engine where all indicators the most important amongst energy consumption, benchmarking, recovery and renewables, to be well reflected through numerical trends and algorithmic models screening the evolution and interaction of each factor and parameter. The objective of establishing a set of key performance indicators computed and modelled is to gather all models with a convenient correlation algorithm that defines bottom line an accurate amount of resulting GHGs emissions from treatment process referring to CDM mechanism, AM0080 project and tools specifically [3].

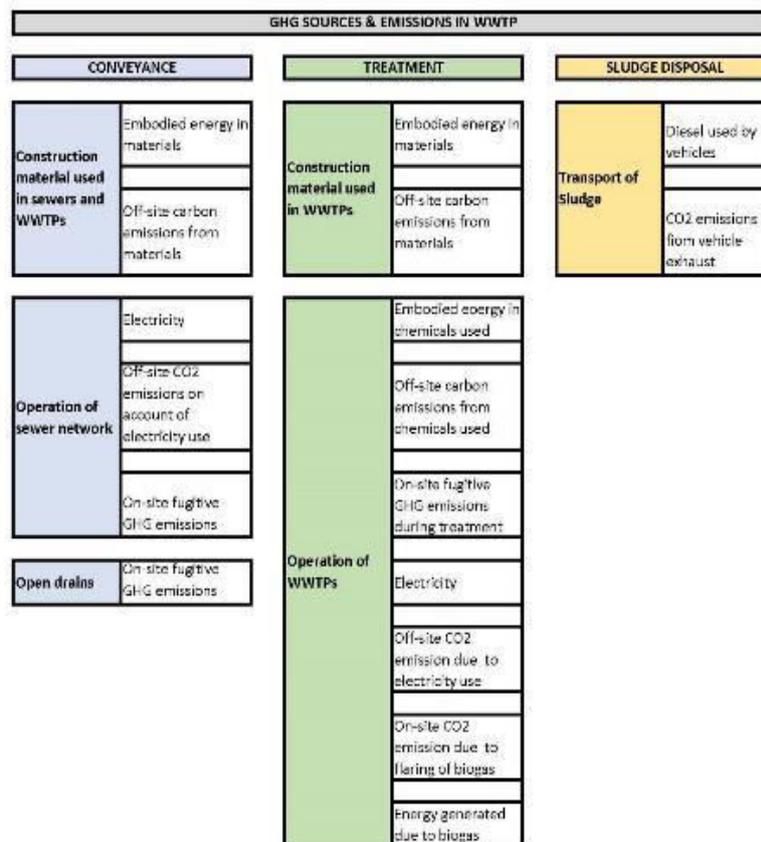
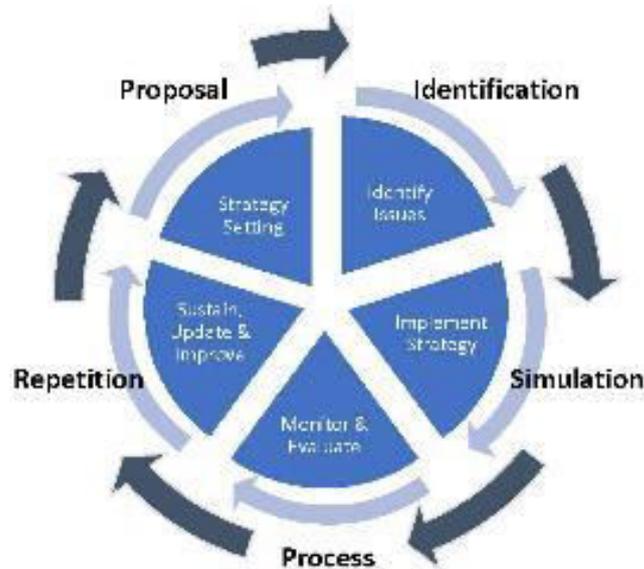


