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(Digitalization, Innovation & Endurable Transformation)

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<p>Unitedworld School of Business presents DIET National Conference on Emerging Trends: A Road to DIET (Digitalization, Innovation & Endurable Transformation) (7th - 8th April, 2023)</p>			





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Role of Data Technologies in Business Environment

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Abstract:

In the present scenario, data technologies have become an integral part of businesses to better understand their customers and to take faster decisions. Big data analytics is playing a vital role to analyse a vast amount of data, transforming the business model thereby improving operations and efficiency. The enormous availability of data from various sources like social media activities, website traffic and customer transactions will have a great impact on business operations to gain insights into customer behaviour, identify patterns and trends, and make better predictions on future performance. A large and voluminous amount of unstructured data is subjected to a lot of data analytics and visualisation so that sense emerges out of it. In order to be able to take appropriate decisions, data analytics subjects the data to proper extraction and categorisation so that meaningful patterns, relationships, connections and other relevant insights evolve. By the process of data visualisation, one gets the ability to manage, organise and present the data collected from multiple sources. Then one can arrange the data in any graphical representation and take appropriate decisions in near real time. Today, the main challenge is the need to store, retrieve and analyse the voluminous multi-source streaming data. However, with the advent of powerful analytic tools, professionals are able to handle this challenge more effectively than in the past.

Due to fast proliferation of data technologies, it is essential that the companies need to develop new skills and techniques to analyse large amount of data into valuable information, analyse the future trends and patterns. The challenge for businesses is that the data which is either in structured or unstructured form needs to be analysed to gain a deeper understanding



into the operations and customers. Machine learning and artificial intelligence will also play a key role in the business environment as AI-powered chatbots can provide customers with 24/7 support. This paper discusses data technologies and their impact on business environment, which will shape the way companies operate in the future.

Keywords: Data Technologies, Data Mining, Data Analytics, Artificial Intelligence, Business Operations

Introduction

Data Technologies is an emerging technology and has brought a revolution in which way businesses operate. With the emergence of Big Data analytics, Artificial Intelligence, Machine Learning, businesses now have the ability to gather and analyze large amounts of data, gain insights into customer behaviour to take better decisions. Every business, small or big, needs valuable data and data-driven businesses are the future in the current time span of big data. It has transformed the way businesses operate by improving their operations and enhance customer experience. The benefits and challenges of data technologies are tremendous and there is abundant opportunity for businesses to use data to optimise operations, identify new opportunities and innovate their products and services.

Big data plays a very important role in understanding customers' needs and their preferences. By analyzing the usage data of customers, businesses can understand customer sentiment and can build digital solutions in ensuring better service and quality experience which will ultimately increase their revenue.

Data technology

Data technology is mainly used for managing big data sets, providing solutions for data management and data integration from multiple sources to realise new business or derive analytical insights from the gathered information [1]. By leveraging Big data, Business Intelligence and analytics, Cloud computing, IoT, Artificial Intelligence and Machine Learning, Blockchain, and VR/AR technologies, businesses can unlock the full potential of their data. As these technologies are constantly evolving, it will create new opportunities for businesses to innovate and improve their operations.



With the development of apps, increase in social media platforms with manpower and commerce going online, there has been a big increase in data. When we access a website, we leave a digital trail, this data can be used to understand consumer behavior and trends. It can help business to understand which products are popular, how customers use their products, identify areas for improvement and potential for new products. Some of the operational big data technologies are online booking system i.e. booking for trains, flights, buses, movies; Shopping on e-commerce websites such as Amazon, Myntra, Ajoio, etc.; Online data from Social networking suites such as Facebook, WhatsApp, Instagram, etc.

Data Technology Tools:

There are several data analytics tools that businesses can use to gather insights and take data-driven decisions. Some popular ones are:

1. SQL (Structured Query Language): SQL is a language used to handle relational databases. It is used to extract, manipulate, and modify data ingested into a database.
2. Python: This is a versatile programming language that is finding increased utility in data science and machine learning. It offers a range of data analysis libraries and visualization tools such as Matplotlib.
3. R: This is a coding language with an environment for doing statistical analysis and graphical outputs. It is often used in data analysis, data visualization, and machine learning.
4. Tableau: It is a powerful tool for data visualization that enables businesses to turn raw data into interactive visualizations and dashboards.
5. Excel: Excel is used for data analysis and management and allows to create variety of graphs and charts.
6. Power BI: This is developed by Microsoft as a business analytic service, Power BI provides very interactive visualizations and capabilities for business intelligence.
7. Google Analytics: This is a web analytics tool for businesses to monitor website traffic and user behavior. It is often used for digital marketing and website optimization.



Challenges of Data Technologies

Despite the numerous benefits of data technologies, there are also several challenges that businesses must overcome when implementing these technologies in their operations.

1. **Data Security:** Data security is the biggest challenge due to the increasing amount of data that is collected and stored. Businesses must ensure that their data is protected from cyber threats and attacks.
2. **Skilled Manpower:** To manage and analyse the vast amount of data skilled data professionals are required.
3. **Data quality and Accuracy:** Data technologies should ensure that data quality is good otherwise it can lead to wrong analysis and decision making.
4. **Data Privacy:** As a large amount of personal data is often collected and used by businesses, the privacy and protection of such data is a matter of concern.
5. **Data Integration:** As businesses collect data from multiple sources, integrating data can be complex and time-consuming.

Data Technologies in Business Environment

The role of data technologies in the business environment has grown exponentially in recent years. Businesses need not necessarily be concerned with enterprises or commercial entities. Data technologies can even be used by health care, educational institutes, transport and banking to improve the way the clients are serviced and ingest more tailor-made solutions for the different categories of customers. Businesses now can gather and analyse data from a multiplicity of sources, including social media, customer interactions, and IoT devices. By analyzing data, businesses gather information regarding customer behavior, market trends and efficiency of operations. This can help them make better informed decisions that are based on objective information rather than on assumptions. Facial recognition and interpretation also is a part of data technology which gathers and processes information.

Businesses use data technologies in the following ways:



- 1. Data collection and storage:** With the help of data technologies, businesses can gather and store vast amounts of unstructured and structured data from multiple sources like customer transactions, social media, and website visits. Large businesses use Cloud Computing to store large amount of data on the Cloud, thus ensuring there are no data loss and data backups are automated.
- 2. Data Mining and Analytics:** Data mining is used in business operations for extracting useful information from large datasets. By collecting and analysing customer data, businesses can identify trends, preferences, and habits, which can help them to develop better marketing strategies, able to meet customer needs for improved service and so customers get a higher quality experience.

Business Intelligence and analytics tools are used to extract valuable insights from data, enabling businesses to make informed decisions. Retailers can use BI tools to analyze customer data to identify their buying habits and preferences. This information can improve customer loyalty by using to personalize marketing efforts. Similarly, manufacturers can use BI tools to analyze production data to identify bottlenecks and improve their production. For example, a study by Accenture found that companies that invest in big data analytics can reduce their operational costs by up to 30% [2].

Data Analytics tools are used by Amazon and provide accurate product recommendations using data from customers' past purchases. Amazon improves the shopping experience of customers and thus boosts its sales by efficiently collecting individual customer's preferences of shopping and detailed choices.

Similarly, Netflix streaming service collects data related to customer behaviour and the type of content i.e. movies, shows, date, time and geographic location etc. It gathers data on the viewing habits i.e. when a viewer pauses and resumes content. With data of viewer they manage to generate recommendation algorithm to enhance the watching experience of the viewer. Google and Facebook have been able to use data analytics to track user behaviour and deliver more targeted advertising.



3. **Business intelligence and reporting:** Data visualization plays a critical role in the business environment by making sense of complex data sets in a visually appealing way. Visualization tools can be used to create real-time dashboards that track key performance indicators (KPIs) and metrics, helping businesses to monitor their performance and track progress towards their goals and make data-driven decisions.
5. **Internet of Things (IoT):** Internet of Things technology is used to connect devices and sensors to the Internet, allowing them to collect and share data. IoT technology enables businesses to monitor their operations and make data-driven decisions in real-time. For instance, logistics companies use IoT sensors to track the location of their vehicles and monitor their performance. Similarly, manufacturers use IoT based sensors to observe the performance of equipment and identify potential issues.
6. **Artificial Intelligence (AI) and Machine Learning (ML):** Artificial Intelligence and Machine Learning technologies are used to automate routine tasks such as data entry thus helps to save employees' time so that they can focus on higher-value tasks. AI and ML technologies use algorithms and statistical models to analyze data, enabling businesses to become more efficient, productive, and customer-focused. Applications of AI include the advanced web search engines (e.g., Google, Bing), recommendation systems (utilised by Amazon, YouTube and Netflix), understanding human spoken words (like Alexa & Siri). AI can be used to analyze customer data and behaviour to create more targeted marketing campaigns. It can also be used to personalize advertising and offer recommendations based on individual preferences.

AI-powered chatbots and virtual assistants tools are becoming increasingly popular for businesses as they provide 24x7 customer service, catering to customer queries and near real time issue resolution. They help to improve customer satisfaction, reduce response time and offer personalized product recommendations. They use natural language processing (NLP) to understand and interpret human input, and generate responses based on pre-programmed rules or machine learning algorithms.



Today machine learning has revolutionised the methods with which companies plan and execute their business from voice – empowered personal assistants viz. Siri, Alexa etc. to deeper underlying and fundamental technologies like pattern analysis, suggestive searches, customer identification, etc. The powerful and predictive capabilities of AI and MI are used by businesses and they are ready to invest heavily on voice assistants, chatbots and other intelligent business processes. Our own Digilocker and UPI transactions are AI based.

7. **Blockchain technology:** Blockchain technology enables businesses to create secure but transparent transactions and remove the dependency on the intermediaries. For instance, supply chain companies can use blockchain technology to track the movement of goods from their origin to their destination.
8. **Virtual and Augmented Reality (VR/AR):** Virtual and Augmented Reality technologies enable businesses to create virtual environments that can be used for training, marketing, and customer engagement. For instance, retailers can use VR and AR technology to create virtual stores that enable customers to shop from anywhere in the world. Similarly, manufacturers can use VR and AR technology to create virtual training programs that enable employees to learn how to operate complex equipment.

Data technologies are used in a business environment as below:

1. **Customer Segmentation:** By analyzing customer data, businesses can segment their customer base into distinct groups based on their demographics, behavior, and preferences.
2. **Fraud Detection:** Data mining algorithms can be used to deduct fraudulent activities such as credit card fraud and identity theft. This helps businesses to minimize losses and improve customer trust.
3. **Forecasting Demand:** Analyzing historical sales data, businesses can forecast demand for their products or services. This helps them to optimize their inventory, production, and pricing strategies.



4. **Sentiment Analysis:** By analyzing customer feedback on social media and other platforms, businesses can identify the sentiment towards their brand and products. This helps them to improve their customer experience and reputation.
5. **Supply Chain Optimization:** Businesses use machine learning algorithms to automate many of the manual processes involved in supply chain management, such as inventory management, order processing, and shipping. This helps them to optimize their supply chain operations, improves efficiency, reduce costs and improve customer satisfaction.
6. **Artificial Intelligence** is being used in supply chain management to optimize processes, reduce costs, and improve customer service. With the help of real-time data, businesses can identify bottlenecks in their supply chain, optimize production processes, and reduce waste. For instance, companies like Walmart have been able to optimize their supply chain management by using real-time data to track inventory levels, monitor delivery times, and streamline their logistics operations. Blockchain technology is being used to improve supply chain transparency and traceability and ensures that their goods are produced and transported in a responsible and sustainable manner.
7. **Predictive analytics:** Predictive analysis is increasingly being used by businesses to improve decision-making, optimize operations, and drive growth. In a business environment, historical data can be used to forecast demand or trends, identify potential market opportunities and mitigate risk.
8. **Personalization:** By analyzing customer data, businesses can tailor their products or services to meet individual customer needs, preferences, and behaviours. This, in turn, can help businesses to improve customer satisfaction and increase customer loyalty. For instance, companies like Spotify and Pandora have been able to personalize their music streaming services by using data analytics to recommend songs and playlists based on each user's listening habits.



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Conclusion

Data technologies have transformed the way businesses operate and it is crucial for the organizations to identify the right technology for their business, to meet the upcoming challenges and thrive in the new digital economy. AI/ML, cloud and data analytics are the technologies that have helped multiple business problems for customers as well as sellers. The ability to gather and analyse vast amounts of data in real-time has enabled businesses to gain insights into customer behaviour, improve operational efficiency, personalize products and services, and make better decisions. However, these technologies also come with challenges, including data security, shortage of skilled professionals, data quality, and ethical concerns. As businesses continue to adopt data technologies, they must be aware of these challenges and invest in the necessary infrastructure, processes and training to overcome them.



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References:

1. en.m.wikipedia.org
2. Source: Accenture, "Big Success with Big Data")
3. <https://www.gartner.com/Big-data>
4. McKinsey & Company. (2018). Artificial intelligence in supply chain management: A game-changer. Retrieved from <https://www.mckinsey.com/business-functions/operations/our-insights/artificial-intelligence-in-supply-chain-management-a-game-changer>
5. Chen, Y., & Wu, C. (2019). Forecasting demand for new products using data mining techniques. *Technological Forecasting and Social Change*, 142, 341-352.
6. Chopra, S., & Meindl, P. (2016). *Supply chain management: Strategy, planning, and operation*. Pearson.
7. Kotler, P., Armstrong, G., Wong, V., & Saunders, J. (2019). *Principles of marketing*. Pearson
8. Patnaik, Rachna, *Data Analytics and Visualization in Libraries*, 12th International, CALIBER, 2019



A MULTI-CRITERIA DECISION-MAKING APPROACH TO TRANSPORT AND LOGISTICS BASED ON BUSINESS INTELLIGENCE

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Abstract:

In an ever-evolving world, transport and logistics businesses are facing a variety of challenges. From changing customer expectations to competition from large e-commerce players, the industry is being pushed to its limits. The current study can make revolutionize the industry which has the great potentiality for business with BI. Fortunately, business intelligence can give transport and logistics companies the necessary insights they need to thrive. In this article, we have explored how business intelligence (BI) can help transport and logistics companies stay competitive in today's market. Study objectives include identifying ways to streamline transportation and logistics operations, reduce costs, and enhance overall efficiency. The study evaluates the BI technologies available, as well as how they can



improve operations, reduce costs, and increase customer satisfaction. Business intelligence is a tool that has become invaluable in many industries, and transport and logistics are no exception. Business intelligence allows companies to collect data on their operations, analyze it, and gain insights into their operations in order to make better decisions. This study will explore how BI can be used in the industry to optimize operations, reduce costs, and improve customer service. The study findings indicate that the Business intelligence tools give transport and logistics companies the ability to see their operations in a new light, understand their customers better, and make informed decisions that drive to succeed. A data quality issue and high implementation costs are two major factors that pose challenges when using business intelligence (BI) tools, since accurate and reliable data is essential for generating insightful insights and making informed decisions.

Keywords: MCDM- Multi-Criteria Decision making, Transport, Logistics, Business Intelligence, Trends

INTRODUCTION

Transportation and logistics is a vast and complex industry, made up of many different moving parts. Business intelligence (BI) helps companies make sense of all the data generated by these moving parts, so that they can make informed decisions about how to optimize their operations. BI tools collect and analyze data from multiple sources, including transportation management systems (TMS), GPS tracking devices, warehouse management systems (WMS), and more. This data is then used to generate reports and dashboards that provide insights into things like fleet utilization, asset utilization, delivery times, and more. By understanding what's happening within their transportation and logistics operations, companies can make changes to improve efficiency and effectiveness. Many BI platforms also include features like predictive analytics and machine learning, which can help companies anticipate future trends and needs. This can be especially helpful in the ever-changing world of transportation and logistics, where planning for future demand is essential to success.



BI In Transport and Logistics

(Balint & Toma, 2015) mentioned the development of new intelligent transport systems is vital for the growth and evolution of the economy because several companies from around the world have to transfer goods between them, communicate and establish new connections. Business Intelligence (BI) has had a significant impact on the transport and logistics sector in global trade and international business. Business intelligence (BI) is a technology-driven process for improving business performance by making better decisions. BI encompasses a wide variety of tools and techniques to collect, store, access, analyze, and share data to support decision-making. In the transport and logistics industry, BI can be used to improve operational efficiency, optimize asset utilization, and reduce costs. For example, BI can be used to track and analyze trends in shipments, traffic patterns, fuel consumption, and maintenance costs. By understanding these trends, transport and logistics companies can make adjustments to their operations to improve performance and save money.

BI can be used to monitor customer satisfaction levels and identify potential areas of improvement. For instance, analyzing customer feedback data can help transport and logistics companies identify issues with specific routes or services. This information can then be used to make changes that improve the customer experience and increase satisfaction levels.

Benefits of BI in Transport and Logistics

(Grabińska & Ziora, 2019) said that the application of BI systems in the field of logistics brings many benefits for the company as the improvement of the whole decision-making process which is related to logistics in the areas of the supply chain activities. There are other benefits, which includes improvement of performance in different areas of business activity. In the fast-paced and constantly changing world of transport and logistics, having a competitive edge can make all the difference. Business intelligence (BI) tools can give your company that edge, by providing insights into your operations that can help you optimize performance, improve customer service, and make better decisions. BI tools can help you track and analyze data on everything from shipment volumes and routes to delivery times and fuel consumption. This information can be used to identify areas where your company is excelling and areas where there is room for improvement. By understanding your transport



and logistics operations at a granular level, you can make informed decisions that will help your business run more efficiently and effectively.

Additionally, BI tools can help you monitor trends in the transport and logistics industry as a whole. This information can be used to anticipate changes in demand or identify new opportunities for growth. With BI on your side, you'll always have an up-to-date picture of the transport and logistics landscape, so you can adjust your operations accordingly. In short, business intelligence tools give transport and logistics companies the ability to see their operations in a new light, understand their customers better, and make informed decisions that drive success.

Application of Business Intelligence In Transport and Logistics

(BI) is a term that describes the process of turning data into insights. By understanding how BI can be used in transport and logistics, businesses can make better decisions about everything from route planning to fleet management. There are many different ways that BI can be used in transport and logistics. One common way is to use BI to track and analyze vehicle maintenance data. This information can be used to help identify trends and improve preventive maintenance schedules. Additionally, GPS data can be used to monitor fleet performance and optimize routes. Another way that BI can be used in transport and logistics is through customer segmentation. By understanding who their customers are and what they need, businesses can create targeted marketing campaigns and improve the overall customer experience. Additionally, BI can be used to track shipping data and identify areas for improvement.

Ultimately, the goal of using BI in transport and logistics is to improve efficiency, save money, and provide a better service for customers. When done correctly, BI can give businesses a competitive edge in an increasingly complex and competitive market.

Key Trends in Digital Transformation of Logistics

The trends in the business intelligence of transport and logistics are driven by the need to manage and analyze large amounts of data, improve efficiency, and optimize the supply chain. As technology continues to evolve, new trends and technologies have emerged,



enabling logistics managers to gain even deeper insights into their operations and make better decisions.

- 1 Information and communication technologies are being used in the field of logistics to reduce costs and increase efficiency from both a provider and consumer perspective.
- 2 Digital platforms are being developed in order to increase the speed of cargo delivery and to expand the scope of activities.
- 3 Digital tools are introduced at all stages of the service provision process, including unmanned drones, robotic equipment, etc.
- 4 Cloud-based BI tools can be accessed from anywhere, making it easier for logistics managers to collaborate and share insights. By expanding the practice of sharing warehouses and vehicles among various participants in the logistics services market, it is possible to increase the efficiency of each party and that of the market. Under the pressure of new technology, the logistics sector can revolutionize dramatically. AI-powered systems can help optimize shipping routes, predict demand, and monitor shipments in real-time.
- 5 Predictive analytics is becoming increasingly important in the transport and logistics industry, enabling logistics managers to anticipate demand, optimize inventory levels, and plan for future transportation needs. The analysis of Big Data sets opens truly unlimited possibilities in logistics sector. In order to improve the level of service and modernize the effectiveness of providers, this will serve as a push towards modernization.

Aim of the Study

The aims of the study is to identify the opportunities to streamline transport and logistics operations, reduce costs, and improve overall efficiency. The study seeks to provide insights into the use of multi-criteria decision-making approaches to improve transport and logistics operations. The study also aims to provide recommendations for decision-makers in the transport and logistics sector on how to leverage business intelligence techniques to improve their operations. It seeks to identify opportunities for collaboration and information sharing among different stakeholders in the Transport and logistics sector to promote the adoption of data-driven decision-making processes.



Objectives

- 1) To understand how business intelligence techniques can be utilized to optimize transport and logistics operations.
- 2) To evaluate the effectiveness of different business intelligence techniques and tools and identify best practices that can be adopted by organizations in the transport and logistics sector.

Research Questions

- 1) What does business intelligence mean for the transport and logistics industry?
- 2) How BI can be used across all aspects of the industry from fleet management to warehousing and delivery?

LITERATURE REVIEW

According to (Zhao & Huang, 2009) the development of E-Commerce depends on the different levels of logistics services. This is mainly due to the strong ability on dealing with data, BI has taken an vital role in logistics management. (Nwaubani, 2011) mentioned BI can aid in the standardization and distribution of goods. Logistics as well as play a critical role in the supply chain-thereby confronting many strategic partners which can contribute a central role in the maximum optimization of supply chain by ensuring consistently competitive advantages. The research of (Liu et al., 2017) mentioned that the application of BI system, can propose a layered structure of collaborative BI system for intelligent management in the hospital logistics, create a data warehouse for the collaborative BI system, can improve data mining techniques like supporting vector machines and swarm intelligence firefly algorithm to solve main challenges in hospital logistics collaborative BI system, researched the collaborative techniques oriented to data and business process optimization to benefit the business processes of hospital logistics management. The study conducted by (Jin & Kim, 2018) mention that study has a positive long-run impact by informing companies in the logistics industry, also in other industries with the possibility of increasing the efficiency and productivity of their existing infrastructure without additional investments. (Ceyhun,



2020) said that the maritime and logistics sector moves toward fully digitalisation. For leading shipping businesses in commercial logistics and maritime nations, AI has become a significant source of rivalry. Although though using artificial intelligence takes a significant upfront investment, in the long run it is profitable because costs are reduced.

Furthermore, it was found in the research (Zhou et al., 2021) that the growth of e-commerce necessitated the establishment of a regional hub for a large-scale logistics company in order to guarantee the regular creation and delivery of a large number of packages into various delivery vehicles by dawn and by noon. As a result, the effectiveness of the sorting process directly affects the level of service the business offers. The study is a fantastic illustration of how developing technologies are being used in the logistics sector. Large firms employ comprehensive BI systems to assist strategic management choices, according to (Iliashenko et al., 2022), which connects multiple sources of information. These digital systems allow for the prediction and modelling of numerous scenarios, aiding in decision-making, in addition to offering analysis of large volumes of data. Digital transport and logistics organisations can overcome a number of significant obstacles with the aid of BI systems.

METHODOLOGY

The study uses a mixed research method where the core purpose of mixed methods is that the use of quantitative and qualitative approaches in combination provides a better understanding of research problems and complex phenomena than either approach alone. The research methodology for the study is based on two main approaches, theoretical and empirical, thus it consists of two stages. First, we used a theoretical approach to gain in-depth knowledge about the main trends in new technologies and how BI are impacting the development of transport and logistics in the global trade and international business.

The most relevant articles in the scientific literature is synthesized with the essential information about the new technologies like big data, cloud computing, Business Intelligence are taken and then it is analyzed. The second part of our research consisted of conducting an online survey using a convenience sampling on 50 people. Our questionnaire is structured in two main parts: the first one consists of questions aimed at collecting basic data about the demographic and company and the second part with detailed examining of implementing the



business intelligence in transport and logistics. An in-depth case study method also chosen for the study as the study required a mixed approach of methods to get the results of the questions.

In-depth Research through Case Studies

Business intelligence (BI) is critical for transport and logistics companies in order to maintain efficient operations and gain a competitive advantage. BI can help organizations to track and monitor KPIs, understand trends, improve decision making and forecast demand.

There are many different ways in which BI can be used in transport and logistics, and various case studies demonstrate the benefits that can be achieved. For example, UPS has used BI to streamline its package delivery operations, DHL has used it to optimize its supply chain management, and FedEx has used it to improve its customer service. BI can therefore provide significant benefits for transport and logistics companies of all sizes.

The transport and logistics sector is under immense pressure to deliver goods and services on time, and at a reasonable cost. In order to survive and thrive, businesses in this sector must make use of all the available data to make informed decisions. This is where business intelligence comes in. Business intelligence tools can help businesses in the transport and logistics sector track their performance, identify areas of improvement, and benchmark themselves against their competitors. By making use of data from various sources, businesses can gain valuable insights into their operations and make better-informed decisions.

There are many different business intelligence tools available on the market, but not all of them are suitable for the transport and logistics sector. To find the right tool for your business, you need to understand your specific needs and requirements. Only then can you identify the features that are most important to you. Once you have selected a few potential solutions, it is important to trial them out before making a final decision. This will allow you to see how well they fit into your existing systems and processes, and whether they offer the features and functionality you require.

ANALYSIS AND FINDINGS

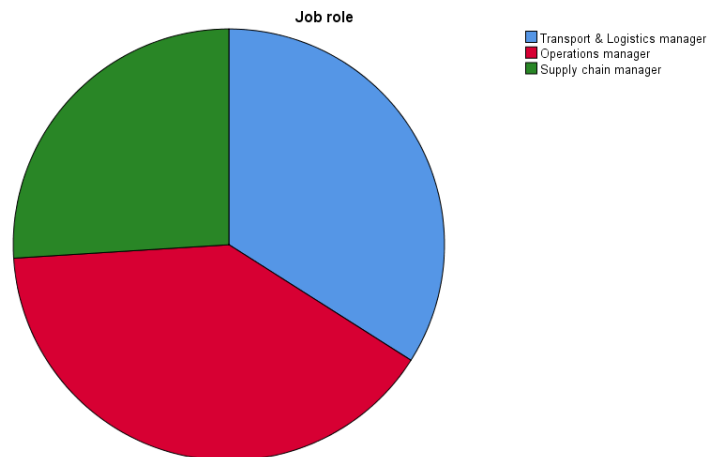


Fig. 1: Frequency Distribution of Respondents According to Job Role

This figure presents the frequency and percentage of job roles in a sample of 50 individuals. There are three job roles presented in this table: Transport & Logistics manager, Operations manager, and Supply chain manager. Out of the 50 respondents, 17 (or 34%) identified as Transport & Logistics managers, 20 (or 40%) identified as Operations managers, and 13 (or 26%) identified as Supply chain managers. The valid percent refers to the percentage of responses that were valid and were included in the analysis.

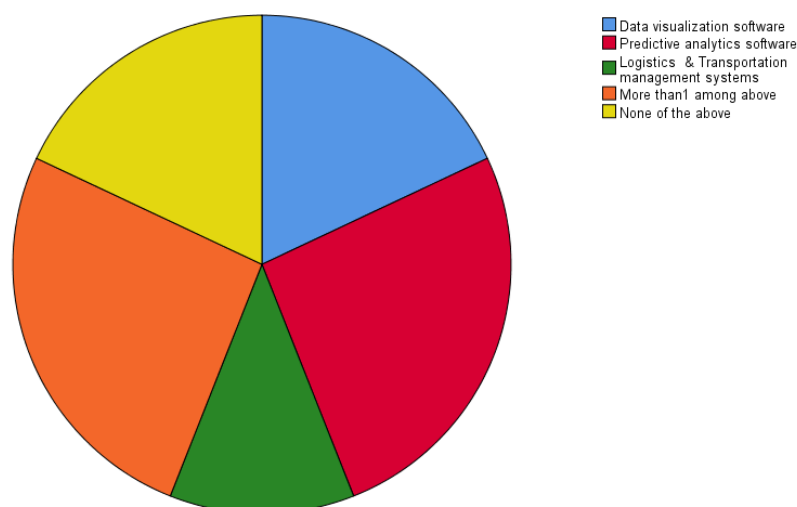


Fig. 2: Types of BI tools used by respondents

This figure 2 presents the frequency and percentage of responses to a question asking what specific business intelligence tools individuals have used or are currently using in a sample of 50 individuals. There are five categories of BI tools presented in this table: data visualization software, predictive analytics software, logistics and transportation management systems, more than one of the above, and none of the above. Out of the 50 individuals, 9 (or 18%) reported using data visualization software, 13 (or 26%) reported using predictive analytics software, and 6 (or 12%) reported using logistics and transportation management systems. Additionally, 13 (or 26%) reported using more than one of the above tools. Meanwhile, 9 (or 18%) reported not using any of the above tools. The valid percent refers to the percentage of responses that were valid and were included in the analysis.

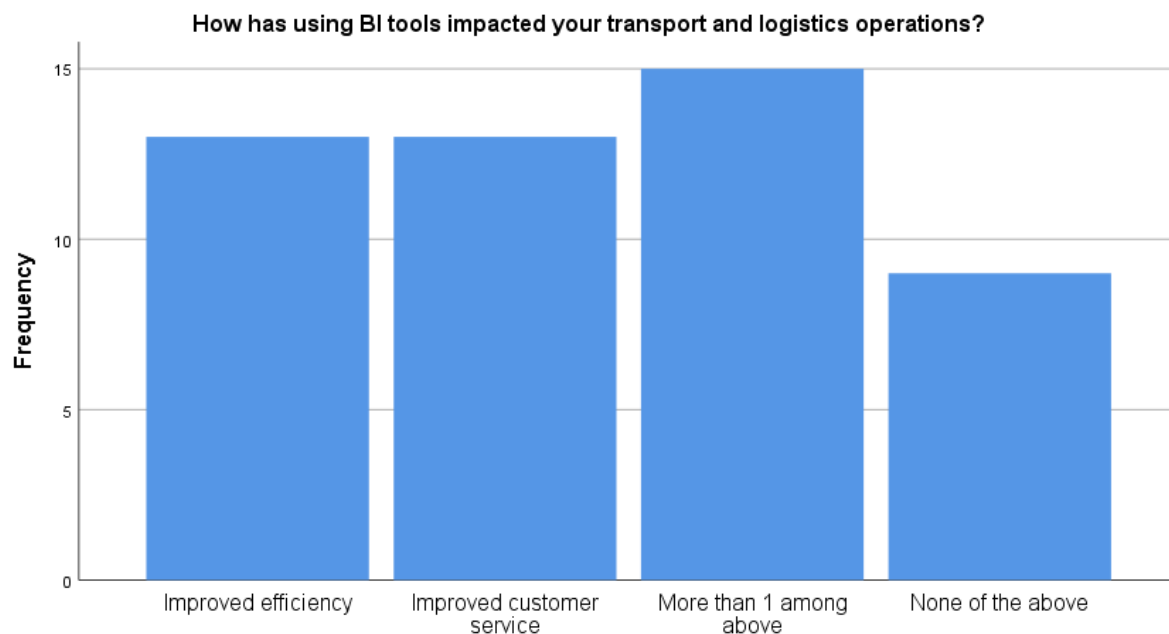


Fig. 3: Impact of BI tools usage in the Business

This figure 3 presents the frequency and percentage of responses to a question about the impact of using business intelligence (BI) tools on transport and logistics operations. The responses are grouped into four categories: improved efficiency, improved customer service, more than one of the above, and none of the above.

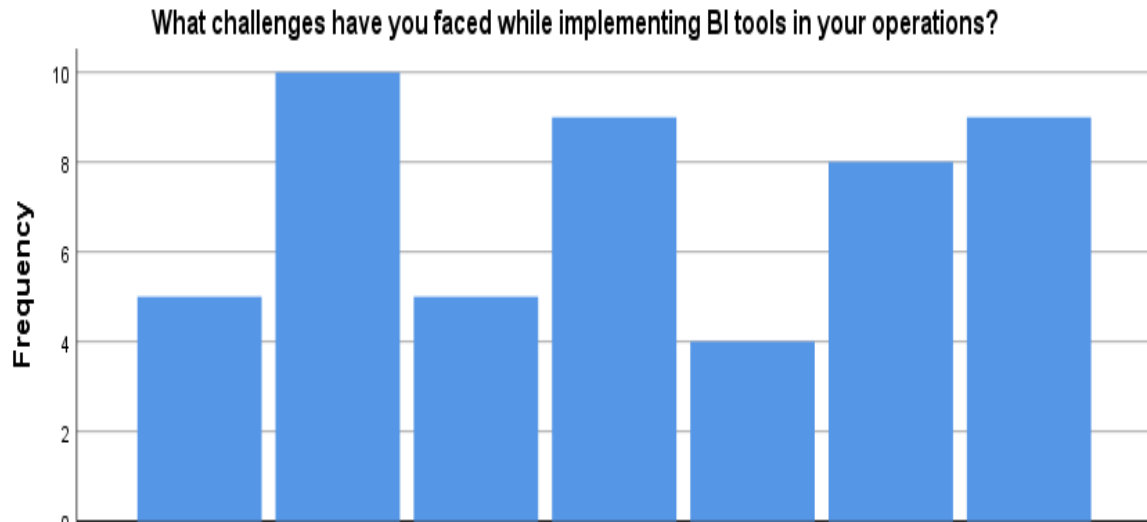


Fig. 4: Challenges faced in the implementation of the usage of BI tools

The responses are grouped into six categories starting from lack of technical expertise, data quality issues, integration with existing systems, cost of implementation, employee resistance to change, more than one amongst the above and the last category was none of the above. A seventh category, none of the above, was also included. Out of the 50 respondents surveyed, 10% (5) cited lack of technical expertise as a challenge faced during implementation. Meanwhile, data quality issues were identified as a challenge by 20% (10) of the respondents. Integration with existing systems was a challenge for 10% (5) of the respondents, while 18% (9) of the respondents cited cost of implementation as a challenge. 8% (4) of respondents identified employee resistance to change as a challenge. Additionally, 16% (8) of respondents faced more than one challenge during implementation. Finally, 18% (9) of respondents did not face any of the listed challenges.

Table 1: Frequency Distribution of Respondents According to Job Role

		Job role			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Transport & Logistics manager	17	34.0	34.0	34.0



	Operations manager	20	40.0	40.0	74.0
	Supply chain manager	13	26.0	26.0	100.0
	Total	50	100.0	100.0	

This table presents the frequency and percentage of job roles in a sample of 50 individuals. There are three job roles presented in this table: Transport & Logistics manager, Operations manager, and Supply chain manager. Of the 50 individuals, 17 (or 34%) identified as Transport & Logistics managers, 20 (or 40%) identified as Operations managers, and 13 (or 26%) identified as Supply chain managers. The valid percent refers to the percentage of responses that were valid and were included in the analysis. The cumulative percent shows the running total of valid percentages up to a given point. For example, the cumulative percent of Operations managers and Transport & Logistics managers combined is 74%, which means that 74% of the sample identified as one of these two job roles. The cumulative percent of all three job roles is 100%, which means that all responses were included in the analysis.

Table 2: Types of BI tools used by respondents

What specific BI tools have you used or are you currently using?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Data visualization software	9	18.0	18.0	18.0
	Predictive analytics software	13	26.0	26.0	44.0
	Logistics & Transportation management systems	6	12.0	12.0	56.0
	More than 1 among above	13	26.0	26.0	82.0
	None of the above	9	18.0	18.0	100.0



	Total	50	100.0	100.0	
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This table presents the frequency and percentage of responses to a question asking what specific business intelligence tools individuals have used or are currently using in a sample of 50 individuals. There are five categories of BI tools presented in this table: data visualization software, predictive analytics software, logistics and transportation management systems, more than one of the above, and none of the above. Out of the 50 individuals, 9 (or 18%) reported using data visualization software, 13 (or 26%) reported using predictive analytics software, and 6 (or 12%) reported using logistics and transportation management systems. Additionally, 13 (or 26%) reported using more than one of the above tools. Meanwhile, 9 (or 18%) reported not using any of the above tools. The valid percent refers to the percentage of responses that were valid and were included in the analysis.

Table 3: Impact of BI tools usage in the Business

Impact of BI tools in your transport and logistics operations?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Improved efficiency	13	26.0	26.0	26.0
	Improved customer service	13	26.0	26.0	52.0
	More than 1 among above	15	30.0	30.0	82.0
	None of the above	9	18.0	18.0	100.0
	Total	50	100.0	100.0	

This table presents the frequency and percentage of responses to a question about the impact of using business intelligence (BI) tools on transport and logistics operations. The responses



are grouped into four categories: improved efficiency, improved customer service, more than one of the above, and none of the above.

Table 4: Challenges faced in the implementation of BI Tools

What challenges have you faced while implementing BI tools in your operations?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Lack of technical expertise	5	10.0	10.0	10.0
	Data quality issues	10	20.0	20.0	30.0
	Integration with existing systems	5	10.0	10.0	40.0
	Cost of implementation	9	18.0	18.0	58.0
	Employee resistance to change	4	8.0	8.0	66.0
	More than 1 among above	8	16.0	16.0	82.0
	None of the above	9	18.0	18.0	100.0
	Total	50	100.0	100.0	

The responses are grouped into six categories: lack of technical expertise, data quality issues, integration with existing systems, cost of implementation, employee resistance to change, and more than one of the above. A seventh category, none of the above, was also included. Out of the 50 individuals surveyed, 10% (5) cited lack of technical expertise as a challenge faced during implementation. Meanwhile, data quality issues were identified as a challenge by 20% (10) of the respondents. Integration with existing systems was a challenge for 10% (5) of the respondents, while 18% (9) of the respondents cited cost of implementation as a challenge. 8% (4) of respondents identified employee resistance to change as a challenge. Additionally,



16% (8) of respondents faced more than one challenge during implementation. Finally, 18% (9) of respondents did not face any of the listed challenges.

Conclusion- Future Perspectives

Business Intelligence in Transport and Logistics is a rapidly growing field that can bring considerable value to businesses across the transport and logistics industry. By leveraging advanced data analytics techniques, companies are able to increase efficiency, make more informed decisions, reduce costs, improve customer service levels and ultimately become more competitive in their respective markets. As technology continues to evolve over time, we look forward to witnessing further advancements in this domain and exploring new ways of leverage. BI is not limited to only these areas; it has a huge scope in going business intelligence for success. The objective of a multi-criteria decision-making approach to transport and logistics based on business intelligence can help organizations in the transport and logistics sector make informed decisions by considering multiple criteria simultaneously. The approach utilizes business intelligence techniques to collect and analyze data from various sources, such as customer preferences, operational efficiency, and cost-effectiveness. The study concludes that a multi-criteria decision-making approach helps decision-makers to identify and prioritize alternatives based on various criteria and make optimal decisions that align with the organization's goals and objectives. By utilizing this approach, organizations can optimize their transport and logistics operations, reduce costs, and improve customer satisfaction.

Data quality issues and cost of implementation are the two major factors which was found to be the challenge when using business intelligence (BI) tools, as the accuracy and reliability of the data are essential for generating meaningful insights and making informed decisions. To overcome data quality issues, it is essential to implement data governance practices and establish data quality standards. Data governance involves the creation of policies and procedures for managing data, while data quality standards define the criteria for acceptable data quality. Additionally, implementing data validation checks, regular data audits, and using data cleaning techniques can help to ensure that the data is accurate, consistent, and complete.



References

- 1) Aylak, B. L., Oral, O., & Yazici, K. (2020). Yapay Zeka ve Makine Öğrenmesi Tekniklerinin Lojistik Sektöründe Kullanımı. *El-Cezeri Fen ve Mühendislik Dergisi*. <https://doi.org/10.31202/ecjse.776314>
- 2) Aylak, B. L., Oral, O., & Yazici, K. (2021). Using artificial intelligence and machine learning applications in logistics. In *El-Cezeri Journal of Science and Engineering* (Vol. 8, Issue 1). <https://doi.org/10.31202/ecjse.776314>
- 3) Bhattacharya, K. (2017). Machine Learning: A Turning Point For Predictive Maintenance? *Velocity*.
- 4) Bipu, N. A. (2019). Geographic Information System & Spatial Analysis. *International Journal for Empirical Education and Research*. <https://doi.org/10.35935/edr/31.9070>
- 5) Cantarelli, C. C., Flybjerg, B., Molin, E. J. E., & Wee, B. van. (2018). Cost Overruns in Large-Scale Transport Infrastructure Projects. *Automation in Construction*, 2(1).
- 6) Ceyhun, G. Ç. (2020). Recent Developments of Artificial Intelligence in Business Logistics: A Maritime Industry Case. In *Contributions to Management Science*. https://doi.org/10.1007/978-3-030-29739-8_16
- 7) Costa, R., Jardim-Goncalves, R., Figueiras, P., Forcolin, M., Jermol, M., & Stevens, R. (2016). Smart Cargo for Multimodal Freight Transport: When “Cloud” becomes “Fog.” *IFAC-PapersOnLine*, 49(12). <https://doi.org/10.1016/j.ifacol.2016.07.561>
- 8) Daj, A., Samoilă, C., & Ursuțiu, D. (2012). Digital marketing and regulatory challenges of Machine-to-Machine (M2M) communications. *2012 9th International Conference on Remote Engineering and Virtual Instrumentation, REV 2012*. <https://doi.org/10.1109/REV.2012.6293118>
- 9) Evelin, V. K. (2016). Business Intelligence in Transportation Logistics. *International Journal of Information Management*, 34(1).
- 10) Fiscaro, A., & Spano, I. (2019). Unmanned aircraft systems HW & SW operations for several needs in O&G industry. *Society of Petroleum Engineers - Abu Dhabi International Petroleum Exhibition and Conference 2019, ADIP 2019*. <https://doi.org/10.2118/197589-ms>



- 11) Giannopoulos, G. A. (2009). Towards a European ITS for freight transport and logistics: Results of current EU funded research and prospects for the future. *European Transport Research Review*, 1(4). <https://doi.org/10.1007/s12544-009-0022-5>
- 12) Grabińska, A., & Ziora, L. (2019). The Application of Business Intelligence Systems in Logistics. Review of Selected Practical Examples. *System Safety: Human - Technical Facility - Environment*, 1(1). <https://doi.org/10.2478/czoto-2019-0130>
- 13) Huie, C. P. (2016). Perceptions of business intelligence professionals about factors related to business intelligence input in decision making. *International Journal of Business Analytics*, 3(3). <https://doi.org/10.4018/IJBAN.2016070101>
- 14) Iliashenko, V., Ilin, I., Schuur, P., Gerrits, B., Kalyazina, S., & Esser, M. (2022). Business Intelligence Systems Application in Transport and Logistics Companies. *Lecture Notes in Networks and Systems*, 246. https://doi.org/10.1007/978-3-030-81619-3_52
- 15) Iyer, L. S. (2021). AI enabled applications towards intelligent transportation. *Transportation Engineering*, 5. <https://doi.org/10.1016/j.treng.2021.100083>
- 16) Jin, D. H., & Kim, H. J. (2018). Integrated understanding of big data, big data analysis, and business intelligence: A case study of logistics. *Sustainability (Switzerland)*, 10(10). <https://doi.org/10.3390/su10103778>
- 17) Klumpp, M. (2018). Automation and artificial intelligence in business logistics systems: human reactions and collaboration requirements. *International Journal of Logistics Research and Applications*, 21(3). <https://doi.org/10.1080/13675567.2017.1384451>
- 18) Konovalenko, I., & Ludwig, A. (2019). Event processing in supply chain management – The status quo and research outlook. In *Computers in Industry* (Vol. 105). <https://doi.org/10.1016/j.compind.2018.12.009>
- 19) Kumar, A., & Kalse, A. (2022). Usage and adoption of artificial intelligence in SMEs. *Materials Today: Proceedings*. <https://doi.org/10.1016/j.matpr.2021.01.595>
- 20) Liu, C., Zhou, Y., Cen, Y., & Lin, D. (2019). (Smart CPS) Integrated application in intelligent production and logistics management: technical architectures concepts and business model analyses for the customised facial masks manufacturing. *International Journal of Computer Integrated Manufacturing*, 32(4–5). <https://doi.org/10.1080/0951192X.2019.1599434>



- 21) Liu, T. K., Lin, S. S., & Hsueh, P. W. (2021). Optimal design for transport and logistics of steel mill by-product based on double-layer genetic algorithms. *Journal of Low Frequency Noise Vibration and Active Control*, 40(1). <https://doi.org/10.1177/1461348419872368>
- 22) Liu, T., Shen, A., Hu, X., Tong, G., & Gu, W. (2017). The application of collaborative business intelligence technology in the hospital spd logistics management model. *Iranian Journal of Public Health*, 46(6).
- 23) Nwaubani, J. (2011). Title: Business Intelligence and Logistics. In *OLYMPUS INTERNATIONAL CONFERENCE ON SUPPLY CHAINS*.
- 24) Pagano, P., Antonelli, S., & Tardo, A. (2022). C-Ports: A proposal for a comprehensive standardization and implementation plan of digital services offered by the “Port of the Future.” In *Computers in Industry* (Vol. 134). <https://doi.org/10.1016/j.compind.2021.103556>
- 25) Permala, A., Kotovirta, V., Huovila, H., Maijala, P., Salmela, H., & Hiljanen, H. (2007). Logistics - Increasing intelligence in supply chains. *VTT Publications*, 635.
- 26) Posthumus, R. (2008). Application technical GIS as a tool in business intelligence. *Position IT*.
- 27) Presthus, W., & Canales, C. A. (2015). Business Intelligence Dashboard Design. a Case Study of a Large Logistics Company. *Nokobit*, 23(1).
- 28) Rajan, N., George, A., Saravanan, S. V., Kavitha, J., & Gopalakrishnan, C. S. (2022). An Analysis on Customer Perception towards Fintech Adoption. *Journal of Logistics, Informatics and Service Science*, 9(3), 146–158. <https://doi.org/10.33168/LISS.2022.0311>
- 29) Vincek, Z. L., Dvorski, S., & Lackovic, I. D. (2017). A Literature Review on the Application of the Cloud Technology in Supply Chains. In *CENTRAL EUROPEAN CONFERENCE ON INFORMATION AND INTELLIGENT SYSTEMS: PROCEEDINGS ARCHIVE 2017*.
- 30) Wajong, A. M. R. (2017). Logistics indicators could improve logistics performance of hospitals. *MATEC Web of Conferences*, 108. <https://doi.org/10.1051/mateconf/201710817002>



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- 31) Winter, R., Gericke, A., & Bucher, T. (2008). Using Teradata University Network (TUN), a free internet resource for teaching and learning. *Educational Technology and Society*, 11(4).
- 32) Zhao, L., & Huang, X. (2009). Research on the application of business intelligence in logistics management. *Proceedings - International Conference on Management and Service Science, MASS 2009*. <https://doi.org/10.1109/ICMSS.2009.5302809>
- 33) Zhou, C., Stephen, A., Cao, X., & Wang, S. (2021). A data-driven business intelligence system for large-scale semi-automated logistics facilities. *International Journal of Production Research*, 59(8). <https://doi.org/10.1080/00207543.2020.1727048>
- 34) Zijm, H., & Klumpp, M. (2016). Logistics and Supply Chain Innovation. In *Logistics and Supply Chain Innovation: Bridging the Gap between Theory and Practice*.
- 35) Balint, A. O., & Toma, M. (2015). How Does Business Intelligence Solutions can Streamline and Influence Transport Networks? *Procedia Economics and Finance*, 20, 59–64. [https://doi.org/10.1016/S2212-5671\(15\)00047-7](https://doi.org/10.1016/S2212-5671(15)00047-7)
- 36) Grabińska, A. & Ziora, L. (2019). The Application of Business Intelligence Systems in Logistics. Review of Selected Practical Examples. *System Safety: Human - Technical Facility - Environment*, 1(1) 1028-1035. <https://doi.org/10.2478/czoto-2019-0130>



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**One Sun One World One Grid & International Solar Alliance: India's
geopolitical power sway**

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Abstract

When Prime Minister Narendra Modi presented the notion of "One Sun, One World, One Grid" (henceforth OSOWOG) at the inaugural assembly of the International Solar Alliance (ISA) in October 2018, it made its first appearance on a global scale .

The PM's OSOWOG vision is founded on the notion of sustainability, which argues that society's resources are limited and must be managed cautiously to ensure that there is enough for future generations while also guaranteeing that the current generation's quality of life is not continually harmed.

OSOWOG's strategy is a step toward developing a more sustainable source of electricity production by using solar power as a continuous renewable energy source, advancing the worldwide objective of sustainable development.

Since this is an idea so no work has been completed, started, or even proposed, and with the paucity of the literature on OSOWOG it would be worthwhile to study India's geopolitical power sway through ISA & OSOWOG.



The aim of this paper is to look at the positive aspect of the OSOWOG with India's geopolitical power sway through ISA & OSOWOG.

Keywords: ISA, OSOWOG, India, Grid, Solar, UK.

Introduction

Prime Minister Modi emphasised the importance of solar in 2018 during the commencement of the second edition of the global re-invest meet, using the phrases One Sun One World One Grid (OSOWOG), which indicated bringing the entire world together to harness solar electricity 24/7, rather than just during the day. India is separated into two wide zones at the centre of the sun spectrum: the far east, which includes nations such as Myanmar, Vietnam, Thailand, and Cambodia, and the far west, which includes West Asia and the African region (MNRE,2020). Through this effort, India intends to create a global network of interconnected renewable energy sources that can be easily shared for mutual benefit and global sustainability. On a worldwide scale, this effort will focus on linking solar energy sources, including decentralised systems such as solar rooftop systems. (ISA,2020)

In 2015, India and France announced ISA to promote solar energy to give energy security to everyone (ISA, 2015). One Sun One World One Grid can help them reach this goal. Furthermore, in phase1, the Indian grid will connect with the Middle East-South Asia-South East Asia system to share solar and other renewable energy resources to fulfil peak base and average demand. In addition, this system will be connected to African power pools in phase 2 to share solar and renewable energy. (ISA,2020) Because this is an idea, no work has been completed, begun, or even proposed, and because there is a scarcity of literature on OSOWOG, the majority of the methodological arguments made below are based on the initiative's goal, data collected from in-depth interviews with policymakers, and consulting research papers related to other mega projects around the world.

History of ISA

At the 2015 India-Africa Forum Summit, Modi announced the International Solar Alliance (ISA) foundation ahead of the UN Climate Change Conference in Paris. Solar energy is the declared goal of the organisation, especially for nations located between the Tropic of Cancer and the Tropic of Capricorn, as stated in the mission statement India's 2014 election



manifesto said that renewable energy sources were a "essential component" of India's energy mix and pledged to "extend and improve" the national solar mission, which was a practical expression of this promise.

Indian Prime Minister Narendra Modi spoke on India's efforts to build the world's biggest renewable energy development programme and the goal of fostering a global solar revolution at the 2018 ISA Founding Conference, which also included French President Emmanuel Macron. Reaffirmation of the BJP's commitment to expanding ISA membership throughout the world was made in the party's 2019 election manifesto. With his re-election, it became operational and has maintained policy consistency since it was formed.

The Shape of World Politics. More than 86 nations have signed the ISA Framework Agreement but have not yet approved it. As of May 2020, the following members have been confirmed as belonging to OSOWOG's MEMASEA zones:

"Middle East: United Arab Emirates (UAE), Kingdom of Saudi Arabia (KSA) and Egypt.

South Asia: Sri Lanka, Bangladesh and Maldives.

Southeast Asia: Myanmar and Cambodia."

OSOWOG might be welcomed by the UAE, Saudi Arabia, and Egypt because of their shared geopolitical objectives. The UAE and Saudi Arabia are already contemplating a future without oil exports. Pakistan's indifference in the South Asian Association for Regional Cooperation (SAARC) seems to have little effect on the prospects in the region, since Afghanistan, Nepal, and Bhutan have shown little interest in signing on. Because of its political-security ties to India and its position as a key node in the Asia Africa Growth Corridor, Myanmar is India's best shot in Southeast Asia (AAGC). In order to resist China's expanding influence via the Belt and Road Initiative, the strategic goal of AAGC has long been formed (BRI).

The AAGC, unlike the BRI, is a marine corridor. India would need to forge strong ties with East African nations in order to bring together OSOWOG and AAGC in a significant way. According to the International Association of Sports Federations (ISA), 15 nations are already located on this border. When the Acquisition and Cross Serving Agreement (ACSA)



goes into effect, India will have a distinct edge in Djibouti since it already hosts a Japanese overseas military facility.

The OSOWOG project's goals align with both the African Union's Agenda 2063 and the 2016-2025 ASEAN Plan of Action for Energy Cooperation (APAEC). China's growing influence in Myanmar and East Africa means that India will have to depend heavily on Japanese and US support in order to achieve strategic objectives.

OSOWOG aspires to position India as the primary source of renewable energy in the Indian Ocean Region, but its implementation might have unintended geopolitical ramifications for other nations in the region.

Importance to examine sustainability from a global perspective

Global interconnectedness was made obvious by the rapid dissemination of COVID19 around the globe. There is no such thing as a solitary corner of the globe when it comes to sustainability. As an example, chopping down trees in the Amazon rainforest does not only have an opposite effect on the Brazilian ecology, but it also helps maintain world temperatures and regulate weather patterns in South America. In response to climate change, a number of ecosystems and natural resources have been pushed beyond their boundaries, resulting in challenges such as increasing droughts and migratory plants in the northern forests. SDGs, which the United Nations approved to create a comprehensive framework for governments throughout the globe to address challenges such as poverty and climate change, were enacted in an attempt to address the same. In addition to environmental issues, such as "Life Below Water" and "Life on Land," additional aims include "Affordable and Clean Energy" and "Decent Work" and "Economic Growth."

Shifting to Renewable Energy Is Essential

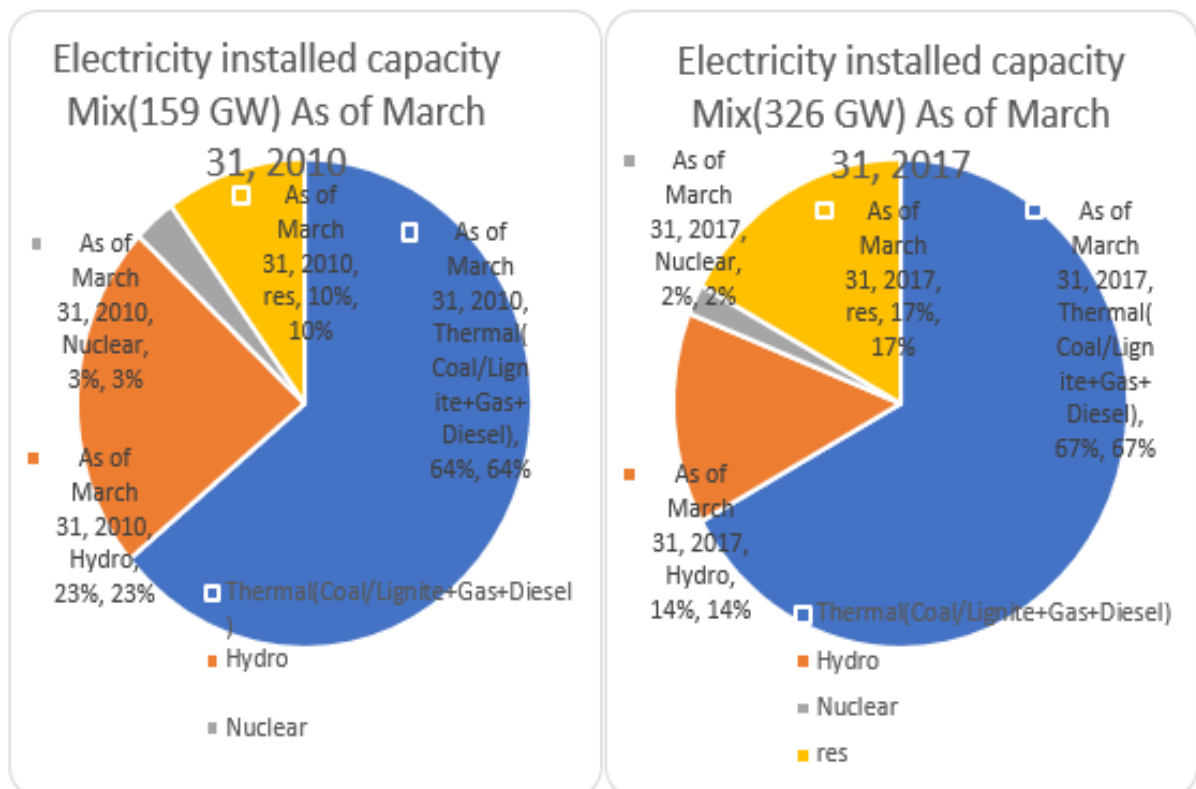
The pollution created by different non-renewable sources of power generation is one of numerous causes contributing to rising levels of greenhouse gas emissions, which is driving fast global warming. Oil, coal, and natural gas together account for one-third of all global warming gases. Consequently, it is essential to improve the quality of life by providing cleaner and more dependable electrical sources. To put it another way:



Since 2013, India has imported almost 1000 million tonnes of coal, according to a research from the Centre for Monitoring Indian Economic. With such a massive import and environmental impact, India has to make an immediate switch to a different form of energy production. As a result of this quick shift to renewable energy, the country's aim of sustainable development and climate change concerns were both addressed in the years to come. Positive news is that, from April to November 2020, coal imports decreased by 17% to 137.6 million tonnes as a consequence of the switch to renewable energy.

With this coordinated effort by Ernst & Young, India ranks third on the Renewable Energy Country Attractive Index in 2021, with an ambitious goal of 175 GW worth of renewable energy output by the year 2022, according to the study Renewable capacity has grown by two and a half times to 141 GW as of this writing. During this time, solar energy capacity grew at an exponential rate, reaching 41.09 GW, a 15-fold increase.

India at the Fulcrum- Renewable Energy growth: An Enabler for OSOWOG





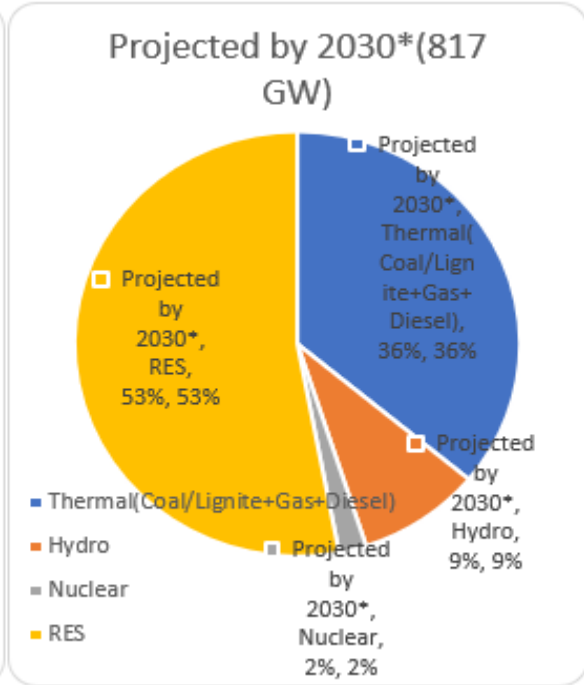
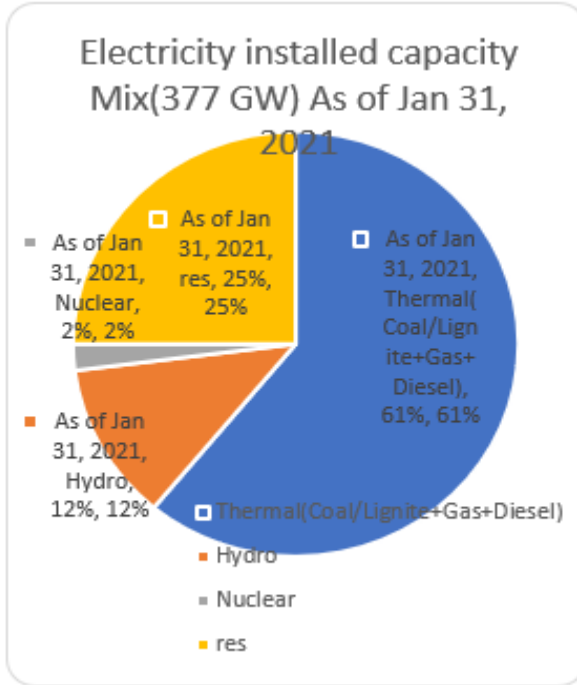
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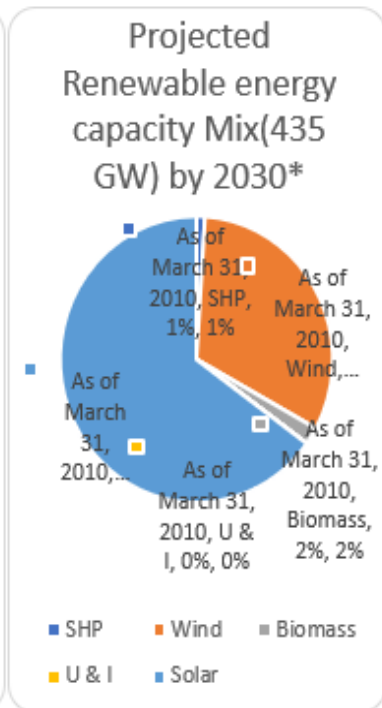
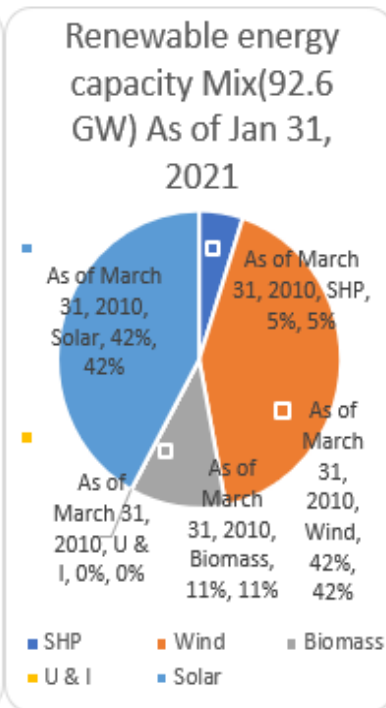
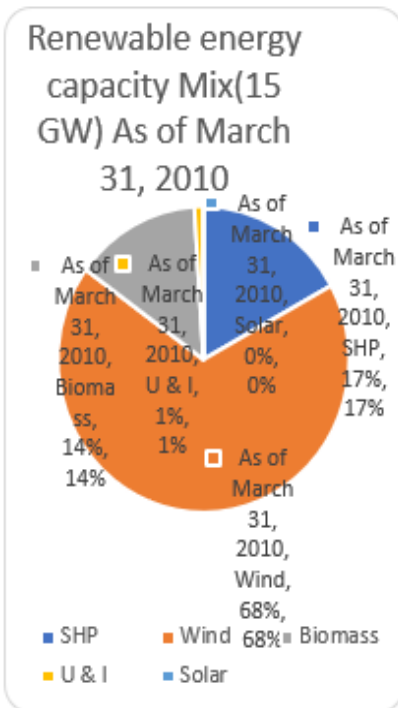
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Why India invests in solar energy

There are three major reasons why India urgently needs a change from coal to solar power as a source of energy: If India's global energy demand doubles to 11 percent by 2040, it is no longer a choice but a need for the country to look at energy sources that would help it become more self-sufficient in power production while keeping environmental costs in check. If we can't use solar energy to meet the rising need for electricity, our reliance on fossil fuels like coal, oil, and natural gas will grow. A rise in oil imports and a rise in local coal output would have both economic and environmental consequences.

With an AQI of 382 placing Delhi in the "severe pollution" category, India is still struggling with an aggressive problem of air pollution. More than 40% of the region's pollution comes from uncontrolled industrial and vehicular sources, on top of the already high levels created by stubble burning in the region's surrounding areas. Reduced usage of fossil fuels may be made possible by the utilisation of solar energy generation. It is clear that ground water and yearly rainfall are diminishing at an alarming pace, indicating the need to diversify energy sources and not depend too much on hydroelectricity as a source of energy. An example of this is the fact that groundwater levels in India decreased by 61% between 2007 and 2017. Even now, it remains a worry even though India is the world's greatest consumer of groundwater for agriculture, household consumption, and industrial purposes. In addition, unlike coal, solar power generation does not depend extensively on water for production, and hence does not put a burden on groundwater supplies.

There is a perception among many that a world powered entirely by clean, renewable energy is an unrealistic goal—but the usage of solar power plants is an important first step. There is no better alternative to fossil fuels in terms of renewable energy than algae. In addition to being simple to maintain, they may be placed both on a utility size and on a personal or household level. solar panel installation may cost more up front but in the long term saves money on power bills and serves as a barrier to rising energy prices.



What makes OSOWOG special.

According to a 2020 proposal suggested by the Ministry of New and Renewable Energy (MNRE), a "common grid" of solar electricity would be utilised to link 140 nations in the OSOWOG. According to the plan's motto, "the sun never sets" since the sun is always a constant everywhere in the world at any given moment. Using the sun's rays to power the planet 24 hours a day, seven days a week is the goal of the endeavour.

It is envisaged that OSOWOG will be deployed in three primary phases:

As part of the first phase, the Indian grid will be linked to other Asian continent grids to exchange solar energy and other renewable energy sources such as wind and hydropower.

First phase would be connected to Africa's renewable resources via the second phase. 'Far East' includes nations like Thailand, Laos, Cambodia, Vietnam and Myanmar, while 'Far West' include countries in Africa and the Middle East, such as Egypt and Jordan. This spectrum is centred on India.

This is the third and final phase, which attempts to link the world. The goal of the project is to develop a "one power grid of renewable energy" that can be accessible by nations throughout the world.

Significance of OSOWOG

By using technology, funding, and expertise, the initiative aims at helping all of its collaborating entities to attract successful investments in renewable energy sources.

All stakeholders will benefit from decreased project costs, better efficiency, and increased asset utilisation if all nations work together.

Using a more cost-effective source of energy generation, such as wind or solar, may help alleviate poverty, provide access to drinking water, sanitary facilities, and food security.

Increased investment in research and development centres like the Center for National Renewable Energy Management in India will result from global cooperation, since these centres will now serve as both global and regional management centers.



India gains from OSOWOG

India and the United Kingdom are publishing a joint statement on OSOWOG at the Conference of Parties (CPO26). This initiative would consolidate India's leadership position for India's economy and the ISA.

COP 26 Summit and OSOWOG

- “At the COP-26 climate summit in Glasgow, India launched ‘One Sun One World One Grid’ (OSOWOG).
- **Key Highlights**
- Prime Minister Narendra Modi also mentioned that the Indian Space Research Organisation (ISRO) will develop a solar calculator application to inform countries about the solar potential of any place on the earth using satellite data.
- He also said that fossil fuels powered many nations to become wealthy during the industrial revolution, but it made the earth and environment poor.
- This initiative was jointly launched by the **United Kingdom** and in partnership with **ISA** and the **World Bank Group**.”

An "intercontinental power infrastructure" is a relatively new notion in India's efforts. India's geopolitical situation might greatly benefit from such a move. Despite the fact that battery and storage technology has gotten more affordable, importing solar energy from other countries seems to be a more practical and inventive solution given the problem of land bank scarcity and the restricted number of hours of sunlight each day throughout the world.

- “Apart from addressing environmental concerns, India also seeks to have a geopolitical edge over China. Experts are of the opinion that OSOWOG is the answer to China’s One Belt One Road initiative.
- These same experts are also of the opinion that announcing infrastructure projects in other countries is a way of asserting superiority.
- Other potential benefits also mean improving the quality of life. The potential benefits include widespread scale-up in energy access, abatement in carbon emissions, lower costs of living and improved livelihoods.



- Annually, India imports about \$250 billion worth of fuels. This includes oil, diesel, LNG, fossil fuels, coal etc.
- If OSOWOG can be implemented, then India has alternative means to meet its energy requirements through sustainable energy that may reduce imported inflation pressures.”

Powerful geopolitical organisation

The energy industry already has a powerful geopolitical organisation, such as OPEC, and international alliances are not new. International Solar Alliance (ISA) is a cooperation of nations with abundant solar resources. It was officially launched during the 2015 UN Climate Change Conference in Paris. There are now 121 nations who have consented to join the International Sailing Association (ISA). There are a lot of nations from Africa, South-East Asia, and Europe represented here. ISA does not include Pakistan and China. Additional agreements between Bhutan and Nepal include energy trading and hydropower project development. The Central Electricity Regulatory Authority approved new legislation for 'Cross-border power commerce' last year, making the transfer of electricity to neighbouring nations easier. As part of this process, a nodal organisation for bilateral power trading was established and monitoring and planning by government authorities. More than 70 nations will be invested in as part of India's response to China's One Belt One Road infrastructure programme. However, the concept of an intercontinental electrical infrastructure is still relatively new. As part of the Australia-ASEAN Power Link (AAPL), Sun Cable will provide renewable energy from Australia to Singapore, and then Indonesia, as part of the project. There will be "three technological groups" involved: a 4,500-kilometer high voltage direct current (HVDC) transmission line, the world's biggest lithium-ion battery, and a solar/storage complex in Australia, Singapore, and Indonesia. What is the purpose of OSOWOG and how useful is it? Numerous countries' infrastructure initiatives in other nations, particularly China, are considered a symbol of power by some policy experts. With ISA and OSOWOG, India intends to assume a leadership role, while being a partner country with most trade organisations. "It's clear that this is a massive undertaking. However, we are at a critical juncture in terms of power production and consumption, necessitating a shift in the sector's paradigm. Energy availability, reduction of carbon emissions, fewer costs, and better lives are



among the possible advantages. A worldwide coalition is necessary for India to achieve this goal.

Geopolitical relevance of solar energy for India

The geopolitical relevance of solar energy needs to be examined in three ways. First and foremost, it may be obtained for free and in large quantities by harnessing the power of nature. While oil and gas are concentrated in particular regions of the globe, such as West Asia, North Africa and Eurasia, renewable energy may be found all over the world.

When the majority of energy was imported from remote areas and at a high cost, there was a tinge of unease among energy-dependent nations. In the 20th century, this led to the majority of geopolitical confrontations. Researchers that focus on energy security claim that the desire for oil and gas was a major factor in both the First and Second World Wars and the intensification of the Cold War. Several geopolitical concepts, such as the Carter Doctrine and the Iran-Iraq conflict, may be traced back to the demand for energy, which in turn led to the Carter Doctrine. Post-1991, the Clinton administration utilised the same catchphrases to gain sway in the energy-rich Caspian area.

Increasing radicalization in various regions of the globe may also be ascribed to geopolitical factors. Boko Haram terrorists in Nigeria; religious extremists in Russia's North Caucasus and other Caspian regions; and ISIS militants in West Asia are instances of religious extremists using oil money to achieve their goals.

In addition, research shows that most oil-producing countries have supported extremist organisations in order to achieve their own goals. Because of their backing for the existing regime, the political class in these nations never took substantial steps to checkmate these extreme organisations. A few of them worried for their own safety if they didn't back these Islamist organisations, fearing a local rebellion. There will be less reliance on energy from a few regions of the planet if solar energy is utilised widely throughout the globe. By doing so, nations (mostly in West Asia) that sponsor terrorist operations will be forced to share the spoils. With less resources at their disposal, radicals may witness a decline in their activism in the future.



An equal footing for India

Last but not least, as most ISA member nations are poorer, they may band together and deal with oil-rich ones to break their monopoly on oil and gas. When it comes to solar energy, India, which is one of the founding members of the International Solar Alliance (ISA), may minimise its dependency on West Asian nations by using solar power. Because of this, you'll save a lot of money. States with a lot of solar energy, like Afghanistan, Uzbekistan, and Turkmenistan, may band together to create an institutional body to harness it. This might lead to the development of a solar-powered electrical system.

Within the ISA, efforts have already been undertaken in this regard. An example of this is the Indian Ocean Renewable Ministerial (IORM) conference that took place in October 2018. During that conference, the ISA and IORM concluded an institutional agreement. Both organisations agreed to "exchange technology" and "jointly collaborate" as part of the plan in order to work together more closely on solar energy harvesting. The Organizational African Union, the Shanghai Collaboration Organization, and the Group of Latin American and Caribbean Countries might all benefit from such cooperation.

It's worth recalling that ISA and the African Development Bank announced a deal in 2018 to harvest solar energy. Joint Declaration's main goal was to build a "roadmap for finance for the development of solar energy in potential African ISA member nations," as stated in the agreement.

Similar arrangements may be made in Latin America to access resources like lithium. For example, lithium resources in Latin American nations like Chile, Argentina, and Bolivia are among the greatest in the world. Lithium can be procured more easily if more nations are involved. Bolivia and India decided to work together on lithium battery development during Indian President Ram Nath Kovind's visit, and Bolivia also indicated its interest in joining the International Solar Alliance (ISA).

With the example of India and Bolivia's combined collaboration, it is clear that trans-regional solar energy cooperation may lead to a more equitable and equitable world energy system. The fact that diverse areas are working together to develop solar energy is a good thing because it lends fresh life to the concept of the Global South. As part of its regional



cooperation, the International Solar Alliance (ISA) is also making a significant effort to address issues such as "technology transfer," "storage of solar energy," and even financial support to member nations, as has been proposed on the ISA website.

Positive Impact on India

In the previous decade, India has made significant investments in renewable energy to reach 175 GW by 2022. (MNRE,2015) India's solar capacity has increased tenfold in the last decade, as a growing number of coal mines become less lucrative as they age and coal prices fall. In fact, India's largest coal producer, Coal India Limited, has announced that it will become a net-zero energy company by 2023-24, and NTPC, India's largest coal-based power company, has won a bid for 470MW of solar power at a tariff of Rs 2.01/kWh (Chandra Bhushan, 2020), which is nearly 40% lower than the current coal power in India. However, most solar systems available in India will have no impact because they are not completed with a storage system. As a result, the only alternative for meeting peak power demand at night will be to operate a conventional coal power station. As a result, OSOWOG is brought into play. India hopes to bring renewable energy from Africa (noon) to India through OSOWOG (night). As a result, India does not need to run its dirty, expensive (given current tariffs) coal plant at night. This has a number of advantages for India.

First, having access to renewable energy 24 hours a day, 7 days a week at a cost well below grid parity. This will aid in the systematic reduction of traditional coal dependency by effectively switching to low-cost renewables. Many countries will be enticed to join OSOWOG because India believes the cost of solar will drop dramatically, and because nations will be joining on their own, it will be simple to cooperate and become responsible on their own to prevent any tragic system collapse.

Whereas, from India's foreign policy perspective, this project provides its leaders with a global platform on which they can express their global climate mitigation policies and future roadmap and potentially pave the way for them to portray themselves as a future global leader in the world order. This also gives India's multinational firms a platform to address the current global energy problem in several Asian and African countries by using their technical advantage.



OSOWOG is just a decentralised solar rooftop system that adds solar energy to an existing grid in a certain country. This would not constitute a significant danger to existing producers' ability to continue operating, but it would be in the long run. African countries that lack an electrical infrastructure will profit the most from this perspective. They do not have to invest any money to transition away from the fossil fuel system because they are receiving direct support for creating renewable energy infrastructure from ISA, WB, and WSB under the OSOWOG. Furthermore, millions of people benefit from improved energy access and security. Because the project is being implemented in phases, beginning with national infrastructure development at the micro-level in various locations and then proceeding step by step, there will be plenty of time to speak with diverse stakeholders and address their particular issues. This idea, on the other hand, talks about a harmonised distribution and platform with common ownership, but even if a country decides to leave after joining and sharing energy for a while, that country's sudden absence will not pose a fatal threat to the OSOWOG system's comprehensive, multifaceted nature. Finally, OSOWOG may partially overcome the challenge of most renewables' storage system. Because the grid is directly connected to the system.

Geopolitical Considerations and Challenges

India and the ISA are currently the only active stakeholders in OSOWOG. However, the endeavour involves a number of geopolitical stakeholders, many of whom have internal conflicts and disagreements. States must consider this integration drive as a benefit to grid stability and efficiency rather than a backdoor threat to national sovereignty because it necessitates collision building across a wide range of stakeholders. The intended Vietnam-Laos-Thailand link was shelved after the (Thai) owner of a major transmission line portion along that route in Laos refused to allow it to be utilised for that purpose (Asian Development Bank,2013). The country's relationship and government trust, which is among the lowest in the African area, is perhaps the most catastrophic failure in collision building. After 11 years, the battle between Ethiopia, Sudan, and Egypt over a dam on the Blue Nile in Ethiopia remains unsolved (JC Veilleux,2015). With a history like this, I don't think they'll agree to transfer renewable energy. And many African countries are in the same boat. Furthermore,



persuading many African countries to connect in order to generate and transfer renewable energy is difficult. After that, move it to West Asia or Southwest Asia.

"In geopolitics, the past never dies, and there is no modern world," remarked Robert D.Kaplanin, referring to the Middle East, where anti- and pro-western players have vied for dominance for many years. As a result, several regional and global powers have enlisted the help of various non-state entities to increase their impact. When a country is unable to adopt a single foreign policy orientation, bilateral relations and foreign policy alignments suffer. In this scenario, one country joins while the other does not, posing a difficult situation for the negotiators. Finally, in the most volatile area in the world, India's significant political issue is the perception that the programme is a one-sided vehicle for India to gain economic clout and satisfy global net-zero ambitions.

Way Forward

For the implementation of OSOWOG, areas that might be enhanced include mechanisms for cost sharing, a well-defined implementation process, and a future method for preserving local, regional and global grid stability that considers concerns like frequency and voltage.

One Sun, One World and One Grid is the future of renewable energy systems because these projects will help balance and distribute renewable energy across international borders. As a result, the global carbon footprint would be reduced, supporting the concept of sustainable development. This means that the future of OSOWOG is brighter than the sun.

Conclusion

The ISA, launched at COP21 in Paris and recently expanded to include all UN member states, aims to help mobilise USD 1 trillion of funding by 2030 to assist developing countries in expanding their solar power grids. The initiative is widely seen as a big and bold move in ISA's ongoing efforts to realise a global solar transition. To summarise, ISA and OSOWOG will undoubtedly inject fresh dynamism into international energy diplomacy in the twenty-first century. If solar energy and other kinds of renewable energy are harnessed more effectively in the near future, one may expect to see a fair and equitable energy order.



References:

Asian Development Bank, "Assessment of the Greater Mekong Subregion Energy Sector Development," p. 47 <https://www.adb.org/sites/default/files/institutional-document/33872/files/assessment-gms-subregion-energy-sector-development.pdf>[Accessed December 11, 2021].

ATMAJA GOHAIN BARUAH,2019 How Can India Become a Global Leader in Solar Power Generation? *How_Can_India_Become_a_Global_Leader_in.pdf[Accessed December 05, 2021].

Benjamin K. Sovacool,2009 Energy policy and cooperation in Southeast Asia: The history, challenges, and implications of the trans-ASEAN gas pipeline (TAGP) network Energy_policy_and_cooperation_in_Southea trans asean pipeline.pdf [Accessed December 07, 2021].

Chandra Bhushan,2020 Energy Transition and Just Transition must go hand in hand- as coal mines become rapidly unprofitable <https://timesofindia.indiatimes.com/blogs/toi-edit-page/energy-transition-and-just-transition-must-go-hand-in-hand-as-coal-mines-become-rapidly-unprofitable/>[Accessed December 10, 2021].

Christopher Cooper, Benjamin K. Sovacool,2012 Miracle or mirage? The promise and peril of desert energy part 2 *Miracle_or_mirage_The_promise_and_peril_desertac.pdf[Accessed December 08, 2021].

Drishti IAS, 2021. One sun, one world, one grid (OSOWOG). *Drishti IAS*. Available at: <https://www.drishtiiias.com/daily-updates/daily-news-analysis/one-sun-one-world-one-grid-osowog> [Accessed December 20, 2021].

Energy Network Australia,2016 CSIRO ELECTRICITY NETWORK TRANSFORMATION ROADMAP: KEY CONCEPTS REPORT key_concepts_report_2016.pdf[Accessed December 12, 2021].

Georgios Konstantinou,2019 Australia-Asian Projects and the Current HVDC scene <https://rtsunsw.home.blog/2019/07/29/au-asean-projects-and-the-current-hvdc-scene/>[Accessed December 12, 2021].



Giorgio Locatelli, Giacomo Mariani, Tristano Sainati, Marco Greco, 2016 Corruption in public projects and megaprojects: There is an elephant in the room! *corruption in megaprojects.pdf [Accessed December 13, 2021].

ISA, 2020 Request for Proposal for Developing a long-term vision, implementation plan, road map and institutional framework for implementing “One Sun One World One Grid” *osowogmnreproposal.pdf [Accessed December 14, 2021].

ISA, International Solar Alliance, - <https://isolaralliance.org> [Accessed December 14, 2021].

JC Veilleux Water Conflict Case Study – Ethiopia’s Grand Renaissance Dam: Turning from Conflict to Cooperation https://www.researchgate.net/publication/281641708_Water_Conflict_Case_Study_Ethiopia's_Grand_Renaissance_Dam_Turning_from_Conflict_to_Cooperation/link/572d1da808ae3736095a3db3/download [Accessed December 16, 2021].

Junfeng Li, Siyu Jiang, 2018 Global Energy Interconnection: an effective solution to climate Challenges https://www.researchgate.net/publication/329620771_Global_Energy_Interconnection_an_effective_solution_to_climate_challenges [Accessed December 16, 2021].

Khalid, Z. et al., 2020. Geopolitical contours of India's 'one-sun, one-world, one-grid' project - strafasia: Strategy, analysis, news and insight of emerging Asia. *Strafasia*. Available at: <https://strafasia.com/geopolitical-contours-of-indias-one-sun-one-world-one-grid-project/> [Accessed December 15, 2021].

Md. Mushfique Alam, Abhishek Kumar, 2020 One Sun One World One Grid: Prospects, Challenges and A Possible Alternative For OBOR https://www.academia.edu/44111258/One_Sun_One_World_One_Grid_Prospects_Challenges_and_A_Possible_Alternative_For_OBOR [Accessed December 10, 2021].

Mirza Sadaqat Huda, 2020 De-securitising the TAPI pipeline: Converging interests of countries, companies and communities through collaborative planning MNRE, 2015 Ministry of New and Renewable Energy <https://mnre.gov.in/> [Accessed December 10, 2021].



MNRE,2020 Request for Proposal for One Sun One World One Grid.

Mukul G Ashar,2020 One Sun-One World-One Grid: India's Transformative Initiative for Sustainable Development https://www.researchgate.net/publication/343980107-One_SunOne_World_One_Grid_India%27s_Transformative_Initiative_for_Sustainable_Development [Accessed December 18, 2021].

Pti, 2021. US backs India-UK-led Solar Green Grids initiative at COP26. *The Financial Express*. Available at: <https://www.financialexpress.com/lifestyle/science/us-backs-india-uk-led-solar-green-grids-initiative-at-cop26/2364393/> [Accessed December 17, 2021].

Robert D.Kaplan, Bulent Aras,2017 Mideast Geopolitics: The Struggle for a New Order https://www.researchgate.net/publication/318160977_Mideast_Geopolitics_The_Struggle_for_a_New_Order [Accessed December 18, 2021].

Sen, A., 2021. Explainer: All about the one sun one world one grid initiative. @businessline. Available at: <https://www.thehindubusinessline.com/blexplainer/bl-explainer-all-about-the-one-sun-one-world-one-grid-initiative/article37486937.ece> [Accessed December 27, 2021].

Steffen Erdle,2010 The DESERTEC Initiative Powering the development perspectives of Southern Mediterranean countries?

Van de Graaf a,n , Benjamin K. Sovacoo,2014 Thinking big: Politics, progress, and security in the management of Asian and European energy megaprojects

Why the International Solar Alliance is geopolitically significant. *Down To Earth*. Available at: <https://www.downtoearth.org.in/blog/energy/why-the-international-solar-alliance-is-geopolitically-significant-64080> [Accessed December 15, 2021].

Waskow and Welch 2005. The environmental, social, and human rights impacts of oil development https://www.opensocietyfoundations.org/uploads/8a632647-ad24-43aca4b8-892b97b62119/osicoveringoil_20050803.pdf [Accessed December 19, 2021].

World Bank, 2010, The Potential of Regional Power Sector Integration: Literature Review <http://hdl.handle.net/10986/17501>, p. 10, [Accessed December 23, 2021]



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**AN ANALYSIS OF HOW EMOTIONAL INTELLIGENCE
CONTRIBUTES TO CAREER ADVANCEMENT IN THE
GOVERNMENT SECTOR**

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ABSTRACT

Employee emotional intelligence (EI) development is becoming increasingly crucial as public sector firms attempt to enhance performance, boost collaboration, and foster a happier work environment. The study looks at how EI affects employee satisfaction, career advancements, overall organizational performance, and staff morale in a government organization. In the study, a framework for managing EI in government organizations is presented. This



framework shows how communication and collaboration can lead to achieving key factors to career advancement that ultimately leads to overall organizational success. The current research has adopted the case study method and gathered secondary data for the qualitative research. The study evaluates seven case studies from the Singapore Civil Service, UK National Health Service (NHS), US Department of Defence, Australian Public Service, Australian Federal Police (AFP), Department of Health and Human Services (DHHS), and Australian Public Service Commission (APSC). The case studies analysis shows the beneficial effects that EI can have on governmental institutions. The study findings highlight the value of EI in government organizations and the advantages of funding, training, and development initiatives that aim to improve EI. It is difficult to emphasize how much EI has impacted in connection with how government organizations are managed. Organizations in the public sector can establish a culture of empathy and understanding that encourages increased performance and work satisfaction for employees by investing in the development of EI skills. The results show that emotional intelligence (EI) is a critical component of management in governmental organizations.

Keywords: Emotional Intelligence, Government Organization, Emotions, Technology, Leadership Development

INTRODUCTION

Emotional Intelligence (EI) is a critical aspect of human behavior that refers to a person's ability to understand, manage, and effectively express their own emotions and respond to the emotions of others. It involves recognizing and managing one's own emotions, as well as perceiving, understanding, and influencing the emotions of others. EI plays a significant role in personal and professional success, as well as in building strong relationships with others. It is considered a soft skill, but research has shown that it is a strong predictor of success in many areas of life, such as leadership, teamwork, and conflict resolution. It refers to a person's ability to recognize, understand, and manage their own emotions, as well as the emotions of others. It involves the development of skills such as empathy, self-awareness, and emotional regulation, which enable individuals to form and maintain positive relationships, navigate complex social situations, and respond effectively to challenges. As EI is an important predictor of success in various domains, including academic achievement,



leadership, and mental health, the study of EI continues to be a rapidly growing area of interest in psychology, with new insights being gained all the time about how it can impact our lives and our interactions with others. Studies have shown that EI is crucial for enhancing leadership effectiveness, teamwork, and overall organizational success.

SIGNIFICANCE OF THIS STUDY

The importance of emotional intelligence in government organizations around the world is increasing, which makes this study significant. It also sheds some light on how to apply EI in the public sector in a manner that enhances teamwork, leadership, and organizational performance. It is becoming increasingly obvious that traditional analytical, and reasoning skills, etc., are insufficient for any organizational success. Furthermore, public sector institutions deal with complex challenges and surroundings that are changing quickly. A significant component of effective leadership and organizational performance in the public sector is EI, which is an in-demand soft skill that recruiters are looking for, organizations are willing and working to incorporate as it includes the capacity to comprehend and control one's own emotions as well as those of others.

For policymakers, professionals, and practitioners looking to create successful strategies for hiring, developing, and retaining public sector employees, it is important to understand the role and significance of emotional intelligence in governmental organizations. This study provides useful insights into how emotional intelligence has been successfully incorporated into public sector organizations and the main aspects that have led to the success of such initiatives by looking at case studies from various regions of the world. It also provides information for the creation of evidence-based best practices for fostering emotional intelligence in governmental institutions.

RESEARCH GAP

While there is significant research on the importance of emotional intelligence in leadership, there is a research gap when it comes to exploring its impact on government organizations. More specifically, there is limited research on the role of emotional intelligence in government leadership and its influence on organizational culture, employee engagement, and overall performance. While some studies have explored the relationship between



emotional intelligence and leadership effectiveness in the private sector, little attention has been paid to this topic in the context of government organizations. The unique challenges and complexities of government operations require a different approach to leadership, and it is important to understand how emotional intelligence can impact leadership effectiveness in this context. Moreover, while some case studies have explored the implementation of emotional intelligence practices in government organizations, there is a lack of comprehensive research on the long-term impact of these practices on employee engagement, performance, and overall organizational outcomes.

Thus, there is a need for more research on the role of emotional intelligence in government leadership and its impact on organizational outcomes. Understanding the impact of emotional intelligence on leadership in the government sector can improve the development of training programs for government leaders, as well as provide insight into how to create a more positive and productive workplace culture in these organizations.

LITERATURE REVIEW

The role of EI in government organizations is studied in this literature review, along with the efficiency of EI training programs in enhancing worker productivity, job satisfaction, and leadership skills. A study on the emotional impact of technology-driven e-learning and the role of technology in emotional intelligence-driven e-learning by (George et al., 2023) provided a foundation for this study on the application and benefits of EI. The findings of this study suggest that EI can contribute to the development of more effective training and e-learning programs that incorporate EI and support the emotional well-being of learners. There is no doubt that teachers play a crucial role in the revitalization and strengthening of the education system (Das & Bhuyan, 2021). As they play a crucial role in the development of educational standards, the researchers examined the level of teacher effectiveness and EI in the study to determine their relationship. The findings of the study by Putri (Putri, 2020) found that good governance, intellectual intelligence, emotional intelligence, and spiritual intelligence positively influence the leadership performance of village government officials in Badung province.



According to (Mfikwe & Pelsler, 2017) research over the past two decades found that emotional intelligence abilities are associated with a range of important work-related behaviors. The study revealed that emotional intelligence and leadership styles do relate to one another and moreover, there were no significant differences in leadership styles and emotional intelligence between bigender respondents. A study conducted by (Deshwal, 2015) mentioned that EI is a crucial factor for deciding success in life and in the organization. The researcher concludes that an employee with better emotional intelligence can perform better in terms of leading the team and building trust among colleagues and the surrounding network. Training for emotional intelligence has been introduced by these organizations in an effort to boost productivity, employee satisfaction, and leadership abilities. Employee morale, teamwork, and general job satisfaction have all improved as a result of integrating emotional intelligence into government enterprises.

EI is a key tool in government organizations around the world since it is a vital skill in managing oneself and relationships with others. Several government institutions, from Singapore to Australia, have included emotional intelligence in their training programs to increase communication, collaboration, and overall job satisfaction. These include:

1. Singapore Civil Service:

The results of examining the effects of a collective emotional intelligence program on the performance of employees in the Singapore Civil Service, according to (Wong et al., 2008) show that the training program was successful in improving communication and collaboration among employees, which resulted in increased job satisfaction.

2. UK National Health Service (NHS):

In the psychological impact of working in a UK emergency department, a mixed methods study by (Mann & Holdsworth, 2014) indicates that the emotional demands of the job can cause stress and burnout in healthcare workers. Training in emotional intelligence can assist employees in better managing their emotions and adjusting to the demands of their jobs.

3. US Department of Defence:

Based on studies published in Workgroup Emotional Intelligence: Scale Development and Relation to Team Process Effectiveness and Goal Focus by (Jordan et al., 2002), EI is



positively correlated with the efficiency of team processes and goal focus. A research published in Human Resource Management Review looked at the effective relationship between workgroup emotional intelligence and team performance in a US Department of Defence organization.

4. Australian Public Service:

In Primal leadership: Realizing the power of emotional intelligence, published by Harvard Business Press, authors (Goleman et al., 2013) argue that emotional intelligence is essential for effective leadership in government organizations because leaders must be able to recognize, understand, and control their own emotions as well as those of others.

5. The Australian Federal Police (AFP):

In Emotional intelligence in policing, a pilot study by (Lawless & Anderson, 2014), a research published in the Journal of Criminal Justice, it is stated that EI is positively correlated with both job performance and job satisfaction among members of the Australian Federal Police.

6. Department of Health and Human Services (DHHS):

Also, according to (Nelis et al., 2009), the research suggests that improving emotional competence through emotional intelligence training can have positive effects on psychological and physical well-being, social relationships, and employability. The study found that participants who underwent emotional intelligence training showed improvements in these areas.

7. Australian Public Service Commission (APSC):

As stated by (Ashkanasy & Daus, 2005) in their study, Rumors of the death of emotional intelligence in organizational behavior are vastly exaggerated, Journal of Organizational Behavior, they argue that emotional intelligence is still a relevant concept and that the APSC has implemented EI training for its employees, which has improved leadership, communication, and teamwork. Employees' performance and job satisfaction have improved as a result of the training on emotional intelligence and coping skills. Contrary to rumors that



emotional intelligence is irrelevant to organizational behavior, the article by (Ashkanasy & Daus, 2005) confirms its relevance.