Figure 11: GHG Emissions Sources & Category

### 3. GHG Emissions Reductions

The approach for calculating and analysing the carbon footprint of baseline WWTP is extended from CDM booklet by UNFCCC [3]. Accordingly, CF minimization has been prioritized to include in plants: Electricity, heat, chemicals, fossil fuels, transportation, and more with the code's advancement, however, GHG emissions considered CO2, CH4, and N2O main emissions to be assessed as a part of Kyoto Protocol. The assessment may be used at two stages of the CF reduction process: (1) while deciding on a plan to minimize GHG emissions, the CF identifies the elements that have the largest environmental effect; (2) CF evaluates the efficacy of the actions taken to improve the energy balance. Furthermore, calculating the CF allows WWTPs management to control GHG emissions contributions [5]. Through the AM0080 project, the UNFCCC encouraged the evaluation of the CF of WWTPs from a life cycle perspective and offered a pilot project to standardize a set of equations to define the CF. The goal of this study is to turn this pilot project into a generic software system based on proven models and algorithms. CF calculation approach throughout the course of a plant's complete life cycle, splits the required LCCI data into two categories: direct & indirect emissions. However, plants are

considered mixing both categories. Direct emissions are those controlled by the plant management system having no previous or subsequent technical history data inputs and outputs of plant's items causing GHG emissions. The complex model simulated in that study as the final result succeeded to define both emissions types and assure a better understanding to the result of energy efficiency and balance proposed at the phase of predesign or rehabilitation. Several different steps may be taken to achieve the complete energy neutrality in WWTPs. The first major step would be reducing the current energy consumption of WWTPs which ranged between 0.25 to 1 kWh/m<sup>3</sup> based on the mathematical calculation following the guidelines of AM0080 methodology. The most promising reviewed operational measures to reduce the energy consumption comprised aeration control strategies since aeration held the biggest share of the total energy consumption in Fès AAS WWTPs. However, innovating a LCA & LCC model (with the assistance of RETSCREEN as a feasibility portal for technical projects) helped to achieve further energy savings. Novel control systems, presuming IoT in our case, proved the possibility of significant reduction of energy for aeration, pumping, agitators, blowers reaching off more than 25% of the time while maintaining the same wastewater effluent standards. Furthermore, chemical and biological applications such as upgrades to nitrogen removal were able to reduce the required aeration energy by more than 60% using these new technological pathways of treatment. The second step towards energy neutrality was the increasing of on-site energy production by energy recovery thru biogas sludge outcome production coupled with CHP engines and emphasis on renewable resources such as solar. The remaining electricity demand was managed to be recovered mainly by organic waste co-digestion to assure energy neutrality yet positive energy production. Reviewing all these successful methodologies in terms of energy self-sufficiency, linked to an executed monitored plant (Fès) proved the point that the predesigned or existing inefficient WWTPs should take a series of actions as reviewed in this literature to be turned into energy positive plant. Analysing the priorities of the actions separately, the literature proposed a CDM-PDD submission according to the resulting calculations and established a set of algorithms and models on MATLAB and histograms on JMP Pro 14 for each case study abovementioned depending on several operational environmental economic parameters. The advanced and complex analysis procedures, techniques and simulation tools (plant wide models) supported perfectly the decision-making to meet a sustainable self-efficient WWTP prototype. The adopted algorithms, and calculation methods used to generate models were all gathered in one user-friendly interface or Software and detailed in PDD submission. Different scenarios and treatment configurations have been simulated and documented by CDM committee to illustrate the difficulty in accounting for all constraints imposed on the system. Therefore, the resulting model will serve as a basis to target challenges that will set the scene for determining directions of further developments within the UNFCCC project delimitations. There are also some tools within CDM methodology that divide the carbon emission system of Fès sewage treatment system into five aspects: material, energy, material consumption, carbon sink and resource. The focus of CDM committee has been mainly on CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O GHG emissions factors. The basis input referred to baseline project on which the addition improvement PDD submitted to CDM committee yet with further extension to the data pool, energy balance components, energy efficiency aspects and emissions factors. Using the operation control method to determine the scope of GHG assessment of the WWTP, the raw GHG emissions must be 100% identified, and the emissions related to sewage treatment must be classified, as shown in Figure 12.



**Figure 12:** Assessment Scope Boundaries

The CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O and other GHG emitted by the sewage treatment plant are uniformly measured by the amount of CO<sub>2</sub> produced. According to the GWP, the potential value of CO<sub>2</sub> is 1, and the potential values of CH<sub>4</sub> and N<sub>2</sub>O are 23 and 296 respectively, CH<sub>4</sub> and N<sub>2</sub>O can be converted into carbon emission equivalent according to the corresponding potential values [6].