RESEARCH QUESTIONS

1. How does emotional intelligence contribute to career advancement in the government sector?

The ability to manage one's emotions has been linked to job progress in a number of industries, including the public sector. Regardless of their technical knowledge and skills, (Goleman, 1998) asserts that people with high EI are more likely than those with low EI to succeed in their careers. This is due to the fact that emotional intelligence (EI) makes it possible for people to comprehend and manage their own emotions as well as detect and react to the emotions of others, which is essential for effective leadership, conflict management, and communication. According to research by (Zeidner et al., 2012), people with high levels of EI typically exhibit superior job performance and job satisfaction, both of which are crucial determinants of career success. Furthermore, research by (Jordan & Troth, 2002) and (Shanafelt et al., 2015) demonstrated a positive correlation between emotional intelligence and professional advancement and promotion in the public sector. EI is clearly a useful asset in career advancement because employees who were believed to have high EI were more likely to be chosen for higher jobs. These studies indicate that emotional intelligence is important for career progression in the public sector because it enables people to communicate clearly, resolve problems amicably, and motivate others to reach their objectives.

2. What strategies can government employees use to develop their emotional intelligence competencies and advance in their careers?

Government personnel can use a variety of techniques to improve their emotional intelligence skills and advance their careers. Participating in self-reflection and self-awareness exercises like journaling, mindfulness, and meditation is one of the most successful tactics (Chapman, 2017). Government employees can increase their capacity to control their emotions and react to others in a more positive way by gaining a better awareness of their own emotions and how they affect their conduct. Another strategy is to ask for criticism from others, such as mentors, bosses, and co-workers (Shanafelt et al., 2015). This can assist people in



determining which emotional intelligence skills they need to develop, such as communication, conflict resolution, and leadership. Employees can improve specialized emotional intelligence abilities by looking for training and development opportunities, such as workshops or coaching sessions (Zeidner et al., 2012). Furthermore, staff members can take cues from role models and act similarly (Chapman, 2017). Employees can learn insights on how to effectively communicate, manage conflicts, and lead others by studying people with high emotional intelligence. Additionally, workers can use their emotional intelligence skills to do certain job-related duties including working with co-workers, resolving problems, and inspiring others, which can help them prove their value to the company and progress their careers (Jordan & Troth, 2002).

Overall, these studies point to a number of strategies that government workers can employ to enhance their emotional intelligence competencies and advance their careers. These strategies include self-reflection, seeking feedback, training and development, role modeling, and applying emotional intelligence skills to tasks that are related to their jobs.

FRAMEWORK & METHODOLOGY

Framework

This research paper aims to investigate the use of EI in different governmental organizations across the globe. The public sector encounters significant problems because of diverse stakeholder interests, complex bureaucratic structures, and accountability to the people. In order to effectively address these issues, using EI in government organizations can be useful. In this paper, we present the analysis of literature and case studies on EI in different government organizations across the globe.

This research on EI, starting with its theoretical framework and empirical data showing its influence on government organizational results, is thoroughly reviewed for this study. For the problems encountered by government organizations, the potential advantages of EI becomes the focus of the study. Following that, the case studies have highlighted instances of how EI has been used in government organizations all across the world, including those in the United States, Canada, and Europe. EI enhances employee morale, job satisfaction, career advancement, and overall organizational performance by encouraging



strong connections, building a positive workplace culture, addressing disagreements successfully, making informed decisions, and setting an exemplary example which is taken as a framework for the study and is shown below in figure 1.



Figure 1: Theoretical Framework of the study

Methods

The current study adopted a case study method, which is an important research methodology that involves analyzing real-life situations or phenomena in-depth and in detail. It is a valuable tool for understanding complex social, economic, and cultural issues, as well as for developing and testing theories. A thorough review of the literature is conducted to understand the research gaps, identify, and address research questions, and analyze the case studies to support the study. The research methodology follows a qualitative approach including two themes to address research questions related to emotional intelligence and its impact on career development and organizational performance. There are seven case studies taken for the current study which are based on secondary data from online sources. Theme 1 is based on 7 case studies which are evaluated in the paper including the Singapore Civil Service, UK National Health Service (NHS), US Department of Defence, Australian Public Service, Australian Federal Police (AFP), Department of Health and Human Services (DHHS), and Australian Public Service Commission (APSC). Theme 2 is based on secondary data from online sources which shows how different organizations have implemented EI and it has led to the career growth of its employees as well as the success of the organizations.



EFFECTIVE EI IMPLEMENTATION IN GOVERNMENT ORGANIZATIONS

A few case studies are illustrated below on how emotional intelligence has been used in government organizations across the world

1. Singapore Civil Service: In 2009, the Singapore Civil Service launched an emotional intelligence program to improve communication and interpersonal skills among its employees. The program was designed to help employees better understand their emotions and the emotions of others, leading to improved collaboration and productivity. This EI program helped improve their officers' emotional intelligence and communication skills. The program includes training on emotional awareness, empathy, conflict resolution, and stress management. As a result of this program, the police officers reported improved relationships with the public, reduced stress levels, and increased job satisfaction.

The Civil Service College in Singapore has incorporated EI training into its curriculum for public officials. The college offers a variety of courses on EI, including courses on self-awareness, self-regulation, motivation, empathy, and social skills. The college aims to develop public officials who are emotionally intelligent and can handle complex and challenging situations in a more effective and efficient manner.

2. UK National Health Service (NHS): The NHS has implemented emotional intelligence training for its leaders and managers to help them better manage stress and improve their ability to lead and motivate their teams. This has resulted in improved engagement and job satisfaction among employees. This EI program helped their personnel manage the emotional and psychological demands of their job. The program covers topics such as emotional self-awareness, empathy, and stress management. The program has helped the personnel to better handle the traumatic experiences they face in their line of duty, leading to improved well-being and job satisfaction.

3. US Department of Defence: The US Department of Defence has been incorporating emotional intelligence into its leadership development programs for several years. This has helped military leaders to be more effective in leading their teams, making decisions under pressure, and building strong relationships with allies and partners. The US



Department of Defence has recognized the importance of emotional intelligence in their personnel, and as a result, they have developed an EI program for their service members. The program includes training on emotional awareness, empathy, conflict resolution, and stress management. The program has been credited with reducing stress levels and improving the overall well-being of service members, leading to a more resilient and effective military force.

The United States Air Force has incorporated EI training into its curriculum for officers. The Air Force aims to develop officers who can better manage the stress and demands of their job, build strong relationships with their colleagues, and make better decisions in high-pressure situations. The City of Toronto has implemented an EI program for its employees. The program provides training on EI skills, such as emotional self-awareness, empathy, and communication. The city has found that the EI program has improved employee satisfaction, reduced turnover, and improved overall productivity.

- 4. Australian Public Service:** The Australian Public Service has implemented emotional intelligence programs to improve leadership skills and to help employees develop their emotional intelligence. This has resulted in improved morale, engagement, and productivity among employees. This also helped them handle the emotional and psychological demands of their job. The program covers topics such as emotional self-awareness, empathy, and stress management. The program has been credited with reducing stress levels, improving the well-being of personnel, and enhancing their ability to work effectively in high-pressure situations.

The Australian Public Service (APS) has adopted EI as part of its leadership development framework. The APS provides EI training to its leaders and encourages them to apply EI principles in their day-to-day work. The APS has found that EI has helped its leaders to build better relationships with colleagues, manage change more effectively, and create a more positive and productive work environment.

- 5. The Australian Federal Police (AFP):** The Australian Federal Police (AFP) is the primary law enforcement agency in Australia and has a reputation for being a leader in innovative and effective policing. The AFP has placed a strong emphasis on the



development of EI among its officers, with a number of programs and initiatives aimed at enhancing the emotional intelligence of its staff.

One such program is the Emotional Intelligence for Leaders (EI4L) program, which provides leadership training for senior officers. The program is designed to help officers identify and manage their emotions, as well as to develop the skills needed to effectively manage the emotions of others. The program has been successful in helping to improve the emotional intelligence of officers, resulting in a more positive and supportive work environment, increased collaboration, and improved performance.

- 6. The Department of Health and Human Services (DHHS):** The Department of Health and Human Services (DHHS) is a large government department responsible for delivering a wide range of services and programs to the Australian community. The DHHS has been proactive in developing the emotional intelligence of its staff, with a number of initiatives aimed at improving the emotional intelligence of employees.

One such initiative is the Emotional Intelligence Awareness and Development Program (EIADP), which provides training and support to staff in areas such as emotional self-awareness, empathy, and emotional regulation. The program has been successful in helping employees to understand and manage their emotions more effectively, leading to improved performance, better relationships with colleagues, and a more positive work environment

- 7. The Australian Public Service Commission (APSC):** The Australian Public Service Commission (APSC) is responsible for setting and maintaining the standards of integrity and ethical behavior within the Australian Public Service (APS). The APSC has placed a strong emphasis on the development of emotional intelligence within the APS, with a number of initiatives aimed at improving the emotional intelligence of employees.

One such initiative is the Emotional Intelligence for Effective Leadership (EIEL) program, which provides leadership training for senior executives. The program is designed to help executives understand and manage their emotions more effectively, as well as to develop the skills needed to effectively manage the emotions of others. The



program has been successful in helping executives to improve their emotional intelligence, leading to a more positive work environment and improved performance.

These are just a few case studies of how emotional intelligence has been used in government organizations across the world. By incorporating emotional intelligence into leadership development programs, these organizations have seen significant improvements in areas such as collaboration, decision-making, communication, and employee morale. The implementation of EI programs has been shown to improve the emotional and psychological well-being of personnel, leading to a more resilient and effective workforce.

FINDINGS AND DISCUSSION

Theme 1: Case study analysis of EI in Public Sector Organizations leading to employee's career growth.

Based on these case studies we can analyze how emotional intelligence contributes to career advancement in the government sector. Emotional intelligence (EI) is the ability to identify, understand, and manage one's own emotions, as well as to recognize and influence the emotions of others. It is an important skill in the workplace, including in the government sector. Government employees who possess a high level of emotional intelligence are more likely to succeed in their careers and advance to higher positions. One reason for this is that EI helps government employees to communicate effectively. Communication is a critical skill in the government sector, as employees need to work with a wide range of stakeholders, including colleagues, superiors, subordinates, and members of the public. Effective communication requires not only the ability to convey information clearly but also to listen actively and respond appropriately to others' emotions. Employees with high EI can read people's emotional states and adapt their communication style accordingly, which can help them build strong working relationships and influence others. EI also helps government employees to manage conflicts effectively. In the government sector, conflicts can arise between different agencies, departments, and individuals with competing interests. Employees with high EI can manage these conflicts constructively by identifying the underlying emotions, understanding the perspectives of all parties, and finding common



ground to resolve the issue. They are less likely to become defensive, aggressive, or confrontational, which can damage relationships and derail career advancement. Moreover, EI helps government employees to lead and inspire others. Effective leadership requires the ability to understand and influence others' emotions, build trust and rapport, and inspire them to achieve their goals. Employees with high EI can create a positive work environment that fosters collaboration, creativity, and innovation. They can also motivate their colleagues to work harder and contribute more to the organization's goals, which can lead to greater recognition and career advancement. Emotional intelligence is a valuable skill for government employees looking to advance their careers. By improving their ability to communicate, manage conflicts, and lead others, employees with high EI can build strong working relationships, resolve conflicts constructively, and inspire others to achieve their goals. These qualities are highly valued in the government sector, and employees who possess them are more likely to succeed and advance to higher positions.

Theme 2: Secondary Data Analysis of Emotional Intelligence Implementation in Various Organizations leading to overall organizational success.

According to the New Carat report, Google has the greatest Emotional Intelligence score of any business in the world, and the share prices of the top EQ brands have increased by +910%. The second iteration of Carat's Brand EQ 2022 Report' examines how emotional intelligence fuels rapid brand growth. Its scope has been widened to include 51 brands and 15,000 respondents from 15 markets. In the initial study, which was published in 2020, five main Brand EQ drivers—empathy, motivation, self-regulation, self-awareness, and social skills—were used to rank some of the most emotionally intelligent businesses in the world. Looking at how each brand performed alone, Google performed best, moving up 14 spots from two years ago and thriving as the pandemic's go-to brand. With 79% of its brand associations being regarded as good, Google demonstrated a significant increase in self-awareness and demonstrated that innovation and technology can have a human face. The domination of Samsung in the EQ category was one of Brand EQ's more unexpected findings.



Figure 1: Top emotionally intelligent companies in 2021

(Source: New Carat report)

Looking into the correlation between emotional intelligence and high growth, the results of Carat's research showed that obtaining high EQ makes eminently commercial sense for brands, with an even higher association between high EQ and high growth. When compared to renowned indices like the S&P 500 and the FTSE 100, the top 20 brand EQ performers significantly outperformed in terms of growth in shareholder value, according to the analysis.

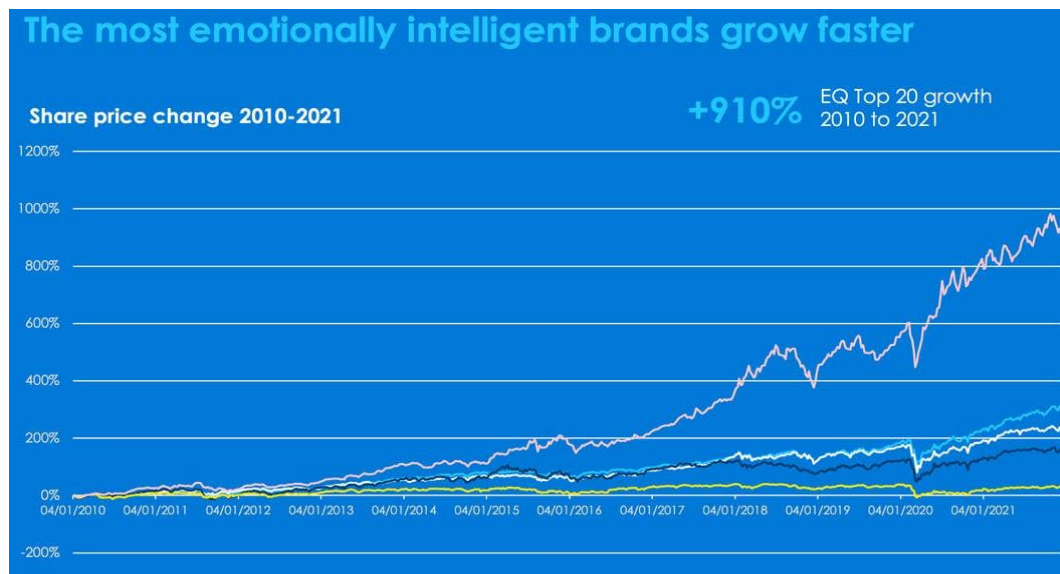


Figure 2: Growth rate of companies based on EI

(Source: New Carat report)



The second wave of research also found that EI brands were founded to create value for people perform better. Brands with high EQ are acting confidently and creatively to help people adapt to new lifestyles, new research further demonstrates this during the Covid-19 pandemic. Examples of this included Disney's fast rollout of Disney+ to keep people entertained at home, and Mastercard's rapid shift to digital to help shoppers and retailers adapt to new ways of living. Similarly, few companies have implemented EI training and reported benefits. Many other companies have also implemented EI training and have seen improvements in employee performance, leadership, collaboration, conflict resolution, customer satisfaction, and decision-making. For example,

1. Google: Google offers EI courses to its employees, which has resulted in improved communication, collaboration, and teamwork among employees.
2. Ford: Ford implemented EI training for its executives, which resulted in increased empathy, better communication, and improved leadership skills. As a result, the company saw improved employee engagement and organizational success.
3. Marriott International: Marriott International implemented an EI training program for its employees, resulting in improved customer service and increased customer satisfaction. Employees were able to better handle challenging customer situations and build stronger relationships with clients.
4. UPS: UPS implemented EI training for its managers, resulting in improved leadership, better communication, and increased employee engagement. The company saw reduced turnover and improved organizational success.
5. American Express: American Express implemented EI training for its call center employees, resulting in improved customer service and increased customer satisfaction. Employees were better equipped to handle challenging customers and build stronger relationships with clients.

CONCLUSION

EI is a crucial factor for career advancement in the government sector. The study findings suggest that individuals who possess high emotional intelligence are more likely to excel in their jobs, communicate effectively, and build stronger relationships with colleagues and superiors. These abilities make them valuable assets to the organization and increase their



chances of being promoted to higher positions. According to research, those with high EI are more likely to succeed in their careers, form good connections with co-workers, and successfully handle workplace politics. In addition, they have improvements in conflict management and negotiating skills, which can in turn help the organization as well. EI is a crucial component of professional growth in the public sector because it enables people to interact positively with others, communicate clearly, and negotiate challenging workplace dynamics.

However, it is essential to note that emotional intelligence alone is not enough to guarantee career advancement in the government sector. Other factors such as job performance, technical skills, and educational qualifications also play significant roles in determining career success. Nevertheless, developing emotional intelligence skills is a worthwhile investment that can lead to career advancement and personal growth.

LIMITATIONS

This paper has two main limitations that should be considered for future studies. First, the study and the findings may not be generalizable to all regions or countries. Second, the sample size was relatively small without a quantitative aspect, limiting the statistical power of the analysis. Generalizability to other regions or countries refers to the fact that the study and its findings may not be representative or applicable to all regions or countries. This could be due to differences in cultural norms, economic conditions, or other contextual factors that could impact the validity of the study's conclusions. For example, if the study was conducted in a specific region that has unique cultural practices or beliefs, the findings may not be generalizable to other regions with different cultural norms. Future studies should attempt to replicate the research in different regions or countries to determine the generalizability of the findings. The small sample size and lack of quantitative aspect refers to the fact that the study had a relatively small sample size and limited the statistical power of the analysis. Small sample size can increase the likelihood of errors, which means that the study may not be able to detect significant effects or relationships that exist in the population. Therefore, the conclusions drawn from the study may not be as robust or reliable as they would be with a larger sample size. Future studies should aim to recruit larger and more diverse samples to increase the statistical power and generalizability of their findings.



REFERENCES

1. Ashkanasy, N. M., & Daus, C. S. (2005). Rumors of the death of emotional intelligence in organizational behavior are vastly exaggerated. *Journal of Organizational Behavior*, 26(4), 441–452. <https://doi.org/10.1002/job.320>
2. Boyatzis, R. E. (2019). *The neuroscience of change: How to train your brain to create better habits*. Harvard Business Review Press.
3. Boyatzis, R., & McKee, A. (2005). *Resonant leadership: Renewing yourself and connecting with others through mindfulness, hope, and compassion*. Harvard Business Review Press.
4. Brackett, M. A., & Katulak, N. A. (2006). Emotional intelligence in the classroom: Skill-based training for teachers and students. In J. Ciarrochi, J. P. Forgas, & J. D. Mayer (Eds.), *Emotional intelligence in everyday life* (pp. 272-287). Psychology Press.
5. Brackett, M. A., Rivers, S. E., & Salovey, P. (2011). Emotional intelligence: Implications for personal, social, academic, and workplace success. *Social and Personality Psychology Compass*, 5(1), 88-103.
6. Brasseur, S., & Grégoire, J. (2010). The relevance of emotional intelligence for leadership effectiveness: A study of managers in the Netherlands and France. *Journal of Leadership & Organizational Studies*, 17(4), 380-394.
7. Chapman, A. (2017). Emotional Intelligence in the Public Sector: Why It Matters More Than Ever and How to Improve It. *Journal of Public Affairs Education*, 23(3), 347-362. [doi:10.1080/15236803.2017.1304583](https://doi.org/10.1080/15236803.2017.1304583)
8. Das, L., & Bhuyan, S. (2021). Teacher effectiveness and emotional intelligence of government secondary school teachers. *Scholarly research journal for humanity science and english language*, 9(46). <https://doi.org/10.21922/srjhsel.v9i46.6652>
9. George, A., Ravindran, D., Sirothiya, M., Goli, M., & Rajan, N. (2023). An Examination of the Emotional Impact of Technology-Driven E-Learning: Role of Technology in Emotional Intelligence-Driven E-Learning. In P. Sharma, R. Bansal, & R. Singh



- (Eds.), Technology-Driven E-Learning Pedagogy Through Emotional Intelligence (pp. 81-102). IGI Global. <https://doi.org/10.4018/978-1-6684-7639-0.ch006>
10. Gohm, C. L., & Clore, G. L. (2002). Four latent traits of emotional experience and their involvement in well-being, coping, and attributional style. *Cognition and Emotion*, 16(4), 495-518.
 11. Goleman, D. (1995). Emotional intelligence. Why it can matter more than IQ. Harvard
 12. Goleman, D. (1998). The emotional intelligence of leaders. *Leader to Leader*, 1998(10), 20–26. <https://doi.org/10.1002/ltl.40619981008>
 13. Goleman, D. (1998). What makes a leader? *Harvard Business Review*, 76(6), 93-102.
 14. Goleman, D. (2016, October 31). Social Intelligence and the Biology of Leadership. *Harvard Business Review*. <https://hbr.org/2008/09/social-intelligence-and-the-biology-of-leadership>
 15. Goleman, D., Boyatzis, R. E., & McKee, A. (2013). *Primal leadership: The hidden driver of great performance*. Harvard Business Review Press.
 16. Hanafi, W. N. W., Daud, S., & Baharin, N. L. (2018). Blue Ocean Leadership and Emotional Intelligence in Government Link Companies (GLCs): Preparing for Industry 4.0. *SHS Web of Conferences*, 56. <https://doi.org/10.1051/shsconf/20185604008>
 17. Jordan, P., & Troth, A. C. (2002). Emotional Intelligence and Conflict Resolution: Implications for Human Resource Development. *Advances in Developing Human Resources*, 4(1), 62–79. <https://doi.org/10.1177/1523422302004001005>
 18. Jordan, P., Ashkanasy, N. M., Härtel, C. E. J., & Hooper, G. J. (2002). Workgroup emotional intelligence. *Human Resource Management Review*, 12(2), 195–214. [https://doi.org/10.1016/s1053-4822\(02\)00046-3](https://doi.org/10.1016/s1053-4822(02)00046-3)
 19. Joseph, D. L., & Newman, D. A. (2010). Emotional intelligence: An integrative meta-analysis and cascading model. *Journal of Applied Psychology*, 95(1), 54-78.
 20. Lopes, P. N., Brackett, M. A., Nezlek, J. B., Schütz, A., Sellin, I., & Salovey, P. (2004). Emotional intelligence and social interaction. *Personality and Social Psychology Bulletin*, 30(8), 1018-1034.



21. Lopes, P. N., Salovey, P., Côté, S., Beers, M., & Petty, R. E. (2005). Emotion regulation abilities and the quality of social interaction. *Emotion*, 5(1), 113-118.
22. Matthews, G., Zeidner, M., & Roberts, R. D. (2017, February 18). *Emotional Intelligence, Health, and Stress*. John Wiley & Sons, Ltd EBooks, 312–326. <https://doi.org/10.1002/9781118993811.ch18Arsha>
23. Mfikwe, N. M. G., & Pelsler, T. G. (2017). The significance of emotional intelligence and leadership styles of senior leaders in the South African government. *Management (Croatia)*, 22(2). <https://doi.org/10.30924/mjcmi/2017.22.2.115>
24. Nelis, D., Kotsou, I., Quoidbach, J., Hansenne, M., Weytens, F., Dupuis, P., & Mikolajczak, M. (2011). Increasing emotional competence improves psychological and physical well-being, social relationships, and employability. *Emotion*, 11(2), 354–366. <https://doi.org/10.1037/a0021554>
25. Palmer, B. R., Gignac, G., Manocha, R., & Stough, C. (2005). A psychometric evaluation of the Mayer–Salovey–Caruso Emotional Intelligence Test Version 2.0. *Intelligence*, 33(3), 285-305.
26. Putri, I. G. A. M. A. D. (2020). Implementation of good government governance, intellectual intelligence, emotional, and spiritual intelligence in managerial performance of village government management. *International Research Journal of Management, IT and Social Sciences*. <https://doi.org/10.21744/irjmis.v7n1.831>
27. Shanafelt, T. D., Hasan, O., Dyrbye, L. N., Sinsky, C. A., Satele, D., Sloan, J. A., & West, C. P. (2015). Changes in Burnout and Satisfaction With Work-Life Balance in Physicians and the General US Working Population Between 2011 and 2014. *Mayo Clinic Proceedings*, 90(12), 1600–1613. <https://doi.org/10.1016/j.mayocp.2015.08.023>
28. Zeidner, M., & Olnick-Shemesh, D. (2010). Emotional intelligence and subjective well-being revisited. In J. Ciarrochi, J. P. Forgas, & J. D. Mayer (Eds.), *Emotional intelligence in everyday life* (2nd ed., pp. 87-106). Psychology Press.



The security and privacy challenges of blockchain in the financial sector, including the risk of hacking and fraud

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Abstract

The use of blockchain technology in the financial sector has gained significant attention in recent years, due to its potential to improve efficiency, transparency, and security in financial transactions. Blockchain technology's privacy and security issues, together with the possibility of fraud and hacking, are a significant worry for the financial sector. The aim of this study is to analyze the privacy and security risks posed by blockchain technology in the financial industry and to determine how well security features and privacy protections work towards fraud and hacking. A literature review of journals articles and research paper are all part of the study design, which uses a systematic investigation approach. The results of the study will provide insights into the security and privacy challenges of blockchain technology in the financial sector and will inform stakeholders about the effectiveness of security measures and privacy features in preventing hacking and fraud, and the impact of security and privacy on the adoption and usage of blockchain technology in the financial sector. The findings of this study will contribute to the body of knowledge on blockchain technology and security and privacy challenges in the financial sector and will inform policymakers and regulators on the development of regulations and standards for ensuring the security and privacy of blockchain technology in the financial sector.



Keywords: Blockchain Technology, Financial Sector, Security, Privacy, Hacking, Fraud, Adoption, Etc.

Introduction

A blockchain is a shared distributed database or ledger that exists across all computer nodes in a network. A blockchain serves as an electronic database for storing data in digital form. With cryptocurrency systems like Bitcoin, blockchains are widely known for maintaining a secure and decentralized record of transactions. The data organization on a blockchain differs from how it is traditionally organized. A blockchain collects data in units called blocks, each of which contains a collection of data. A blockchain known as the blockchain comprises blocks, each of which has a set amount of storage space. When a block is full, it is sealed and connected to the block before it. Every additional piece of information that comes after that newly added block is combined into a brand-new block, which is then added to the chain once it is full.

Blockchain aims to enable the distribution and recording of digital information without its editing. Therefore, a blockchain serves as the basis for immutable ledgers, or records of transactions that cannot be changed, removed, or destroyed. Because of this, blockchains are often referred to as distributed ledger technologies (DLT).

In recent years, blockchain technology has emerged as one of the most ground-breaking and disruptive technologies. It has transformed a number of businesses, including the financial one. Blockchain technology is a secure, decentralised ledger system that makes the transfer of digital assets quick and easy. Blockchain technology is being utilised in the financial industry for several purposes, including payment systems, digital identity management, and anti-money laundering (AML) initiatives.

The adoption of blockchain technology in the financial industry has been hampered despite its potential advantages by several security and privacy issues. The likelihood of hacking and cyberattacks has grown along with the growing use of blockchain technology in the financial industry. Furthermore, owing to the transparency of the blockchain ledger, the privacy characteristics of the technology are under scrutiny. For blockchain technology to be used safely and securely in the financial industry, these security and privacy issues must be resolved.



Therefore, it is essential to study the security and privacy challenges of blockchain technology in the financial sector. This study aims to explore the impact of these challenges on the adoption and usage of blockchain technology in the financial sector, including the risk of hacking and fraud. The study will also evaluate the effectiveness of the security measures and privacy features of blockchain technology, as well as the regulations and standards for ensuring the security and privacy of blockchain technology in the financial sector.

Objectives:

- To evaluate the impact of security and privacy challenges on adopting and using blockchain technology in the financial sector.
- To explain the effectiveness of blockchain technology's security measures and privacy features in preventing hacking and fraud.
- To generate practical recommendations that ensure the security and privacy of blockchain technology in the financial sector.

Literature Review

(Trivedi et al., 2021) The unique technological capabilities of blockchain can revolutionize the financial industry while increasing its transparency and confidence in cyberspaces. Blockchain has the potential to significantly enhance banking, capital markets, insurance, and international commerce when combined with technologies of field-sensing like IoT and AI.

(Andoni et al., 2019; Sharma, 2018; Yoo, 2017) Prominent banks in India, such the Reserve Bank of India (RBI), Yes Bank, Axis Bank, and the State Bank of India (SBI), are thinking about implementing blockchain technology, which may be a quicker, more transparent, and more secure means to serve their consumers better.

(Zheng et al., 2018; Nofer et al., 2017) The largest bank, the State Bank of India, was the first to create a blockchain consortium for financial transactions made up of roughly ten institutions. The bank has finished its first blockchain-based project, which will allow its users to communicate Know Your Customer (KYC), Combating the Financing of Terrorism (CFT), and Anti-Money Laundering (AML) issues. However, this technology hasn't yet been proven in terms of knowledge.



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(Andoni et al., 2019; Rijmenam, 2018; Eyal, 2017) Blockchain technology may present options for postal organisations, including decentralized platforms, secure record-keeping, and quick transaction systems. This industry is beginning to investigate blockchain to enhance its operations, like the banking industry. Various banks use various strategies when experimenting with and implementing this technology. Some banks look at choices internally first, while others try to utilise technology to look at options between banks.

(Andoni et al., 2019; Knirsch et al., 2019; Zhang et al., 2018) The data structure that records many transactions and upholds the data's decentralisation, security, and transparency is accurately represented by blockchain technology.

(Zhang et al., 2020) In the traditional banking system, third-party facilitation adds a cost of 5 to 20% to remittances, especially when sending money internationally. The cost of remittances using blockchain is 2 to 3%. The use of cryptocurrency, however, may present certain difficulties in the payment process. Payments made using cryptocurrency may thus not be possible until a balance of interests and legislation across nations is reached.

(Andoni et al., 2019; Puthal et al., 2018) The most claimed advantages of blockchain technology include cost effectiveness, above-average earnings, improved recordkeeping systems, smart digital contracts with universal online identity systems, a safe digital platform, room for innovation, and a lack of governmental constraints.

(Helo and Hao, 2019; Swaniti initiative, 2018; Kewell et al., 2017; Kshetri, 2017) Blockchain allows for the direct sharing of databanks without the involvement of a primary owner. They also listed a few benefits, including exceptional data quality, data longevity and dependability, empowered users, long-term viability, process honesty, transparency, and immutability, a streamlined ecosystem, accelerated transaction speed, and much lower transaction costs. In summary, blockchain will encourage the system to become more robust by assisting banks with the authentication, fusion, and trading of economic statements, the validation of agreements, the retention of reviews and audit trails, and the prevention of money laundering.



(Chang, V., Baudier, P., Zhang, H., Xu, Q., Zhang, J. and Arami, M., 2020) Whereas the bank is a centralised institution, the Blockchain is decentralised. If a centralised system can be created using the Blockchain's underlying technology. Blockchain technology is now being employed in banks. Supply chain finance and payment settlement are just a few of the business sectors where it is being used in order to better understand clients and identify potential anti-money laundering concerns. Second, the use of automation and smart contracts is increasing productivity, reducing costs, and reducing operational risks and fraud in the financial services sector. This technology may alter the financial business paradigm, allowing intelligent employees to focus on more difficult cognitive tasks.

(Younus, D., Muayad, A. and Abumandil, M., 2022) The existing financial system has a number of issues that require the creation of distributed, decentralised solutions. Decentralized solutions that protect the confidentiality and integrity of financial data have the potential to be made possible with the help of blockchain technology. Financial industry adoption of blockchain technology.

(Kumari, A. and Devi, N.C., 2022) FinTech will bring about significant improvements in investing practises that provide superior client data supported by blockchain technology. Blockchain in FinTech can offer a lot more effective financial alternative than what we presently have since it is based on equity and decentralisation. FinTech's blockchain-based ecosystem provides swift money transactions, excellent security, and transparent financial tracking.

Research Question:

- How does the security and privacy of blockchain technology in the financial sector impact the adoption and usage of blockchain technology?
- How effective are blockchain technology's security measures and privacy features in preventing hacking and fraud?
- How the regulations and standards are effective for ensuring the security and privacy of blockchain technology in the financial sector in mitigating the risk of hacking and fraud?



Research Methodology

This study aims to will provide insights into the security and privacy challenges of blockchain technology in the financial sector and about the effectiveness of security measures and privacy features in preventing hacking and fraud, and the impact of security and privacy on the adoption and usage of blockchain technology in the financial sector. Integrative review is the most beneficial and acceptable method to accomplish the objective of this study. This study may evaluate, analyze, and synthesize the literature on Blockchain technology by using an integrative review technique, which enables the development of a taxonomy or categorization of significant difficulties. Ebsco, ResearchGate, and Scholar Google were used to extract pertinent literature on blockchain's advantages, prospects, costs, dangers, and obstacles in the context of banking and financial services. The following keyword combinations were part of the search criteria: Blockchain OR Block chain AND (Banking and Finance OR Fintech) AND Challenges OR Benefits OR Benefits OR Risks OR Security. The security and privacy of blockchain along with are then captured using the literature that has been extracted, and secondary research is used to create a blockchain analysis framework and taxonomy that identifies and groups the major influencing factors, such as advantages, disadvantages, opportunities, and risks for the banking and finance industries.

Discussion

The distributed ledger technology based on blockchain has a lot to offer new financial services. Internet communications are starting to be impacted by blockchain. Networks have the power to completely alter how things operate and are closely related to the digital technologies that are revolutionizing most sectors. As information technology has made peer-to-peer (P2P) and mass media communications possible, blockchain technology will significantly alter the banking and financial sector. Blockchain makes it possible for users to send and receive money instantaneously, securely, and for a minimal transfer charge enabling quick transactions without the involvement of a third party, which lowers or eliminates the possibility of hacking. With other elements of the fourth industrial revolution, such as blockchain networks and financial technology firms' preparedness for the digital platform and other services, the digitization of banking and financial services is left unfinished. With quicker reaction times and more proficiency in providing secure and straightforward financial transactions, digitalized

banking services rigorously examine outdated, tradition-based company structures and methods.

1. Types of Blockchain

Public Blockchain- All public blockchains are open-source. Anybody may engage in the transactions made possible by this sort of Blockchain, everyone can see what blocks are being added, and anyone can participate in the consensus process, which determines what blocks are added to the chain and what its current status is.

Closed Loop Blockchain- A Closed Loop blockchain differs from a public blockchain in that only a small number of carefully chosen nodes are given the authority to validate transactions. The ability to read a blockchain may be granted to everyone or only to participants.

Private Blockchain- One organisation may only have write permissions. Database administration and auditing, or regions unique to a single entity where it is not necessary to grant the public the opportunity to view or check, are major uses

2. How does Blockchain works?

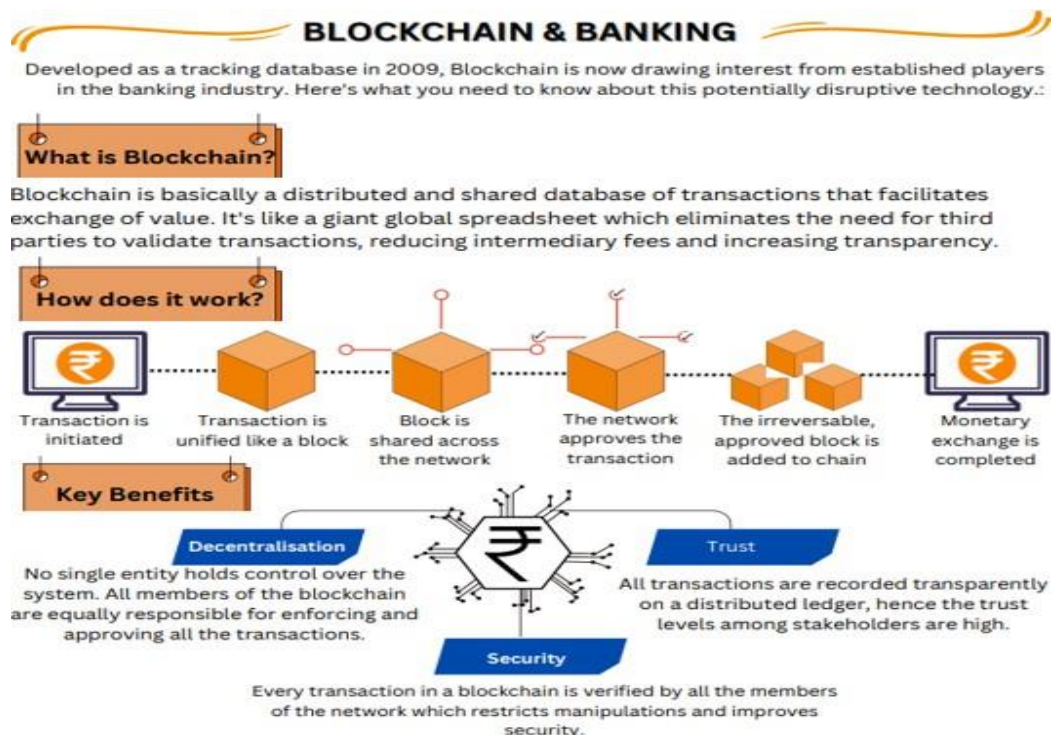


Figure:1



A block is where the records of all the transactions are kept when data on a blockchain is accessed or changed. By the use of distinctive, immutable hashes like those produced by the SHA-256 algorithm, stored transactions are encrypted. Older data blocks are not overwritten by new ones; instead, they are added together to allow for the monitoring of any changes. Moreover, since all transactions are encrypted, records are unchangeable, allowing the network to detect and reject any alterations to the ledger.

When transactions are progressively and endlessly recorded and these blocks of encrypted data are continuously chained to one another, a flawless audit history is created that enables access to previous iterations of the blockchain.

The majority of nodes, often referred to as consensus mechanisms, must check and certify the legality of new data when it is uploaded to the network based on permissions or financial incentives. A new block is made and added to the chain when agreement is obtained. The blockchain ledger is then updated on all nodes.

The first node in a public blockchain network to reliably demonstrate the authenticity of a transaction is rewarded financially. It is known as mining to do this.

3. Applications of Blockchain in Financial and Blockchain Sector

Table 1: Application of blockchain in financial sector

Application	Description	Benefits
Trade Finance	The financial tools and goods used by businesses to support international trade and commerce are referred to as trade finance.	Provide banking services to small and medium-sized businesses (SMEs) and businesses that often engage in open account trading. Digitizing labor-intensive paper operations helps cut operational expenses. Accelerate trading and funding approval cycles.
KYC Verification	KYC means Know Your Customer, while creating an account and on an ongoing basis, KYC checks are required to identify and confirm the client's identity.	Real-time tracking and monitoring of data changes. Financial Institutes have direct access to data, speeding up data collection and processing.



Cross- Border Payment	any kind of transaction in which the payer (the client) and the recipient (the business) are both situated in separate countries.	This has speedy funding; Transaction information is embedded into the immediate payment. Moreover, it is possible to stop the transfer of customer information between jurisdictions.
Supply Chain Finance	A group of commercial and financial procedures supported by technology that offer flexible payment choices to a buyer and one of their suppliers at lower financing rates.	Businesses use the blockchain as a platform to automate and streamline supply chain financing procedures. This improves efficiency and assists other firms cut operating costs. The blockchain also makes it easier for parties to transactions to remain trustworthy and consistent.
Digital Identity	Data that collectively represents a particular person or thing online is known as a digital identity. It is exclusive of personally identifiable information (PII), can safeguard customer privacy while giving useful data to comprehend target markets and specific people.	People may manage data sharing and create their own profiles. All activities and business processes are tamper-proof and permanently recorded as blockchain transactions, and only permitted network members have access.
Hedge Funds	Financial partnerships known as hedge funds use pooled capital and a variety of trading techniques to generate active returns for their clients.	Using cryptographic methods, blockchain technology makes transactions safe and unchangeable. By doing so, the hedge fund's overall security is improved and the chance of fraud is decreased.
Audit and Assurance	The process of conducting an audit involves carefully examining the accounting data presented in financial statements of a corporation. Assurance, on the other hand, entails evaluating and analysing various activities, processes, and procedures.	Provides a visible and secure record of transactions, which lowers the chance of fraud. This can assist auditors to spot any inconsistencies or questionable behavior and take immediate action.



4. Some Examples of blockchain used in financial sector

4.1 HDFC Bank

Trade Finance: To simplify its trade finance processes, HDFC Bank has started utilising blockchain technology. To automate the trade financing process and increase transparency and efficiency, the bank has created a blockchain-based platform Called Infosys Finacle . With the use of this platform, the bank can speed up trade finance transactions, eliminate manual work, and increase documentation accuracy.

KYC Verification: The bank is also investigating how blockchain technology may be used to enhance its Know Your Customer (KYC) verification procedure. By utilising blockchain, HDFC Bank has built a decentralised, tamper-proof database of client identities, facilitating faster and easier customer verification and preserving data privacy and security.

Cross-Border Payment: To enable cross-border payments utilising blockchain technology, HDFC Bank has teamed with Ripple, a well-known blockchain payment service provider. By this cooperation, HDFC Bank is able to provide its clients with quick, safe, and transparent cross-border payment options.

Supply Chain Finance: In collaboration with the National Stock Exchange of India, HDFC Bank has also developed Invoice Mart, a blockchain-based supply chain financing platform.

By using their receivables from major corporations, this platform enables small and medium-sized businesses (SMEs) to receive funding at reasonable costs.

4.2 Deloitte

Digital Identity: Deloitte is working on a blockchain-based digital identification system that gives users secure access to control over, and sharing of their personal data. This system speeds up identification verification procedures, let people maintain their personal information securely and easily, and prevent identity theft.

Supply Chain Management: Blockchain technology is being investigated by Deloitte to enhance supply chain management and traceability. The Firm has created a blockchain-based technology called Blockchain in a Box that enables businesses to follow the flow of products and raw materials across their supply chain, enhancing efficiency and transparency.



Digital Banking: Smart Identity, a blockchain-based technology created by Deloitte, allows safe and practical digital financial services. By the use of biometric authentication and blockchain technology, this platform enables users to securely access their bank accounts and conduct transactions.

Customer Onboarding: Developing a seamless onboarding process for people and organisation is known as customer onboarding. The larger microservices architecture of the digital bank accelerator includes the onboarding module. Blockchain-based digital identification lowers the administrative burden of securely and reliably enrolling new clients.

Loan Management: In order to integrate distributed ledger technology with SAP Loans Management for Banking, SAP S/4HANA version, Deloitte and SAP are working together, a blockchain-based solution that uses smart contracts recorded in the blockchain to replace paper-based certificates of ownership. From loan setup to repayment, this solution is intended to provide comprehensive servicing for a wide range of lending products, including bonded loans.

Audit and Assurance: Deloitte is investigating the application of blockchain technology in audit and assurance services. The company has created a blockchain-based platform called Deloitte COINIA that enables auditors to access and verify financial data, enhancing the integrity and dependability of audit reports safely and effectively.

4.3 Axis Bank

Cross-Border Payment: To enable cross-border payment utilising blockchain technology, Axis Bank has teamed with Ripple, a well-known blockchain payment service provider. By this cooperation, Axis Bank is able to provide its clients with quick, safe, and transparent cross-border payment options.

Supply Chain Finance: In collaboration with R3, a preeminent provider of blockchain software, Axis Bank has launched Invoice Chain, a supply chain financing platform built on the blockchain. With the help of this platform, small and medium-sized businesses (SMEs) may use their receivables from huge corporate to acquire funding at reasonable rates.



KYC Verification: To enhance its Know Your Customer (KYC) verification procedure, Axis Bank is looking into using blockchain technology. Axis Bank may use blockchain to build a decentralized, tamper-proof database of client IDs, facilitating faster and easier customer verification and preserving data privacy and security.

Trade Finance: In order to improve its trade finance processes, Axis Bank is likewise looking at using blockchain technology. In collaboration with R3 and other institutions, the bank is piloting Marco Polo, a blockchain-based platform. With the use of this platform, the bank can speed up trade finance transactions, do away with manual work, and increase paperwork accuracy.

4.4 Kotak Mahindra bank

Trade Finance: The bank has adopted the Trade Ace blockchain-based technology to automate the trade financing procedure and boost efficiency and transparency. With the help of this platform, the bank can speed up the processing of trade finance transactions, do away with the need for manual involvement, and enhance the documentation's reliability.

KYC Verification: The bank is using blockchain technology to enhance its Know Your Customer (KYC) verification procedure. By leveraging blockchain, Kotak Mahindra Bank can build a decentralised, tamper-proof database of client identities, facilitating faster and easier customer verification and preserving data privacy and security.

Cross-border Payment: In order to enable cross-border payments utilising blockchain technology, Ripple, a prominent blockchain payment service, has teamed with Kotak Mahindra Bank. By this relationship, the bank is able to provide its clients with cross-border payment options that are quick, safe, transparent, and low-cost.

Digital Identity: The bank is using blockchain technology to create a secure digital identity system that lets people manage and share their personal information. This solution helps speed up identification verification procedures, deter identity theft, and give users a safe and practical method to handle their personal data.



5. Challenges associated with the adoption of blockchain technology in the financial sector

Cost and efficiency- Peer-to-peer transactions on blockchain networks may be carried out quickly and efficiently, but at a high aggregate cost that is higher for some types of blockchain than others. Blockchains consequently provide a productivity conundrum. The procedure considerably increases productivity at the network-wide scale, but it necessitates a certain critical mass of nodes.

Security and privacy- While Bitcoin and other cryptocurrencies provide pseudonymity (Bitcoin transactions are linked to 'wallets' rather than to specific people), many blockchain-based applications call for smart contracts and transactions to be unquestionably linked to known identities, which raises serious concerns about both privacy and the security of the information stored on the shared ledger. Although no technology is totally safe, some contend that a blockchain's decentralised design and encryption have yet to be breached. Blockchain-based identities would be distinct and provide a better level of confidence that the person was who they claimed to be. Driving public adoption of blockchain applications will probably require aggressively framing the privacy conversation around ideas of value, security, and trust.

Awareness and understanding- The main issue with blockchain are a general lack of knowledge of the technology and a general lack of comprehension of how it operates, especially in industries like finance. Investment and idea exploration are being hampered by this.

Modifications of data- The data that the banking and financial industry stores, particularly data regarding a transaction, is frequently modified. Due to the challenges, it presents in such adaptations, the Blockchain system ends up being more of a burden than an asset for the company. As a result, a few of these financing organisations decide against using it for transaction recording. The data entering process takes a lengthy time. Given that there may be many transactions in the banking industry every day, a lengthy process might postpone the recording of every such transaction, making the system ineffective.



Regulatory and Governance- Blockchain regulations are not well defined. Examples of important regulatory aspects upon which financial institutions rely include dispute resolution mechanisms, responsible regulatory agencies and their coordination mechanisms, legal standing of documents/instruments stored on blockchains, liability ownership (of smart contract failures, etc.), definitions (such as whether virtual currency is a commodity, money, or property), territorial requirements (such as on data), and regulatory reporting (e.g., EMIR-related).

For blockchain, there isn't a standardized, open governance framework. Market dynamics essentially guide decision-making. As a result, there is a danger of infrastructure and network failure as well as general financial system instability. It might be difficult to put in place an efficient governance system. There are concerns over whose users or other parties would be in charge of and responsible for the DL system. Smart contracts, for instance, may involve several parties (contract authors, contract custodians, and contractual parties), and governance and liability problems may occur if the contracting parties break their obligations under the agreement or the smart contract has code or design flaws.

Conclusion

Blockchain technology has the enormous potential to completely transform a number of sectors, including banking and finance. For companies aiming to simplify processes, cut expenses, and increase transparency, it offers appealing advantages like decentralisation, immutability, and security.

Several banks and financial organisations have already begun testing out use cases for blockchain technology in the financial industry. Blockchain technology is being used in a number of industries to boost productivity, lower fraud, and promote transparency, including trade finance, KYC verification, cross-border payments, supply chain financing, digital identification, hedge funds, and audit and assurance.

While the adoption of Blockchain technology is in the initial stage, it has potential to transform the industry by overcoming the current challenges prevailing around security, privacy, efficiency, cost implementation, regulations and governance in the financial sector



References

- Chang, V., Baudier, P., Zhang, H., Xu, Q., Zhang, J., Arami, M., 2020b. How Blockchain can impact financial services—The overview, challenges and recommendations from expert interviewees. *Technol. Forecast. Soc. Change.* <https://doi.org/10.1016/j.techfore.2020.120166>.
- Helo, P., Hao, Y., 2019. Blockchains in operations and supply chains: a model and reference implementation. *Computers & Industrial Engineering.* <https://doi.org/10.1016/j.cie.2019.07.023>.
- Zhang, L., Xie, Y., Zheng, Y., Xue, W., Zheng, X., Xu, X., 2020. The challenges and countermeasures of blockchain in finance and economics. *Syst. Res. Behav. Sci.* 37 (4), 691–698.
- Zheng, Z., Xie, S., Dai, H.N., Chen, X., Wang, H., 2018. Blockchain challenges and opportunities: a survey. *International Journal of Web and Grid Services* 14 (4), 352–375.
- Nofer, M., Gomber, P., Hinz, O., Schiereck, D., 2017. Blockchain. *Business & Information Systems Engineering* 59 (3), 183–187.
- Andoni, M., Robu, V., Flynn, D., Abram, S., Geach, D., Jenkins, D., Peacock, A., 2019. Blockchain technology in the energy sector: A systematic review of challenges and opportunities. *Renewable and Sustainable Energy Reviews* 100, 143–174.
- Yoo, S., 2017. Blockchain based financial case analysis and its implications. *Asia Pacific Journal of Innovation and Entrepreneurship* 11 (3), 312–321.
- Zhang, P., White, J., Schmidt, D.C., Lenz, G., Rosenbloom, S.T., 2018. FHIRChain: applying blockchain to securely and scalably share clinical data. *Comput. Struct. Biotechnol. J.* 16, 267–278.
- Sharma T.K. (.2018). Which Indian bank uses Blockchain Technology? (Accessed on 15th Jan, 2023)- <https://www.blockchain-council.org/blockchain/which-indian-bank-uses-blockchain-technology/>.
- Puthal, D., Malik, N., Mohanty, S.P., Kougianos, E., Yang, C., 2018. The blockchain as a decentralized security framework [future directions]. *IEEE Consumer Electronics*



Magazine 7 (2), 18–21.

Knirsch, F., Unterweger, A., Engel, D., 2019. Implementing a blockchain from scratch: why, how, and what we learned. EURASIP Journal on Information Security 2 (1), 1–14.

Rijmenam M.V. (2018). Blockchain – 7 benefits for the financial Services Industry, (Accessed on 5th february 2023) - <https://londonspeakerbureau.com/blockchain-7-benefits-financial-industry/>.

Eyal, I., 2017. Blockchain technology: transforming libertarian cryptocurrency dreams to finance and banking realities. Computer (Long Beach Calif) 50 (9), 38–49.

Kshetri, N., 2017. Blockchain’s roles in strengthening cybersecurity and protecting privacy. Telecomm. Policy 41 (10), 1027–1038.

Kewell, B., Adams, R., Parry, G., 2017. Blockchain for good? Strategic Change 26 (5), 429–437.

Swanitiinitiative (2018). Improving Public Service Delivery through Blockchain Technology. (Accessed on 22nd February 2023)-http://www.swaniti.com/wp-content/uploads/2018/02/Blockchain-Paper_Swaniti-Initiative-1.pdf.

Younus, D., Muayad, A. and Abumandil, M., 2022. Role of smart contract technology blockchain services in finance and banking systems: concept and core values. Mohanad, Role of Smart Contract Technology Blockchain Services in Finance and Banking Systems: Concept and Core Values.

Guo, H. and Yu, X., 2022. A Survey on Blockchain Technology and its security. Blockchain: research and applications, 3(2), p.100067.

Osmani, M., El-Haddadeh, R., Hindi, N., Janssen, M. and Weerakkody, V., 2021. Blockchain for next generation services in banking and finance: cost, benefit, risk and opportunity analysis. Journal of Enterprise Information Management, 34(3), pp.884-899.

Kumari, A. and Devi, N.C., 2022. The Impact of FinTech and Blockchain Technologies on Banking and Financial Services. Technology Innovation Management Review, 12(1/2).

Srikant RP., 2019. Our learnings from implementing Blockchain (Assessed on 23th February 2023) <https://www.expresscomputer.in/blockchain/our-learnings-fromimplementing->



blockchainabhijitsinghicicibank/34717/#:~:text=The%20blockchain%20application%20created%20by%20ICICI%20Bank%20digitises,ability%20to%20access%20a%20single%20source%20of%20information.

Bank enables blockchain based trade financing operation: (Accessed on 25th February 2023)
<https://economictimes.indiatimes.com/industry/banking/finance/kotak-mahindra-bank-enables-blockchain-based-trade-financing-operation/articleshow/58714243.cms>

Trivedi, S., Mehta, K. and Sharma, R., 2021. Systematic literature review on application of blockchain technology in E-finance and financial services. Journal of technology management & innovation, 16(3), pp.89-102.

Jon Raphael and Amy Steele., Impact of blockchain in accounting: (Accessed on 22nd February 2023)-<https://www2.deloitte.com/us/en/pages/audit/articles/impact-of-blockchain-in-accounting.html>

Miranda Wood., 2019. Infosys blockchain trade finance: (Accessed on 22nd February 2023)-
<https://www.ledgerinsights.com/r3-infosys-blockchain-trade-finance/>

Tim Swanson, Blockchain key challenges, Audit transformation and opportunities in cognitive, blockchain, and talent, Deloitte.: (Assessed on 26th February 2023)
<https://www2.deloitte.com/content/dam/Deloitte/uk/Documents/Innovation/deloitte-uk-blockchain-key-challenges.pdf>

Re imagining trade blockchain: (Accessed on 27th February 2023)-
<https://www.edgeverve.com/finacle/testimonials/re-imagining-trade-blockchain/>

Shrinivasan Reddy., 2020. Finacle inducted in IFSCA regulatory plan for blockchain finance: (Assessed on 22th February 2023)-https://www.business-standard.com/article/companies/infosys-finacle-inducted-in-ifscaregulatory-plan-for-blockchain-finance-122080100433_1.htm

<https://www.invoicemart.com/about-us/overview> : (Accessed on 27th February 2023)

Shivam Vahia., 2021. Banks are joining forces to use blockchain to power letters of credit: (Accessed on 1st March2023)- <https://www.businessinsider.in/cryptocurrency/news/sbi-hdfc-icici-and-12-others-banks-are-joining-forces-to-use-blockchain-to-power-letters-of>



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credit-a-move-that-could-be-a-boon-for-msmes/articleshow/83570874.cms

ICICI BANK., 2017. Picture was referred from (Accessed on 4th March 2023)-
<https://www.icicibank.com/blogs/banking-innovation/blockchain-infographic>.

Venkatesha N. Vyaya and Anjani Kumar., 2019. Blockchain adoption in financial sector:
(Accessed on 2nd March 2023) -<https://www.infosys.com/industries/financial-services/white-papers/documents/blockchain-adoption-financial-services.pdf>.



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Impact of Chaos theory: Implications for Consumer behavior pattern in Gujarat during Pandemic

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Abstract:

Chaos Theory with its roots in the natural sciences, provides a holistic approach for understanding the dynamic and fluid nature of organizations and the market scenario. This paper provides a review of literature that outlines the origins and basic principles of Chaos Theory. It relates pandemic situation with chaos theory and try to develop a study on effective implication of the same. Prime focus would be perception among the consumers and their buying pattern in terms of Chaos which raised due to pandemic situation since 2020. Survey would be conducted using a well- designed questionnaire and primary data would be collected based on the perception of consumers.

Keywords: chaos theory, consumer buying behavior pattern



1. Introduction

Henri Poincare discovered that the "gravitational and orbital behavior of bodies in the solar system could not be explained" in the 19th century, which is when Chaos Theory first emerged.

uses straightforward, linear Newtonian physics. (Cutright, 1997, p. 3). Meteorologist Edward Lorenz developed on Chaos Theory in the 1960s. Lorenz examined weather simulations on computers. His objective is to increase the consistency of these sophisticated systems using patterns. (Cutright, 1997). Chaos theory has a significant effect that was seen during the pandemic. Different operating systems underwent a number of developments that have an impact on consumer purchasing habits. The community outside of their organizations may be impacted if the deployment is unsuccessful. The beginning of the nonlinear occurrences might be the company losing clients as a result of issues with poor customer service caused by the newly introduced system. The customers of the company can stop doing business with them as a result of the changes. By applying Chaos Theory to businesses, we can observe that quick fixes or minor adjustments within a company can have a disastrous effect on the system as a whole. (Stapleton et al., 2006). Additionally, it's possible that the newly implemented system is up to par, more effective, and will have a multiplicative effect.

2. Literature Review

Chaos theory is now used in management settings, despite its origins in pure mathematical and physical applications. Among the first to apply Chaos Theory to the social applications was Physicist Alvin M. Saperstein (Kiel & Elliott, 1996). Mason (2007) defines Chaos Theory as a tool for self-organization within the workplace. Chaotic systems are often seen as being subject to random activity; however, what is being observed is volatility resulting from the complication of the organizational system (Pryor, Amundson, & Bright, 2008). Chaos helps us see that although the system's shape is predictable, its exact form occurs through individual acts and choices (Wheatley, 1999). Within organizations, order exists without reliability (Cartwright, 1991, as cited by Wheatley, 1999). According to Theitart and Forgues (1995), "organizations are dynamic systems governed by nonlinear relationships" (p. 21).



According to Theitart and Forgues (1995), planning improves the organization's ability to protect themselves against potential environmental threats. Organizational leaders must be aware of the various internal and external systems that are intrinsically involved in the organization. A system can be affected by even a little alteration.

According to Mason (2007), the implications of Chaos Theory are that "many interactions in a system can produce unexpected patterns or behaviors because stimulating one part of the system can have unexpected effects in the other, unanticipated, parts of the system" (p.12). Departmental head in any Organization can apply Chaos Theory by recognizing and attempting to understand the randomness that is involved in the change process, while also acknowledging that it cannot be controlled (Hannay, Ross, & Erb, 2000).

Peters (1987) contends that organizations must adapt and thrive amongst chaos, rather than merely learn to cope. Organizational leaders can use business principles to their advantage by modifying their business strategies to take advantage of flexibility in a chaotic environment. Chaos Theory has been helpful in describing the uncertainty, confusion, and periods of rapid change that we often experience on a daily basis, both in our personal lives and in the workplace (Hannay et. al., 2000).

Accepting Chaos Theory as a prism through which to assess an organization's general adoption of the change process has an impact on how plans are created and executed. Organizations adopting this notion might start to explore and evaluate potential, unforeseen effects of executing change rather than imposing a predetermined set of changes. Levy (1994) presents a disorganized viewpoint on corporate strategy. The author argues that tiny adjustments, such as a competitor's new business strategy or the adoption of new technology within the company, can have significant effects on the organizational system. Many companies around the world face an ever-changing environment and continuing technology progresses that often results in reorganization

(Snyder, Acker-Hocevar, & Wolf, 1995). Due to how frequently many companies fail to adapt to these shifting situations, organizational theorists and practitioners are turning to new ideas like Chaos Theory. The framework provided by chaos theory enables the intense interdependence that exists both within and between organizations. Because of this



interdependence, changes in the system that seem irrelevant or minor might have unexpected impacts. In contrast to previous theories and organizational frameworks, chaos theory acknowledges the order and predictability of the basic disorder and unpredictability that exist in organizations.

Snyder, Acker-Hocevar, and Wolf (1995) postulate that if organizations considered chaos as a norm within their organization, they would open themselves to a variety of options and possibly new, previously unimagined futures. Hannay, Ross, and Erb (2000) state that organizations are constantly situated on the edge of chaos and are vulnerable to volatility and resulting in change. Due to the development of chaos within the workplace, individuals within the organization seek stability (Mason, 2007). The potential for creativity, which is stimulated by the unlimited possibilities, arises from this need for stability. It is only when an input is taken out of the system (referred to as negative feedback) that the organizational system gets pushed back to its original state, resulting in stability (Mason, 2007).

Although leaders cannot precisely plan for a change process, they can recognize patterns, as they occur, and design conditions that lend themselves to adaptability (Hannay et. al, 2000). Organizations that are flexible leave themselves up to fresh perspectives and opportunities for change implementation. This strategy could also be used in conjunction with more conventional change approaches, where scenarios, goals, and milestones are outlined, but where an organizational culture that is open to new possibilities and mid-stream adjustments is strongly ingrained.

3. Methodology

3.1 Design and measurement

This study employed a mixed methodology. A systematic questionnaire was used to gather the main data. This questionnaire included the respondents' demographic information as well as their opinions on how consumers of different banks saw chaos theory (different modifications made by the bank to its goods and operational systems). Using Cronbach's alpha, the dependability of each dimension was evaluated. The five characteristics of Chaos theory were used as independent variables and the Overall Satisfaction (S) as the dependent



variable in this study's linear regression analysis. The following diagram illustrates the relationship in the regression model between the independent and dependent variables:

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + \text{error}$$

Where Y is the overall customer satisfaction following the application of the Chaos theory (S), b_0, b_1, \dots, b_5 are parameters, X_1 is the change to the infrastructure (I), X_2 is the change to the marketing strategy (M), and X_3 is the change to the transaction system. Changes to security systems (T), X_4 (S) X_5 is adjustments to numerous customer service procedures (P).

3.2 Hypothesis

The study concentrates on various attributes of Chaos Theory during and post pandemic that leads to customer satisfaction.

In this backdrop, the following hypothesis statements were formulated in consistent with the literature review which provides the scope and depth of the study.

H01: Change in infrastructure during pandemic has no impact on consumer buying pattern

H02: Change in various marketing strategy during pandemic has no impact on consumer buying pattern.

H03: Change in various security systems during pandemic has no impact on consumer buying pattern.

H04: Change in various transaction system like shifting to online mode during pandemic has no impact on consumer buying pattern.

H05: Innovative changes at customer service level during pandemic will have no impact on consumer buying pattern.

3.3 Questionnaire design and data

Structured questionnaires from the study's original sources were used to gather the study's primary data people who actively participated in shopping during the pandemic. The questionnaire included questions about the demographics of the respondents and their opinions on how the implications of Chaos theory would affect their typical purchasing patterns. The respondents were asked to use a seven-point Likert scale (1 = strongly disagree,



2 = disagree, 3 = somewhat disagree, 4 = neither agree nor disagree, 5 = somewhat agree, 6 = agree, and 7 = strongly agree) to evaluate their level of satisfaction with various applications of chaos theory in their banks. According to Lewis (1993), 7-point scales had a greater connection with the outcomes of t-tests. Foddy (1994) asserts that scale validity and reliability require a minimum of 7 categories. Inferential and descriptive statistics have both been used in data analysis. We used Excel to create a multivariate regression model and to determine the descriptive statistics. The questionnaire was well-structured and aimed to cover every component of the study's goal. The Cronbach's alpha approach is used to evaluate the survey instrument's reliability. According to Bryman and Bell (2007), the reliability test determines whether or not respondents' ratings on individual traits have a tendency to be correlated with their scores on those other attributes. An alpha coefficient greater than or equal to 0.75 is typically regarded as satisfactory and a good sign.

3.4 Demographic profile of sample data

Data profile Description

Primary data: Structured questionnaire

Secondary data: Obtained from online journals and magazines.

Sampling method 'Snowball' (Morgan, 2008; Malhotra, 1999; Tuncalp, 1988).

Data collection: Questionnaires were sent via email and also distributed personally to nearly 150 respondents.

Response rate: 112 response were obtained

Yielding a response rate of 74.6%

Respondents' profile

Male: 48.62%; female: 51.38%



3.4 Descriptive statistics

Descriptive Statistics of various variables under study

Table-1

	Attributes	Mean	Standard Deviation
1.	Infrastructure for shopping purpose should be changed instantly making it customer friendly during pandemic.	6.61	0.67
2.	Innovative marketing strategies should be implemented to attract consumers during pandemic	6.60	0.54
3.	Changes in various procedures at customer service level including complaint handling should be made more appropriate for consumers.	6.76	0.42
4.	New procedures and policies for customers which includes change in the transaction systems by upgrading it to online mode for customer convenience.	6.77	0.43
5.	Online mode of payment and cashless delivery needs to changes during pandemic.	6.87	0.46
6.	Change in the security system(e.g.OTP) is user friendly for the customers.	6.59	0.54
7.	Customer satisfaction increases based on the chaotic behavior which occurs in system by small incremental changes in various outlets.	6.85	0.49



3.5 Regression Statistics

Table-2

Regression Statistics								
Multiple R	0.508375738							
R Square	0.258445891							
Adjusted R Square	0.223466924							
Standard Error	0.435113389							
Observations	112							
ANOVA								
	df	SS	MS	F	Significance F			
Regression	5	6.994191931	1.398838	7.388608	5.60011E-06			
Residual	106	20.06830807	0.189324					
Total	111	27.0625						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	2.213713746	1.200158411	1.844518	0.0679	-0.165717032	4.59314452	-0.165717032	4.593144525
X Variable 1	-0.015654702	0.078877637	-0.19847	0.843059	-0.17203729	0.14072789	-0.17203729	0.140727886
X Variable 2	-0.01651439	0.098322366	-0.16796	0.866933	-0.211448043	0.17841926	-0.211448043	0.178419263
X Variable 3	0.495269976	0.096175626	5.149641	1.21E-06	0.304592443	0.68594751	0.304592443	0.685947509
X Variable 4	0.15632348	0.079657882	1.962436	0.052333	-0.001606019	0.31425298	-0.001606019	0.314252979
X Variable 5	0.064453008	0.062108136	1.037755	0.301746	-0.058682413	0.18758843	-0.058682413	0.187588429

4.1 Interpretations:

The model summary of the regression model, which shows customer satisfaction as a function of service quality aspects, is shown in the table above. The model summary table's R value (0.508) shows a positive correlation between all five of the investigated attributes. According to the R² (0.258) result, the independent factors account for 22.68% of the total variation in the dependent variable (overall satisfaction). According to this study's R² value of 0.258, five separate aspects of chaos theory account for 25.8% of the differences in overall



customer satisfaction. The regression model significantly and well predicts the dependent variable, according to the ANOVA results. According to F-statistics, at the 5% level (0.00 0.05) of significance, the entire model is highly significant and an excellent fit.

$$S = 2.213 + (-0.015) (I) + (-0.016) (M) + 0.495(T) + 0.156(S) + 0.064(P)+Error$$

In above regression model three attributes of chaos theory change in the transaction system change in various policies and procedures at customer service level and Changes in customer security has a positive impact on Overall satisfaction of the customers. Furthermore, Marketing Strategy and Infrastructure has negative impact on the customer satisfaction based on the chaos theory attributes.

4.2 Conclusion and Recommendation:

In this paper, an attempt has been made to investigate the impact of the chaos theory from the perspective of customers and their reaction towards changes which occurred in various organisation in terms of policies and implementations after pandemic started. The overall results indicate that impact of various attributes of chaos theory as perceived by the customers was below their expectations. According to the findings of regression analysis, three of the five characteristics of chaos theory have a favorably significant impact on overall customer satisfaction. The findings of the study have important ramifications for understanding the pattern of consumer satisfaction for the retail industry during a pandemic in terms of chaos theory. Additionally, it aids in creating an appropriate strategy for modifying and adapting services for retail clients in order to exceed their expectations of satisfaction. As the pandemic progressed view of customers towards buying changed, there would be an existence of heavy competitions among all different competitors. It was inevitable for all the banks to be more innovative and try to bring all the incremental changes in the systems and the approaches as well. Timely changes will increase the customer satisfaction to greatest possible extent. There may be the possibility of negative impact as well whenever we use the attributes of chaos theory, so we need to be very careful in selecting and implementing the change process in the organization. As observed in the above model as well, Changes in infrastructure and and Changes in the Marketing strategy has a



negative impact on overall customer satisfaction and it affected the buying behavior of customer as well.

4.3 Limitation of the Study

The study's time span and sample size were both constrained. The study only looked at five aspects of chaos theory and gave each dimension an equal amount of weight. It was discovered after looking at the data that included more attributes in the analysis could increase the model's precision. The response rate was another problem that was encountered. Only 74.6% of 150 surveys that were distributed via various methods were returned.

4.4 Future Research

Future study should focus on a larger sample size and clients from all retail sector segments. The research can be expanded to compare the effects of different Chaos. By contrasting the aspect under study with pre- and post-pandemic conditions, more research may be done. The study might potentially be repeated at the national level in other service industries (health, higher education, etc.).

4.5 Disclosure statement

The authors made no mention of any potential conflicts of interest.



5.0 References

- Agnvall, E. (2008). Older, wiser and ready to network. Retrieved from http://www.shrm.org/diversity/library_published/nonIC/CMS_025340.asp
- Bechtold, B. L. (1997). Chaos theory as a model for strategy development. *Empowerment in Organizations*, 5, 193-201.
- Bloch, D. P. (2005). Complexity, chaos, and nonlinear dynamics: a new perspective on career development theory. *The Career Development Quarterly*, 53, 194-207.
- Chaos Theory. (2009). In *Merriam-Webster Online Dictionary*.
- Retrieved from <http://www.merriam-webster.com/dictionary/Chaos>
- Complexity Theory. (2000). In the *American Heritage Dictionary of the English Language*.
- Retrieved from <http://www.thefreedictionary.com/complexity+theory> AHRD 2010 Americas Conference 1169 55-2
- Ciulla, J. B. (2000). *The working life: The promise and betrayal of modern work*. New York: Times Books.
- Cutright, W. M. (1999). *A chaos metaphor for strategic planning in higher education: An exploratory study*. Unpublished doctoral dissertation, University of Tennessee, Knoxville.
- Duffy, J. A. (2000). The Application of chaos theory to the career-plateaued worker. *Journal of Employment Counseling*, 37, 229-236.
- Fitzgerald, L. A. & van Eijnatten, F. M. (2002). Reflections: Chaos in organizational change. *Journal of Organizational Change Management*, 15, 402-411.
- Hannay, L. M., Ross, J. A. & Erb, C. S. (2000, April). *Building change capacity within secondary schools through goal-driven and living organizations*.
- Lee, M. (2001). A refusal to define HRD. *Human Resource Development International*, 4(3), 327-341.
- Levy, D. (1994). Chaos theory and strategy: Theory, application, and managerial implications. *Strategic Management Journal*, 15 (Special Issue: Search for New Paradigms), 167-178.



- Marion, R., Richardson, M. D. (1991). *The mathematical modeling for chaotic social structures*. Clemson University, Clemson, South Carolina (ERIC Document Reproduction Service No. ED 345321)
- Mark, A., Critten, P. (1998). Chaos and complexity: The future for health care HRM. *Health Manpower Management*, 24(4), 139-142.
- Mason, R. B. (2007). The external environment's effect on management and strategy: A complexity theory approach. *Management Decision*. 45, 10-28.
- Peters, T. (1987). *Thriving on chaos: A handbook for a management revolution*. New York, NY: HarperCollins Publishers.
- Pryor, R. G. L., Amundson, N. E. & Bright, J. E. H. (2008). Probabilities and possibilities: The strategic counseling implications of the chaos theory of careers. *The Career Development Quarterly*. 56, 309-318.
- Smith, P. J. (2006). Technical rationality and professional artistry in HRD practice. *Human Resource Development International*, 9(2), 271-281.
- Stapleton, D., Hanna, J. B. & Ross, J. R. (2006). Enhancing supply chain solutions with the applications of chaos theory. *Supply Chain Management: An international journal*. 11,108-114.
- Thietart, R. A., & Forgues, B. (1995). Chaos theory and organization. *Organization Science*, 6(1), 19-31.
- Wheatley, M. J. (1999). *Leadership and the new science: Discovering order in a chaotic world* (2nd ed.). San Francisco: Berrett-Koehler.
- Yorks, L., & Nicolaidis, A. (2006). Complexity and emergent communicative learning: An opportunity for HRD scholarship. *Human Resource Development Review*, 5(2), 143-147.



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Financial Inclusion

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Abstract

Purpose: Financial inclusion refers to access to affordable financial services for all people and businesses, seen as crucial for poverty alleviation and economic empowerment. Financial Inclusion research aims to understand and promote access to financial services for underserved populations. This includes exploring barriers to access and developing solutions to improve financial literacy, access to credit and other financial products, and overall financial health. The goal is to improve financial stability and economic opportunity for individuals, communities, and countries.

Method: The authors of this paper conduct a study on financial inclusion by comparing the utilization of financial services available to the general public in India with other countries. They gather data from various sources such as the Reserve Bank of India (RBI) bulletin and published secondary sources. They also consider previous research studies on digital financial inclusion to compare the current state in India with other countries. Additionally, data is collected from various sources such as government reports, financial institutions, and survey data to understand the extent of financial inclusion in a particular region or country.

Finding: The finding of the paper are problems in financial inclusion can include lack of access to banking services, limited knowledge and understanding of financial products and services, and low levels of financial literacy. Possible solutions to these problems include government policies and programs to increase access to banking services, financial education initiatives to increase awareness and understanding, and the development and implementation of new technology-based financial services.

Social implication: Practices for social implications of financial inclusion includes education and awareness programs, creating inclusive financial products and services, collaborating with community-based organizations, promoting digital literacy, and ensuring access to financial services in underrepresented populations.

Key words: Fin Tech, Financial Freedom, Micro Finance, Banking Services, Financial Literacy.

Introduction



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Financial inclusion is a critical policy priority in India, where a significant proportion of the population, especially in rural areas, lacks access to financial services. With a population of 1.41 billion people living in 28 states and 8 union territories, the need for an inclusive financial system that provides accessible and affordable services for all cannot be overstated. The lack of financial services in rural areas is not unique to India, as it is a global issue.

The Reserve Bank of India (RBI) has been encouraging banks to open more branches and ATMs to increase access to financial services. However, financial inclusion goes beyond providing access to banking services and credit. It involves ensuring that all individuals, especially low-income and disadvantaged groups, have access to a range of financial services such as savings and payment accounts, credit, insurance, and pensions without any discrimination. The goal is to provide basic financial services to everyone, regardless of their income or savings.

Financial inclusion is a means of promoting transparency in offering financial assistance and avoiding hidden transactions or costs. It encourages everyone in society to participate in managing their finances properly, promoting financial stability and sustainable economic growth. It helps to reduce poverty, promote entrepreneurship, and improve access to credit, savings, insurance, and other financial services.

Governments and financial regulators have a critical role to play in promoting financial inclusion by creating an enabling environment that encourages financial innovation, promoting financial education, and supporting financial literacy programs. Through financial inclusion, everyone can have access to financial services and contribute to economic growth and development.

To achieve this, financial inclusion initiatives seek to introduce digital financial solutions that can serve the economically disadvantaged. Additionally, mobile banking and other financial services are being introduced to reach the poorest individuals who live in remote regions of the country. Tailored and custom-made financial solutions are also provided to people based on their individual financial status, household requirements, preferences, and income levels.

The Digital India Movement, accompanied by measures such as Demonetization, has encountered resistance from certain segments of society, particularly rural India. This is



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partly due to low levels of financial literacy, which hinder financial freedom. Additionally, the high charges associated with digital payments are not well understood by this population. To tap into this untapped market, various banking and non-banking institutions across the globe have initiated low-cost digital financial services. It has become evident that not only rural populations, but also low-income groups in urban areas, require financial literacy to achieve true financial inclusion. By leveraging technology, financial inclusion can create awareness amongst these groups, instill the habit of saving, and safeguard their financial assets from exploitation by moneylenders. This will enable them to avail schemes such as Stand-Up India, the government of India has launched several schemes for financial inclusion, including the Pradhan Mantri Jan Dhan Yojna, which aims to provide access to financial services such as savings accounts, insurance, and pension to all households in India. The scheme also aims to provide overdraft facilities to account holders to help them meet their emergency financial needs. Other schemes include the Micro Units Development and Refinance Agency (MUDRA) scheme, which provides loans up to RS. 10 lakhs to micro and small enterprises, and the Atal Pension Yojna, which provides a pension to the unorganized sector workers. Digital financial inclusion aims to create a cashless economy by promoting electronic payments and digital services through the use of fintech. This shift from cash to digital payments is expected to increase efficiency, transparency, and security in financial transactions. It has the potential to accelerate economic development and improve the standard of living by making financial services more accessible and affordable. Digital payments can also facilitate financial inclusion for underserved groups by enabling them to participate in the formal economy and access financial services. Fintech plays a critical role in promoting financial inclusion, which means making basic financial services, such as savings, loans, and insurance, available and accessible to everyone, especially to those who are underserved or excluded from traditional financial institutions. Fintech enables financial institutions to deliver these services through digital channels, such as mobile phones, internet banking, and digital wallets, making them more affordable, convenient, and secure for customers.

Fintech solutions are particularly effective in expanding financial inclusion in developing countries where many people lack access to formal banking services. Mobile money, for



instance, allows people to store and transfer money using their mobile phones without the need for a bank account. This has helped millions of people in developing countries, especially in rural areas, to access financial services for the first time. Other fintech innovations, such as peer-to-peer lending platforms, crowdfunding platforms, and microfinance apps, have also enabled underserved groups to access credit and financing.

In conclusion, financial inclusion is crucial for the economic and social development of India. It provides a sense of security to the less fortunate sections of society and helps them lead a better life. The government of India and other stakeholders must continue to prioritize financial inclusion and implement policies and programs that ensure that financial services are accessible and affordable to all, especially those who are economically underprivileged.

Literature survey

Financial inclusion is an important concept that aims to promote access to financial services for all members of society, especially those who are underserved or excluded from traditional banking services. The following is a brief literature survey on financial inclusion:

"Financial inclusion and poverty reduction: Evidence from rural households in India" (Chaudhuri, 2017): This study examines the impact of financial inclusion on poverty reduction in rural India, using data from a survey of households. The results suggest that access to formal financial services, such as savings accounts and loans, can significantly reduce poverty and improve the overall economic well-being of households.

"Digital financial inclusion: A catalyst for economic growth and poverty reduction" (World Bank Group, 2017): This report highlights the potential of digital financial inclusion to promote economic growth and poverty reduction, particularly in developing countries. The report provides examples of successful digital financial inclusion initiatives and outlines key challenges and opportunities for promoting digital financial inclusion. Digital financial inclusion is a complex issue with many challenges and dimensions. In today's world, financial technology (FinTech) is one of the key factors that can determine the success of financial inclusion programs.



FinTech has the potential to improve access to financial services, reduce transaction costs, and increase financial literacy among underserved populations. It can enable the unbanked and underbanked to access financial services and participate in the formal economy.

However, there are also challenges associated with the use of FinTech in financial inclusion. These challenges include issues related to cybersecurity, data privacy, regulatory compliance, and consumer protection.

To ensure that FinTech is used effectively in financial inclusion programs, it is important to address these challenges and develop appropriate policies and regulations that promote innovation while also protecting consumers. Additionally, it is important to ensure that FinTech is accessible and affordable to all, including those in remote and underserved areas.

Overall, the success of financial inclusion programs depends on a combination of factors, and FinTech is an important piece of the puzzle. By leveraging FinTech appropriately, we can create a more inclusive financial system that benefits everyone.

"Financial inclusion, financial regulation, and financial education in the United States" (Cordell and Huang, 2018): This article discusses the state of financial inclusion in the United States and explores the role of financial regulation and education in promoting financial inclusion. The authors argue that regulatory reforms and financial education programs can help to expand access to financial services and improve financial literacy among underserved populations.

"Measuring financial inclusion: Explaining variation in use of financial services across and within countries" (Demirgüç-Kunt et al., 2018): This study examines the factors that contribute to variation in financial inclusion across and within countries, using data from a survey of adults in over 140 countries. The results suggest that factors such as income, education, and trust in financial institutions are important predictors of financial inclusion.

"Microfinance and financial inclusion" (Karnani, 2018): This article provides an overview of microfinance and its role in promoting financial inclusion. The author discusses the benefits and limitations of microfinance and explores the potential for new innovations, such as mobile banking and digital payments, to expand access to financial services for underserved populations.



"Financial inclusion in China: Current status, challenges, and policy implications" (Zhang and Shi, 2019): This study provides an overview of the state of financial inclusion in China, a country with a large population and significant economic development. The authors discuss the challenges faced in expanding access to financial services, including limited availability of credit and uneven regional development, and propose policy recommendations for promoting financial inclusion in China.

"Financial Inclusion in Pakistan: An Empirical Analysis" (Zaman, Rahman, and Ahmad, 2018): This study analyzes the level of financial inclusion in Pakistan and identifies factors that influence access to financial services. The authors found that gender, income, education, and trust in financial institutions are significant predictors of financial inclusion in Pakistan.

"Financial inclusion in Bangladesh: The role of mobile financial services" (Islam, Rahman, and Hossain, 2019): This article examines the role of mobile financial services in promoting financial inclusion in Bangladesh. The authors found that mobile financial services have played a significant role in expanding access to financial services for underserved populations in Bangladesh.

"Financial Inclusion in Bangladesh: Progress and Challenges" (Mahmud, Hasan, and Hossain, 2018): This report provides an overview of the state of financial inclusion in Bangladesh and identifies key challenges and opportunities for promoting financial inclusion. The report highlights the role of microfinance institutions and mobile financial services in expanding access to financial services for underserved populations in Bangladesh.

"Financial Inclusion in Pakistan: An Analysis of Microfinance and Social Performance of Microfinance Institutions" (Naseer, 2019): This study examines the role of microfinance institutions in promoting financial inclusion in Pakistan. The author found that microfinance institutions have played a significant role in expanding access to financial services for underserved populations in Pakistan, but there is still a need for greater regulation and oversight of the microfinance sector.

Financial inclusion is the process of ensuring access to affordable and appropriate financial services for all, especially the poor and vulnerable populations who are traditionally excluded



from formal financial services. In this context, the role of urban and rural backgrounds has been extensively studied in the literature.

One of the studies conducted by Akram and Hussain (2020) examines the impact of urban and rural backgrounds on financial inclusion in Pakistan. The study finds that urban areas have better financial inclusion indicators compared to rural areas. However, the study also suggests that the difference in financial inclusion between urban and rural areas is decreasing over time, which can be attributed to the increased adoption of mobile banking and other digital financial services in rural areas.

Another study by Kapsos and Katsikeas (2019) explores the role of rural and urban backgrounds in financial inclusion in Nigeria. The study finds that rural populations have lower access to formal financial services compared to urban populations. This can be attributed to factors such as lack of infrastructure, limited financial literacy, and cultural barriers.

A study by Ray and Jha (2019) examines the role of urban and rural backgrounds in financial inclusion in India. The study finds that urban areas have better access to formal financial services compared to rural areas. However, the study suggests that the government's efforts to promote financial inclusion, such as the Jan Dhan Yojana program, have led to significant improvements in financial inclusion indicators in both urban and rural areas.

The Indian government has launched various initiatives to promote financial inclusion among women in the country. One such initiative is the Mahila Samaan certificate, which was launched in 2014 as part of the Sukanya Samridhi Yojana (SSY) scheme.

The Mahila Samaan certificate is a financial instrument that can be purchased by parents or guardians of a girl child. The certificate has a maturity period of 21 years and offers a fixed rate of interest, which is higher than that offered by other small savings schemes. The funds from the certificate can be used for the education and marriage of the girl child.

A literature survey conducted by Pandey and Jain (2020) examines the impact of the Mahila Samaan certificate on financial inclusion of women in India. The study finds that the certificate has been successful in promoting financial inclusion among women, especially in rural areas. The study suggests that the certificate has enabled women to save and invest in



their children's education and marriage, which was previously difficult due to cultural barriers and lack of financial literacy.

Purpose of Study

The purpose of the research paper on financial inclusion is to explore the importance of financial inclusion in promoting economic and social development, especially in India where a significant portion of the population lacks access to financial services. The paper aims to investigate the various initiatives and policies implemented by the government and financial institutions to promote financial inclusion, including the use of fintech solutions and digital financial services. The paper also aims to examine the impact of financial inclusion on poverty reduction, entrepreneurship, and access to credit, savings, insurance, and other financial services. Ultimately, the goal of the research paper is to provide insights into the importance of financial inclusion and recommend ways to improve financial access and literacy for underserved and disadvantaged groups.

Finding

The research paper finds that lack of access to banking services, limited financial literacy, and poor understanding of financial products and services are some of the primary challenges hindering financial inclusion across the globe. To address these challenges, government policies and programs, as well as financial education initiatives, are crucial. Additionally, technology-based financial services and platforms have emerged as a game-changer for financial inclusion. The study highlights the success of many financial institutions and government initiatives in achieving a cashless society and increasing access to digital financial services, which has become more significant after the COVID-19 pandemic. The pandemic has acted as a catalyst for people to adopt digital financial platforms, leading to a significant increase in the use of digital financial services compared to traditional financial services, according to the Financial Access Survey (FSA) data released by the IMF in 2021. The literature survey reveals that the availability and accessibility of digital financial services have a significant impact on financial inclusion. According to a study by Demirgüç-Kunt et al. (2018), countries with higher levels of digital financial inclusion also have higher levels of overall financial inclusion. Furthermore, digital financial services have the potential to



improve financial literacy and increase financial resilience among underserved populations (Hartarska & Nadolnyak, 2018).

Another key finding is the importance of government policies and regulations in promoting financial inclusion. Countries with strong government support for financial inclusion initiatives have been able to make significant progress in reducing financial exclusion (Kumar, 2020). The use of technology and innovative financial products, such as mobile banking and microfinance, has also been found to be effective in expanding financial access to underserved populations (Aduda, 2019).

Finally, the COVID-19 pandemic has accelerated the adoption of digital financial services and highlighted the need for digital financial inclusion. A study by GSMA (2020) found that the pandemic has led to an increase in the use of mobile money and other digital financial services in low- and middle-income countries. However, the study also noted that significant challenges remain in achieving digital financial inclusion, including affordability, access to technology, and digital literacy.

On November 1st, 2021, the International Monetary Fund (IMF) released the results of the twelfth annual Financial Access Survey (FAS). The survey revealed that digital financial services experienced significant expansion during the pandemic, while traditional financial services remained stable. The increased usage of mobile money was particularly notable in low- and middle-income economies, with the value of mobile money transactions as a share of GDP increasing by 2 percentage points on average for low- and lower middle-income economies in 2020. The number and value of mobile and internet banking transactions also grew across all income groups, especially among upper middle- and high-income economies.

(Figure I)



Source: IMF Financial Access Survey and staff calculations.

Note: These charts show the weighted average of the indicators for respective groups.

Data Tables and Graphs:

The number of UPI transactions in India has been growing at a rapid pace due to its ease of use and wide accessibility. Chart 1 shows how UPI transactions have grown over every month of 2022-23. Online transactions through UPI almost tripled after COVID.

The transactions done by debit card users during the months of April 2022 to January 2023 are shown in the chart. It shows that the average number of transactions done at ATMs was above 55 crores, whereas the transactions done at Point of Sale (POS) were above 30 crores.

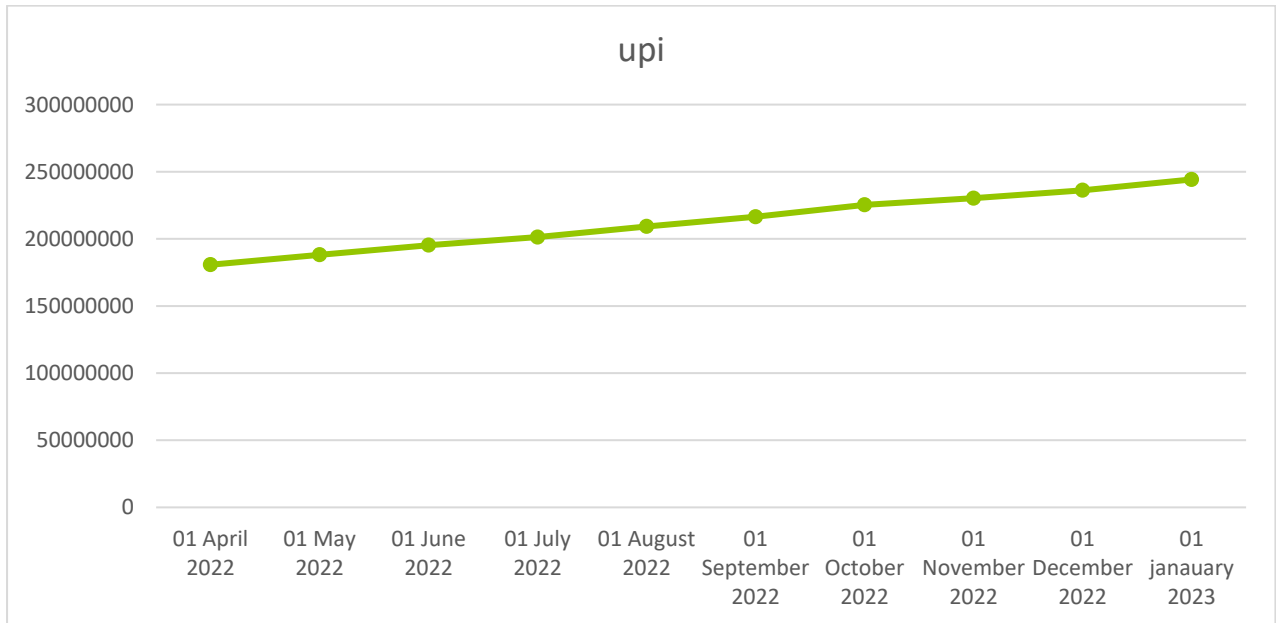
Chart 3 shows the total number of users who use ATMs month-wise. This figure depicts that every month, at least 1.3 lakh users use ATM cards, whereas the lowest of all months is April 2022. The reason for this could be due to less adoption of financial services.

Chart 4 shows the total number of transactions done at POS month-wise. The chart depicts that every month, at least 60 crore transactions were happening, and the lowest of all



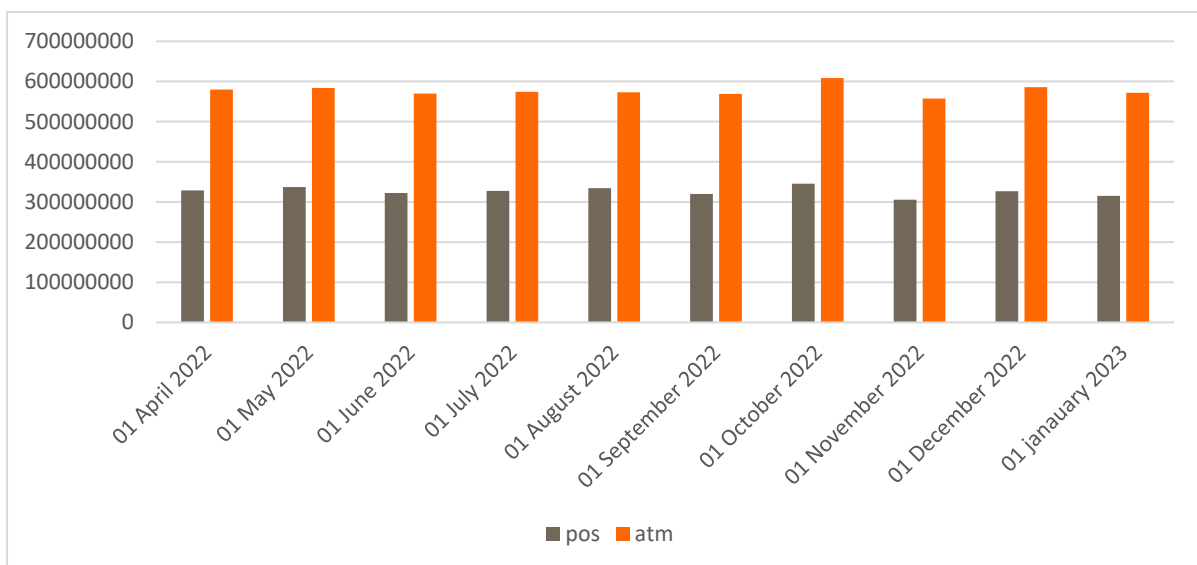
transactions occurred in April 2022. The reason for this could be due to the peak of the financial year.