As per the IPCC agreement, it is the amount of CO<sub>2</sub> directly emitted during sewage treatment. the CO<sub>2</sub> emissions of biogenic wastewater are not included in the total GHG emissions, according to the "GHG Inventory Protocol-Corporate Accounting and Reporting Standards" [6], the total GHG emissions must be included. investigated and studied, the amount of CO<sub>2</sub> produced during the operation of the actual sewage treatment plant, clarified to have the following factors affecting CO<sub>2</sub> emissions as per the calculation formula of CO<sub>2</sub> production:

$$MCO_2 = Q * EFCO_2 \quad (1)$$

MCO<sub>2</sub> - Biological treatment process emissions (g)

Q - Amount of sewage treated during calculation (m<sup>3</sup>)

EFCO<sub>2</sub> - emission factor to the CO<sub>2</sub> emission of the A<sub>2</sub>O process.

The calculation formula for CH<sub>4</sub> generation is as follows:

$$MCH_4 = (TOW * EFCH_4) - R_0 \quad (2)$$

MCH<sub>4</sub> - CH<sub>4</sub> emissions from biological treatment process (kg)

TOW - The organic matter content in sewage during the calculation period (kg)

EFCH<sub>4</sub> - CH<sub>4</sub> emission factor to the methane emission factor of the aerobic treatment process

R<sub>0</sub> - The amount of CH<sub>4</sub> recovered during the calculation period (kg) if no sludge digestion R<sub>0</sub> = 0

The formula for calculating the amount of N<sub>2</sub>O produced is as follows:

$$MN_2O = TN * EFN_2O \quad (3)$$

MN<sub>2</sub>O - N<sub>2</sub>O emissions from biological treatment process (kg)

TN - Total nitrogen removal from sewage during calculation (kg)

EFN<sub>2</sub>O - N<sub>2</sub>O emission factor

During the operation of the sewage treatment plant, blowers, pumps, aeration equipment and other equipment consume a large amount of electricity, the carbon emissions of the purchased electricity during the production process are the indirect emissions of the sewage treatment plant, the calculation formula:

$$MCO_2 \cdot E = E \cdot EFCO_2 \cdot E \quad (4)$$

$MCO_2 \cdot E$  - Indirect CO<sub>2</sub> emissions from power consumption (kg)

$E$  - Power consumption (kWh)

$EFCO_2 \cdot E$  - The emission factor of electric energy consumption (kgCO<sub>2</sub>/kWh) Ref: Regional Grid Baseline Emission Factor

Some chemicals are used in the sewage treatment process, such as disinfectants, flocculants, etc., the formula for calculating carbon emissions of purchased chemicals:

$$MCO_2 \cdot Y = \sum Y_i \cdot EFCO_2 \cdot Y_i \quad (5)$$

$MCO_2 \cdot Y$  - Indirect CO<sub>2</sub> emissions from chemicals consumption (kg)

$Y_i$  - Consumption of chemicals  $i$  (kg)

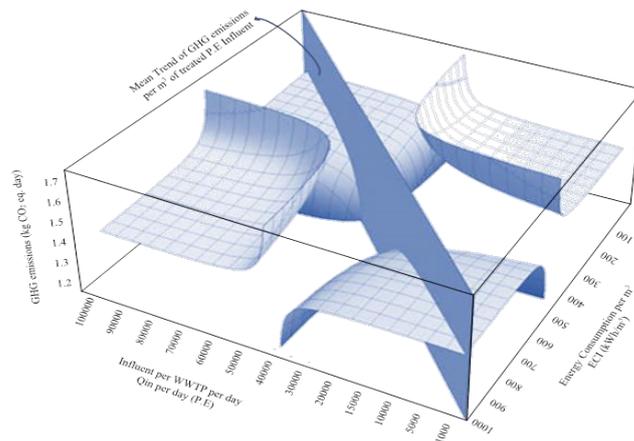
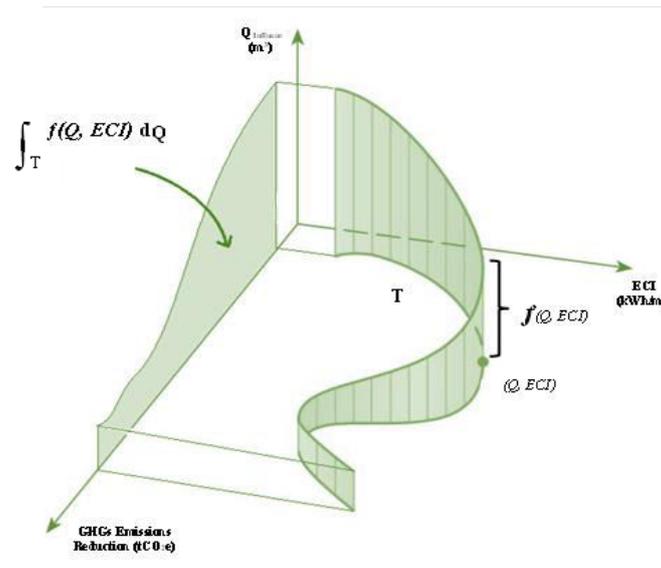
$EFCO_2 \cdot Y_i$  - The emission factor of CO<sub>2</sub> consumed by chemicals (kgCO<sub>2</sub>/kg)