Graph 1. Growth of UPI in India



Source: RBI Bulletin 2022-23

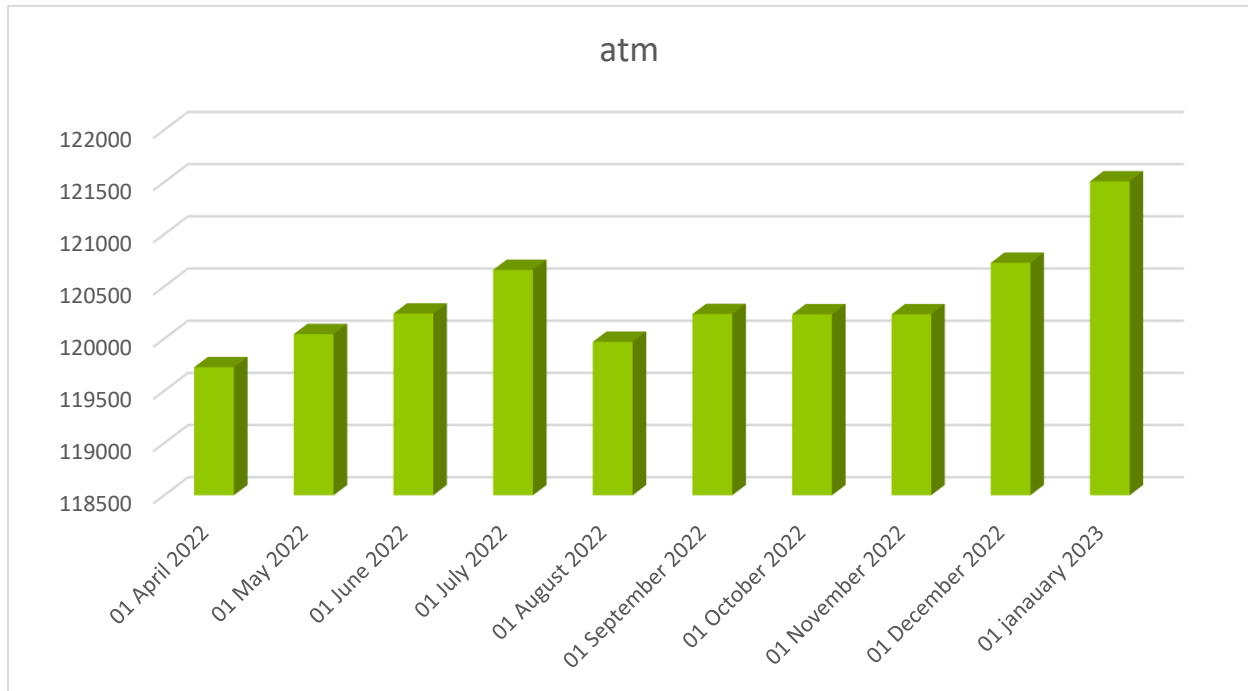
Graph 2. Trend analysis of use of Debit card at POS and ATM (number of transactions during 2022-23)



Source: RBI Bulletins 2022-23

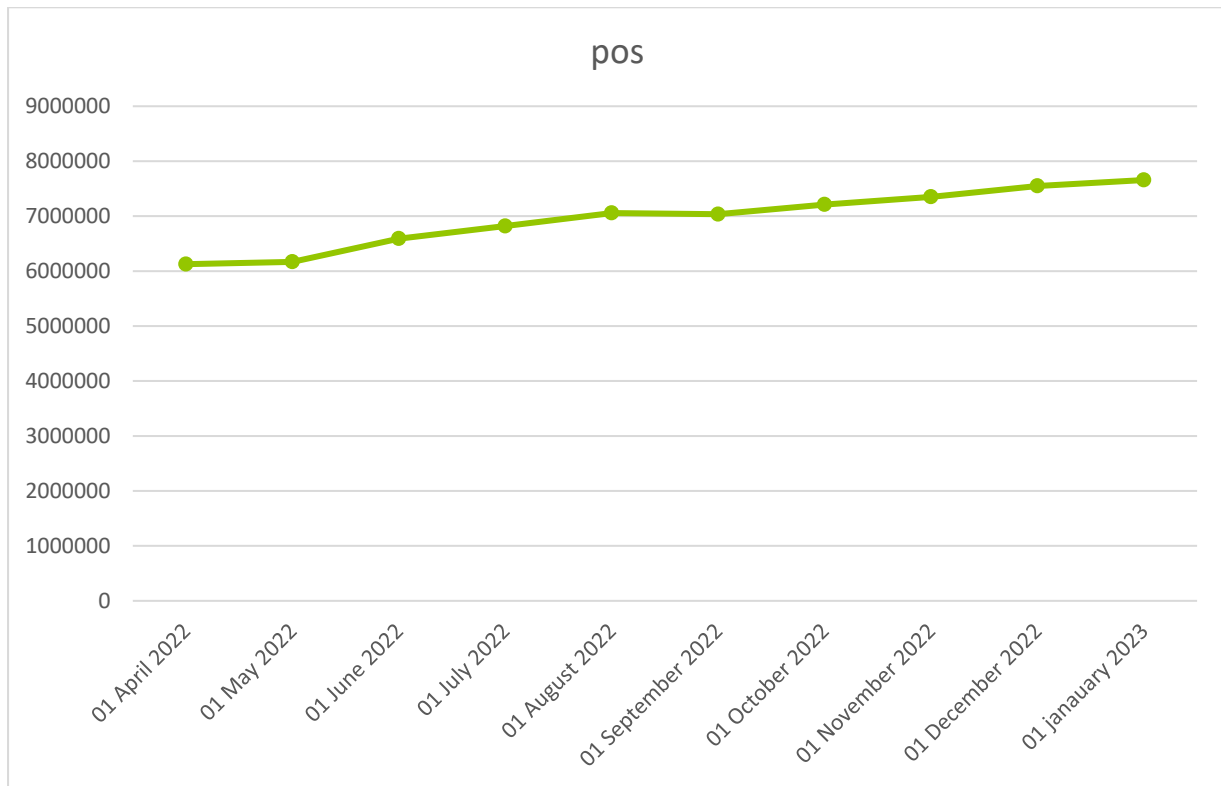


Graph 3: Trend Analysis of use of ATM (number of transactions during 2022-23)



Source: RBI Bulletins 2022-23

Graph 4: Trend Analysis of use of POS (number of transactions during 2022-23)



Source: RBI Bulletins 2022-23

Discussion:

Why major part of rural areas in India is unserved by financial services? Limited access to banking services is a significant challenge in India, particularly for the population residing in rural areas where banking infrastructure is scarce. Low levels of financial literacy are prevalent in India, making it challenging for individuals to understand the benefits of financial services such as loans and insurance. India has a high level of poverty, with a significant proportion of its population living below the poverty line. This makes it difficult for them to access financial services, as they often lack the necessary collateral to secure loans. Despite making significant progress in building digital infrastructure, many people in rural areas of India still lack access to smartphones and the internet, limiting their ability to use online financial services. To improve financial inclusion in India, the government can work with banks to increase their presence in rural areas, partner with NGOs to provide financial education, introduce financial literacy programs in schools and universities, offer incentives to financial service providers, and promote the development of digital payment



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systems. Fintech has the potential to increase financial inclusion by making financial services more accessible and affordable to underserved and unbanked populations. This can be achieved through mobile banking apps, digital payments, microfinance platforms, and block chain technology. However, it is important to ensure that these solutions are accessible to everyone, regardless of their income, education, or other factors that may limit their access to financial services. During the pandemic, the use of digital financial services increased significantly as people were forced to stay at home and avoid in-person interactions. This made traditional methods of accessing financial services, such as visiting a bank branch, more difficult. The government and financial institutions actively promoted digital financial services as a safe and efficient way to access financial services during the pandemic, which may have encouraged more people to try these services for the first time. Additionally, the pandemic highlighted the importance of having access to financial services, especially during times of crisis, which may have motivated people to seek out and adopt digital financial services. Kenya, Brazil, and Indonesia are examples of countries that have made significant progress in achieving financial inclusion in rural areas. Kenya launched (2007) the mobile money platform M-Pesa, while Brazil established a national financial inclusion strategy and social programs like Bolsa Familia (2010). Indonesia expanded access to digital banking services, launched a national financial inclusion strategy, and established a national payment system (2016) . All three countries have implemented policies and programs to increase financial inclusion and reduce poverty among low-income households.



References:

1. Demirguc-Kunt, A., Klapper, L., Singer, D., & Van Oudheusden, P. (2015). The Global Findex Database 2014: Measuring Financial Inclusion around the World. World Bank Policy Research Working Paper, (7255), 1-58. doi:10.1596/1813-9450-7
2. Allen, F., Demirgüç-Kunt, A., Klapper, L., & Martinez Peria, M. S. (2016). The Foundations of Financial Inclusion: Understanding Ownership and Use of Formal Accounts. *Journal of Financial Intermediation*, 27, 1-30. doi: 10.1016/j.jfi.2016.02.002
3. Agarwal, S., & Klapper, L. (2013). What can we learn about financial access from U.S. immigrants? *Journal of Banking & Finance*, 37(5), 1846-1864. doi: 10.1016/j.jbankfin.2012.11.037
4. Bateman, M., & Chang, H. J. (2014). Microfinance and the Illusion of Development: From Hubris to Nemesis in Thirty Years. *World Economic Review*, 3, 1-17.
5. Chaudhuri, S. (2017). Financial inclusion and poverty reduction: Evidence from rural households in India. *Journal of Asian Economics*, 48, 69-81. <https://doi.org/10.1016/j.asieco.2016.11.002>
6. Cordell, D., & Huang, Y. (2018). Financial inclusion, financial regulation, and financial education in the United States. *Journal of Financial Stability*, 35, 35-50.
7. Demirgüç-Kunt, A., Klapper, L., Singer, D., Ansar, S., & Hess, J. (2018). Measuring financial inclusion: Explaining variation in use of financial services across and within countries. Brookings Institution Press.
8. Karnani, A. (2018). Microfinance and financial inclusion. In *Routledge Handbook of Social and Sustainable Finance* (pp. 71-87). Routledge.
9. Zhang, H., & Shi, L. (2019). Financial inclusion in China: Current status, challenges, and policy implications. *Emerging Markets Finance and Trade*, 55(12), 2738-2756.
10. Zaman, K., Rahman, M. M., & Ahmad, M. (2018). Financial Inclusion in Pakistan: An Empirical Analysis. *Pakistan Journal of Social Sciences*, 38(2), 729-744.
11. Islam, M. R., Rahman, M. M., & Hossain, M. A. (2019). Financial inclusion in Bangladesh: The role of mobile financial services. *Journal of Asian Finance, Economics and Business*, 6(4), 241-251.



12. Mahmud, S., Hasan, M. S., & Hossain, M. A. (2018). Financial Inclusion in Bangladesh: Progress and Challenges. *Journal of Asian Finance, Economics and Business*, 5(2), 47-57.
13. Naseer, A. (2019). Financial Inclusion in Pakistan: An Analysis of Microfinance and Social Performance of Microfinance Institutions. *Journal of Risk and Financial Management*, 12(3), 130.
14. Akram, U., & Hussain, M. (2020). Financial inclusion in Pakistan: The impact of urban and rural backgrounds. *The Journal of Developing Areas*, 54(1), 75-88
15. Kapsos, S., & Katsikeas, C. S. (2019). Rural and urban backgrounds in financial inclusion: Insights from Nigeria. *Journal of African Business*, 20(3), 354-372.
16. Ray, S., & Jha, S. K. (2019). Financial inclusion and its determinants: Evidence from India. *Journal of Financial Economic Policy*, 11(1), 98-117.
17. Pandey, R., & Jain, N. (2020). Financial inclusion of women in India: An analysis of Mahila Samaan certificate. *Journal of Entrepreneurship and Public Policy*, 9(2), 161-177.
18. Reserve Bank of India. (2016). Financial Inclusion in India: Journey So Far and Way Forward. Retrieved from https://www.rbi.org.in/Scripts/BS_SpeechesView.aspx?Id=1029
19. Mundra, U. (2016). Financial Inclusion in India: Progress and Challenges. *Journal of Social and Economic Development*, 18(1), 7-22. doi:10.1007/s40847-016-0022-6
20. Krishnan, M. R. (2019). Financial Inclusion in India: A Review of Contemporary Issues. *Pacific Business Review International*, 11(8), 1-9.
21. Gupta, A. (2018). Financial Inclusion in India: A Review of Literature. *International Journal of Management Studies*, 5(1), 114-120.
22. Singh, R. (2018). Financial inclusion in India: Progress and challenges. *International Journal of Management Studies*, 5(1), 107-113.
23. Ramakumar, R. (2019). Financial inclusion in India: Recent policy initiatives and performance. *Economic and Political Weekly*, 54(6), 27-30.
24. Kumar, D. (2017). Financial inclusion in India: Strategies and challenges. *International Journal of Economics and Financial Issues*, 7(4), 475-479.
25. Rao, N. K., & Sudhakar, K. (2020). Financial inclusion in India: An empirical study. *Journal of Emerging Technologies and Innovative Research*, 7(11), 9-15.



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Indexed in: Crossref, ROAD & Google Scholar

26. Makhija, S. (2018). Financial inclusion in India: A study of government policies and initiatives. Journal of Commerce and Management Thought, 9(2), 136-148.
27. "Financial Inclusion: A Framework for IMF Engagement" by International Monetary Fund, 2018: <https://www.imf.org/en/Publications/PolicyPapers/Issues/2018/03/01/-Financial-Inclusion-A-Framework-for-IMF-Engagement-45656>
28. Report of the Committee on Comprehensive Financial Services for Small Businesses <https://www.rbi.org.in/Scripts/PublicationReportDetails.aspx?ID=838>
29. Reserve Bank of India's Annual Report on Trend and Progress of Banking in India: <https://www.rbi.org.in/Scripts/AnnualReportPublications.aspx?head=Trend%20and%20Progress%20of%20Banking%20in%20India>
30. Guidelines for Licensing of Small Finance Banks in the Private Sector: <https://www.rbi.org.in/Scripts/NotificationUser.aspx?Id=10286&Mode=0>
31. Master Directions on Financial Inclusion: <https://www.rbi.org.in/Scripts/NotificationUser.aspx?Id=10797&Mode=0>
32. Report of the Working Group on Technology and Innovation in Financial Inclusion: <https://www.rbi.org.in/Scripts/PublicationReportDetails.aspx?ID=896>
33. Financial Inclusion in India: A Review of Initiatives and Achievements: <https://www.rbi.org.in/Scripts/PublicationReportDetails.aspx?ID=835>



Comparative Analysis: Machine Learning Usage Across Recommender Systems of OTT Platforms

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Abstract

In today's world, OTT (Over the Top) platforms have become an important factor in terms of entertainment and a major stress reliever for people all around the world. The growth of OTT platforms has been increasing day by day i.e., almost 50 percent. Millennial customers, who grew up in a digital world and don't have the time or the patience for films, television programs, or any other content to broadcast on television, will be the largest audience for streaming television. Netflix, Spotify, Amazon Prime, and Disney+Hotstar are a few entertainment platforms.

This paper aims at performing the comparative study of machine learning implementation across various OTT platform's recommender systems by discussing the benefits of leveraging machine learning potentials to overcome the existing challenges being faced by these platforms. Also, we discuss the scope of improvising the features of OTT platforms through Machine learning approaches that could bring more value to the platform users and owners.

1. Keywords: Machine Learning, OTT (over the top), Recommendation System (RS), Collaborative Filtering

INTRODUCTION

Over the top, or OTT is so named because, unlike traditional TV, OTT devices provide end-users with access to video content over the cable box. OTT allows content creators to



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communicate with their viewers through a website or a smartphone. Various forms of entertaining content can be consumed by viewers through OTT platforms on almost any device connected to the internet, such as mobile phones, iPad, laptop, television, computer. **This makes it possible to view movies and other forms of entertainment at one's convenience** [1]. Netflix, Prime Video, Disney+Hotstar, aha are a few examples of OTT platforms that have gained popularity due to their user-friendly features.

The OTT applications have surpassed social media platforms like Facebook, messaging services like WhatsApp. Hence, online streaming has an overall growth of 50 percent in the entertainment industry from the year 2017 to 2022. In February 2019, around 145 million users spent 363 million hours on an OTT platform. **In which 83 percent of time was spent on a Smartphone and 17 percent on a Computer** [2]. **As per the market research carried out by Brightcove in collaboration with YouGov, 29% of customers prefer watching movies on free internet streaming platforms** [3]. Whereas 23% said that they'd rather pay a smaller cost with fewer advertisements. **As a result, advertising has become the most popular sort of marketing strategy utilized in OTT platforms, and is regarded as a success** [4]. The reason behind the success of these OTTs is the recommendation systems. Recommender systems are data filtering technologies with the primary goal of providing individual recommendations. Recommender systems help both services consumers and suppliers. In a digital environment, they reduce the costs of searching and selecting items. The importance of using accurate and efficient recommendation strategies inside a system that provides customers with relevant and trustworthy recommendations cannot be underestimated. According to the study, 72% of consumers expect businesses to provide personalized interactions. Adding to the pressure on businesses, users now have more options than ever to choose something else if they don't like the experience they're getting. **Companies that thrive at personalisation earn 40% more money from these activities than the ordinary player** [5]. The Indian OTT market has around 40 VoD (Video on Demand) providers, and by 2023, it can rise up to 100. This will help in stating a mark of Rs 237.86 billion by FY25- IBEF. In the present world, the number of users as well as the data is increasing. Eventually, it is posing a challenge. Manually building a personalized recommender system which can filter the relevant information from the large volume of data



can be a mountainous task. Hence this implementation can be automated by using machine learning approaches, which help in recommending the user perspective products based on several factors. Similarity algorithms, matrix factorization are few ML approaches leveraged in building the recommendation systems.

In this paper, we will be reviewing and discussing the Machine learning approaches that are considered in building the Recommender systems of top OTT platforms like Netflix, Spotify, Amazon Prime Video and Hotstar.

2. Recommendation Systems

Almost all the OTT platforms make use of recommendation systems to recommend the relevant content to the users [6]. A recommendation system is a mechanism for gathering information that assists users in identifying the products they desire among the huge number of items available. **The main aim of the recommendation system is to predict the rating given by a user for a particular thing [7].** It contributes to the company's growth. **Even today, it is quite challenging what a specific user wants from the available resources as everyday new people come. Suggestion of movies by Netflix, prime video, hotstar; recommending products by amazon, flipkart; etc., is possible by recommendation system [8].** These recommendation systems make it simple for users to find what they desire. As a result, creating a successful recommender system is tough due to the fact that user preferences vary over time. A significant number of studies on recommendation systems are being conducted using diverse methodologies with the goal of extracting important information from the huge database. There has been significant development in this domain with the surge of technologies like Machine Learning, Artificial Intelligence, Data Mining, Knowledge Discovery and others.

Some of the benefits of Recommendation Systems are as listed below:

- Higher revenue: There are only a few strategies for increasing sales without increasing marketing efforts. If you set up an efficient recommendation system, you can earn extra money on a regular basis without putting in any effort.
- Greater user gratification: The fastest path to a sale is ideal because it saves time and effort for both you and your customer. Recommendation systems assist you in



shortening your clients' path to a sale by providing an appropriate alternative before they hunt for it.

- Increased loyalty and share of mind: A user-friendly interface keeps the visitor glued to the website thus increasing the probability of buying from the portal.
- Reduced churn: One of the most successful ways to re-engage people is through emails supported by a recommender system. Discounts or vouchers are another cost-effective strategy to re-engage clients, and they can be combined with suggestions to enhance conversion rates.

2.1) Categories Of RS:

The Recommendation System comprises three techniques: Content-based Filtering, Collaborative Filtering and Hybrid Filtering [9]. The content-based filtering revolves around the user's profile. Generally, a user provides data externally or internally. That particular data is stored by the system and recommendation is provided based on his/her previous activities. **Unlike content-based filtering, collaborative filtering identifies the similar users for a new user based on their preferences and recommends according to them as their tastes are similar** [10]. Hybrid filtering is a mixture of both collaborative and content-based filtering.

A. Content Based Filtering

The other name of Content-Based Filtering is cognitive filtering [11]. This technique recommends the things to the user based upon their previous search activities. For instance, if a user/customer wishes to watch only thriller movies, then the system recommends them similar to those thriller movies that are having good ratings. Content-based filtering only deals with the particular user's interest. Before offering cinemas or any other products to users, content-based filtering looks at their interests. It concentrates entirely on the choices of a particular person, drawing conclusions based on user preferences. Therefore, if we speak about the movies, then content-based filtering takes into account the user's rating. It checks which movies the user has given the high ratings by looking at the various genres in the user profile. Behind assessing the users' profile, the approach suggests films to the user based on his preferences.

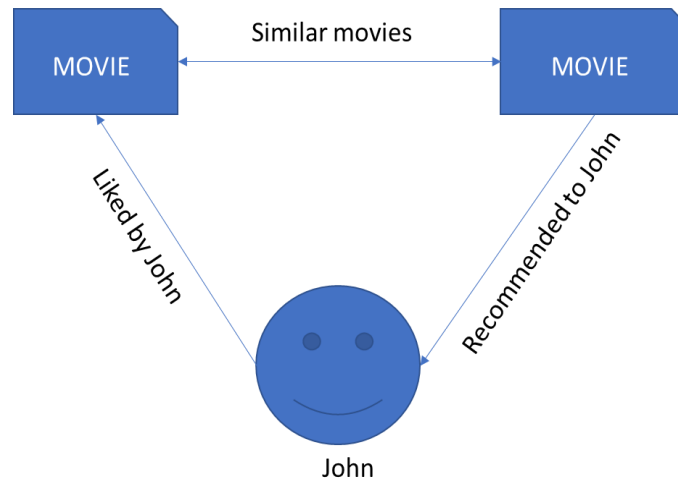


Fig 1: Content-Based Filtering

B. Collaborative Filtering

Goldberg et al., was the first person who proposed the idea of collaborative filtering in 1991 [12]. As there is plenty of data available nowadays, and people don't have time to select and search for the items or products that they require according to their interest. As a result, collaborative filtering is indeed one of the methods for filtering data and providing relevant information to the user. Collaborative Filtering has become one of the most used techniques for suggesting things to the users. Considering the decisions made by the other users, this approach proposes similar things of that user to the current user. This approach initially determines whether the present user and the neighboring user are identical or not, then according to the neighboring user, it anticipates the items. There can be as many users as possible. This method aims to find the similar users from a set of users. The similarity among users, on the other hand, is established by the evaluations that people are giving to a particular product. In this way, the process continues and you will get the desired results. **This technique takes the customer's ratings for any product from a big collection of user ratings [13].** This huge catalogue is referred to as the user-item matrix.

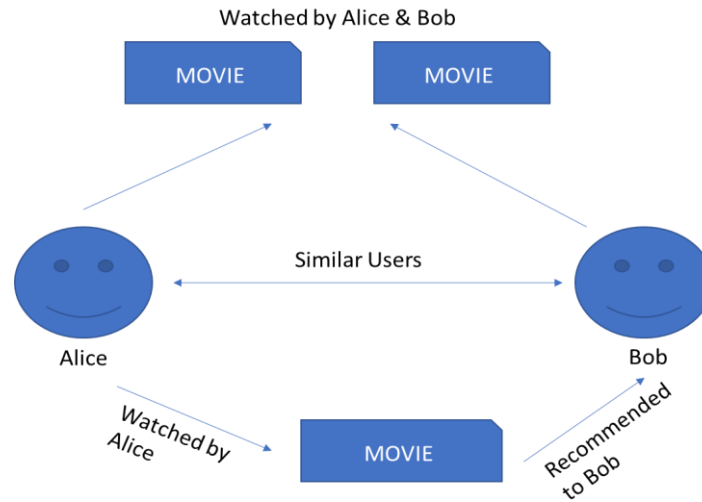


Fig 2: Collaborative Filtering

C. Hybrid Filtering

This method uses ratings and reviews of movies as input and performs collaborative and content-based filtering to provide lists of suggestions. It combines the two strategies, namely collaborative filtering and content-based filtering. Hybrid filtering is effective in case the aforementioned methods don't give the right outcomes. Through this approach we can address many unsolvable issues raised by collaborative filtering and content-based filtering. The cold start problem (sometimes RS has difficulty recommending products to users since there is little data about the user or the item) is a big stumbling block in collaborative filtering or in recommender systems in general. [14] **So, using content-based filtering followed by collaborative filtering may be a viable option.** As a result, making it hybrid may be able to fix the problem.

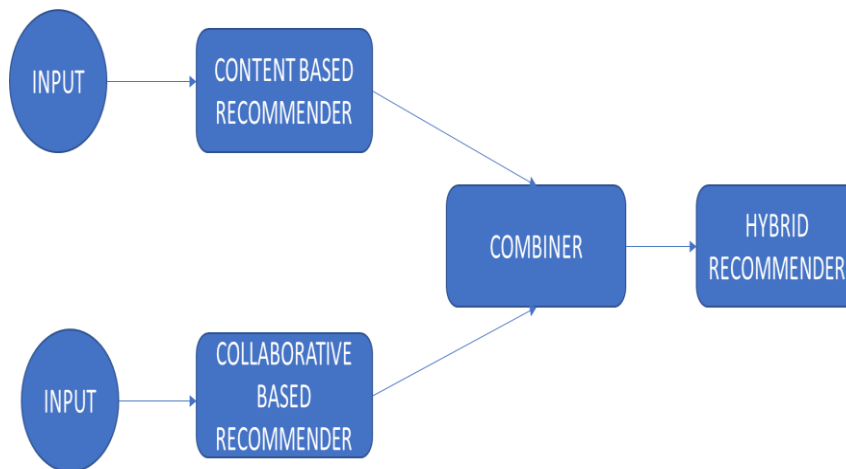


Fig 3: Hybrid Filtering

S. M. Ali et al. suggested a hybrid model that combines movie genomic markers with a **content-based filtering idea** [15]. It employs Principal Component Analysis with Pearson Correlation to eliminate redundant tags, hence reducing processing complexity.

F. Deng et al. proposed a method for calculating a user's potential preference using **hybrid features such as user-generated features, picture visual features, and converting user item evaluations into hybrid feature ratings** [16]. The results of the trials reveal that the suggested strategy is more effective on large datasets and gives better results on sparse datasets.

In this paper [17], **C. Yang et al.** proposed a hybrid technique based on **object attribute and social similarity**. The author employed collaborative filtering techniques in conjunction with social commonalities and movie genres.

As per the study developed by Priscila Valdiviezo and J. Bobadilla [18], they combined **multiple customer reviews and demographic information such as age, identity, and profession into a single matrix model, which showed that collaborative filtering was used in finding the missing ratings**. The key objective of the same is to improve the overall rating prediction of the film. The BPR-MF model was used by the author to solve the sparsity issue.



2.2) Metrics for Evaluating Recommendation Algorithms

The benefits of the recommendation system occur when the accuracy of the system is good. **There are basically three measures to evaluate the accuracy of the recommendation system** [19]. They are MAE, k fold cross validation and RMSD.

MAE (Mean Absolute Error)

The mean absolute error (MAE) is a statistic that analyzes the errors of observations by measuring the magnitude of difference between actual values and predicted values of observations. The MAE can be calculated as shown below:

$$\text{MAE} = \frac{\sum_{i=1}^n |y_i - x_i|}{n}$$

MAE = mean absolute error

y_i = prediction

x_i = true value

n = total number of data points

- Lower Value of MAE, the better performance
- It ensures a much more robust estimation
- The range of MAE is from 0 to infinity

B. K fold cross validation

A validation strategy known as K-Fold divides the data into k-subsets. It uses the holdout method k times, wherein each of the k subsets acts as a test set while the remaining k-1 subsets acts as the training set. In order to perform k fold validation, MSE (Mean Squared Error) is used.

$$\text{MSE} = (1/n) * \sum (y_i - f(x_i))^2$$

Where,

n = Total Observations

y_i = The ith observation's response value

$f(x_i)$ = The ith observation's predicted response value

There are a few steps to perform k fold cross validation.



Step 1: Begin with the division of the dataset into k similar-sized groups/folds.

Step 2: Then select one group among others and fit the model to remaining k-1 folds. Compute MSE for the groups.

Step 3: Repeat this process until all the folds are calculated.

Step 4: Now calculate the average of MSE of all folds by using the formula,

$$\text{Test MSE} = (1/k) * \sum \text{MSE}_i$$

Where,

k = Number of folds

MSE_i = Test MSE on the ith iteration

C. RMSD (Root Mean Square Deviation)

$$\text{RMSD} = \sqrt{\frac{\sum_{i=1}^N (x_i - \hat{x}_i)^2}{N}}$$

RMSD = root-mean-square deviation
i = variable i
N = number of non-missing data points
x_i = actual observations time series
x̂_i = estimated time series

- Lower the RMSD, better the performance
- RMSE is most useful when large errors are particularly undesirable
- The range of RMSD is from 0 to infinity

3. Implementation Of Machine Learning By Ott Platforms

Machine learning is the most important technology in today's world. It empowers the computer to improvise without relying on explicit programs. The objective of this technology is to create data-driven computer systems that can learn on their own.

OTTs like Netflix, Spotify, amazon use recommendation systems. Recommendation systems are a sort of machine learning algorithm that ranks and rates products as well as users. A recommender system is a software system that tries to predict how users will review a specific product or a good. These predictions will then be assessed and given to the user,



increasing user involvement on the platform by boosting product quality and user decision-making processes. The algorithms like decision tree, random forest, XGboost, etc., help in the decision-making process.

The general implementation steps of recommendation system in machine learning are [20]:

Step 1: Load the dataset of users and products

Step 2: Convert data frames to graph lab sframe

Step 3: Make comparisons based on users & products

Step 3: Train the model

Step 4: Provide recommendations

There are three types of approaches in recommendation systems - user-user interaction, item-item interaction, user-item interaction. The problem with user-user interaction & item-item interaction is that users' preferences change over time. So to solve this problem, user-item interaction is implemented in which a matrix factorization technique is applied. The basic principle behind matrix factorization is to decompose a single matrix into the product of multiple matrices. Now, let us see in detail how ML is used by the OTT platforms.

3.1) Usage of ML In Netflix's RS

The success of Netflix can be attributed to the application of machine learning algorithms named the Netflix Recommendation Engine or NRE. It categorizes the information fetched from the user's profile. Depending on the user's preferences, the system uses 1300 recommendation clusters to filter over 3,000 titles in one go. It's so effective that customized recommendations from the algorithm contribute for 80% of Netflix's audience participation. The NRE is assumed to save Netflix somewhere around \$1 billion per year. With a 93 % retention rate, Netflix is chosen by 47 % of North Americans.

Data Points tracked by Netflix using Machine Learning are:

- User's information like gender, mobile number, location, etc
- The time he watched the content



- Videos or scenes he watched frequently
- The exact date and time, the user watched
- User's search history, etc

3.1.1) Algorithms Used By Netflix RS:

Netflix uses algorithms such as KNN (k- Nearest Neighbour), deep learning. They also used two algorithms named Restricted Boltzmann Machines (RBM) and Singular Value Decomposition (SVD). RBM is used to enhance the collaborative filtering model's capabilities and SVD is used to provide users with the best dimensional embedding. Using a sequential combination of these two algorithms, SVD and RBM, in ensemble, the best results were obtained.

Previously [21], **Netflix used A/B testing to select the best algorithms.** This testing was not accurate as it is a traditional method. So, to improve the selection of algorithms, efficiency; Netflix used the interleaving techniques. Interleaving is a learning strategy that involves combining different topics or types of practice to make learning easier.

3.1.2) Interleaving In Machine Learning:

Similar to the notion of interleaving in cognitive behaviour [22], Netflix uses interleaving to speed up algorithm growth by enhancing the volume of learning, resulting in even more personalized and hence better suggestions. So, Netflix employs a variety of ranking algorithms, each customized for a certain purpose. The 'Trending now' row, for example, combines recent popularity patterns, but the Top choices row, which appears on the homepage, offers suggestions based on individual video rankings. These algorithms are used with others to create personalized homepages for millions of subscribers.

Netflix uses the interleaving technique to accelerate learning by rapidly testing a wide range of concepts. They created a two-stage online experimental procedure. The first stage entails a quick trimming process in which we select the most promising ranking algorithms from a vast collection of initial concepts. The second stage involves running a standard A/B test on the reduced set of algorithms to see how they affect long-term member behaviour.



3.1.3) *Improvable Approaches In Netflix's RS*

Netflix's RS can be improved by making use of reinforcement learning. The latter works by rewarding good behaviour while penalizing bad conduct. In general, [23] **a reinforcement learning agent can observe and grasp its environment, act, and learn through trial and error technique.** When a Netflix user hits shuffle play, this is an action that is delivered to Environment (Netflix APP), which starts the Internal State. This suggests a result to the user, and the amount of time spent watching the movie is used to calculate the reward. The purpose of the algorithm is to maximize the reward, or how much time the user invests on watching the suggested films or series. The "Markov Decision Process" is used by RL algorithms to identify and preserve internal state. It is a mathematical framework that finds application in decision-making, wherein the results are impacted partly random and they are partially affected by the decision maker. Based on it, the algorithm determines the Next Recommended. For example, if the reward is relatively low, like if the user is frequently changing movies, then the previous path that the model adopted was incorrect, and so it needs to switch to an alternative genre, wherein it can figure out the path to find movies that were most viewed by the user. If the user watches the movie for a fair amount of time (a few minutes, for example), the path is partially correct, and you have the next probable option with you. It can be concluded that the genre may be correct, but the selection's sub nature is incorrect. And so, the user can find the perfect movie via continual learning process.

3.2) *ML Used By Spotify's RS*

Spotify has been emerging as the most popular music platform in the present world. **This application uses the concepts of Machine learning as it is being utilized to assist listeners in finding content that is relevant to them and recommend the music according to the users' interest [24]. Reinforcement learning, deep learning, causal inference, approximate inference, meta-model learning, graphical models, and time series modeling are the machine learning techniques used by Spotify [25].** Reinforcement learning (RL) is the main concept used in Spotify's RS. The RL model identifies the user's satisfaction as the customer's happiness is a very important criterion. Collaborative filtering, Natural Language Processing, audio model are the three models used by Spotify.



3.2.1) Improvable Approaches In Spotify's RS

KNN (k-Nearest Neighbour), the supervised machine learning algorithm, can be used to improve Spotify. KNN is used to classify the different songs. Random Forest is also the best algorithm that can be used in improving Spotify's RS as it makes use of ensemble techniques i.e., combining multiple models and obtaining a single model from them improves the accuracy.

3.3) ML Used By Amazon Prime Video's RS

Similar to Netflix, Amazon Prime Video also uses a recommendation system to recommend the movies to its users. The elemental concept of machine learning used in Prime Video is graph convolutional networks. This technique works by integrating the data from films most viewed by the user and viewers from different sources, and processing large data sets. Thus making it easier for Amazon Prime to find the area of interest of the user and make recommendations accordingly. **NLP (Natural Language Processing) is used in developing Alexa which is also used to recommend the relevant products to the user** [26]. Linear Regression, Random Forest are used to check the most popular video among all the available videos.

3.3.1) Improvable Approaches In Amazon Prime Video's RS

Active learning is a part of supervised learning. **This method is used to develop a high-performance classifier while minimizing the size of the training dataset to a minimum by actively selecting the accurate data points** [27]. The dataset related to users is very huge as millions of people come every day. So, it is significant to classify the users based on their personal formation as well as their preferences. The next thing is classifying the movies. This may be small data or large data depending on the releasing of the movies. We can perform query synthesis when the data is small and sampling when the data is large. Therefore, by utilizing the concept of active learning, the recommendation system of Amazon Prime video can be improved.



3.4) ML Used By Disney + Hotstar's RS

While heavy traffic is one of the main concerns of OTT platforms such as Hotstar, customer experience is also a major issue [28]. Hotstar, which has over 100 million downloads, is developing machine learning algorithms to extract user insight from the gigabytes of data they collect every day. **The recommendation engine then uses the user's viewing history to create algorithms personalized to the user and the content he or she wants to see** [29]. They also utilize machine learning techniques to deal with user variation among geographies. Whether it's through the latent semantic index, clustering, or deep learning, they are always refining their modeling tactics and creating better features.

3.4.1) Improvable Approaches In Disney+Hotstar's RS

By using the clustering techniques, it becomes easy to group the similar data. **There is a lot of content available in various languages and also different categories such as sports, live channels, movies, shows, etc** [30]. Therefore, by using k-means clustering, it becomes even more simple to recommend the relevant things to the users as everything is grouped together.

4. Conclusion

This study presented the ways of leveraging machine learning techniques in various OTT platform's Recommendation systems that adds value to the platform's users' experience. Also, this study aimed at explaining types of RS and notices that collaborative filtering is better than content-based filtering and any recommender system's accuracy can be improved by including more movies/any content forms features. Through our literature study, we can conclude that Hybrid Filtering is more effective in finding user's preference across the different OTT platforms. It aids the construction of an effective and efficient recommendation system combining the capabilities of other two approaches. Thus, we realized the scope of the OTT platform's recommendation systems to improve their efficiency through various Machine Learning techniques.



References

1. Ganuza, J.J. and Vicens, M.F., 2014. **Over-the-top (OTT) content: implications and best response strategies of traditional telecom operators.** Evidence from Latin America. *info*.
2. Sundaravel, E. and Elangovan, N., 2020. **Emergence and future of Over-the-top (OTT) video services in India: analytical research.** *International Journal of Business, vol. Management and Social Research*, 8(2), pp.489-499.
3. Brightcove (2018). **Releases Asia OTT TV Research on OTT Adoption Preferences in Partnership with YouGov** (Press release). Retrieved 12 December 2019, from <https://www.brightcove.com/en/company/press/brightcove-releases-asia-ott-tv-research-ott-adoption-preferences-partnership-yougov>
4. Palop, J.J., Mucke, L. and Roberson, E.D., 2010. **Quantifying biomarkers of cognitive dysfunction and neuronal network hyperexcitability in mouse models of Alzheimer's disease: depletion of calcium-dependent proteins and inhibitory hippocampal remodeling.** In *Alzheimer's Disease and Frontotemporal Dementia* (pp. 245-262). Humana Press, Totowa, NJ.
5. statistics, o., 2022. **OTT Platform Statistics In India Reveals Promising Growth.** [online] Selectra.in. Available at: <<https://selectra.in/blog/ott-streaming-statistics#ott-platforms-at-a-glance>> [Accessed 2 June 2022].
6. Rohrer, D. and Taylor, K., 2007. **The shuffling of mathematics problems improves learning.** *Instructional Science*, 35(6), pp.481-498.
7. Katarya, R. and Verma, O.P., 2017. **An effective collaborative movie recommender system with cuckoo search.** *Egyptian Informatics Journal*, 18(2), pp.105-112.
8. Wattal, S., Hong, Y., Mandviwalla, M. and Jain, A., 2011, January. **Technology diffusion in the society: Analyzing digital divide in the context of social class.** In *2011 44th Hawaii International Conference on System Sciences* (pp. 1-10). IEEE.



9. Things Solver. 2022. **Introduction to recommender systems**. [online] Available at: <<https://thingsolver.com/introduction-to-recommender-systems/>> [Accessed 3 June 2022].
10. Salter, J. and Antonopoulos, N., 2006. **CinemaScreen recommender agent: combining collaborative and content-based filtering**. *IEEE Intelligent Systems*, 21(1), pp.35-41.
11. Li, H., Cai, F. and Liao, Z., 2012, August. **Content-based filtering recommendation algorithm using HMM**. In *2012 Fourth International Conference on Computational and Information Sciences* (pp. 275-277). IEEE.
12. Nichols, D., Oki, B.M. and Terry, D., 1992. **Using collaborative filtering to weave an information tapestry**, *Comm. Assoc. Comput. Mach*, 35, pp.51-60.
13. Jain, K.N., Kumar, V., Kumar, P. and Choudhury, T., 2018. **Movie recommendation system: hybrid information filtering system**. In *Intelligent Computing and Information and Communication* (pp. 677-686). Springer, Singapore.
14. Valdiviezo-Díaz, P. and Bobadilla, J., 2018, August. **A hybrid approach of recommendation via extended matrix based on collaborative filtering with demographics information**. In *International Conference on Technology Trends* (pp. 384-398). Springer, Cham.
15. Ali, S.M., Nayak, G.K., Lenka, R.K. and Barik, R.K., 2018. **Movie recommendation system using genome tags and content-based filtering**. In *Advances in Data and Information Sciences* (pp. 85-94). Springer, Singapore.
16. Deng, F., Ren, P., Qin, Z., Huang, G. and Qin, Z., 2018. **Leveraging Image Visual Features in Content-Based Recommender System**. *Scientific Programming*, 2018.
17. Yang, C., Chen, X., Liu, L., Liu, T. and Geng, S., 2018, June. **A hybrid movie recommendation method based on social similarity and item attributes**. In *International Conference on Swarm Intelligence* (pp. 275-285). Springer, Cham.
18. Jajoo, M., Chakraborty, N., Mollah, A.F., Basu, S. and Sarkar, R., 2019. **Script identification from camera-captured multi-script scene text components**. In



Recent developments in machine learning and data analytics (pp. 159-166). Springer, Singapore.

19. 2022. [ebook] Available at: <<https://www.sciencedirect.com/science/article/pii/S1110866515000341>> [Accessed 3 June 2022].
20. Klipfolio.com. 2022. *5 steps to setting up a recommender system*. [online] Available at: <<https://www.klipfolio.com/blog/recommender-system>> [Accessed 3 June 2022].
21. Medium. 2022. *A/B Testing and Beyond: Improving the Netflix Streaming Experience with Experimentation and Data....* [online] Available at: <<https://netflixtechblog.com/a-b-testing-and-beyond-improving-the-netflix-streaming-experience-with-experimentation-and-data-5b0ae9295bdf>> [Accessed 3 June 2022].
22. Rohrer, D., 2012. **Interleaving helps students distinguish among similar concepts**. *Educational Psychology Review*, 24(3), pp.355-367.
23. Medium. 2022. *Netflix Shuffle Play: One of the Best examples of Reinforcement Learning*. [online] Available at: <<https://medium.com/analytics-vidhya/netflix-shuffle-play-one-of-the-best-example-of-reinforcement-learning-b8e69129ad3d>> [Accessed 3 June 2022].
24. Mehrotra, R., 2021, October. **Algorithmic Balancing of Familiarity, Similarity, & Discovery in Music Recommendations**. In *Proceedings of the 30th ACM International Conference on Information & Knowledge Management* (pp. 3996-4005).
25. Goldmann, M. and Kreitz, G., 2011, September. **Measurements on the spotify peer-assisted music-on-demand streaming system**. In *2011 IEEE International Conference on Peer-to-Peer Computing* (pp. 206-211). IEEE.
26. Variety.com. 2022. *Amazon Prime Video Recommendation Technology: Behind the Scenes - Variety*. [online] Available at: <<https://variety.com/2019/digital/news/-amazonprimevideoalgorithms1203233844/>> [Accessed 3 June 2022].



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27. Elahi, M., Ricci, F. and Rubens, N., 2016. **A survey of active learning in collaborative filtering recommender systems.** *Computer Science Review*, 20, pp.29-50.
28. En.wikipedia.org. 2022. **Disney+ Hotstar - Wikipedia.** [online] Available at: <https://en.wikipedia.org/wiki/Disney%2B_Hotstar> [Accessed 3 June 2022].
29. LinkedIn.com. 2022. **How Disney+Hotstar is using Machine Learning and Artificial Intelligence.** [online] Available at: <<https://www.linkedin.com/pulse/how-disneyhotstar-using-machine-learning-artificial-patel>> [Accessed 3 June 2022].
30. Zheng, L., 2020. **Improved K-Means Clustering Algorithm Based on Dynamic Clustering.** *International Journal of Advanced Research in Big Data Management System*, 4(1), pp.17-26.



A Comparative Study on Mergers and Acquisitions in the Banking Sector- Case of ICICI Bank and Yes Bank

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ABSTRACT

Business transactions known as mergers and acquisitions (M&A) occur when ownership of a company, another business organisation, or one of its operating divisions is transferred to or combined with another company or business organisation. As a tool for strategic management, M&A enables companies to expand or contract as well as alter the nature of their industry or competitive position (RF Bruner, JR Perella – 2004). It is a well-liked business strategy for consolidating and restructuring corporations in order to increase market share, long-term profitability, penetrate new markets, take advantage of economies of scale, and other objectives.

The 1991 reforms led to a large rise in the number of private banks entering the Indian banking sector. By extending into new areas, the banks tried to maintain their expansion, which considerably boosted competition in the banking sector. In order to defend themselves, banks have started to take market share away from their competitors. This signalled the beginning of the merger era in the banking sector.

Hence, using important performance metrics including capital adequacy, asset quality, managerial efficiency, profitability, and earnings, this study investigates the extent of mergers in the Indian banking sector. The T-test was used to assess the significance of the ratio



changes between the merger and prior. Using data from the relevant banks' official websites, two banks—ICICI bank (merge with bank of Rajasthan) and Yes bank—were selected as the study's sample. The results of the analysis show that ICICI Bank's financial performance has greatly improved since the merger. It has been decided that the combination has given them evidence of growth and expansion. In order to help banks realise synergistic gains in terms of equality and financial outcomes, the study also analyses policy implications for the reform of the Indian banking system.

Key words: Mergers and Acquisitions, Banking, Financial Performance, Financial Ratios, Expansion, Growth

I. Introduction and Conceptual framework

1.1 Introduction

In today's world of fierce competition, growth is the rule. Both internally, by expanding operations and establishing new divisions, and externally, through takeovers, mergers and acquisitions (M&As), amalgamations, joint ventures, etc., a firm can grow. The most common long-term approach for company restructuring and strengthening in the contemporary globalised world is mergers and acquisitions as the degree of competition rises daily. The primary basis for mergers and acquisitions is the mathematical formula one plus one equals greater than two.

The banking industry is essential to a country's economic development. The banking landscape has undergone an enormous change as a result of economic deregulation, globalisation, and technological advancement. The banking industry is turning to the process of consolidation, corporate restructuring, and strengthening in order to stay effective and viable in the face of the rapidly changing environment. Because of this, mergers and acquisitions have emerged as the go-to method for increasing the size of banks, which in turn significantly affects their ability to enter the global financial market. Additionally, mergers and acquisitions are frequently used to increase market share, overall productivity, and profitability, strengthen capital bases, rationalise costs, achieve economies of scale, and improve manpower efficiency.