Each used chemical should calculate its CO<sub>2</sub> emissions with corresponding emission coefficients. There are some other aspects of emissions, because it is difficult to obtain GHG emission factors for calculation, but should be estimated according to the actual situation of the sewage treatment plant, determine an appropriate ratio, and include it in the total GHG emissions. After a comprehensive analysis, it is determined that other emissions are 10% of the calculable emissions, which are included in the total GHG emissions of the sewage treatment plant.

A set of algorithms were formulated ruling GHGs emissions during all phases and translated into models to generate a user-friendly interface thesis subject matter. Models generated present GHGs emissions controlled and translated into main generic model to generate Software interface literature subject matter.

#### 4. RESULTS AND FURTHER IMPROVEMENTS

In this literature, a cooperative decision support system for energy saving and production in WWTPs has been presented. The characteristics of this decision support system are aligned with the original research question and with the specific objectives presented in the UNFCCC program, CDM methodology, AM0080 project. The comparison between the baseline project objectives set by CDM and the obtained results using all necessary simulations and modelling, was shared step-by-step with CDM committee and preapproved before publication. The proposed submission has been approved as a consistent model and presented to committee with a coherent structure enabling the integration of information, data gathered online, static data, and expert knowledge to provide decision making support along with the advancement and technologies adopted day by day in this field. Reaching the pre-validation phase is sufficient to positively answer the original and developed research questions.



### 4.2. Further Improvements

The set of Algorithms ruling GHGs emissions during all treatment phases, translated into Bridge Models to generate Final Model. The Final Model gathered all bridge models into Loophole Basis Control to assess all relevant projects via Software Interface. Amount of CO2 directly emitted during WWT according to the "GHG Inventory Protocol" refers to equations (1), (2), (3), (4), & (5). GHGs Emissions Reduction Final Equation collecting all Variables & Parameters: 
$$[(PE)]_{(EC,y)} = \sum_j [(EC)]_{(PJ,j,y)} \times [(EF)]_{(EF,j,y)} \times (1 + [(TDL)]_{(j,y)})$$

The data normalization of WWTP case study consists of the new perspective for this research where the application of a uniform set of measurement units and the calculation of comparable key performance indicators are the next level of automation in WWTP management and control strategy. This improvement if ever achieved, would make the calculations faster, more stable and reliable, ultimately enabling the connection of managing a larger number of WWTPs with same scale and conditions due course. An original approach based on the random forest

algorithm was developed yet to be verified before submission and integration. it is useful to mention some of the forthcoming foreseen flaws and aims at a time to stimulate a discussion within the framework of this thesis knowing that these shortages were the stimulus of Software further development through continuous publications under CDM mechanisms and sponsor upon publication: application of software at larger scale, database upscaling, IT & WWT mix of knowledge challenge integrating core algorithms with fastest response, central computed connectivity to electrical grid, sewer mains database incorporation, widening the application to more WWT typologies, and commercial enhancement to interface.

## 5. CONCLUSIONS

This literature is the output of close follow up of baseline plant despite the redundancy and time salvage waiting committee response to proceed to the next level along with potential failure in equity with potential future developments identified and approved. This study shows the possibility to build a plant generic decision support system specifically oriented to optimize the energy balance in WWTPs and define GHGs emissions with remarkable reduction on climate change grounds. The two main lanes consist of 'market-oriented' and 'research oriented' projects. The first lane is the development of existing methodologies with the aim to deliver a service to the market. The second lane consists of the development of new methodologies for decision making support. at the moment, it is possible to report a strong interest from the UNFCCC and the author to continue exploring the topic with new projects and collaborations to assure the resulting interface will be further extended to the flaws noted hereabove, knowing that the current version of the generated software delivers the required complete report for an AAS WWTP energy balance, LCA, LCC & GHGs emissions with suggestions and recommendations for predesign or rehabilitation enhancement based on solid decision making support tools.

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## AN ANALYTICAL STUDY ON THE OPEN PRISON SYSTEM IN INDIA

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### ABSTRACT

*Prison institutions serve two purposes firstly eliminating criminals and secondly reformation and rehabilitation of offenders. After-care is now generally accepted as a crucial part of penal programs. This form of correctional service provides help and guidance to the discharged inmates by counselling and monitoring, it is also known as 'released person's convalescence'.<sup>13</sup> Reformatory process has expanded in the form of open prison and open-air camps. Open jail and camps are developed in the twentieth century and are used as a device for rehabilitating offenders back to normal society by intensive after-care.*

### INTRODUCTION

The modern Anglo-American penologist has observed that inmates respond more to humane treatment and constructive rehabilitation than to punishment lacking purpose<sup>14</sup>. The recent development in the United States Correctional Services shows, beside parole, probation, intermediate sentence, juvenile court etc. Open prisons and camps have been established across the country, whereby the institution provides work to the inmates in forest, agriculture and construction side, rather than making them sit idle inside their prison cells. Such work allowed and provided by the institution gets better monetary returns. On comparison with the closed prison establishment, open prisons incur less cost and are self-sufficient.<sup>15</sup> The State can employ work, for the benefit of public at large, inmate population which in the other case would remain unproductive.

In the late nineteenth century, semi-open prison was established in Switzerland under the name Witzwill. Though open prisons in modern sense were established in 1930 and 1940 in United Kingdom and United States respectively.

### Open Prison in U.S.A and Netherlands

'Prison farms' were the initial open prison institution established in America in the 19<sup>th</sup> Century. Generally, the convicts who were on the end of their sentence were transferred to prison farms as laborers. Though these camps were in early stages regarded as 'slave camps' but after the experience gained from this issue. The State realized that most of the inmates can be trusted to work outside the guarded enclosure and under the supervision of unarmed person. However, this system of correction had the risk of inmates fleeing or escaping from work. The number of escapees was low and negligible. This form of prison was made an integral person of the correctional program in U.S.A.

Another reason for opting to evolve to open prison was, it fulfilled the purpose of reducing overcrowding in the prison. In instances of war and political upheavals, many persons are dumped into jails. Taking into the consideration of reducing overcrowding in the prison, some of the inmates were selected to be transferred to open-air camps. This model achieved economic benefits in prison expenditure and contributed substantially to lessen the burden of State.

<sup>13</sup> All India Jail Manual Committee Report (1957-59), p 70-71, para 121

<sup>14</sup> Sanford Bates, "Anglo-American Progresss in Penitentiary Affairs", (IPPF), 1964

<sup>15</sup> B. Chandra : Open Prisons (1984) p. 150

The concept of open prison in Netherlands came in the mid twentieth century, after the establishment of open prison institution in Roemond, Hoorn and Warnsveld. The institution served the traditional purpose within the standard of pre-release treatment, from prisoner's period of detention in closed institution to his return of free life.<sup>16</sup> The Central Selection Committee meets monthly and makes recommendation on the prisoners who has to be transferred to open institution. The maximum number of inmates in each institution is fixed to 25, for competent supervisors to conveniently watch and analyze inmate's individual progress. The inmates who have spent time in guarded prison during their sentence and who are recidivists can spend a maximum of 5 months in the prison and institutions are set up near the town. Inmates are allowed to interact with the members of society during their working and leisure hours. The idea behind establishing an open institution near town is that the inmates will get adequate chances to get work from private entrepreneurs. Wage for the work they do is collected and provided to the inmates, i.e. 30% of their wage is deposited and to be given during their release and 10% is given to them for their private expenses. The deposited amount plays a crucial role in an inmate's life after his stay, as he will have sufficient funds to bear his expense till he finds some work. He also has an option to invest this money to establish his work. Further, the institution provides entertainment and recreation for prisoners' leisure time which must be spent inside the institution.