In response to the various economic reforms implemented by the Indian government since 1991, in its move towards liberalisation, privatisation, and globalisation, mergers and acquisitions have been started in the banking sector of India. The Indian banking sector underwent a number of reforms on the advice of the Narshimam Committee I (1991), Narshimam Committee II (1997), and Verma Committee (1999). These reforms' primary goals were to boost a competitive and diversified financial system as well as the efficiency of Indian banks.

In order to provide credit, banks must expand as economies do. In 2014, SBI Chairman Arundhati Bhattacharya emphasised that "India will need bigger banks as its economy grows. Now, it is very challenging to organically grow larger banks. So, the best course of action will probably be to take an inorganic approach by teaming up with some of the banks." India's banks are still very small in comparison to their international rivals. The largest bank in the nation, SBI, is ranked 16th, while Bank of Baroda is ranked 32nd in Asia. As a result, m&a are seen as a tactic for developing huge banks with a presence throughout India. In order to build considerably stronger financial institutions, the finance ministry is now exploring various options for merging the nation's main state-run banks. M&A originated in the United States and Europe before spreading to other nations. The United States and Europe have been the focus of the majority of studies on bank mergers and acquisitions. In light of this, I will use important performance ratios in my research to examine the extent of mergers in the Indian banking industry.

1.2 Concept and Definition

A merger is referred to as the amalgamation of two or more businesses into a single entity, one of which continues to operate while the others are dissolved. The surviving business or businesses take on the obligations and assets of the merged business or businesses. A merger occurs when two businesses come together, and one is entirely swallowed up by the other. The smaller business loses its identity when it combines with the bigger business, which keeps it. After a merger, the combined business is dissolved, and all of its obligations, rights, and liabilities are transferred to the remaining business. A consolidation is not the same as a merger since a consolidation takes place when two corporations combine to form a brand-new corporation and lose their individual identities.



The rules of successful acquisition given by Peter F. Drunker are as follows: -

- (1) Consider what you could contribute to the enterprise you're considering purchasing, rather than what the acquirer enterprise will contribute to the accumulated.
- (2) Shared core or entity: The two businesses must share a market or technology.
- (3) Temperament fit: No acquisition will be successful unless people within the acquiring corporation recognise the product, the market, and the buyer of the enterprise being acquired.
- (4) Within a year or so, the purchasing business must be able to supply top management for the organisation it acquires.
- (5) It is crucial that a variety of individuals in the management groups of both companies obtain major promotions across the line that connects one of the former companies to the other within the first year of a merger.

1.3 Statement of Problem

M&A is essential for saving struggling banks. Banks are using a variety of strategic alternatives, such as mergers and acquisitions, strategic alliances, joint ventures, and more, to address the difficulties and explore the potential. It helps people reach their objectives and become financially stable. For banks that are about to fail, mergers are one of the best and safest moves. In order to get a competitive edge over their rivals, banks frequently turn to mergers and acquisitions. In order to get a competitive edge in the fast-moving market climate, mergers and acquisitions are projected to take place on a far larger scale than ever before due to the growing rivalry in the globalised economy. Many studies have been done to look at the profitability and efficiency ratios of companies engaged in M&A, especially those that are international. In-depth studies have not been carried out in the Indian context, according to the literature. As a result, this study looks at how ICICI Bank profited from the merger and sheds light on how the bank's performance improved as a result.

1.4 Need of the Study

Any organization's ultimate goal is survival, and m&a are one type of survival strategy. The combination of firms is the quickest way to mergers, acquisitions, takeovers, and so on. The Indian government has consistently made deliberate efforts to achieve higher economic



growth. While the Income Tax Act of 1961 provides some benefits to merged firms, the Indian Companies Act of 1956 provides the procedure for amalgamation. The merger has likely piqued the interest of all professionals, consultants, finance managers, bankers, and merchant bankers who advise and advise corporate clients. At the same time, Indian firms face competition from MNCs. This poses a significant problem for all industries, including the banking sector. Their reorganisation via M&A could assist them in re-establishing themselves as viable units of optimal size. As a result, the success of reorganisation must be scrutinised. Therefore, study aims to investigate the success of m&a following merger efforts in the banking sector.

1.5 RESEARCH GAP

Research Gap: It is being identified that the national and international literature did not perform any comparative analyses between a merged bank and a non-merger bank to check the significance of mergers and acquisitions.

1.6 Objectives of the Study:

The research objectives are-

- To understand the impact of ICICI and Rajasthan bank's merger on the performance of ICICI bank through key performance ratios.
- To compare the performance ratios of ICICI and Yes bank to explain the scope of mergers in Indian Banking System
- Suggest policy Implication for strengthening of Indian Banking System.

1.7 Significance of this Study

The most important component of the Indian financial system is banking. It is critical to improve the competitiveness and quality of the banking system in order to achieve efficiency in performance. Mergers taking place in India are consistent with the consolidation trend that has characterised the financial services and banking industries. The ambition to achieve operational synergies, realise economies of scale, and offer one-stop services to a more demanding customer has led to an alarming number of bank mergers throughout the world. As a result, there is a desire to expand swiftly through mergers as opposed to the difficult and slow process of typical business expansion. Mergers appear to result in financial and strategic



growth. The financial and strategic management aspects of the merger must be examined from a variety of perspectives. The current study examined the financial implications of banking mergers before and after they occurred.

II. Review of Literature

2.1 Introduction:

The liberalisation policy has exposed Indian companies, including banks, to both local and international competition (Agarwal, R. N, 2003; Lawrence, Peter and I. Longjam, 2003; Sen, Kunal and R. Vaidya ,1997). This liberalisation has compelled banks to restructure their operations and portfolios in order to compete on a national and international scale (Prasad, 2007; Selvam et al, 2009). (Pamarty, M.,2011). Corporate restructuring in India is still in its infancy (Economy Watch, 2010). Globally, corporate restructuring (Donaldson, G.,1994) through mergers and acquisitions has gained traction (Pinto, Prakash, and Balakrishna C.H., 2006; Prasad,2007) and has become a key technique of corporate restructuring (B.K. Bhoi,2000; Shirai, Sayuri, 2002), particularly in the financial services industry, which has experienced merger waves (Mallikarjunappa,T and Nayak.P. (Bhattacharya, A., Lovell, C.A.K., and Sahay, P., 1997). Several heartening reasons have been noted by (Hawawini and Swary, 1990; Khemani, 1991 quoted in Kar, R. N. and Soni, A.) as to why institutions in the financial services industry engage in mergers and acquisitions. According to (Pinto, Prakash, and Balakrishna C.H., 2006), some of these are: access to information and proprietary know-how (Yadav, A. K. and Kumar B.R., 2005.), achieve economies of scale and scope (Mantravadi, P and Reddy, A., 2007), augment market power (Shirai, Sayuri, 2001), realise diversification (Pearson,1999), achieve certain tax related benefits (S (Mantravadi,P. and Reddy, A., 2001). According to (Khan Azeem Ahmad, 2011), one of the primary reasons for restructuring activity in the financial services industry (Kaushik, KP. and Chaudhary, T., 2010; Pamarty, M., 2010) is to capture significant 63 economies of scale and scope (Wang, J., 2007), both domestically and internationally (Pinto, Prakash and Balakrishna C.H., 2006). (Chatterjee Sayan, 2009) contend that mergers increase value by creating synergies (Theory of Coase, 1937). According to the study, synergies include economies of scale, more efficient management, and improved production procedures (Prasuna D G, 2013). (Ghosh, A., 2001;



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Shanmugam, K.R., Das, A., 2004). Due to the presence of these synergies (Satish Kumar, Bansal Lalit K.,2008), mergers and acquisitions are increasingly being used the world over (Prasad,2007), to improve competitiveness by gaining greater market share (Ghosh, A. and Das,B. ,2003), to broaden the portfolio so as to reduce business risk, to enter new markets and geographies (Prabhudeasi, A.,2008), and capitalise on economies of scale etc (Devos, E., Kadapakkam, P.R., and Krishnamurthy, S.,2008).(Pamarty.M., 2011). The first and most important reason frequently cited in literature is the achievement of synergies ((Hoang, Thuy Vu Nga Lapumnuaypon, Kamolrat, 2007): financial (DePamphilis,2005 ; Handa Rajan, 2007; P. M. Healy, K.G. Palepu, and R. S. Ruback,1992) operational (Porter, 1985; Handa Rajan, 2007; P. M. Healy (Kaur Pardeep, Kaur Gian,2010). The second reason is that earnings and market share have increased (Prajapati, S., 2010). Similar findings were found in studies examining the motivations for mergers in the Indian banking sector (Mehta Jay and Kakani Ram Kumar, 2006), which stated that merger and acquisition are necessary for the state to create a few large banks (Prajapati, S., 2010).

Merged banks may be better positioned to compete globally (Jagdish R. Raiyani, 2010; Suchismita Mishra, Arun.J, Gordon and Manfred Peterson, 2005;). Mergers may also result in lower operating expenses (Kukalis S., 2007). Merger of two weaker banks or merger of one healthy bank with one weak bank can be considered the quickest and least expensive way to improve 64 profitability and stimulate growth (Franz, H. Khan cited in The Free Library by Farlex, 2010). Apart from synergy and improved performance, the primary motivation for mergers and acquisitions in the banking industry is to increase customer base (Egl Duksait and Rima Tamosiunien, 2009; Morrall, K.,1996). From the perspective of the customer, bank mergers can result in more services, such as higher loan limits, more branches, and more Automated Teller Machines (Sureshchandar, G.S., Rajendran, C., and Anantharaman, R.N., 2002). (Shashidhar, Mishra, 2006). The merged bank can provide better services to the end user by bringing together a variety of services such as traditional banking, merchant banking, mutual funds, and insurance products under one roof, leading to innovation and the emergence of new products such as bank assurance (Rehana Kouser and Irum Saba, 2011). (Deolalkar, G.H. 1999; Rehana Kouser and Irum Saba, 2011).



Mergers and acquisitions have long been a significant phenomenon in the economies of the United States and the United Kingdom (ASSOCHAM study 2009; European Central Bank, 2000). It is gaining traction in India as well (Goyal, K. A. and Joshi, V., 2011). In India, competition among banks is the primary motivator for bank mergers (Srinivasan, R. Chattopadhyay, G., and Sharma, R., 2008), with an emphasis on economies of scale, cost efficiency, and profitability (Kumar Suresh, 2013; Mehta Jay and Kakani Ram Kumar , 2006;. Prajapati, S.,2010). In some countries, weak banks are forced to merge in order to avoid the problem of financial misery (Chong, Beng-Soon, Ming-Hua Liu, and Kok-Huai Tan.,2006; Cole, R.A., and J.W. Gunther, 1998; Jaffe, Dwight, and Levonian, M.E, 2001). This was also a common feature in India prior to liberalisation (Srinivasan, R. Chattopadhyay, G. and Sharma, R., 2008). However, once commercial and business aspects for restructuring became the focal point for banking acquisitions (B.K. Bhoi, 2000), voluntary acquisitions gained traction (Khan Azeem Ahmad, 2011). Synergies resulting from increased efficiency (Dewan Astha, 2007), cost savings (Kaur, P. and Kaur, G., 2010), economies of scale, and other factors became the primary drivers of voluntary amalgamations in the Indian banking sector (Dilip Kumar Chanda,2005). 'India is gradually but steadily transitioning from a regime of a large number of small banks to a regime of a small number of large banks' (Mohan.K.,2006; Prajapati, S., 2010). The current review of literature addresses both the national and international scenarios. Three sections make up the literature review. The first section deals with the concept, the second with the pre-merger and post-merger performance of banks globally, and the third with the pre-merger and post-merger performance of banks in India:

2.2 Concept:

The Indian banking sector is the crown jewel of the Indian economy (Duvvuri Subbarao, 2013). A study by (Agarwal,J., 2000) emphasised the need for systematic growth of the Indian economy and emphasised the importance of Indian banks (Dhawal Mehta, Samanta Suni,1997) in meeting the challenges of this economic growth (Ram Mohan.,T.T.,2007). The study emphasised that because India is a developing country (Lawrence, Peter, and I. Longjam, 2003), the Indian banking sector has the potential to propel India into the top three economies in the world (Shirai, Sayuri, 2001). The study also discussed financial issues and



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emphasised mergers and acquisitions in the Indian banking sector (Paul,2002) to encourage financial performance and development of Indian banks (Kumar, S. and Bansal, L. K.,2008) (Aggarwal A.K. ,2006; Goyal K.A. and Joshi Vijay, 2011; Panwar, S., 2011). From the beginning of the financial services sector in India, the banking sector in particular has seen a lot of mergers and acquisitions (Lakshminaryanan ,P.,2005). According to (Shashidhar, Mishra, 2006), the current economic and banking environment is vastly different from what it was four decades ago (Goyal K.A. and Joshi Vijay, 2011), when the merger movement was at its peak. When the weaker banks were on the verge of extinction, it was the move to consolidate the base (Sathye, Milind, 2003). The current trend is for younger generation banks to take over smaller banks in order to grow larger quickly (Akhil Bhan, P.,2009 ;Kar, R. N. and Soni, A.,2008). Historically, mergers and acquisitions activity began in 1920, when three presidency banks (Bank of Bengal, Bank of Bombay, and Bank of Madras) were reorganised to form a single banking entity, which was later known as State Bank of India (Ravichandran, Nor and Said, 2010). (K, Mohan, 2006) expressed concern that the Indian market was overbanked but underserved. As a result, Indian banks clearly lacked global scale (Deolalkar, G.H., 1999). The study also revealed that, from the standpoint of the financial system, bank consolidation was essential (K. Mohan, 2006). The primary goal of consolidation would be to strengthen banks, achieve economies of scale, increase global competitiveness, provide lower-cost financial services, and retain employees in order to improve management efficiency (Sharma Manoranjan, 2011). The study also demonstrated how consolidation would provide banks with new entry barriers, ensure immediate entry into new markets, and lower operating costs through resource consolidation (Duvvuri Subbarao, 2013; Swain B.K., 2005). According to this , domestic banking m &a. The research also demonstrated how consolidation would provide banks with new entry barriers, ensure immediate entry into new markets, and lower operating costs through resource consolidation (Duvvuri Subbarao, 2013; Swain B.K., 2005). According to the study, market-related parameters such as size and scale, geographic and distribution synergies, and skill and capacity would drive mergers and acquisitions in the domestic banking sector (Mehta Jay and Kakani Ram Kumar, 2006). The view about the relative small size of Indian banks was supported by (Vidyakala, k., Madhuvanathi, S., 2009), who stated that the size of the banking



firm is the focal point of interest. He believed that the larger the bank, the greater its competitiveness and chances of survival (Kumar, S., and Bansal, Lalit. K., 2008). Due to their small size, Indian banks were unable to compete for international business in terms of fund mobilisation, credit disbursement, capital, and financial service provision (Franz. H. Khan, 2007), A similar problem was predicted in a study by (Prasuna D G, 2013), who examined the Narsimhan Committee Reports from 1991 to 1998 and concluded that the emerging scenario pointed to SBI and its Associates forming a single entity in the coming years (Kaur, P. and Kaur, G., 2010).

2.3 Literature review of bank performance before and after mergers in a worldwide context:

From the standpoints of strategy and finance, the topic of mergers and acquisitions is current. It is regarded as an important strategy for rapid growth and increased market share (Bruner, 2004; Egl Duksait and Rima Tamosiunien, 2009; Sharma. P, 2012) and has been extensively researched globally over the past few decades (Bhagaban Das and Alok Kumar Pramanik., 2007), particularly in the USA and UK markets (Cartwright, 2005; Barr, Richard S. et al. , 2002). It has been an intriguing question that has piqued the interest of researchers all over the world (Grant Thornton, International Business Report 2008). Studies conducted in the United States and the United Kingdom to determine whether mergers and acquisitions achieve the synergies intended reveal three approaches to the study (Kukalis S., 2007; Kumar Raj, 2009): i) Event-based studies, which look into the change in the company's value at the time of the announcement. ii) Accounting-based approach: This method looks at how certain accounting relationships—like operating cash flows, earnings, or assets—change over time—typically over a period of three to five years. iii) Clinical approach (case-based approach). Each of these methods has advantages and disadvantages. However, the method has a disadvantage that may result from inefficient and weak markets, where share prices may not adequately reflect the company's value (Ravichandran K., Khalid Abdullah & Residah Mohd-Said, 2009). Furthermore, share prices may be affected by other macroeconomic factors such as taxes, foreign exchange rates, interest rates, and a variety of other macroeconomic variables. (Healey, P. M., Palepu, K. G., and Rubeck, R. S., 1992) examined post-acquisition accounting data for the 50 largest US mergers between 1979 and mid-1984 and discovered



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that announcement returns based on stock price changes of the merging firms are significantly associated with post-merger operating performance, indicating that the expected gains in the merger drive the share price on announcement. (Ma, J., Pagán, J. A., et al., 2009) investigated abnormal returns to bidder firm shareholders on the day of merger and acquisition announcement in ten emerging Asian markets: China, Hong Kong, India, Indonesia, Malaysia, Philippines, Singapore, South Korea, Taiwan, and Thailand. Using a sample of 1,477 trades from eleven emerging Asian countries, the study found that stock markets exhibit predictable positive cumulative anomalous returns in three separate event windows. The findings confirmed that information revealed during the transaction is significant to shareholder gain and that 72 shareholders of the target firm benefit financially during the merger and acquisition transaction. (Ravenscraft, D., and F.M. Scherer, 1987) investigated 471 acquisitions between 1950 and 1977. Their main finding is that acquirers have 1 to 2 percent lower profitability than target firms. A similar study in the European banking industry by (McKinnon, Ronald, 1991) concluded that there are significant abnormal returns to shareholders, and these returns differ from bank to bank. The study also concluded that because these returns are significant, the European banking industry has the potential to capitalise on economies of scale and scope. Mantravadi, P., and A. Reddy (2007) (Cybo-Ottone and Murgia, 2000). The impact of merger announcements on shareholder wealth has also been studied using event study methodology. (Godlewski, C., 2003) used event study methodology to study the market reaction to mergers and acquisitions in the Italian banking sector from 1994 to 2003. This study was done to show how merger transactions significantly impacted shareholder wealth in Europe, especially in Italy. The announcement returns gave considerable evidence about the acquisition's subsequent success, according to the empirical research. A similar study by (Kaplan and Weisbach, 1992) used market-based variables to investigate synergy gains that influenced the capitalization of the merged firm. The total acquisition announcement returns are strongly positively correlated with deal success, the research shows.



2.4 Literature review of bank performance before and after mergers in an Indian context:

The banking sector in India, in particular (Pinto, Prakash, and Balakrishna C.H., 2006), has seen numerous mergers and acquisitions since its inception (Bhide, M.G., Prasad, A., and Ghosh, S., 2001). (Chaudhuri, 2002). Historically, mergers and acquisitions activity began in 1920, when three presidency banks (Bank of Bengal, Bank of Bombay, and Bank of Madras) were reorganised to form a single banking entity, which was later known as State Bank of India (Joshi and Little, 1997; Kumbhakar and Sarkar, 2003; Rao and Rao, 1988). However, during the pre-liberalized era, there were far-reaching severe regulatory policies, such as the Industrial licencing policy, MRTP Act, 1969, Industries Development and Regulation Act, and FERA Act-1973, that discouraged Indian companies, including banks, from expanding their operations (Arun and Turner, 2002; Mc. Kinnon, Ronald, 1991). As a result, only regulatory authorities-initiated mergers and acquisitions (Agarwal, Manish, 2002; Joshi and Little, 1997; Rao, P.V.S. Jagan Mohan, 2001). Although many mergers occurred prior to liberalisation, these mergers were directed by the RBI (Chaudhuri, 2002). These were generally mergers in which a weak bank was taken over by a strong bank on the direction of the RBI in 1981. (Franz, H. Khan 2007; Mehta and Samantha, 1997). However, in the modern era, competitive market dynamics are driving today's mergers. (Beena, 2000) investigated merger trends in India over a longer period spanning 1973-1995, which included both the pre- and post-liberalization eras. The study revealed that, while the majority of mergers occurred in the different sectors the banks were on the rise.

The start of banking sector reforms in 1991 (Chatterjee, G.,1997), which coincided with economic reforms in 1991 (Bhattacharyya, A., Lovell, C., and Sahay, P., 1997; Kamesam, Vepa, 2002), set the tone for banking sector expansion (Bhide, M. G.,Prasad, A.,Ghosh, Saibal, 2001; Deolalkar, G.H.,1999;). Several researchers attempted to study mergers and acquisitions in India after the reform period ended in 1991. Among the notable studies are: (Beena P.L, 1998, 2000, 2004, 2008; Das,A., 1997; Kumar Raj, 2009; Pawaskar.V, 2001; Sharma, P., 2012; Mantravadi,P and Reddy, A., 2008).



(Beena, 2004) emphasised that the current environment in India is favourable for mergers and acquisitions, and thus the study discovers evidence of a rising trend in the number of mergers in India since the implementation of economic reforms. Finally, (Aggarwal R.N., 2003) concluded that financial sector reforms aided the banking industry in increasing profitability and productivity. Because the banking sector is critical to sound economic growth, it is critical to improve the range and quality of the banking system in order to stimulate the efficiency of several other sectors as well (Mohan, K.,2006). Due of increased worldwide rivalry, M&A has gained importance (Shobhana V.K. and N. Deepa, 2011). This strategy has helped banks gain competitive market power and competitive advantage (Duksait, E., & Tamoinien, R., 2009) both domestically and internationally by significantly reducing costs and improving brand image (Agarwal, Manish,2002).

The banking sector has undergone significant transformation over the last two decades and is now on par with the global banking sector (Madgavkar, Anu, Puri, Leo and Sengupta, Joydeep, 2001). 82 The Indian banking system has undergone a seismic shift (D. Subharao, 2012). This technological revolution addressed a number of issues, such as expanding client reach and modernising the product and service mix. Banking customers' expectations have risen in tandem with advances in technology and sophistication (Humphrey, Willeson, Bergendahl ,and Lindblom,2006).Customers now have several banks to choose from, thanks to increased competition brought on by the arrival of foreign banks on the Indian banking platform (Schneider, B. and Bowen, D.E., 1985). As a result, bank survival is becoming a major challenge in the arena of global competition (Khan Azeem Ahmad, 2011).

Statistically negligible differences between pre- and post-merger financial performance were observed in a small number of research studies that assessed post-merger financial performance. This was confirmed by (Kumar Raj, 2009), who observed that the changes in the operating performance of the merged entity during the pre-merger and post-merger period as reflected in their profitability; asset efficiency and solvency position were statistically insignificant. (Mantravadi, P and Reddy, A., 2007)analyzed Indian companies for the period 1991 to 2003, to study the impact of mergers on their operating performance. According to the study's findings, there is no significant difference in the operating performance of companies in India before and after mergers. (Pawaskar V., 2001) examined pre- and post-



merger financial performance from 1992 to 1995 using an accounting-based approach and regression analysis, analysing five significant ratios on growth, returns, leverage, and liquidity, and discovered that acquiring firms outperformed industry standards in terms of returns and profitability. The results of the regression analysis indicated that, in comparison to the acquirer's competitors, post-merger profitability had not increased. A similar study conducted by (Ravichandran, Nor, and Said, 2010) attempted to assess the pre- and post-merger efficiency and performance of selected public and private banks in voluntary mergers initiated for business and commercial reasons. A factor analysis was used to achieve the study's results.

2.5 Variables Identified:

Variables

NET PROFIT MARGIN

RETURN ON ASSETS

NET INTERESTMARGIN

CAPITAL EMPLOYED

RETURN ON EQUITY

CAR

CREDIT DEPOSIT RATIO

CASA%

COST TO INCOME

ADVANCES

DEPOSITS



III. Research Methodology

3.1 RESEARCH GAP

Research Gap: It is being identified that the national and international literature did not perform any comparative analyses between a merged bank and a non-merger bank to check the significance of mergers and acquisitions. It has been discovered that there haven't been any national or international comparative studies comparing merged banks to unmerged banks to determine the importance of M&A. With a focus on the Indian banking industry in the post-liberalization era, the current study will investigate the particulars of M & A

3.2 Significance of the Study

The most important component of the Indian financial system is banking. It is critical to improve the competitiveness and quality of the banking system in order to achieve efficiency in performance. Mergers taking place in India are consistent with the consolidation trend that has characterised the financial services and banking industries. The ambition to achieve operational synergies, realise economies of scale, and offer one-stop services to a more demanding customer has led to an alarming number of bank mergers throughout the world. As a result, there is a desire to expand swiftly through mergers as opposed to the difficult and slow process of typical business expansion. Mergers appear to result in financial and strategic growth. The financial and strategic management aspects of the merger must be examined from a variety of perspectives. The current study examined the financial implications of banking mergers before and after they occurred.

3.3 Objectives of the Study:

The research objectives are-

- To understand the impact of ICICI and Rajasthan bank's merger on the performance of ICICI bank through key performance ratios.
- To compare the performance ratios of ICICI and Yes bank to explain the scope of mergers in Indian Banking System
- Suggest policy Implication for strengthening of Indian Banking System.



3.4 Hypothesis of the Study

- Hypothesis for first objective are as follows:
- Ho: There is no significant difference in the financial performance of the banks before and after the merger
- H1: There is a significant difference in the financial performance of the banks before and after the merger.
- Hypothesis for second objective are as follows.
- Ho: The performance ratios of ICICI Bank and Yes Bank do not significantly differ from one another.
- H1: The performance ratios of ICICI Bank and Yes Bank do significantly differ from one another.

3.5 Research Design

Personally, I believe that research design is an important process. The researcher used the study design as a framework to choose the methods and tools that would be applied to the investigation. The hypothesis testing research design is used in this study. This research strategy was chosen primarily because the data was collected in a fairly succinct and systematic manner, allowing for easy analysis and factual results. The major goal of the study was to determine whether there were any notable differences between pre- and post-merger data. So, one of the greatest options for this kind of research is hypothesis testing.

3.6 Research Variable

Changing, measurable characteristics are referred to as variables. It might change over time inside a single person or even between individuals, groups, or even between them.

3.7 Data Collection

Secondary data collection and information gathering methods were applied in this investigation. Secondary data are ones that have been statistically analysed and have already been gathered by another party. Journals, journals, newspaper articles, books, periodicals, annual reports, company circulars, government publications, websites, industry associations, libraries, e-libraries, university data bases, and search engines are a few examples of secondary data sources. The acquiring banks' official websites are where information is



collected. Examining financial data from before and after three years of mergers. Secondary sources such annual reports, press announcements, and the Securities and Exchange Board of India were used to acquire financial information.

3.8 Data Analysis

The research's participating banks' merger data was obtained and edited. Only the information and details necessary to achieve the goals have been collected. Second, all relevant data is entered into an Excel spreadsheet. Data entry has been completed on all of the parameters chosen for the study. An Excel Spreadsheet is the primary place where data is entered, saved, and analysed for later use. These data was analysed using the t test and hypothesis testing.

3.8.1 Tools Analysis

Data analysis employs the paired-t test. A statistical method called the paired t-test is employed when there are two correlated samples to compare the means of two populations. Case control studies, "before-after" or "matched pairs" studies, and paired sample t-tests are all examples of this. What the importance of a sample means is being considered, as well as an acceptable judgement test. Additionally, it can be used to evaluate the importance of partial and simple correlation coefficients. Calculated from the sample data, the pertinent test statistic is then compared to its problem value using the T-distribution at a predetermined level of significance for accepting or rejecting the null hypothesis.

IV. Analysis and Interpretation

For the purposes of this study, two cases were chosen: the August 2010 merger of ICICI Bank and Bank of Rajasthan, and a case of Yes Bank and ICIC Bank. The financial performance of the selected banks is assessed by calculating various financial and accounting metrics.

For Objective first: In first objective we tried to check whether banks have improved after merging with another bank, and for this, the two banks mentioned above are used. Their key performance ratios are compared and analysed and according to that interpretations are made.

Table 1: The past profiles of ICICI Bank and Bank of Rajasthan are displayed in Table 1.

Table 2: The financial results of ICICI Bank following the merger are shown in Table 2.



Table 3: The Bank of Rajasthan and ICICI bank, the combined entities, as well as the acquiring bank, ICICI bank, are shown in Table 3 along with their respective mean pre-merger and post-merger ratios.

Table 1: Performance ratios of the Bank of Rajasthan and ICICI Bank prior to the merger for three fiscal years (in percentages)

Performance Ratios	ICICI Bank			Bank of Rajasthan		
	2007-08	2008-09	2009-10	2007-08	2008-09	2009-10
Net Profit Ratio	9.76	7.9	-6.78	11.51	10.74	11.17
Return on Assets	0.78	0.67	-0.45	1.19	0.88	10.13
Interest Margin	2.94	2.45	2.104	2.30	2.30	12.50
Capital Employed	8.3	9.13	7.3	11.6	8.9	8.09
Return on Equity	15.4	11.08	-11.3	12.7	6.83	7.10
CAR (Capital Adequacy Ratio)	11.12	11.22	6.52	15.9	11.5	10.4
Credit Deposit Ratio	54.370	51.6	46.36	62.76	75.42	71.16
CASA%	29.45	27.24	22.79	36.10	18.70	21.70
Cost to Income	61.10	61.19	116	40	53.40	57

Source: Annual Reports of ICICI Banks And Bank of Rajasthan



Table 2: ICICI Bank's Performance Ratios for the Three Fiscal Years Following the Merger (in Percentages)

Performance Ratios	ICICI Bank		
	2011-12	2012-13	2013-14
Net Profit Ratio	16.7	17.1	17.9
Return on Assets	1.80	1.66	1.7
Interest Margin	5.30	5.30	6.2
Capital Employed	10.8	10.7	8.5
Return on Equity	11.3	26.7	19.6
CAR (Capital Adequacy Ratio)	18.4	16.2	15.5
Credit Deposit Ratio	65.12	76.27	79.6
CASA%	53.50	51.90	52.90
Cost to Income	52.91	43.50	48.20

Source: Annual Reports of ICICI Bank

Table 3: Mean and t ratios of Pre-merger and Post-merger Ratios of combined (The Bank of Rajasthan & ICICI Bank) and Acquiring Bank (ICICI Bank)

Ratios	Mean 1 (X1)	Mean 2(X2)	t value	Significance
NET PROFIT MARGIN	6.9	16.94	6.66	Significant
RETURN ON ASSETS	0.75	1.64	6.12	Significant
NET INTERESTMARGIN	2.25	3.05	5.4	Significant
CAPITAL EMPLOYED	9.36	9.42	0.32	Not Significant
RETURN ON EQUITY	7.25	12.72	1.95	Not Significant
CAR	13.24	18.78	33.57	Significant
CREDIT DEPOSIT RATIO	61.9	66.63	2.97	Significant
CASA%	30.95	42.76	6.5	Significant



COST TO INCOME	58.47	40.49	-6.05	Significant
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Source: Compilation by the researcher based on Tables 1 and 2

The pre- and post-merger financial performance of the Bank of Rajasthan and the ICICI Banks has been compared using key ratios.

With a t-value of 6.66, which is statistically significant at the 5% level of significance because the critical t-value is 2.365, the mean value of the net profit margin improved from 6.98% to 16.94% following the merger. With a t-value of 6.12, the mean value of return on assets dramatically rose from 0.75% to 1.64% during the post-merger period. In the post-merger period, net interest margin also dramatically rose, rising from 2.25% to 3.05% with a t-value of 5.4. The increase in each of the three measures shows that since the merger, the bank's profitability has greatly increased. Accepting H1, we can say that pre- and post-merger performance in terms of net profit margin, return on assets, and net interest margin differed significantly from one another.

Even if the average capital employed and return on equity have increased, their respective t-values of 0.32 and 1.95 make them statistically inconsequential. Ho is therefore accepted, suggesting that the pre- and post-merger capital employed and return on equity ratios are not statistically different. The capital adequacy ratio's mean value grew from 13.24% to 18.78% following the merger, with a statistically significant t value of 33.57. As a result, H0 is disregarded, which permits H1 to be approved. One of the most crucial measures of a bank's health, solvency, and capacity for expansion is having higher capital adequacy ratios.

With a t value of 2.97, the efficiency of the credit deposit ratio has grown from 61.90% to 66.63%. The statistical significance of the increase shows that there is a significant change in the credit deposit ratio between pre- and post-merger performance, which led to the acceptance of H1. With a t value of 6.5, which is statistically significant, the bank's performance has also improved in terms of CASA, which increased from 30.95% prior to the merger to 42.76% after the merger. As a result, Ho (null hypothesis) is rejected and H1 (alternate hypothesis) is accepted at the 5% level of significance. A greatly improved stable low-cost deposit base is indicated by CASA rises. Between before and after the merger, the typical cost-to-income ratio decreased from 58.47% to 40.49%. The change is considerable



with a t value of -6.05, leading to the rejection of H₀ (null hypotheses). This ratio has significantly decreased, demonstrating that the bank is being operated more profitably and efficiently after the merger as evidenced by the bank's declining costs relative to income.

Thus, analysis demonstrates that the merger approach was advantageous for both Bank of Rajasthan and ICICI Bank as most financial metrics greatly increased as a result of the merger

For the second objective

In second objective we tried to check whether banks who have merged are in a better position as compared to the ones who have not merged for this, the two banks mentioned above are used (the ICICI Banks and Yes banks' financial performance has been compared based on key ratios). Their key performance ratios are compared and analysed and according to that interpretations are made.

Table 4: The past profiles of ICICI Bank and Yes Bank are displayed.

Table 5: Performance ratios of Yes Bank no -merger for three fiscal years.

Table 6 displays the mean of ratios, for ICICI bank and Yes Bank along with significance t-test value.

Table 4: Performance ratios of ICICI Bank post-merger for three fiscal years.

Performance Ratios	ICICI Bank		
	2011-12	2012-13	2013-14
Deposits	3615.63	4900.39	5609.75
Return on Assets	1.5	1.66	1.7
Return on Equity	15.4	11.08	-11.3
CAR (Capital Adequacy Ratio)	11.12	11.22	6.52
Interest Margin	16.3	16.7	18.6
Advances	4642.32	5123.95	5866.97

Source: Annual Reports of ICICI Bank



Table 5: Performance ratios of Yes Bank no -merger for three fiscal years.

Performance Ratios	Yes Bank		
	2011-12	2012-13	2013-14
Deposits	45935	46956	54192
Return on Assets	1.58	1.57	1.6
Return on Equity	20.71	20.89	22.4
CAR (Capital Adequacy Ratio)	16.5	18.3	14.4
Interest Margin	2.7	2.8	2.9
Advances	34364	47000	55633

Source: Annual Reports of Yes Bank.

Table 6: displays the mean of ratios, for ICICI bank and Yes Bank along with significance t-test value.

Ratios	Mean1(X1)	Mean2(X2)	T value	Significance
Deposits	3902.9	6211.08	3.66	SIGNIFICANT
Returns on assets	1.583	1.64	5.30	SIGNIFICANT
Returns on equity	11.33	12.75	2.62	SIGNIFICANT
CAR	16.4	18.78	4.21	SIGNIFICANT
Net interest Margin	2.8	3.05	5.16	SIGNIFICANT
Advances	4566.67	4708.59	0.20	NOT SIGNIFICANT

Source: Compilation by the researcher based on Tables 1 and 2

Here, the ICICI Banks and Yes banks' financial performance has been compared based on key ratios.

The critical t-value is 2.365, making the mean value of the advances, which climbed from 4566.67 to 4708.59, statistically inconsequential at the 5% significance level. With a t-value of 5.3, the mean asset return has grown dramatically from 1.5% to 1.64%. The net interest margin for ICICI Bank improved dramatically, going from 2.8% to 3.05% with a t-value of



5.16. The two ratios are rising, which suggests that ICICI Bank is more profitable than Yes Bank. In light of the acceptance of H1, we draw the conclusion that ICICI Bank and Yes Bank's performance ratios differ significantly from one another.

The mean values, however, have risen and are statistically significant for deposits (t-values of 3.66). Hence, Ho (null hypothesis) is disproved, indicating that there is a significant distinction between deposits made with ICICI bank and Yes Bank. With a mean increase from 16.40% to 18.78% and a statistically significant t value of 4.21, ICICI Bank's capital adequacy ratio has improved. Due to the rejection of Ho (null hypothesis), H1 is accepted (alternate hypotheses). One of the most critical measures of a bank's health, solvency, and growth potential is higher capital adequacy ratios.

Returns on equity have increased from 11.33% to 12.75% in terms of efficiency, and t value 2.62 indicates a significant performance difference between ICICI Bank and Yes Bank in terms of returns on equity, prompting the acceptance of H1 as the baseline.

Thus, analysis shows that because most financial parameters have significantly improved in the situation of ICICI bank (after its merger with Bank of Rajasthan) especially in comparison with Yes Bank.

V. Conclusion and Recommendations

5.1 Conclusion

Mergers and acquisitions are two of the most common corporate strategies used by companies looking to increase value creation. It is a well-liked business strategy for consolidating and restructuring corporations in order to increase market share, long-term profitability, penetrate new markets, take advantage of economies of scale, and other objectives.

The goal of the current study was to look into how mergers and acquisitions affected a sample of Indian banks' financial performance. The analysis shows that the merger approach was advantageous for both Bank of Rajasthan and ICICI Bank as most financial metrics greatly increased as a result of the merger. This was the first objective, where we tried to determine whether banks have improved after merging with another bank. For this, the two banks mentioned above are used and their key performance ratios are compared and analysed,



and then interpretations are made. This indicates that after the Bank of Rajasthan and ICICI Bank merged, the performance of banks in terms of their financial parameters dramatically improved. So, we can conclude that combining is one of the most effective strategies for banks to survive in this cutthroat industry.

The two banks listed above are used in the second objective, which compared the financial performance of ICICI Banks and Yes Banks based on key ratios in order to determine if banks that have merged are in a better position than those that have not. The investigation reveals that because most financial indicators have greatly improved in the circumstances of ICICI bank (after its merger with Bank of Rajasthan), especially when compared with Yes Bank, and conclusions are drawn based on comparisons and analyses of their key performance ratios. So, we can draw the conclusion that bank mergers can help them perform even better than before. Also, such banks have advantage over the ones who haven't merged and thus they perform better than them.

Most financial variables improved significantly after the merger in both cases, while others did not, but it is possible that these ratios will improve in future years because only three years of financial ratios are compared. In the long run, synergy gains are created when dealing with mergers and acquisitions, resulting in an improvement in bank efficiency and performance. As a result, mergers and acquisitions improve bank financial performance.

5.2 Suggestions:

The following are the study's suggestions:

- To increase the number of bank mergers and acquisitions, which increases bank profitability, the Reserve Bank of India and the Government of India should liberalise its mergers and acquisitions rules.
- The general public must be informed about mergers and acquisitions by banks. It must intensify its management-specific training programmes in order to increase productivity.
- After the merger, the banks ought to concentrate on liquidity. The banks must put the right plans in place if they are to sustain their liquidity position..



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- A bank merger enables the company to rapidly build up and attract a sizable number of new clients. An acquisition not only gives your bank greater resources to lend and invest with, but it also gives it a larger geographic operating area.
- Through improved efficiency, mergers and acquisitions in India seek to boost shareholder value and competitiveness, enabling you to meet your growth goals more quickly. In the marketplace, the strongest survive. India has experienced a wave of mergers in recent years.
- Consolidation is a difficult and drawn-out process. Contrarily, it seems as though the banks' game of waiting and watching is ended. The industry's companies appear to be combining as a result of increased competition and tighter prudential rules from the top bank.
- These banks are under the control of the government. Most of these financial institutions are working to change how the public views them. Recent efforts to cut down on government stakes, VRS, and NPA settlement are all positive measures. On the other hand, if the government reduces its interest and re-evaluates the need for a merger, true consolidation is feasible. According to the government, consolidation is necessary to keep a bank from failing.
- The merger must increase shareholder value and be profitable. It ought to increase the bank's capital sufficiency and net worth. More business prospects for both banks should result from the combination.
- Combining powerful banks is a way to strengthen the base while maintaining competition. The public sector banking business is now again hungry for mergers.



References:

- Acharya, Shankar (2002), "India: Crisis, Reforms and Growth in the Nineties", Working Paper Stanford University, Volume 139, pp. 1-40.
- Adrian Gourlay, Geetha Ravishankar, Tom Weyman-Jones (2006), "Non-Parametric Analysis of Efficiency Gains from Bank Mergers in India", Discussion paper series, Department of Economics, Loughborough's Institutional Repository.
- Agarwal, Manish (2002) "Analysis of Mergers in India", M Phil Dissertation submitted to the Delhi School of Economics.
- Agarwal, R. N. (2003), "Capital Market Development, Corporate Financing Pattern and Economic Growth in India", Asian Economic Review, Volume 45, Issue 1, pp. 23- 34.
- Ahmad Ismail, Ian Davidson & Regina Frank (2009), "Operating performance of European bank mergers", The Service Industries Journal, Volume 29, Issue 3, pp. 345.
- Akhil Antony K. (2011), "post-merger profitability of selected banks in India", International Journal of Research in Commerce, Economics and Management, Volume 1, Dec. 2011, Issue 8, pp. 133-135. 7.
- Allen David E and Parwada Jerry T, (2006), "Investors' Response to Mutual Fund Company Mergers", International Journal of Managerial Finance, Emerald Group Publishing Ltd, Volume 2, Issue 2, pp. 121-135.
- Anand, M., and Singh, J. (2008), "Impact of merger announcements on shareholders wealth: Evidence from Indian private sector banks", Vikalpa, Volume 33, Issue 1, pp. 35– 54.
- Anand Rajan, Kumar Anil, Kumar Gautam & Padhi Asutosh, (1998), M&As in Asia, The McKinsey Quarterly, Issue 2, pp. 64-75.
- Andre, P., M. Kooli and J. L'Her (2004), "The Long-Run Performance of Mergers and Acquisitions: Evidence from the Canadian Stock Market", Financial Management, Volume 33, Issue 4, pp. .27-43.
- Arora, S and Kaur, S. (2008), "Diversification by Banks in India: What are the Internal Determinants?", The Indian Banker, Volume III, Issue 7, pp. 37-41.



- Arunava Bhattacharya, C.A.K Lovell, Pankaj Sahay (1997), “The impact of liberalization on the productive efficiency of Indian Commercial banks”, European Journal of Operational Research, Volume98, pp 332-34
- Arun, T.G. and Turner, J.D. (2002a), “Financial liberalization in India”, Journal of International Banking Regulation, Volume 4, Issue 2, pp. 183-188.
- Arun, T.G. and Turner, J.D. (2002b),” Financial Sector Reforms in Developing Countries: The Indian Experience”, World Economy, Volume 25, Issue 3, pp. 429-445.
- Arun, T.G. and Turner, J.D. (2002c), “Public Sector Banks in India: Rationale and Prerequisites for Reform”, Annals of Public and Cooperative Economics, Volume 73, Issue 1, pp. 89-109.
- ASSOCHAM Report, (2012), Merger and Acquisition Newsletter, ASSOCHAM National M&A Council, Volume 1, pp. 1-10.
- Banker, Rajiv D., Natarajan, Ram (2004),“Statistical Tests Based on DEA Efficiency Scores”, in W.W.Cooper, L. Seiford and J. Zhu (eds) Handbook of Data Envelopment Analysis, Boston, KluwerAcademic Publishers, 2004.
- Bashir, A., Sajid, M.R. and Sheikh, S.F. (2011), “The Impact of Mergers and Acquisitions on Shareholders Wealth: Evidence from Pakistan”, Middle –East Journal of Scientific Research, Volume 8, Issue 1, pp.261-264.
- Beena, P.L. (2004), “Towards understanding the merger wave in the Indian corporate sector – acomparative perspective”, working paper 355, February, CDS, Trivandrum, pp 1-44.
- Berger A.N., Humphrey D.B. (1992), “Measurement and efficiency issues in commercial banking”, In Griliches Z. (Ed.), National bureau of economic research, studies in income and wealth, Volume 56, pp. 24–79, Chicago: University of Chicago Press
- Bhaskar A Uday, Ratnam C. S Venkata and Bhal Kanika T. (2009), “Role of Communication and HR Integration: A Study of a Bank Merger”, retrieved from [Http://Www.Ilera-Online.Org](http://Www.Ilera-Online.Org) / 15thworldcongress / Files / Papers / Track_1 / Poster / Cs1w_13_Bhaskar.Pdf, last accessed on 21st April 2012. 98



- Bhattacharya, A., Lovell, C.A.K., and Sahay, P. (1997), "The impact of liberalization on the productive efficiency of Indian commercial banks", *European Journal of Operational Research*, Volume 98, Issue 2, pp.250-268.
- Bhattacharyya Surajit and Chatri Ankit (2012) "Efficiency of Indian Commercial Banks: Post Reform Experience from Mergers and Acquisitions", *The Indian Economic Journal*, Volume 60, Issue 3, October –December-2012.pp 1-28.
- Bhayani, S. (2006), "Performance of the New Indian Private Sector Banks: A Comparative Study", *Journal of Management Research*, Volume 5, Issue 11, pp. 53-70.
- Bhide, M.G., Prasad, A. and Ghosh, S. (2001), "Banking sector reforms: a critical overview", *Economic and Political Weekly*, Volume 36, Issue 1, pp. 399-408.
- B.K. Bhoi (2000), "Mergers and Acquisitions: An Indian Experience" *RBI, Occasional Papers* Volume 21, Issue 1, pp. 133-166.
- Bodla, B.S. and Verma, R. (2006), "Evaluating Performance of Banks through CAMEL Model: A Case Study of SBI and ICICI", *The ICFAI Journal of Bank Management*, Volume 5, Issue 3, pp. 49-63.
- Burki, A and Niazi (2006), "Impact of Financial Reforms on efficiency of state-owned, private and foreign banks in Pakistan" *CMER working paper no. 06-49*, Lahore university of Management Sciences.
- Capron Laurence (1999), "The Long-Term Performance of Horizontal Acquisitions", *Strategic Management Journal*, John Wiley & Sons Publication, Volume 20, Issue 11, pp. 987-1018.
- Cartwright, S. (2005). "Mergers and acquisitions: An update and appraisal." in G. P. Hodgkinson and J. K. Ford (eds), *International review of industrial and organizational psychology*, Volume 20, Chichester, UK, Wiley, pp 1-38.
- Chakrabarti, R., (2008). "Do Indian acquisitions add value?", *Money and Finance ICRA Bulletin*, pp. 61–73. Available at <http://www.ibef.org/industry/financialservices.aspx>, last accessed in April 2012.