### **Open Prison in India**

The concept of Open Prison Institution in pre-independence period did not achieve much success due to period of various wars and development of rights of prisoners of war (POW) in various jail committee report which pointed towards the required humane treatment and conditions of prisoners. It was observed by Sir Alex Cadrew that a critical part of person's life is not going to the prison but when he comes out of it. Inmate loses his social standing and character, which results in difficulty to adapt to the normal life in the society. The period of post-independence has seen radical changes. Upon the report submitted by Sir Walter Reckless, U.N. Technical Expert during his stay in 1952, All India Jail Committee was appointed in 1956-1957. The committee worked for 3 years on the report and established a new framework of correctional service. One of the recommendations was to establish an open prison for rehabilitation of inmates. Allowing the inmates to work in an open environment and restoring their self-respect and self-confidence. Open prison is only available to convicted person.

### **Open Prison in Various States of India**

In 1949, State of Uttar Pradesh became the first state to establish open camps which was attached to Model Prison in Lucknow. Followed by Mauli Ali Agricultural Colony in Andhra Pradesh and part of Yarvada in Maharashtra. This moves towards rehabilitation of inmates in the above States motivated the other States to establish open air camps for inmate's rehabilitation by giving them work on agricultural farms, construction site and industries as labour. Presently, there exist 86 operational open prisons spread across India, Rajasthan being on top having 39 open prisons<sup>17</sup>. Rajasthan also tops in total no. jails, the number being one hundred and forty four with an occupancy rate of 94.1%. The institution lacks the scope and nature of open prison as there exists a confusion to whether to treat open prison as places of employment or integral part of pre-release program of the convict. Open prisons are also the places for such convicts who, if freedom and responsibility is given to them, may reform themselves to fit for society and lead a normal life away from crime, after they get release from the correctional institutions. Majorly, Open prison institutions differ in two ways from conventional prison, firstly, absence of maximum security and secondly greater contact with

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<sup>16</sup> Ernest A.M. Lamber, "Mr. Prisoner goes to Town", (1964) p. 126.

<sup>17</sup> Crime in 2019, NCRB

society. The Supreme Court also praised the establishment of open prison in *Dharmbir v. State of Uttar Pradesh*,<sup>18</sup> while directing the State Govt. to transfer two young offenders in their early twenties to open prison in Uttar Pradesh. The Court observed that the open prison acts as shield to protect the young offenders from the known wrongdoing in the conventional prison.

The Supreme Court stated that the open prison plays a crucial role in reformation scheme and is recognized as one of the requirements of prison management.<sup>19</sup> Open air camps also works on the philosophy that the convict after their release, will not be indulged into crime. In order to encourage the prisoners, they are given incentives in the form of training in agriculture and horticulture etcetera. Facilities like games, sports and other recreational facilities develop a sense of discipline and social responsibility in the prisoners. Daily schedules, prayers and work give them spiritual strength and a practice of preparing them to live back in society. The Court also observed that though problems do occur in open prison, but nature of problems is basically management and can be resolved conveniently. It is thus essential and for the benefit of society that the inmate when coming out of the prison does not become a hardened criminal but a reformed person who is able to understand his social responsibility and has moved away from the life of crime.

Indian prison administration and correctional services has seen radical changes in development open prison and changes in correctional penology towards rehabilitation of inmates. Changes and development made in this regard are worth appreciating for the purpose of usefulness of open prison. The author lists down some of the leading open prison camps and institution –

**a. Sampurnanand Agriculture-cum-Industrial Camp, Nainital, Uttrakhand**

Sampurnanand Open prison was started in February 1960 in Tarai region near Sitarganj town, Nainital, Uttrakhand. This institution was recognized as one of the largest open prisons in the world, spread over 7 villages i.e., Kalyanpur, Merabararara, Prahlad Pulsiya, Lalarpatti, Barn, Lalarkhas and Rudrapur. In the initial stage, camp had the status of District Jail which was raised to the status of Central Jail. The land area of the camp was spread over 5965 acres and 2000 acres was given to the Government for purpose of rehabilitation of displaced person. The above area was forest land which was converted to agricultural land by the inmates. Though there was lack of knowledge and training for the inmates on agricultural work, a joint venture was started in partnership with the Pandit Govind Ballabh Pant Agricultural University in 1975. The University worked for 12 years giving training in carpentry, masonry work, dairy farming, poultry farming, sheep-rearing etcetera. The partnership made a substantial growth in agriculture work for inmates and made profit for open prison.

Long-term inmates were brought in the camp for agricultural farms and some of them were also provided work in cottage industries in field of spinning and weaving. The inmates were given daily earning for their work and the institution accommodated many long-term inmates as wage earners. The institution was functioning smoothly, and convicts rarely made any escapes, the institution made more emphasis on character building of the inmates for them to become law-abiding citizen on their return to society. In the initial stage the eligibility criteria for a prisoner to be selected in Satyaanad Camp was he shall be a casual prisoner and habitual emerging from State of Uttar Pradesh, he shall not have more than one previous conviction, the inmate shall be in age group of 21 – 50 years and sentenced for 1 year or more of imprisonment with minimum remaining period of 6 month of imprisonment after spending 1/8<sup>th</sup> period of sentence inclusive

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<sup>18</sup> *Dharmbir v. State of Uttar Pradesh*, (1979) 3 SCC 645

<sup>19</sup> *Ramamurthy v State of Karnataka*, (1997) 2 SCC 642 (659) para 50

of remission. The institution was highly selective and only 500 prisoners were selected during the initial period. The ineligible prisoner for open prison included, returnees and ex-convict, political offender and person committing offences under Indian Penal Code.<sup>20</sup>

The daily schedule for prisoners inside the open prison starts with mass prayers in the morning, followed by drill and after which the inmates must report to their work site. During their working hours, they are reminded of the benefits of good behavior, honesty, sincerity to maintain the reputation and name of the institution through large speakers and amplifiers installed. This brings a physiological change in the minds of the inmates to appreciate for a good and healthy life. On occasions of any festivals or days of national importance, special programs are arranged and special food is made to mark the occasion. Another remarkable characteristic of the open prison was that replacement of names given to officials and prisoners i.e. the names of warden, head warden, deputy jailor and jailor were replaced by supervisor, head supervisor, welfare officer and chief welfare officer respectively. Even in the case of inmates, convict was replaced by 'mazdoor'. The object of the institution was that inmates are made to forget about their experience in prison, to resume their normal life in society without the stigma. Some additional features of the institutions –

- (i) No attendance or head count during the night. Only once when they report for their work.
- (ii) Inmates were allowed to meet their friends and relatives without any restrictions and were eligible for periodic home-leave.
- (iii) For any breach of institution rules or discipline, normal punishment was given in the form of fine to be levied on their wage.
- (iv) 'Swayam Rakshaks' was a group formed by an institution where inmates volunteered to guard the prison day and night without any security arrangements.
- (v) The inmates were given the name of 'shiv-niwasi' to remove the stigma of being called prisoner.

There are various open prisons established in India but the number of them are limited to 86 out of 1350 total jails and it has occupancy rate of 70.67%<sup>21</sup>. In spite of few shortcomings in open prison, it shall be agreed that open prison institution have become part and parcel of current prison system. The functioning of open prisons has beyond reasonable doubt proved that 'help' and not 'hate' shall be the guiding principle for modern prison administration. Simultaneously, it reflects long term imprisonment as a procedure for punishment. The State should take into consideration the directions issued by the Supreme Court in *Ranamurthy's* case by establishing open prison camps in every district. The ignorance of state government has led to overcrowding of inmates in prisons (Central and District Jail), which can result in more risk of spreading of disease, surveillance and disorder within inmates. There should be promotion of community service, probation of offenders, parole and indeterminate and suspended sentences. The other factors to be kept in mind regarding the prisoners are physiological effects and mental health, human dignity and right to healthy environment, prisoners diet, overcrowding and discipline, prevention of HIV/Aids in prison and crime prevention and treatment.

In order to achieve a crime-free society, different theories of inflicting punishment have evolved. It is a fact that crime rates are increasing in countries, which implies that there is a failure of theories or practical or both for prevention of crime and moving towards a crime-free

<sup>20</sup> Sections 153-A, 216-A, 231, 232, 295, 298, 303, 309, 328, 364, 386, 389, 396, 417 and 489-A, Indian Penal Code.

<sup>21</sup> Crime in India, 2019.

society. There are 3 major theories on rehabilitation i.e., Deterrence, Retribution, Incapacitation. The reforms are suggested for placing the convict back in society and preventing him from committing any crime in future. The ideas of mental health and psychological effects have also shown concern towards rehabilitation of the convict. Correctional penology has developed to put punishment with correctional efforts but there are embedded implementation fallacies. The reform in the subject matter has not been changed for many years and calls for special attention from the government and the prison authorities.

## ABOUT THE EDITOR



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## ABOUT THE BOOK

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