- Chatterjee, G. (1997) “Scale Economies in Banking – Indian Experience in Deregulated Era”, Reserve Bank of India Occasional Papers, Volume 18, Issue 1, pp. 37-59. 99
- Chatterjee Sayan (2009), “The Keys to Successful Acquisition Programmes, Long Range Planning”, Elsevier Publication Ltd, Volume 42, pp. 137-163.
- Chaudhry, Sahila and Singh, Sultan (2012), “Impact of Reforms on the Asset Quality in Indian Banking”, International Journal of Multidisciplinary Research, Volume 5, Issue 2, pp.13-31.
- Chong, Beng-Soon, Ming-Hua Liu and Kok-Huai Tan. (2006), “The Wealth Effect of Forced Bank Mergers and Cronyism”, Journal of Banking and Finance, Volume 30, Issue 11, November 2006, Pages 3215-3233.
- Chowdhury Subroto (2011), An Inquiry Into The Financial Soundness of Commercial Banks in India Using the ‘CAMEL Approach’ , Journal of Banking Financial Services and Insurance Research, Volume 1, Issue 1 , pp. 88-121.
- Coase, R H (1937), “The Nature of the Firm”, *Economica*, New Series, Volume 4, Issue 16, November 1937, pp. 386-405. 38. Cole, R.A., and J.W. Gunther, (1995), “A CAMEL Rating's Shelf Life”. Available at SSRN:
- Cole, R.A., and J.W. Gunther (1998), “Predicting Bank Failures: A Comparison of Onand Off-Site Monitoring Systems.” *Journal of Financial Services Research*, Volume 22, Issue 1, pp. 103-117.
- Cybo-Ottone A., Murgia M. (2000), “Mergers and shareholder wealth in European banking”, *Journal of Banking and Finance*, Volume 24, Issue 6, pp.831–859.
- Das, A. (1997) “Measurement of Productive Efficiency and its decomposition in Indian banking firms”, *Asian Economic Review*, Volume 39, Issue 3, pp. 422-39.
- Das, A.K., Misra, A.K., January, (2005), “Bank Scale Economies, Size and Efficiency: The Indian Experience”, Special Issue, *Indian Banks Association Bulletin*, Indian Banks Association, pp. 145-149.
- Dash, M. and Das, A. (2009), “A CAMELS analysis of the Indian banking industry”, Retrieved from <http://ssrn.com/abstract=1666900>.



- Delaney Frank T and Wamuziri Sam C (2004), "The Impact of Mergers and Acquisitions on Shareholder Wealth in the UK Construction Industry", Engineering, Construction and Architectural Management, Emerald Group Publishing Limited, Volume 11, Issue 1, pp. 65-73.
- Derviz, A., and Podpiera, J. (2008). "Predicting Bank CAMEL and S&P Ratings: The Case of the Czech Republic. Emerging Markets", Journal of Finance & Trade, Volume 44, Issue 1, pp.117.
- Devarajappa S. (2012), "Mergers in Indian Banks- A study of merger of HDFC bank ltd. and Centurian Bank of Punjab ltd." International Journal of Marketing, Financial Services & Management Research, Volume 1, Issue 9, September 2012, pp.33-41.
- Devos, E., Kadapakkam, P.R., & Krishnamurthy, S. (2008), "How Do Mergers Create Value? A Comparison of Taxes, Market Power, and Efficiency Improvements and Explanations for Synergies", The Review of Financial Studies, Volume22, Issue 3, March 27, 2008, pp.1179-1211, downloaded from <http://rfs.oxfordjournals.org/content/22/3/1179.full.pdf+html>, accessed in June 2012.
- Dewan Astha (2007), "Effect of Mergers and Acquisitions on Operating Performance: A Study of Acquiring Firms in India" accessed at <http://www.wbiconpro.com/302-%20Astha.pdf>, accessed in April 2012.
- Dhawal Mehta, Sunil Samanta (1997), "Mergers and Acquisitions: Nature andSignificance", Vikalpa the Journal for Decision Makers, Volume 22, Issue 4, pp. 31- 38.
- Dilip Kumar Chanda (2005), "Bank Mergers in India: A Critical Analysis" IASSI Quarterly, Volume 23, Issue 4, pp. 107-123.
- Dilshad, M. N. (2013), "Profitability Analysis of Mergers and Acquisitions: An Event Study Approach". Business and Economic Research, Volume3, Issue 1, pp. 89-125.
- Donaldson, G. (1994) Corporate Restructuring, Harvard Business School Press, Boston, MA.



- Duksait, E., & Tamošiūnien, R. (2009), “Why Companies decide to participate in mergers and acquisition transactions”, *Mokslas-Lietuvos Ateitis Science- Future of Lithuania*, Volume 1, Issue 3, pp.21-25.
- Eccher, E. A., Ramesh K., and Thiagarajan S. R. (1996), “Fair value disclosures by bank holding companies”, *Journal of Accounting and Economics*, Volume 22, Issue 1, pp. 79-117
- Economy Watch (2011), “Mergers and Acquisitions in Banking Sector”, Available at: <http://www.economywatch.com/mergersacquisitions/international/bankingsector.html>, last accessed on 23rd April 2011.
- Elliott, J. A., Douglas, H. L. J., and Shaw, W. H. (1991), “The Evaluation by the Financial Markets of Changes in Bank Loan Loss Reserve Levels”, *The Accounting Review*, Volume 66, Issue 4, pp. 847-861.
- Focarelli, D. F. Panetta and C Salleo; “Why do banks merge?” *Journal of Money, Credit, and Banking*; Volume 34, Issue 4, 2002, pp. 1047-1066.
- Hirtle and Lopez (2008), “ABA Banking Journal, Banks performance evaluation by camel model”, *Finance Trade Publications*, Volume 4, Issue 4, pp. 9-14.
- George E Halkos, Dimitrios S Salamouris (2004), “Efficiency measurement of the Greek commercial banks with the use of financial ratios: a data envelope analysis approach”, *Management Accounting Research*. Volume 15, Issue 2, pp. 201-224.
- Ghosh, A., (2001), “Does operating performance really improve following corporate acquisitions?” *Journal of Corporate Finance*, Volume 7, Issue 2, pp. 151-178.



Adoption of Cloud Platform in Small and Medium Enterprises

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Abstract

With information technology invading into almost all the aspect of life starting from manufacturing, banking, education, social media, digital business etc and the major contributor to enable businesses to run during known and unknown disruptions like pandemics, and natural disasters. During such incidences, it assumes the driver seat for all the businesses right from finance and accounting to the logistics execution which has no face but only means the result driven execution, and thereby enabling the organizations to run the businesses as usual and smoothly during the troubled times.

With the growth in IT enablement resulting into increased dependence on automation, integration, and cater business growth, the enterprises are looking forward to have cost effective, scalable, sustainable, and secured infrastructure, thereby evaluating the option of cloud adoption which provides higher scalability, flexibility, lower Total Cost of Ownership and robust infrastructure.

This paper attempts to review select research publications on cloud adoption and deployment options. This further also includes an independent survey in select Small and Medium Enterprises in Gujarat across various industry sector such as Manufacturing, Processing, Education, FMCG etc. sectors to identify cloud adoption and delivery options along with key



parameters to select the best suited cloud deployment options for Small and Medium Enterprises

Keywords: Cloud, Infrastructure, Scalability, Security, Cost

Introduction

While most of the Small and Medium Enterprises as on today are still working with disintegrated legacy systems to run their operations having outdated hardware and infrastructure which is due for overhaul, replenish or replacement, which is in turn impacts operational efficiencies of the organization and adds to overhead cost in terms of higher administrative, sustenance and infrastructure cost along with slower performance in the operations resulting into reduced efficiencies and productivity across multiple business functions, thereby causing delays and dissatisfaction among customers and employees.

According to (Fisher, 2018) ; to keep in mind long term Total Cost of Ownership, while selecting right ERP decision makers are increasingly comparing the merits of Cloud offering, however it is important to weigh the below aspects before making decision:

- Key requirement for accessibility and performance
- Security and related compliances
- Total long-term cost of ownership

In the same article (Fisher, 2018) has done in depth study for comparing total long-term cost of ownership between cloud hosting and on-premise hosting further to provide the guidelines for suitability of the hosting options for the respective organizations in terms of:

- Initial investment cost to set up the cloud
- Simpler and regular upgrades of products and infrastructure alike to stay compliant
- Reduces dependency on inhouse team for maintenance
- Enables creating of the users for the most recent versions and features
- Provides most efficient and secured solution which enables scalability, business continuity, upgrades



Cloud Infrastructure is a hardware platform which provides a scalable, flexible, on- demand access to a shared infrastructure servers, storage, and applications. This allows enterprise not to their own hardware, data center and also upgrading the required operating systems, database versions along with security patches. This also transfers the ownership of maintaining the infrastructure along with Service Level Compliances to the Service Providers. There multiple types of cloud service providers and the enterprises can use the cloud services based their requirements, growth, security and other compliance.

Cloud Deployment Options and their comparison

There are multiple cloud deployment options available with their advantages and disadvantages. Table 1 describes various cloud deployment options which has been elaborated by (Golightly, 2022) , (Tavbulatova, 2020) , and (Arora, 2017).

Table 1 :Cloud Deployment Options

Cloud Option	Definition
Public Cloud	<ul style="list-style-type: none">• This is Owned and maintained by cloud service provider (Hyper scalars)• Service provider hosts the physical and IT infrastructure as well and applications are also hosted by the service provider at the location
Private Cloud	<ul style="list-style-type: none">• This is dedicated hosting designed to be used by only one organization and can be maintained either by the organization or by other service provider or by external vendor• The hosting of this can either be located at the organization itself or away from the organization's location.
Hybrid Cloud	<ul style="list-style-type: none">• This is a combination two or multiple clouds either of private or community or public• This type of cloud combines either private and public cloud which facilitates to retains required capabilities of each set and allows sharing of data whenever required
Community Cloud	<ul style="list-style-type: none">• This type of cloud allows sharing of the resources between multiple but similar type of organizations• This type of cloud is can be maintained either by the team in the organization or external vendor



(Haris, 2018), has compared the various cloud deployment options based on some of the important parameters as described in Table 2

Table 2: Comparison of Cloud Deployment Options

Parameters/Cloud Deployment Options	Public Cloud	Private Cloud	Hybrid Cloud	Community Cloud
Initial Set up Cost	Low	High	Medium	Low to Medium*
Maintenance Cost	Lowest	Highest	Medium	High
Scalability	Low to Medium	High	Medium to High	Medium
Security	Low	Highest	Medium	High
Performance	Medium	Highest	High	High
Reliability	Low	Highest	High	Medium
Ease of Use	High	Low	Low to Medium	High
Data Control	Low	Highest	Highest***	Medium to High**

* Varies as per the number of organizations having common goals and accesses

** This depends upon the community collaboration

*** This requires extremely right set up

Key Considerations for Selecting Cloud Deployment Option

Though all the deployment options have their own advantages and disadvantages of various cloud deployments. (Golightly, 2022), has discussed various deployment options in terms of scalability, cost, service management and other aspects.

(Kansara, 2021) and (B. Patel, 2021) They along with other researchers have observed that to stay relevant and adapt the fast-changing business environments Small and Medium Enterprises (Enterprises having employee strength between 100 to 999) are mostly benefitted with the public cloud deployments which is also observed by (Aggarwal, 2009) ; (Arora,



2017). Based on the observations by various researchers, some of the important factors that are considered by Small and Medium Enterprises are:

I. Cost: Converting CapEx to OpEx

Unlike large enterprises Small and Medium Enterprises have smaller budgets and fewer IT staff. (Aggarwal, 2009) has observed typically an IT generalist—to support a complex array of IT resources and users. (Aggarwal, 2009) they have further elaborated that in medium enterprises (100 to 999 employees) who manages various IT functions ranging from infrastructure and applications. Hence these enterprises are bound to look for the infrastructure which has lower initial set up and maintenance cost.

This enables the enterprises from not procure and manage the hardware and instead facilitates flexible paying options

II. Scalability & Sustenance: Catering changing demands of business

Small and Medium Enterprises are not sure of how their business requirements as they are fluctuating due to highly competitive market condition. Small and Medium enterprises have very limited budgets, in which they need to ensure to have scalable and flexible capacity that can be ramped up or down without spending high cost on their IT hardware, software and thereby on maintenance services. In a public cloud these enterprises can take advantage of adding or removing the capacity as per their requirements to for data storage and to get better performance to meet their needs.

Also, this enables the enterprises to optimize the utilization of the resources, thereby reducing the upfront investment cost; which otherwise need to be planned and procured with future growth plan and generally doesn't reach the full capacity for 3-5 years.

III. Business Continuity: Running business as usual during outages

Unexpected business stoppages and loss of data may lead to closure of emerging business or the start-up. However, cloud hosting provides them business continuity by providing them right approach for backup along with local machines. Cloud based backup is one of the most widely used technique that is provided by using public clouds.



This in turn enables Small and Medium Enterprises that do not have CapEx, which can provide better hardware and tools to continue business as usual with restricted budgets.

IV. Security: Keeping the data and environment Secure

Though Security continues to be the one of the concerns in cloud adoption especially in Public Cloud deployment, however with the increased adoption the Public Cloud Providers have evolved in better and secured environment. (Solutions, 2015) , also mentioned Security continues to be the one of the concerns in cloud adoption especially in Public Cloud deployment, but in reality cloud- based servers are probably more secure and resilient than traditional than on-premise servers.

In order to have more secured infrastructure some of the enterprises use Hybrid cloud which enables them to leverage benefits of both Private and Public cloud. (Anuary, 2011) discussed this further mentioning these enterprises use private cloud for applications and data that require a high degree of compliance and security such as enterprise HR, CRM, financial and payroll-related applications and use public cloud for less-sensitive data and provides benefits such as scalability, pay-per-use billing and lower expenses. Most of the enterprises use public cloud deployment use them for storing data not to be shared with suppliers and Ideal use of the public cloud is for backups, e-mails, disaster recovery and storage of data that need not be shared with isolated business functions.

Cloud service providers will likely have antivirus, intrusion detection and network protection capabilities built into the infrastructure, making cloud services an extremely secure, resilient and disaster-proof option for Small and Medium Enterprises.

Cloud Deployment trends in Small and Medium Enterprises

Researchers have observed that the most of the Small and Medium Enterprises are increasingly moving towards adopting the cloud that enables them the reduction in cost both CapEx and OpEx to these enterprises. To validate the observations made by them, an independent survey is carried out in Small and Medium Enterprises in Gujarat across various industry sectors such as Manufacturing, Processing, Education, Services, and FMCG etc.

50 plus responses that are received from various industry segments from these enterprises are analyzed further. Figure 1 shows the results obtained from the survey and indicates that 70%



of the enterprises have already adopted the cloud and further indicates Education and Banking & Financial Sector has the highest adoption of cloud which is 100%.

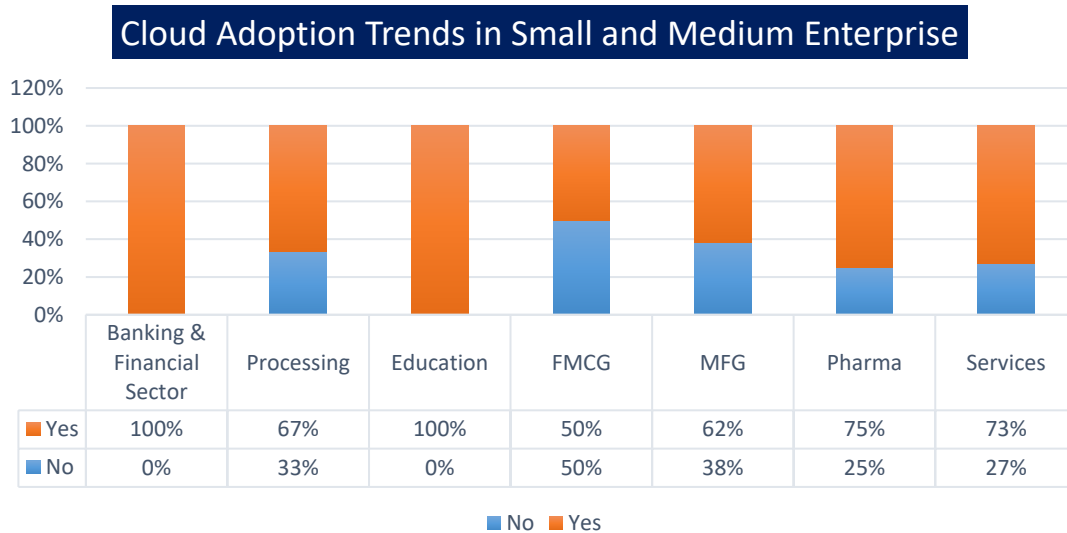


Figure 1: Cloud Adoption Trends

Further analysis on the data has been done to find out various cloud deployment options that are adopted by the Small and Medium Enterprises across various industry segments. Figure 2 indicates that approximately 57% enterprises have adopted the public cloud and 43% have adopted the hybrid cloud. Banking & Financial Sector along with the Manufacturing Sector are the leading adopters of hybrid cloud while FMCG Sector has the highest adoption of the public cloud followed by Education Sector.



Cloud Deployment Trends in Small and Medium Enterprises

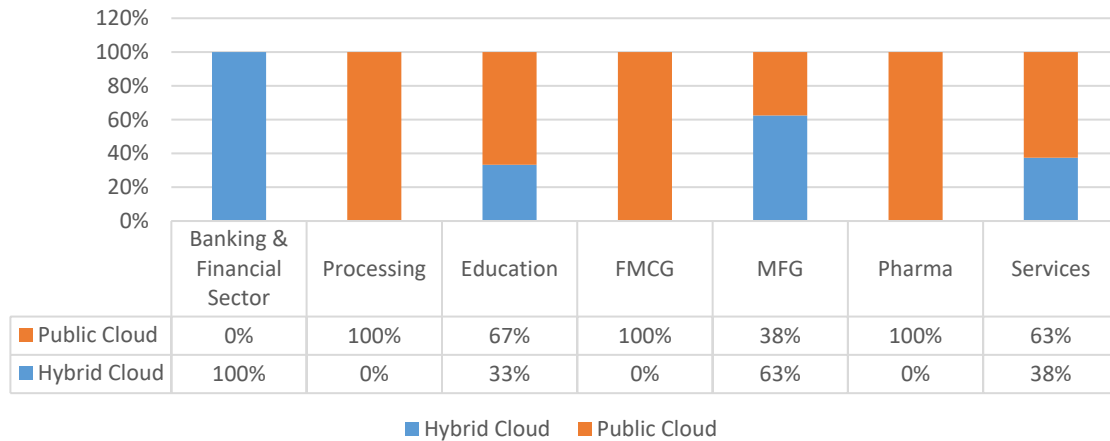


Figure 2: Cloud Deployment Options

Conclusion

In today's competitive business environment, Small and Medium Enterprises are required a kind of hosting options which can cater the changing demands and meet their business growth, and also enables them to optimize the cost in terms of one time and recurring cost and are looking for the flexible payment options which can enable them to scale up or scale down the infrastructure requirements. Hence cloud deployment options can facilitate organizations to achieve these requirements, and provide added flexibility to scale as per business demands and provide better pricing models to optimize the spend in infrastructure requirements.

This research paper attempts to discuss the importance of adoption of cloud as a most effective hosting option in Small and Medium Enterprises and various cloud deployment options available that can cater the requirements of these Enterprises. Along with this, the paper also provides high level insights into basic guiding principles which Small and Medium Enterprises must consider along with comparison of various options available. The next step of this research can be focused towards benefits of cloud adoption in these enterprises and to address the step-by-step elaboration to arrive upon Cloud Deployment Strategy in Small and Medium Enterprises.



References

- Aggarwal, S. &. (2009). The Compelling TCO Case for Cloud Computing in SMB and Mid-Market Enterprises.
- Anuary, J. (2011). Smb Perspectives Cloud Computing – Coming “ Sink -Hole” for SMBs ?
- Arora, S. &. (2017). Adoption and Use of Cloud by Small and Medium Businesses (SMBS). *Advances in Computational Sciences and Technology*, 10(4), 529–536.
- B. Patel, P. H. (2021). Cloud Computing Deployment Models: A Comparative Study. *International Journal of Innovative Research in Computer Science & Technology*,, 45-50.
- Fisher, C. (. (2018). Cloud versus On-Premise Computing. *American Journal of Industrial and Business Management*, 1991–2006.
- Golightly, L. C. (2022). Adoption of cloud computing as innovation in the organization. *International Journal of Engineering Business Management*, 1-17.
- Haris, M. &. (2018). A Systematic Review on Cloud Computing. . *International Journal of Computer Sciences and Engineering*, 632 - 639.
- Kansara, P. N. (2021). Cloud Computing Deployment Models: A Comparative Study. *International Journal of Innovative Research in Computer Science & Technology*,, 45-50.
- Rajeswari, S. &. (2018). Survey of data and storage security in cloud computing. . *IEEE International Conference on Circuits and Systems*,, 45-51.
- Sanjeev Aggarwal, L. M. (n.d.). The Compelling TCO Case for Cloud Computing in SMB and Mid-Market Enterprises.
- Solutions, A. I. (2015). White Paper Cloud Migration for SMBs : Harnessing the power of cloud computing.
- Tavbulatova, Z. K. (2020). Types of cloud deployment. *Journal of Physics: Conference Series*, 1582(1).



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Impact of Technological Advancement on Customers: A Study on Electronic Proof of Delivery

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Abstract

In India, logistics industries consider being sunshine industry and are facing a frequent transformation process. Among others, EPOD is one of the digital tool to collect wide array of data, accelerate beyond the conventional signature enhance customer loyalty and at diminished costs. The present study focuses on adapting and verifying the program that was originally created for existing customers and how the determinants influence EPOD. To assess the EPOD, the researcher utilises descriptive research design to know exactly what is happening in the organisation. The researcher studies the variables like affective, behavioural, confidence and attitude towards EPOD among consumers. Correlation outcome provides an



outcome that all the variables have a close association with attitude towards EPOD. Besides, attitude of EPOD among consumers influence the productivity too. 0.3% influence of behavioural attributes of EPOD on productivity. Besides, confidence attributes of EPOD influence the productivity to be around 1.4%. In addition, 0.9% impact to be identified with the attitude of EPOD technology on productivity. Finally, the study found that the consumer attitude towards EPOD technology has an impact on productivity.

Keywords: EPOD; Logistics services; Productivity.

Introduction

Logistics services plays a critical role in gaining a competitive edge in today's global business environment. Managing transport is the most important area of any business. Today more than 66% of world trade (value-based) is transferred through maritime transport. Today knowledge about logistics and transportation goes through an electric payment on delivery network. Customers can see information from ordering a product for shipping and supplying the finished product in this system. The information is often in the system automatically, and may often take a while to update them. Items are ordered from subcontractors, and from the outset, the order will be available in the network. Subcontractors often have the option of filling in information directly to the network so that company can monitor their order situation and when it is ready for pickup. This is a system that uses computing devices, automated and mechanical machines without human needs to transmit data throughout the network.

Statement of the Problem:

It is evident that supply chain is always a critical area of all industries. From past few years customers' expectations, mode of delivery of services or products are changing rapidly. In this scenario it is really a daunting task for logistic companies to ensure and intensified the better services to the customers in terms of quality and on time delivery.

It is apparent that now a days logistic companies are turning to cloud-based logistics solutions and electronic proof of delivery to enhance transparency, services, traceability during their entire operation.



In this paper, researchers have investigated to analyse the behavioral attitude and acceptance level towards electronic proof of delivery system. On the basis of extensive literature review this research will address below mentioned questions:

What is the acceptance level and ease of using electronic payment on delivery system among customers?

What is the impact of technological advancement in the form of electronic payment on delivery system on companies?

Objectives

The objectives of the study are:

- To identify EPOD adaption and ease of using among customers.
- To analyses the factors which influence the behavior EPOD in Bangalore
- To identify the impact of attitudes of customers in influencing the EPOD in Bangalore.
- To find out how the customer confidence influence the EPOD
- To identify the impact of behavioural attributes on customers in influencing EPOD

Hypothesis

(H0) There is no association between the affective attributes and attitude of technology.

(H1) There is association between the affective attributes and attitude of technology.

(H0) There is no association between the behavioral attributes and attitude of technology”

(H2). There is an association between the behavioral attributes and attitude of technology”

Scope of the study

Today, electronic proof of delivery is a quickly-growing trend that too many businesses are enacting in their business processes to know the modern world in front of them and to prevent the development of a more positive approach toward using technology. Couriers, logistics suppliers and distributors can now gather a vast array of data beyond the conventional signature, enhancing customer loyalty while reducing operating costs. Industries that earlier had little requirement for ePOD software are therefore recognizing possible advantages. As



new electronic proof of delivery systems became a should-have software to enhance portable work force activities throughout all sectors.

Limitation of the Study

Review of Literature

Concept of Electronic Proof of Delivery (E-POD)

Turner, M. (2020) explained Electronic Proof of Delivery (EPOD) is a digital system that allows the customer to keep track of the goods shipped in an effective manner that enables the logistics company to provide better customer service. Traditionally, the paperwork was filed by the employee manually and data was put into IT systems. For an employee, it was a horrific and time-consuming work that often-included human mistakes and delays. In the new approach, the consumer wants the production at an accelerated pace that the conventional paperwork process can not satisfy. In EPOD the transaction details such as invoice number, dispatch date, purchase order, shipping information, price quotes will be exchanged. Deliveries at any location can be monitored by telephone, it helps return the damaged goods, check order information, monitor the loading and unloading of goods. This, in effect, saves an employee's time and improves workplace productivity, as well as delivering the product on time. EPOD is a device which is customer focused. The driver must make a note of each delivery according to the customer's request for potential references and also helps to address any difficulties the customer faces. The program is also collecting feedback and performing a customer survey in seconds. Finally, it helps to reduce paperwork-related harm. In addition, our organization keeps customer data which can be shared with other departments without any pause in the flow of information.

Maurice, R. (2020) indicated that, when adapting digital proof of delivery, it will allow us to know the benefits and the issues to remember. We are in an age of digital transformation, of digitisation of everything around us. With this transition, logistics problems are growing, customers can order online anywhere at any point in time, or ask to receive their bills in digital form.

Sudasassi, R. (2020) Six specific ways of why logistics companies will implement ePOD software are explained in this Report. Traditionally, the sole purpose of getting a signature on



the paperwork is to verify whether or not the product is being received due to the advancement of mobile device technology, which helps to meet the endless ever-changing expectations at the time of delivery. Six reasons,

- Customer Service Effective
- Live to route
- Precision and Performance
- Act as rule
- Good apprehension about data
- Go on white.

Nowadays, everything is done at the fingertips using a smartphone that provides an efficient way to interact with the customers and also delivers better customer delivery experience. The EPOD system helps to increase the goodwill and profitability of your business over the period.

Wibbeling, Sebastian & Schneiders, Fabian. (2013) claimed that, due to the growth of the internet, competition in the e-commerce market, which is often referred to as the e-business where goods and services are bought and sold, has in effect increased. Demand, as well as market growth, will pose new challenges for logistics providers by addressing individual demand and updating their current order and distribution processes. The issue of protection and authentication for sensitive and expensive products which cost the customer a fortune comes into the picture. In order to create a strong linkage among purchaser and the end user, it is necessary to reduce the security risk by adapting EPOD (electronic proof of delivery) which helps to improve process authentication. Security should be the highest priority particularly when it comes to the health sector.

Alkhlaifa (2017), this paper explore the factors influencing consumer confidence in e-commerce in Jordan. This research investigated the elements which affect consumer's confidence in ecommerce. Survey was conducted among 150 university students. This study concluded that consumer behavior and privacy is the significant factor which impact consumer confidence in e-commerce activity.



Nino Mushkudiani (2018), This paper investigated the expansion of e- payments in Georgia. In this paper researcher have identified the progress and development of cashless payment system in Gergoia. This paper indicates how people are adapting the cashless payment system.

KhaledAldiabat (2019), The means of payment influences the decision to shop online. This research quantifies the impact of e-cards on e-shopping decisions in Jordan by examining four factors: use and reliability, trust and safety, e-card type, and perception. Results showed a positive relationship between the use and reliability of electronic cards and the decision to shop online, with the use of electronic cards. The study also concluded that the type of electronic card and payment method influences the decision to shop online. (Credit card, debit card, prepaid card, cash on delivery).

Research Gap Analysis

It is evident from the deep literature review that no single study has been conducted to analyse the various factors pertains to baehaviourial, confidence, ease of use of electronic payment system on delivery. This paper is an attempt to investigate various factors influencing the consumer behavior while pre and post purchase and ease of use.

Methodology

For the purpose of study, researchers have used non-probability sampling technique. Convenient sample method was used for data collection. To assess the impact of Technological Advancement on Customers, researchers have conducted survey through administered questionnaire prepared on Likert scale-5 point scale. The data was collected from 102 customers.



Result and Discussion

Table 4.1 showing the age

		Frequency	Percent	Valid %	Cumulative%
Valid	28 to 38 years	34	33.3	33.3	33.3
	38 to 48 years	25	24.5	24.5	57.8
	Above 48 years	43	42.2	42.2	100.0
	Total	102	100.0	100.0	

Table 1: Age

From the above table it observed that the 33.3% of respondents between the age of 28 and 38 years, 24.5% of between the 38 and 48 years and 42.2% are above 48 years. Therefore it is concluded that the highest number of respondents are above 48 year

Figure 1: Age

Table 4.2 showing the gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	47	46.1	46.1	46.1
	Female	55	53.9	53.9	100.0
	Total	102	100.0	100.0	

Source: Primary Data

Table 2: Gender

Table 4.2 depicts that the 46.1% of respondent's male and 53.9% are female.

Hence, it is clear that the highest number of respondents are female.



Table 4.3 showing the education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	UG	36	35.3	35.3	35.3
	PG	33	32.4	32.4	67.6
	Others	33	32.4	32.4	100.0
	Total	102	100.0	100.0	

Source: Primary Data

It is clear from the table that the 35.3% of respondents UG and 32.4% are PG and others. Hence, it is concluded that the maximum number of respondents are UG.

Table 4.4 showing the occupation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Farmers	28	27.5	27.5	27.5
	Business	20	19.6	19.6	47.1
	Employee	24	23.5	23.5	70.6
	Others	30	29.4	29.4	100.0
	Total	102	100.0	100.0	

Source: Primary Data

We can see in the above table that the 27.5% of respondents 'farmers while 19.6% of respondent's business, 23.5% of employee and 29.4% are others. Therefore, it is concluded that the most of the respondents are others.



Table 4.5 showing the descriptive statistics of affective attributes

Particulars	Mean	Std. Deviation
I think it is important to keep up with the latest trends in Technology	2.8235	1.49197
I get anxious to have EPOD	2.9902	1.46575
Using EPOD makes me very nervous	3.0196	1.36418
I am no good with EPOD	3.0196	1.39291
The challenge of adding a EPOD and keeping them updated does not appeal to m	2.9118	1.44265
EPOD makes me feel uncomfortable	2.8529	1.34530
I don't think I would enjoy doing EPOD	3.0490	1.45137
I am not comfortable to do well with EPOD	2.9216	1.43979
I don't think EPOD is interesting for me.	3.1569	1.40540
I think using or keeping an EPOD would be very hard for me	3.2451	1.41026
EPOD makes me feel uneasy and confused	2.8235	1.44477
I feel aggressive and hostile towards EPOD	3.0588	1.50789

Source: Primary Data

Table 5: Descriptive statistics of affective attributes

From the above table it depicts that the mean value of affection is 2.83 for respondents think it is important to keep up with the latest trends in technology, 3.01 for respondents get anxious to have EPOD and Using EPOD makes me very nervous, 2.91 for the challenge of adding a EPOD and keeping them updated does not appeal to m, 2.85 for EPOD makes me feel uncomfortable, 3.05 for respondents don't think I would enjoy doing EPOD, 2.92 EPOD, I am not comfortable to do well with EPOD , 3.24 for respondents think using or keeping an EPOD would be very hard for me, 2.82 for EPOD makes me feel uneasy and confused and 3.06 for respondents feel aggressive and hostile towards EPOD.



Table 4.6 showing the descriptive statistics of behavioural attributes

Particulars	Mean	Std. Deviation
I would like working with EPOD	3.0588	1.36304
Generally, I would feel ok about EPOD	3.1078	1.41356
I would feel at ease in an EPOD	3.0000	1.42815
EPOD usage makes me enjoyable and stimulating	2.9510	1.38862
I am comfortable with EPOD	2.6373	1.46097

Source: Primary Data

Table 6: Descriptive statistics of behavioral attributes

From the above table it infers that the mean value of behavioral is 3.05 for respondents would like working with EPOD, 3.10 for respondents would feel ok about EPOD, 3 for respondents would feel at ease in a EPOD, 2.955 for EPOD usage makes me enjoyable and stimulating and 2.63 for I am comfortable with EPOD.

Table 4.7 showing the descriptive statistics of attitude of EPOD technology

Particulars	Mean	Std. Deviation
I feel it is important to be able to find any information	2.7941	1.49811
EPOD technology will provide solution to problems	2.8235	1.32315
With technology anything is possible	2.9902	1.33123

Source: Primary Data

Table 7: Attitude of EPOD technology

It observed that the mean value of attitude is 2.79 for respondents feel it is important to be able to find any information regarding EPOD, 2.82 for EPOD technology will provide solution to problems and 2.99 for with technology anything is possible.



Table 4.8 showing the descriptive statistics of Confidence attributes of EPOD technology

Particulars	Mean	Std. Deviation
Once I start to use on EPOD and I will use it continuously	3.0980	1.48597
I have a lot of confidence when it comes to have EPOD	2.9902	1.42464

Source: Primary Data

Table 8: Descriptive statistics of Confidence attributes of EPOD technology

Table 4.8 found that the mean value of confidence is 3.09 for Once respondents start to use on EPOD and I will use it continuously and 2.99 for respondents have a lot of confidence when it comes to have EPOD.

Table 4.9 showing the descriptive statistics of Impact of ePOD on productivity

Particulars	Mean	Std. Deviation
Technological facilities have a positive effect on productivity	3.1667	1.46296
Using technology would facilitate the understanding of difficulty in the sector	3.0980	1.48597
Using current technologies would promote the improvement of the productivity	3.1471	1.47854

Source: Primary Data

Table 9: Descriptive statistics of productivity

It observed that the mean value of effects of EPOD is 3.17 for Technological facilities have a positive effect on productivity, 3.09 for Using technology would facilitate the understanding of difficulty in the sector and 3.15 for Using current technologies would promote the improvement of the productivity.



Table 4.10 showing the correlation between the attitude of EPOD technology on affective, behavioural and confidence attributes

Particulars	Affective	Behavioural	Confidence	Attitude
Affective	1	.060 (0.002)	.073 (0.001)	.002 (0.000)
Behavioural		1	.054 (0.003)	.122 (0.001)
Confidence			1	.118 (0.002)
Attitude				1

Table 10: correlation between the attitude of EPOD technology on affective, behavioral and confidence attributes

Table 4.10 explains the association between the confidences on variables of EPOD.

it is found that the coefficient of correlation between affective and confidence has positive correlation, i.e., 0.025. It has a significance value of 0.000 which is below 0.005 Hence, rejects the **null hypothesis(H0)**.

With respect to second variables using behavioral, a positive correlation is found among behavioral and confidence i.e 0.122. It has a significant value of 0.001 which is below 0.005. Hence, we reject the **null hypothesis (H0)**.

With respect to last variables using attitude, a relative positive correlation, i.e. 0.118 is found. Significance value is 0.002 which is below 0.005, thus, we reject null hypothesis and accept alternative hypothesis.



Table 4.11 showing the correlation between the consumer attitude towards EPOD and its productivity

Particulars	Attitude	Productivity
Attitude	1	.095 (0.000)
Productivity		1

Table 11: correlation between the attitude and effects of EPOD

Table 4.11, explain the relationship between the attitude and effects of EPOD. This table studies the relationship of human, independent factors to the dependent factor.

A coefficient of correlation between attitude and effects of EPOD have positive correlation, i.e., 0.095. It has a significance value of 0.000 which is below 0.005 Thus rejects the **nullhypothesis (H₀)** that "there is no association between the attitude of EPOD and productivity.

CONCLUSION

Based on results, the primary conclusion of this study confirmed that the EPOD application is appropriate among consumers. EPOD considers being an effective technology especially for logistics. This study assess the EPOD technology adoption and validation in terms of determinants like affective attributes, behavioural attributes, confidence attributes and how the customers have an attitude towards EPOD technology and how it influence the EPOD in terms of productivity. With the help of correlation, the study found that the close association between the attitudes and its effect on EPOD in terms of productivity. Besides, affective, behavioural and confidence attributes of customers has a close association with the effects of EPOD. Besides, confidence attributes of EPOD influence the productivity to be around 1.4%. In addition, 0.9% impact to be identified with the attitude of EPOD technology on productivity. Finally, the study found that the consumer attitude towards EPOD technology has an impact on productivity. Considering the EPOD attitude of consumers, the Intugine technologies designed uniquely and the utility of such an application can be determined with the EPOD.



References

- Jeffrey, T. J. (1993). *Adaptation and validation of a technology attitude scale for use by American teachers at the middle school level* (Doctoral dissertation, Virginia Tech).
- Ioane, Bogdan. (2017). Cultural Adaptation of Research Instruments – The Case of Materialism Scales Culturally Adapted for Use in China. *Asian Business Research*. 2. 7. 10.20849/abr.v2i2.148.
- Iqbal, Hafiz. (2016). Adaptation and Validation of Aricak's Professional Self-Esteem Scale for use in the Pakistani Context. *The European Journal of Social and Behavioural Sciences*. 16. 2055-2066. 10.15405/ejsbs.185.
- Ferreira, M.B.G., Haas, V.J., Dantas, R.A.S., Felix, M.M.D.S. and Galvão, C.M., 2017. Cultural adaptation and validation of an instrument on barriers for the use of research results. *Revistalatio-americana de enfermagem*, 25.
- Guedes, E.D.S., Sousa, R.M.C.D., Turrini, R.N.T., Baltar, V.T. and Cruz, D.D.A.L.M., 2013. Adaptation and validation of the instrument positions on the nursing process. *Revistalatio-americana de enfermagem*, 21(1), pp.404-411.
- de Lima Barroso, B. I., Galvão, C. R. C., da Silva, L. B., & Lancman, S. (2018). A Systematic Review of Translation and Cross-Cultural Adaptation of Instruments for the Selection of Assistive Technologies. *Occupational therapy international*, 2018.
- Wibbeling, Sebastian & Schneiders, Fabian. (2013). Research Project ePOD@Home: Electronic Proof of Delivery at Point of Delivery. 10.1007/978-3-642-32838-1_12.
- Turner, M. (2020). How does an electronic proof of delivery (EPOD) system work? Retrieved 13 March 2020, from <https://www.obs-logistics.com/blog/how-does-an-electronic-proof-of-delivery-epod-system-work>
- Rock the Docks-What ePOD Brings to Cross-Docking - Supply Chain 24/7. (2020). Retrieved 13 March 2020, from https://www.supplychain247.com/article/-rock_the_docks_what_epod_brings_to_cross_docking



Groundwater Management Governance in India

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Abstract:

Water scarcity problem in India has become grave and the present per capita availability of water is 1486 cubic meters in the year 2021 (Acharya, 2021). Per capita availability of water below 1700 cubic meters is considered as water stressed and if this number falls to 1100 cubic meters the country may be declared as water scarce and water insecure. One of the most important aspects of achieving water security is to work on the conservation and recharge of groundwater (Mishra et.al., 2021). State plays a pivotal role in ensuring efficient groundwater governance and implementation of relevant laws and policies. This conceptual paper is an effort in capturing a snapshot of the present government machinery in India to manage its groundwater resources. Various government websites, policy papers, bill documents and reports were reviewed to understand the hierarchical structure of groundwater governance in the country. Impact of each of their work on others was studied to understand how implementation and its pace would be affected. The laws, ministry, departments and ongoing policies that constitute the government machinery for groundwater management have been presented at the end. The insights shared herein may be of help to anyone looking to work as a stakeholder in groundwater management. Researchers looking to contribute to groundwater scenario of the country may find easy access to the governance structure. Anyone studying policy implications of national level policies may also find it helpful to



understand how information and power flows in the system to ensure smooth implementation. Literature review carried out to look for a similar snapshot of present groundwater governance did not bring to surface any work capturing such a comprehensive discussion as covered in this paper.

Keywords:

Groundwater Management, Groundwater Management Governance, Groundwater Legislation, Groundwater in India

Introduction

One of the reports on status of water in India by NITI Aayog notes that in absence of necessary measures to curb the water crisis existing in the country, the availability of potable water will go down to half of its requirement by 2030. Besides drinking water, other priority areas like irrigation, industry and sanitation are bound to face more critical challenges if the state of affairs isn't brought under control. It is not a matter of contest that one of the most important aspects of water management is the groundwater development and management. As groundwater is a shared resource, the role of the State in ensuring sound groundwater governance cannot be overstated. Various laws and Supreme Court judgments have reaffirmed the role of State in ensuring Right to Water to the citizens of the nation. The study of present governance structure for efficient groundwater management is vital to understand how stakeholders may contribute in mitigating the groundwater crisis. Literature review of research performed in this area indicates that while critical analysis of various aspects of groundwater governance exists, the need for a comprehensive snapshot of the ongoing efforts of the State towards achieving success in this field is not successfully met. The last few years have seen expedited efforts in formation of an integrated Ministry, Measurement Index as well as Special schemes focused towards problem solving for water crisis. This paper is an effort towards arriving at a comprehensive understanding of the latest integrations and formations for efficient groundwater management governance in the country. Research was conducted to fulfill the following objectives:

- i) To attain a comprehensive understanding of the governance machinery for Groundwater Management in the country



ii) To understand the hierarchy encompassing the various stakeholders of this system Information regarding all the aspects of the subject was collated by studying and analyzing government websites, audit reports, research articles and any other online material available as part of the secondary data. The findings were then discussed with relevant officials in some important government departments as part of primary data so as to validate the findings and perspectives attained earlier. The understanding arrived at has been presented in the form of a flow-chart model of the Groundwater Management Governance in the country. The paper then arrives at some important conclusions, which are comprehensively presented in the end.

“Model Groundwater (Sustainable Management) Bill 2017”

“Model Groundwater (Sustainable Management) Bill 2017” is an advisory legislation based on which every state of the country is expected to form its individual customized legislation, after due consideration of the various factors and aspects unique to the state like its topography, water resource availability, priority water extraction areas, to mention a few. The first version of a Model Bill dealing with the matter of Groundwater was drafted in 1970 – “Model Bill to Regulate and Control the Development and Management of Ground Water, 1970”. Over the years the Bill went through multiple revisions to meet the need of changing times and changing paradigms. Various legal developments like the decentralization related reforms of the 90’s, access to water being recognized as one of the fundamental rights and water resources being recognized as a public trust were all inculcated in the original bill up to 2005.

The latest version, the Model Groundwater (Sustainable Management) Bill, 2017, was put down by the Ministry of Water Resources, River Development & Ganga Rejuvenation and is an advisory piece of legislation to be used as reference for states to put forth customized legislation to address the increasingly grave situation of the groundwater crisis. The integration of the above-mentioned legislative changes extends a new basis for regulation that views groundwater as a public resource which the State is bound to safeguard and manage. It not only allows the state the power to action for exercising measures at aquifer level, it renders the state responsible to address the ongoing overexploitation of groundwater leading to ever decreasing water tables.



The Bill Lays down the 4 Basic Principles – “Non-discrimination & Equity”, “Subsidiarity and Decentralization”, “Protection, Precaution and Prior Assessment” and “Integrated Approach”. All the following aspects of the Bill have been laid down keeping these principles at its core. The legal status of water is acknowledged and then “Groundwater Protection Zones” and “Groundwater Security Plans” have been defined. The Bill further delves into the Institutional framework through which the Bill’s activities are to be exercised. It then lays down the mandatory duties of all groundwater users and states the authorization rules for its abstraction for various kinds of users. The Bill then moves towards monitoring aspects like assessment and transparency including important tools like Social Audits. Monitoring and assessment give way to recognition of offenders and hence the Bills follows the course of listing down the offenses, due penalties for offenders and mandatory liabilities to be fulfilled. It takes into account the importance of dispute management and covers various aspects like avoidance, maintenance and conciliation. The Bill concludes by closing the loop about aspects like drill to be followed for funds collected under the act, effect of the act on various other laws, power attributed to State Government, local authorities and powers of making regulations and removal of difficulties.

Some of the salient features of this Bill can be said to be i) It applies the doctrine of public trust to water, similar to the ongoing trend worldwide ii) Referring to a precautionary principle such that groundwater regulation is backed by a strong environmental perspective iii) Centering around an institutional structure wherein bottom-up approach leads to each government level can be called upon by levels above them iv) Clearly stating the statute of Drinking water being top-priority of Groundwater use v) Proposing innovative substantial regulatory measures like protection zones and security plans for groundwater. One aspect that the Bill might have fallen short is the scope for a process of consultation with various cross-sections users.

As per the present status, 20 States/UTs have put in place relevant legislation for groundwater development and management which the various stakeholders of the groundwater extraction, usage and management are bound by. The rest of the states are in the process of forming a similar legislation. The road to a water secure nation is being paved through these legislative developments.



Ministry of Jal Shakti

Ministry of Jal Shakti was formed under the Government of India in 2019 by the merger two existing ministries – “Ministry of Water Resources, River Development & Ganga Rejuvenation” and “Ministry of Drinking Water and Sanitation”. To understand the importance of this merger step, it is important to understand what the mandates of the earlier ministries. “Ministry of Water Resources, River Development & Ganga Rejuvenation” came into being for formation and implementation of rules for the development as well as regulation of the water resources in India. The “Ministry of Drinking Water and Sanitation” came into being for the overall policy framing, management planning & funding as well as coordination of programs of drinking water and sanitation in India. The merging of the two ministries was a well considered step with an integrated approach as a central pillar. To add to this, the ministry has also got off on the right foot by making the Jal Shakti Abhiyan a citizen participation-based initiative. This initiative has placed the onus on the people too to ensure a new approach to solving the problem of water.

To understand the role of the Ministry in a comprehensive manner, it's important to have a look at its vision, mission and function. The vision with which it was created was to propagate the idea of ‘optimal sustainable development’, which includes ‘maintenance of quality of the existing water resources and their efficient use’. The mission the ministry is expected to achieve is that of ‘Integrated Water Management’ (IWM). It is important to note that by accepting IWM as an important mission the Ministry and its scope is aligned with the international initiatives related to water as the way forward for sustainable development and management. The functions of the ministry are an extension of its vision and mission and cover various aspects of i) Planning and Policy formulation ii) Technical guidance, scrutiny and monitoring iii) Infrastructure and research support iv) Central Financial Assistance & External Finance from World Bank, etc. v) Overseeing various schemes and initiatives for Irrigation as well as Groundwater Development vi) Formulation of a national perspective for water-balance and development vii) Mediation and Dispute resolution related to inter-state rivers and projects viii) Flood Control, Flood Forecasting for Ganga and Brahmaputra ix) International talks and negotiations around water and Indus Water Treaty x) Effective mitigation of pollution as well as rejuvenation of Ganga.



It is important to note that one main aspect missing is clarity on specifics as to how to tackle the herculean problem of groundwater depletion at hand. The ministry has been formed with a broad stroke approach, lacking clear targets or priorities. There has also been ambiguity as to where from the promised investment of Rs. 3.5 Trillion will be brought in and exactly in what specific activities will it be spent. Post-covid, situation looks graver as the present machinery and set-up lacks focus on prioritization of tasks or a systematic plan to move things for the better.

Central Ground Water Board

Central Groundwater Board (CGWB) came into being in 1970 under the Ministry of Agriculture, Government of India as a result of renaming of the “Exploratory Tube wells Organization”. In 1972 it was further merged with the “Ground Water Wing of the Geological Survey of India”. CGWB is a scientific organization consisting of multi-disciplinary experts who are Hydro-geologists, Geophysicists, Chemists, Hydrologists, Hydrometeorologists and Engineers. It is formed of four main wings: “Sustainable Management & Liaison (SML)”, “Survey, Assessment & Monitoring (SAM)”, “Exploratory Drilling & Materials Management (ED&MM)” and “Water Quality & Training and Technology Transfer (WQ&TT)”.

CGWB mainly engages in the following activities:

- Conducting groundwater management studies
- Carrying out exploratory programs for drilling
- Monitoring levels and quality of groundwater
- Maintaining a network of observation wells for groundwater
- Implementing artificial recharge demonstrative schemes and recharge augmentation rainwater harvesting

Besides these, it also performs the following activities too:

- Carrying out joint periodic assessment of replenish able groundwater resources with concerned State Government agencies
- Performing Supplement activities like remote sensing and GIS research, geophysical studies as well as groundwater modeling exercises



- Engaging in special studies such as groundwater depletion, groundwater contamination, water balance, etc.
- Organizing capacity building activities Central/State Government organizations personnel engaged in various activities in groundwater sector along with its own personnel
- Conducting campaigns for mass awareness on water conservation and judicious use of groundwater
- Generating data so as to provide various studies that can act as scientific base for water resource planning involving various stakeholders
- Advising various state level and central level user agencies on groundwater planning and management
- Providing technical know-how for scientific groundwater exploration

Central Ground Water Authority

Central Ground Water Authority is a statutory body operating under the aegis of Ministry of Home Affairs (MHA). It was constituted to regulate and control development and management of ground water resources in the country under Section 3 (3) of the Environment (Protection) Act, 1986. It was the result of a Public Litigation (PIL) raising concerns about the overexploitation of groundwater resources leading to alarming declines in the groundwater levels, presented to the Honorable Supreme Court of India in 1996. The Authority was conferred with the following powers:

- i) To issue directions and take measures in the matters referred to in various sections of the said Act
- ii) To resort to penal provisions as instructed under relevant sections of the said Act
- iii) To issue necessary regulatory directions for the management, control and development of groundwater
- iv) To exercise powers for the appointment of officers as per section 4 of the Act

The main activities the CGWA is involved with at present are:

1. Groundwater Development Regulation
2. Industries and Projects Clearance



3. CGWA representation in various Expert Committees
4. Management of Groundwater Pollution from Geogenic Sources
5. Registration of persons and agencies employed for Water Well Construction
6. Dealing with Legal Issues related to Groundwater Management

The above have resulted into various achievements at multiple levels. CGWA has provided the relevant technical reports by conducting spot surveys. It has also assisted the Honorable Supreme Court and various High Courts on various legal matters related to water conservation including highway and flyover projects, protection of water bodies, etc. CGWA also identified the vital need for rainwater harvesting and hence has been organizing country wide mass awareness & training programs for same, with the intention of communicating its importance for groundwater recharge. These activities also ensure dissemination of cost-effective technologies to various government, non-government and private sector stakeholders. The awareness program also took ample support of electronic and print media for effective promotion. Now, the need for the hour is to come up with an integrated ground water development and management plan based on principles of sustainability. Besides the stakeholders mentioned above, other stakeholders like industrial and farmer associations if included to this group the chances of achieving success faster in the present endeavors will improve.

National Water Policy

The first National Water Policy was adopted in September, 1987 for governing the process of planning and development of water resources so as to ensure their optimal utilization. Review and updating of the original draft took place in 2002 and 2012. However, NITI Aayog's latest data analysis shows how India is facing its first water crisis and if timely precautionary measures aren't taken then India's potable water demand is expected to outstrip supply by the year 2030. Hence, one more draft update of the policy needs to take place. Some important aspects that have changed since the last draft update may be listed as below:

- Prioritization of water usage needs to be redefined based on the changes in the last decade
- Policy parameters need to be setup with regards to revitalization of rivers, as many of our rivers and rivulets have dried up



- Budgeting needs to be redone to cover multiple levels be it basin or sub-basin
- Modulation and tracking of water flow may now take the support of innovations in technology
- “Composite Water Management Index 2.0, 2018” by NITI Aayog’s need to be inculcated in the policy
- Decrease of Spring sets in Himalayas and its implications need to be inculcated in the policy
- Natural challenges like climate change, extreme rainfall, etc need to be taken into consideration in the updated policy draft
- Command Area Development needs to be executed to ensure that the 21 million hectares of land set aside for irrigation reaches the farmers through construction of small channels

A drafting committee has been constituted to work on the updating process and the new draft is expected to be announced in the coming few months. If all the above concerns are taken into consideration the country is bound to be guided by a comprehensive and integrated water policy soon. This in turn may lead to more efficient groundwater management, taking off the pressure the country is facing at present with respect to water insecurity.

Indian National Committee on Ground Water

Indian National Committee on Groundwater is one of the 3 Indian National Committees constituted to co-ordinate the R&D program headed by Water Resource Engineering under the Ministry of Water Resources, Government of India. Basic, applied as well as action research is encouraged and supported in the form of financial assistance in the form of grants to (i) academicians in IITs/Universities/ recognized laboratories for R&D (ii) Central/State Government Water Resource/Irrigation departments (iii) Non-government Organizations. The Chairman of Central Ground Water Board Chairs this committee, ensuring priority agendas are given due consideration during screening of the research proposals.

The main domains for which proposals are welcome are: i) Groundwater Recharge ii) Groundwater Quality iii) Climate Change Impact on Groundwater iv) Groundwater – Surface water and its interrelation v) Groundwater Management vi) GIS Solutions & Remote Sensing



applications vii) Investigation of Geophysical nature viii) Mathematical and/or Simulation modeling. The various entities eligible to avail funding are: a) Central & State Govt. R&D institutes or labs b) Organizations of MoWR c) IITs, Recognized Engineering and Agricultural Colleges, Recognized Universities as well as WALMIs d) NGOs, non-profit Private R&D institutions and/or organizations under DSIR (Department of Scientific and Industrial Research) that are capable of carrying R&D. As far as eligibility for proposal type is concerned, those proposals which don't investigate any new techniques, those mainly involved in data collection or application of known data analysis techniques and those where end-user of research is not well identified are bound to be rejected.

Some of the successfully completed projects listed on the website of this committee have been on the following titles:

1. "Geohydrological Study for augmentation of spring discharge in Western Himalaya"
2. "Study of fluvial geomorphology and tectonics of Khari-Mashi drainage basin, Rajasthan for database preparation and groundwater recharge capability assessment"
3. "Ground Water Flow Modeling and aquifer vulnerability assessment studies in Yamuna – Krishna Sub basin, Muzaffarnagar Distt., U.P"
4. "Institutional framework for regulating use of ground water in India"
5. "Development of Models for the cleanup of Cr (VI) contaminated Aquifers using bio-remediation"
6. "Development of defluoridation Media for contaminated ground water and its lab to field application"
7. "Identification of sites for artificial ground water recharge in Upper Ganga Plains, using remote sensing – GIS"
8. "Causes effects and remedial measures of Arsenic contamination in ground water aquifers in parts of West Bengal"
9. "Impact of Urban Industrial and Agricultural Pollution in Surface and Ground Water in and around Hyderabad and Secunderabad, A.P"
10. "Study on Ground Water Contamination through Municipal Landfills in the NCT, Delhi"



About 8 more projects are ongoing and are being carried out in Orissa, Chennai, Gujarat, Rajasthan and Jharkhand.

Ground Water Management and Regulation Scheme

Central Ground Water Board (CGWB) launched the Ground Water Management and Regulation (GWMR) Scheme as a Central Sector Scheme in 2007-08. The objectives this scheme was set-up to achieve were i) Aquifer delineation and characterization to & ii) Ground water management development plans. However, “National Aquifer Mapping and Management Programme (NAQUIM)” has been the priority activity under GWMR. While the national area identified to be covered under NAQUIM studies was nearly 25 lac sq kms, to total area covered till now is about 22 lac sq kms. The aquifer maps arrived at and management plans further prepared have then been forwarded to the State agencies so that suitable demand and supply side interventions can be planned and executed.

Besides this, the scheme is also an instrument to carry out other CGWB activities like:

- Groundwater level as well as quality monitoring
- Dynamic groundwater resources assessment in collaboration with States/UTs
- Groundwater withdrawal regulation as well as control for certain States/UTs
- Demonstrative projects for recharge in some select areas under water stress
- Scientific infrastructure improvement to ensure technological upgradation

It is important to note that the findings of this scheme help in bridging the knowledge gaps so as to empower the stakeholders for necessary sustainable groundwater management all over the country.

- A report of the scheme audit was released by the “Comptroller and Auditor General of India (CAG)” in December 2021, providing findings from performance audit for the period of 2013-2018. Important observations followed by relevant recommendations of CAG mentioned therein are listed below:
- Increasing the observation wells used by CGWB for water level assessment to 50,000
- Expediting the revision process of the Model Bill
- Enactment of legislation on groundwater in all the 33 states/UTs



- Keeping a check on the groundwater extraction percentage, especially in case of states which were non-complaint
- Ensuring that the 2-yearly assessment of groundwater resources takes place as per prescribed intervals without fail
- Effective co-ordinations between CGWA and state-agencies for enforcement of penal provisions as per “Environment Protection Act, 1986” for complying with NOC conditions
- Reviewing the strategy for utilizing allocated funds for mapping and management of groundwater and ensuring more efficient utilization of allocated funds
- Assessing the progress under all targets as per the SDGs
- Strengthening the organization through review of the CGWB mandate
- Fund allocation and utilization under the scheme for 4 consecutive years including present year are as under:

Year wise Funds allocation & utilization for last 4 yrs		
Financial Year	Allocation (Rs. in Cr)	Expenditure (Rs. in Cr)
2019-20	257.41	251.33
2020-21	140.80	138.06
2021-22	180.24	180.19
2022-23	390.00	49 (up to 30th June 2022)

(Source: pib.gov.in)

Atal Bhujal Yojana

Atal Bhujal Yojana is a special scheme launched for groundwater management under the Ministry of Jal Shakti on 25th December, 2019. The primary objective behind it is “To improve the management of groundwater resources in the water stressed areas of the selected States”. Integration of multiple central and state schemes may take place to bring about community-led implementation of appropriate investments/management actions under Atal Bhujal Yojana. Some of the key areas expected to witness results are: (a) A strong framework



for institution building (b) Effective monitoring & disclosure of groundwater data (c) Efficient planning and implementation of groundwater interventions. The implications of the scheme mainly be seen on (i) Women, marginal farmers, and agricultural laborers (ii) Groundwater management agencies of central and state government (iii) Flood and drought prone population, especially rural poor (iv) Ministries of agriculture as well as environment (v) Civil society organizations & NGOs (vi) Research as well as educational institutions (vii) Students & researchers and (vi) Private sector. One of the main goals of Atal Jal is to arrive at a community-led sustainable groundwater management that can be scaled up. Another aim of the scheme is to bring about community level behavioural change for fostering sustainable groundwater management through awareness programs and capacity building in the participating states.

The states identified as water stressed and hence worthy of attention, as per the scheme and the groundwater agencies responsible for groundwater management therein are:

Gujarat	“Gujarat Water Resources Development Corporation Limited under the Department of Water Resources”
Haryana	“Ground Water Cell under the Department of Agriculture”
Karnataka	“State Ground Water Directorate under the Water Resources Department”
Madhya Pradesh	“Ground Water Division under the State Water Resources Department”
Maharashtra	“Ground Water Surveys and Development Agency”
Rajasthan	“Ground Water Directorate under the Public Health Engineering Department”

(Source: ataljal.mowr.gov.in)

The scheme has been backed by detailed planning regarding implementation, management and co-ordination aspects in detailed. Hierarchically, at the central level implementation of the Program is to be lead by a “Program Management Unit (PMU)”, whose establishment is under the MoWR, RD&GR. The PMU is to be responsible for all the important management aspects like coordination with state level agencies, fm and procurement, result monitoring and evaluation as well as communications. A “Technical Support Agency (TSA)” at national



level will support the PMU by running a national communication campaign to positively impact behavioral changes for program success. At the state level, Steering Committees are to be formed the participating states to overlook the ground implementation of program at the state and local level. Each of the states further have a nodal agency assigned along with Program Implementation Agencies (PIAs), which are further responsible for various operational and techno-commercial aspects. PIA is responsible for need based and adequate support for preparation and implementation of “Water Security Plans (WSPs)”. Further, the responsibility of implementing the Program at the district level will lie on government institutions in the district, block and Gram Panchayat (GP). The state PIA supported by TSA will be responsible for ensuring these agencies are able to perform their tasks well with required assistance and are monitored efficiently for their achievement fulfillments.

“Composite Water Management Index – Round II, 2019”

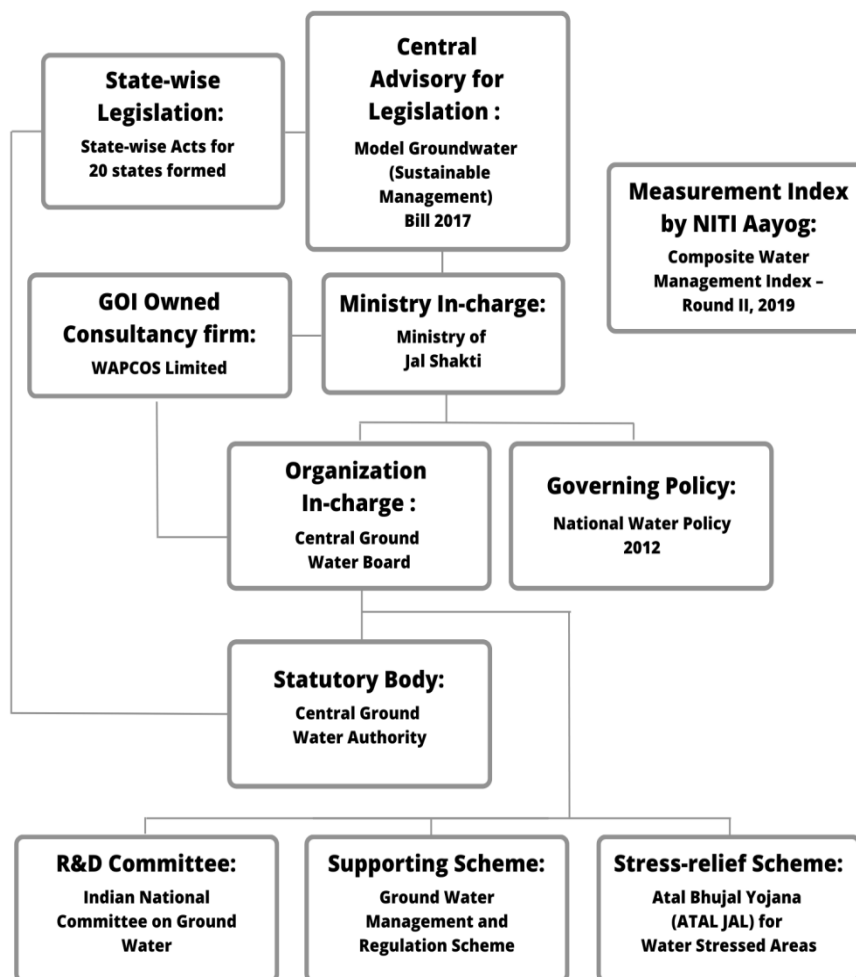
“Composite Water Management Index (CWMI)” has been developed by the NITI (National Institution for Transforming India) Aayog to open up the possibility of effective water management in India. It is the first of its kind comprehensive collection of water data at the country level and uses well structured questionnaires as well as focus group discussions to excavate qualitative data on water. It was developed through collaborative efforts with various stakeholders at national and state backed by a brawny process for data validation. It is a very important step for encouraging “competitive and cooperative federalism” in country’s governance and management of groundwater through a culture of data-based decision-making.

The CWMI 2019 measured the status of all the Indian states on an exhaustive list of water indicators and reported relative trends from the past. This ensures creation of a shared frame for comparative improvement in water management in India and highlights the specific problem areas that need improvements. Some of the expected outcomes from the CWMI exercise are i) Establishment of clear baseline and bench-mark on key water indicators for every state ii) Identification of high-performers and under-performers as well as progress over time, thus inculcating a culture of constructive federalism iii) Identification of areas for deeper engagement and investment. Eventually, NITI Aayog plans to develop the Index into a composite, national-level data management platform for all water resources in India.



WAPCOS Limited

WAPCOS Limited is a technology-driven Consultancy & Engineering, Procurement and Construction (EPC) organization which came into existence on June 26, 1969, under the Companies Act, 1956. It operates under the aegis of the Ministry of Jal Shakti and has now been recognized as a ‘Mini Ratna-I’ Public Sector Enterprise with strong presence in the country as well as the world. It offers services like infrastructure development, water resources and power generation. Its main activities are “pre-feasibility and feasibility studies”, “master and regional development plans”, “detailed engineering reports”, “commissioning and testing”, “operations and maintenance and capacity building” as well as “resource development in areas of competence”.





Conclusions

After careful study of each aspect of the present governance machinery from groundwater development and management in India, one is able to arrive at a comprehensive understanding of how each of them are related to each other and how some of them act as compasses or catalysts for others in their planning and decision-making. The scenario presents a perspective of hope and success towards achieving water security for the nation. Instead of standalone and individualistic efforts by various departments and organizations, the push is towards a more efficient and wise approach so as to mitigate redundancy and resource mismanagement. Some important conclusions can be listed as: i) the overall shift in the Groundwater Management Governance machinery has been towards a more integrated approach, with due importance being given to collaborative efforts by all stakeholders ii) there has been an introduction of planned efforts in ensuring citizen participation as an imperative step in achieving water security iii) accountability and result-oriented approach have been placed at the centre of every effort at all levels of governance iv) effective efforts and support towards R&D and Innovation are seen at all stages.

References

- Acharya, D. (2021). *Water and Public Policy in India: Politics, Rights, and Governance*. Taylor & Francis.
- Aayog, N. I. T. I. (2019). Composite water management index. *Government of India, New Delhi* http://social.niti.gov.in/uploads/sample/water_index_report2.pdf. Accessed, 28, 21.
- Asthana, V. (2009). *Water policy processes in India: discourses of power and resistance* (Vol. 18). Routledge.
- Balachandran, A., & Scientist, D. (2009). Central Ground Water Board. *Govt. of India, Ministry of water resources, South eastern coastal region, Chennai District ground water brochure technical report series, Thoothukudi district, Tamil Nadu*.
- Balachandran, S. (2020). Role of Jal Shakti Ministry. *Issue 2 Int'l JL Mgmt. & Human.*, 3, 122.



- Chaudhary, V., Jacks, G., & Gustafsson, J. E. (2002). An analysis of groundwater vulnerability and water policy reform in India. *Environmental Management and Health*, 13(2), 175-193.
- Chinchmalatpure, A. R., Gorain, B., Kumar, S., Camus, D. D., & Vibhute, S. D. (2019). Groundwater pollution through different contaminants: Indian scenario. *Research developments in saline agriculture*, 423-459.
- Cullet, P., & Gupta, J. (2009). India: evolution of water law and policy. *The evolution of the law and politics of water*, 157-173.
- Cullet, P., Bhullar, L., & Koonan, S. (2017). Regulating the interactions between climate change and groundwater: lessons from India. *Water International*, 42(6), 646-662.
- Cullet, P. (2018). Model Groundwater (Sustainable Management) Bill, 2017: A new paradigm for groundwater regulation. *Indian Law Review*, 2(3), 263-276.
- Cullet, P. (2021). Groundwater Management—Towards a Legal Framework Ensuring Equity and Protection. *Groundwater Law and Management in India: From an Elitist to an Egalitarian Paradigm*, 337-347.
- Harshit. (2022). Groundwater Law and Management in India: Towards an Equitable Framework. *Issue 4 Int'l JL Mgmt. & Human.*, 5, 1159.
- Khalil, A., 2020. *Disclosable Restructuring Paper - Atal Bhujal Yojana (Abhy)-National Groundwater Management Improvement - P158119*, World Bank Group. United States of America. Retrieved from <https://policycommons.net/artifacts/1259592/disclosable-restructuring-paper/1829868/> on 20 Apr 2023. CID: 20.500.12592/3nm397.
- Koundouri, P. (2004). Current issues in the economics of groundwater resource management. *Journal of Economic Surveys*, 18(5), 703-740.
- Lnu, S., 2022. *Disclosable Version of the ISR - Atal Bhujal Yojana (Abhy)-National Groundwater Management Improvement - P158119 - Sequence No : 08 (English)*, World Bank Group. United States of America. Retrieved from <https://policycommons.net/artifacts/2639633/disclosable-version-of-the-isr-atal->



[bhujal-yojana-abhy-national-groundwater-management-improvement-p158119-sequence-no/3662421/](#) on 20 Apr 2023. CID: 20.500.12592/2357sq.

Mishra, B. K., Kumar, P., Saraswat, C., Chakraborty, S., & Gautam, A. (2021). Water security in a changing environment: Concept, challenges and solutions. *Water*, 13(4), 490.

Rana, M., & Guleria, V. (2018). Water scarcity in India: a threat to sustainable management of water. *ESSENCE Int J Env Rehab Conserv*, 9(1), 35-44.

Richard-Ferroudji, A., Raghunath, T. P., & Venkatasubramanian, G. (2018). Managed aquifer recharge in India: Consensual policy but controversial implementation. *Water Alternatives*, 11(3), 749-769.

Romani, S. (2006). Central Groundwater Authority-Past Experience and Future Strategies for Regulating the Development and Utilization of Groundwater in India. *Groundwater Research and Management: Integrating Science into Management Decisions*, 87.

Saha, D., & Ray, R. K. (2019). Groundwater resources of India: potential, challenges and management. *Groundwater Development and Management: Issues and Challenges in South Asia*, 19-42.

Sharma, S. K., Seetharaman, A., & Maddulety, K. (2021). Framework for sustainable urban water management in context of governance, infrastructure, technology and economics. *Water Resources Management*, 35(12), 3903-3913.

Singh, D. K., & Singh, A. K. (2002). Groundwater situation in India: Problems and perspective. *International Journal of Water Resources Development*, 18(4), 563-580.

Srinivasan, V., & Lele, S. (2017). From groundwater regulation to integrated water management: the biophysical case. *Economic and Political Weekly*, 52(31), 107-114.

Suhag, R. (2016). Overview of ground water in India. *PRS On Standing Committee On Water Resources, Legislative Research*, (February), 12p.

Vohra, K. (2022). New initiative taken up in Central Water Commission, DoWR, RD & GR, Ministry of Jal Shakti-Support for Irrigation Modernization Programme (SIMP). *Water and Energy International*, 65(5), 30-31.



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Indexed in: Crossref, ROAD & Google Scholar

Vyas, J. N., & Nath, S. (2021). The Role of Government and the Public in Water Resource Management in India. *Pollutants and Water Management: Resources, Strategies and Scarcity*, 399-415.

<https://www.drishtias.com/loksabha-rajyasabha-discussions/policy-watch-national-water-policy>

<https://jsactr.mowr.gov.in/>

<https://jalshakti.gov.in/>

<https://jalshakti-dowr.gov.in/>

<https://jalshakti-dowr.gov.in/sites/default/files/RnDGuidelines-April2019.pdf>

https://jalshakti-dowr.gov.in/sites/default/files/Model_Bill_Groundwater_May_2016_0_0.pdf

<https://jalshakti-dowr.gov.in/schemes-projects-programmes/programmes/r-and-d-programme-water-sector>

<https://guj-nwrws.gujarat.gov.in/showpage.aspx?contentid=2337&lang=english>

<https://ataljal.mowr.gov.in/>

<https://documents1.worldbank.org/curated/en/784231467194617127/pdf/106660-REVISED-ESSA-P158119-PUBLIC-Disclosed-5-10-2018.pdf>

<https://cgwb.gov.in/R-and->

[D.html#:~:text=The%20Indian%20National%20Committee%20on,the%20field%20of%20Ground%20Water](https://cgwb.gov.in/R-and-D.html#:~:text=The%20Indian%20National%20Committee%20on,the%20field%20of%20Ground%20Water)

<https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1847097>

<https://prsindia.org/policy/report-summaries/ground-water-management-and-regulation>

<https://www.drishtias.com/daily-updates/daily-news-analysis/composite-water-management-index-2-0>

<https://social.niti.gov.in/wtr-ranking>

https://social.niti.gov.in/uploads/sample/water_index_report2.pdf

<https://www.wapcos.co.in/sebi-important-events-history.aspx>



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Assessing the Viability of Private Universities in Gujarat for Attracting and Increasing the Foreign Students Admissions in the Higher Education Programs: Market Potential Analysis and Factors Impacting Admissions

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Abstract

The number of international students looking for higher education possibilities has increased due to the expansion of the global higher education market. Private universities in Gujarat, India, have recognized this trend and are looking for ways to attract prospective international students to their higher education programs. This literature review examines the viability of private universities in Gujarat for attracting international students to higher education programs. This article discusses the growth of the Indian higher education sector and the increasing interest of international students in studying in India. The paper emphasizes how crucial it is to carry out a market potential study for higher education programs in private universities, with a focus on potential admissions of international students. The analysis should consider the opportunities and challenges associated with the internationalization of higher education in India, as well as the marketing mix for higher education services. The research had set hypotheses to evaluate the parameters such as Programmes desired by International/Foreign students, influences driving prospect international/foreign students towards their desired field of study, Programme decision making by students, international students desire on Internship program and employment opportunities overseas. Statistical analysis such as reliability and normality test, descriptive statistics, inferential statistics, construct validity determination using Barlett test and Kaiser Meyer Olkin test, correlations analysis were instruments of the research findings. This research had recommended that international students have a desire to pursue higher education in Private Universities, Gujarat. Institutions in Private Universities can therefore help the expansion and development of the Indian higher education system by enrolling and retaining foreign students.

Originality/value: The article provides information that will be valuable to most of the Private institutions who are contemplating the idea of admitting more international students into their specific programs.

Keywords: *Higher Education, Foreign Students, Private Universities, Internships, Overseas employment, Opportunities for Private Universities, Challenges for private universities*



Introduction

The Indian higher education sector has witnessed significant growth in recent years. According to the All-India Survey on Higher Education (AISHE) report for 2019-20 by the Department of Higher Education, Government of India, there were 1,043 universities and 42,343 colleges in the country, with a total enrolment of 3.85 crore students (Department of Higher Education, 2020). The National Education Policy (NEP) 2020, launched by the Ministry of Education, Government of India, aims to further improve the quality of higher education in the country and make it more accessible to all (Ministry of Education, 2020). According to the Ministry of Education's All India Survey on Higher Education (AISHE) 2020-21, Gujarat had a total of 12,758 international students enrolled in higher education institutions.

According to the Ministry of education, India (2020) data which has been divided by state, it is clear that Karnataka has the highest number of foreign students, with a total of 10,231 enrolled. It is evident that Karnataka boasts the greatest quantity of foreign students, with a total of 10231. Other states with notable numbers include Uttar Pradesh (5089), Punjab (4966), Maharashtra (4599), Tamil Nadu (4461), Delhi (2345), Haryana (2321), Telangana (2261), Gujarat (2227), and Andhra Pradesh (2094), each with more than 2000 foreign students. It is also worth noting that there are a total of 168 different countries represented among the foreign students in India. This indicates the diverse student population that India attracts from all over the world.

One of the key factors contributing to the growth of higher education in India is the increasing number of international students choosing to study in the country. Ahmedabad, the largest city in Gujarat, has emerged as a hub for education, with several top-ranked business schools, including the Indian Institute of Management (IIM) Ahmedabad, Gujarat Technological University, and Institute of Management, Nirma University.

According to a report by the Institute of International Education (Bhandari, 2019), India is the second-largest source of international students in the world, after China. The report also states that there has been a steady increase in the number of international students coming to India for higher education over the past few years. Private Universities in the city of Gujarat,



is home to several higher education institutions that offer a wide range of programs in various disciplines.

Given the growing demand for higher education in India and the increasing interest of international students in studying in the country, it is important to conduct a market potential analysis for higher education programs in Private Universities with special reference to prospective international student admissions.

Background to the Problem

Maringe (2006) argues that universities in developing countries are facing an increasingly competitive environment for recruiting students, and understanding how prospective applicants make decisions is essential to compete effectively. Research has identified several factors influencing college choice, such as the availability of Programmes matching students' interests, the institution's reputation and quality, affordability, location, campus resources, student support services, and career opportunities after graduation (Coccarri & Javalgi, 1995; Holdsworth & Nind, 2006; Kallio, 1995; Shanka et al., 2006). Therefore, comprehending the decision-making process of prospective students is crucial for the; private universities to succeed in recruitment markets.

Relevance of Research

The aim of the study was twofold: to identify the factors that affect the admission of International/Foreign students and increase the number of International/Foreign students admitted, thereby increasing income for private institutions, as well as to identify ways to enhance the development and learning of all students during their time at university.

Vision of the Indian Government

Indian Government has set out a clear vision for the future of higher education in India. One of the key initiatives in this vision is the "Study in India" program, which seeks to position India as a desirable destination for international students. "Study in India" program was launched in 2018 by the Indian government, The program offers a range of scholarships and incentives to attract students from around the world, and it is supported by a comprehensive marketing campaign that showcases India's rich cultural heritage and vibrant academic community.



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To enhance the quality of higher education in the country, the Indian government has taken several steps, including the establishment of new universities and colleges, the introduction of new Programmes and programs, and the modernization of existing infrastructure. The government has also introduced measures to improve the quality of teaching, including the use of technology-enabled learning and the promotion of research and innovation. Indian Government has emphasized the need to create a strong ecosystem for higher education in India can produce world-class graduates and researchers. The government has launched several initiatives aimed at promoting collaboration between industry and academia, including the creation of research parks and incubation centres, as well as the establishment of industry-academia partnerships.

Overall, the Indian government's vision for higher education and international student recruitment aims to create a world-class education system that is accessible to all. By attracting top talent from around the world, improving the quality of education, and fostering collaboration between industry and academia, the government hopes to prepare graduates to drive India's economic growth and development.

However, the implementation of these initiatives has faced several challenges. In their article, "Educational Reforms in India: A Review of Recent Initiatives and Implementation," Kumar and Kumar (2020) argue that despite the government's efforts, many challenges persist in the education system, including a lack of funding, inadequate infrastructure, and a shortage of qualified teachers. These challenges could hinder the implementation of the government's higher education initiatives, including the Study in India program.

Singh (2021) also highlights the challenges faced by the Study in India program. In their article, "The Study in India Programme: Opportunities and Challenges," they argue that the program faces stiff competition from other countries that have well-established education systems and a reputation for high-quality education. Nevertheless, the Indian government's commitment to improving the quality of higher education and attracting international students remains strong. Kothari (2021) notes in their article, 'Study in India' Initiative: A New Avenue for Education Diplomacy," that the Study in India program is an integral part of the government's larger agenda to position India as a global leader in education and enhance its soft power.



However, there are also several challenges that need to be addressed to attract more international students to Indian higher education institutions (Anand & Srivastava, 2016; Kaur & Gupta, 2017; Rajagopalan & Pandey, 2016).

These include the lack of infrastructure and resources, limited research opportunities, Innovative Teaching Techniques and the need for reforms in the regulatory framework.

In conclusion, the Indian government's initiatives to improve the quality of higher education and attract international students through the Study in India program are critical to the country's economic growth and development. While there are challenges that need to be addressed, the government's vision and commitment to building a world-class education system are commendable.

Literature Research

Market Potential Analysis

To conduct an effective market potential analysis for higher education programs in Private Universities (Business Schools) with special reference to prospective international student admissions, it is important to consider the marketing mix for higher education services (Chavan & Sankpal, 2019). This includes the product (the programs and Programmes offered), price (the cost of education), promotion (the methods used to attract and retain students), and place (the location and accessibility of the institution).

The market potential analysis should consider the opportunities and challenges associated with the internationalization of higher education in India. Several studies have identified the opportunities for Indian higher education institutions to attract more international students (Akbar & Parvez, 2017; Krishnamurthy & Muralidharan, 2018; Nayak & Das, 2019).

These include the availability of high-quality education at a lower cost compared to other countries, the diversity of programs and disciplines offered, and the cultural richness and heritage of the country. It is crucial to consider the elements like the nation's economic growth, governmental policies on higher education, and the availability of resources for foreign students when evaluating the market potential of private universities in Gujarat.



According to a study by Singh and Kumar (2019), Gujarat's economic expansion has increased the number of students pursuing higher education. Additionally, the state now has new institutions and colleges thanks to the government's emphasis on higher education.

These variables imply that Gujarat's demand for higher education is rising, which offers a chance for private colleges to draw in foreign students. As a result of more foreign students opting to study in India, the country's higher education sector has experienced tremendous expansion in recent years. It is crucial to undertake a market potential study for higher education programs in Private Universities with special reference to possible international student admissions given the opportunities and challenges connected with the globalization of higher education in India. Private Universities can attract and retain more international students and contribute to the expansion and development of the Indian higher education industry by considering the marketing mix for higher education services.

Factors Impacting Admissions of International Students

The admission of international students to Gujarat's private universities is influenced by a number of variables. These include the university's standing, the caliber of the curriculum, the price of tuition, and the accessibility of financial assistance and scholarships. International students are more likely to pick universities with a decent reputation and high-quality education, according to a study by Patel and Sharma (2020). International students frequently encounter financial obstacles to studying abroad, the availability of scholarships and financial aid is a crucial consideration.

In their studies, TWatjjakul (2014) and Raza et al. (2021) have noted that many tertiary institutions have a goal of increasing their student intake as a means of generating more income. This strategy, however, can result in enrollment and financial issues if the institutions are unable to meet the satisfaction of their students, who are viewed as customers.

As stated by Taylor (2017), these institutions prioritize the development of new programs and the elimination of obsolete ones to meet the needs of society. On the other hand, Dickenson (2010) and Berube & Ruth (2015) argue that these institutions must also adapt quickly to the market by offering popular programs to attract students. Ryan et al. (2010) assert that tertiary level institutions share many traits with the service industry, highlighting the "people-based"



nature of education and the importance of relationships with students, who are seen as customers or clients. As a result, these institutions heavily market themselves based on this customer-centric approach. In this field, research has identified various aspects that affect students' Programme preferences.

According to Maringe (2006), Programme of study decisions is closely related to institutional choice decisions. Moreover, Wiswall and Zafar (2014) argue that understanding the determinants of occupational decisions is a major social issue. Social factors such as parents, peers, and role models, as well as prestige and job lucrativeness, have been found to influence individual perceptions toward college Programme choices (Theresa, 2015; Rababah, 2016).

Alanezi et al. (2016) conducted a survey of higher education students and found that aptitude for a certain Programme greatly influenced student choices in Higher education. Rababah (2016) also identified personal interests, gender, career opportunities, and job availability as additional factors that affect Programme choices. However, for this study, only two theories will be considered. These theories are the social cognitive career theory (SCCT) and the theory of planned behavior (TPB).

SCCT and TPB Theories

The SCCT posits that career decision-making is a process that involves the interplay between individual factors (e.g., interests, abilities, and goals), contextual factors (e.g., social support and barriers), and learning experiences (e.g., observational, and experiential learning) (Lent, Brown, & Hackett, 1994).

The TPB suggests that an individual's behavior is influenced by their attitudes, subjective norms, and perceived behavioral control (Ajzen, 1991). In the context of Programme choice, this theory implies that students' perceptions of the benefits and drawbacks of different Programmes, the expectations of significant others, and the perceived ability to enroll and succeed in a particular Programme are crucial in their decision-making process.

The Social Cognitive Career Theory (SCCT) and the Theory of Planned Behavior (TPB) are two psychological theories that help explain how students make decisions about their Programmes and future careers. The SCCT theory proposes that students' career decisions are influenced by a combination of individual, contextual, and learning experience factors.



Therefore, according to the SCCT, career choices are not solely determined by the individual's personal characteristics, but also influenced by the surrounding environment.

In contrast, the TPB theory suggests that students' behavior is influenced by their attitudes, subjective norms, and perceived behavioral control. Attitudes refer to the student's beliefs and evaluations of different Programmes, while subjective norms refer to the student's perceptions of what others, such as parents or peers, think about their Programme choices. Perceived behavioral control refers to the student's perceived ability to enroll and succeed in a particular Programme. Hence, the TPB theory implies that a student's decision to pursue a particular Programme is influenced by their beliefs, what others think about their choices, and their perceived ability to succeed in that Programme (Ajzen, 1991).

Both the SCCT and TPB theories highlight the importance of individual and contextual factors in shaping student Programme choices. In conclusion according to the two theories mentioned above, to invite more international students, the higher education institutions must understand the factors that influence their Programme choices.

Recent research has highlighted the importance of incorporating emotions and affective experiences into career decision-making, as evidenced by work on Social Cognitive Career Theory (SCCT) and the Theory of Planned Behavior (TPB) (Krieshok, Blacksmith, & McKay, 2019). SCCT emphasizes the role of cognitive processes and social factors in shaping career-related behaviors, while TPB posits that attitudes, subjective norms, and perceived behavioral control all influence decision-making (Lent, Brown, & Hackett, 2000). However, recent work has expanded both theories to incorporate the impact of emotions, such as anxiety and optimism, on career exploration and decision-making. This suggests that understanding and addressing individuals' emotional experiences may be a crucial aspect of effective career counseling and guidance.

Research Questions

- What are the factors that influence the International/Foreign students' academic decisions for the admission in Private Universities of Gujarat?
- What are the new Programmes that should be added to better serve international/foreign students and boost enrolment in Gujarat's private universities?



- What are the preferences of International/Foreign students regarding mode of learning in Private Universities of Gujarat?
- What should Private Universities in Gujarat consider as factors to increase the admissions and make the experience of international/Foreign students more effective?

Research Methodology

Hypothesis

In this study, evidence that the researcher expected to be instances if the hypotheses were true was tested using positive hypotheses, and evidence that the researcher expected to be non-examples was tested using negative hypotheses.

Hypothesis 1:

The purpose of the hypothesis below was to ascertain whether business school met the needs of prospective international students.

H₀₁: There is no significant connection between the Programmes required by the International/foreign students and the programmes on offer at Private universities in Gujarat.

H₁₁: There is significant connection between the Programmes required by the International/foreign students and the programmes on offer at Private universities in Gujarat.

Hypothesis 2:

The purpose of the following hypothesis is to investigate the relationship between the factors that motivate prospective international students and the academic area they want to pursue.

H₀₂: There is no significant association between International Student's/Foreign Student's preferred field of study and the influences that drive these students to join private universities in Gujarat

H₁₂: There is a significant association between International Student's/Foreign Student's preferred field of study and the influences that drive these students to join private universities in Gujarat.



Hypothesis 3:

The aim of the following hypothesis was to relate the proportion of International/Foreign students having desire for Internship with that of International/foreign students who would seek employment after studies.

H₀₃: The number of International/Foreign students having desire for Internship does not correlate with the number of International/Foreign students who wish to get employed overseas after their studies.

H₁₃: The number of International/Foreign students having desire for Internship correlates with the number of International/Foreign students who wish to get employed overseas after their studies.

Hypothesis 4:

The below hypothesis aims to find out the correlation between Programme decision and the desire for employment overseas by International/Foreign students enrolled in private universities in Gujarat.

H₀₄: There is no relationship between Programme decision taken by International/Foreign students and their willingness for overseas employment.

H₁₄: There is relationship between Programme decision taken by International/Foreign students and their willingness for overseas employment.

Profile of Participants

Instrument for carrying out the research was survey questionnaire. The determination of sample size based on population was calculated using Slovin's formula. With the use of the empirical model and a quantitative, stratified sampling approach followed by a snow ball sampling, the researcher was successful in finding the most prevalent of the obtained responses and draw observations and conclusions.

The empirical model was found suitable because it gave a sufficient description of observable occurrences and is based on observed and measured phenomena. The survey approach was used in the research under consideration since it was the most practical way to gather information about potential students.



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To achieve optimum results for this study, the participants were divided into four age groups: 18 to 24 years, 25 to 30 years, 31 to 35 years, and 36 years and over. Students typically begin their postsecondary education at the age of 19, with students aged 21 and over making up a significant percentage in the higher education sector.

Although students from the age of 25 and up share many of the same problems and worries as their younger peers, additional factors, such as dependents, financial obligations, paid employment, the relatively long time since they last used their academic skills, their lack of familiarity with ICT, and their unfamiliarity with the modern style of assessment, can have an impact on their overall university adjustment and success (Dawborn-Gundlach & Margetts, (2018)).

Ethical Consideration

Ethical considerations towards handling the data as per Data Protect Act 2017 were observed. This survey was conducted with the utmost respect with ethics and morals. As a result, this study has abided by the following fundamental ethical principles: obtaining participants' informed consent; protecting their anonymity and confidentiality; and reducing the risk of damage to study participants. (Williams and Pigeot, 2016). To protect participant anonymity and confidentiality and lessen the risk of harm to study participants, the names, addresses, and other personal information of the individuals were kept confidential.

Journals Referred

The authors undertook a thorough evaluation of academic materials, including peer-reviewed journal articles, conference papers, dissertations, and research reports that had a higher education focus to accomplish the goals of their study.

Data Measurement

After gathering and organizing the data, the researcher started measuring and evaluating it in accordance with the hypotheses put forth, employing non-parametric testing as well as normality. Additionally, the results of the respondents' preferences for internships were discussed to assist the University in developing the best internship programs. Several descriptive statistics, such as frequency finding and cross-tabulation, were used to decide which Programmes should be introduced to the private universities in Gujarat.



Non-parametric Testing

A normality analysis of the results from every questionnaire item revealed that the data was not distributed normally. As a result, non-parametric testing was required to determine the data's validity.

Results and Discussion

Data Analysis and Findings

Tool	IBM Statistical Package for Social Sciences (SPSS) Software Version 28
Step	Statistical Analysis
1	Reliability test - Determination of Cronbach Alpha Value
2	Descriptive Statistics-Demographic Analysis
3	Determination of Construct Validity
4	Inferential Analysis
	Test of Normality
	Correlations
	Summary of Results and Acceptance/Rejection of Hypothesis
5	Cross-sectional Analysis- Demographics and desire for study overseas

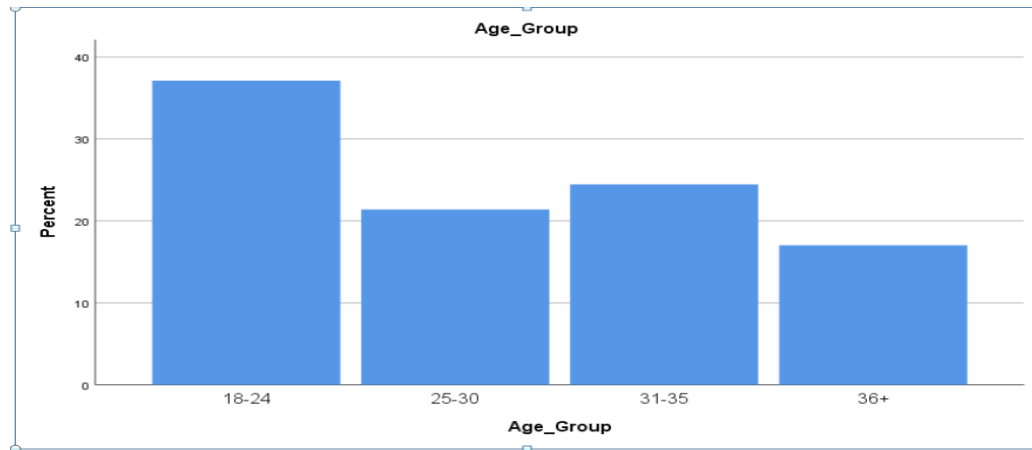
Table 1: Steps in Statistical Analysis

Demographic profile of Respondents

350 questionnaires were sent to prospective participants out of which 220 responded. As stratified sampling was used in this study, there was not a uniform distribution of responders between the age categories. As a result, respondents between the ages of 18 and 24 made up the largest age group, significantly outnumbering all other age groups. This is particularly advantageous because, the average age of a first-year undergraduate student in universities is 19 years old, whereas many postgraduate students are 31 years old or older.



Figure 1: Respondents' Age Grouping



Number of Cases	Valid	100%
Gender	Male	58.9%
	Female	41.1%
Age Group	18-24 years	37.5%
	25-30 years	21.2%
	31-35 years	24.1%
	>36 years	17.2%
Category of Study	Business & Management	32.7%
	Technology	25.4%
	Engineering	13.3%
	Hospitality & Arts	17.2%
	Health	11.4%

Table 2: Demographics Frequency Analysis

Data Analysis

Hypothesis 1:

The 11 areas into which the participants' suggested Programmes were grouped included engineering, information technology, business and management, hospitality, health, the arts, social sciences, other sciences, trade skills, functional skills, and languages. An expanded version of the suggestions made by the responders is shown in the table below.

Figure 2: Response of International/foreign students on their desired programmes.

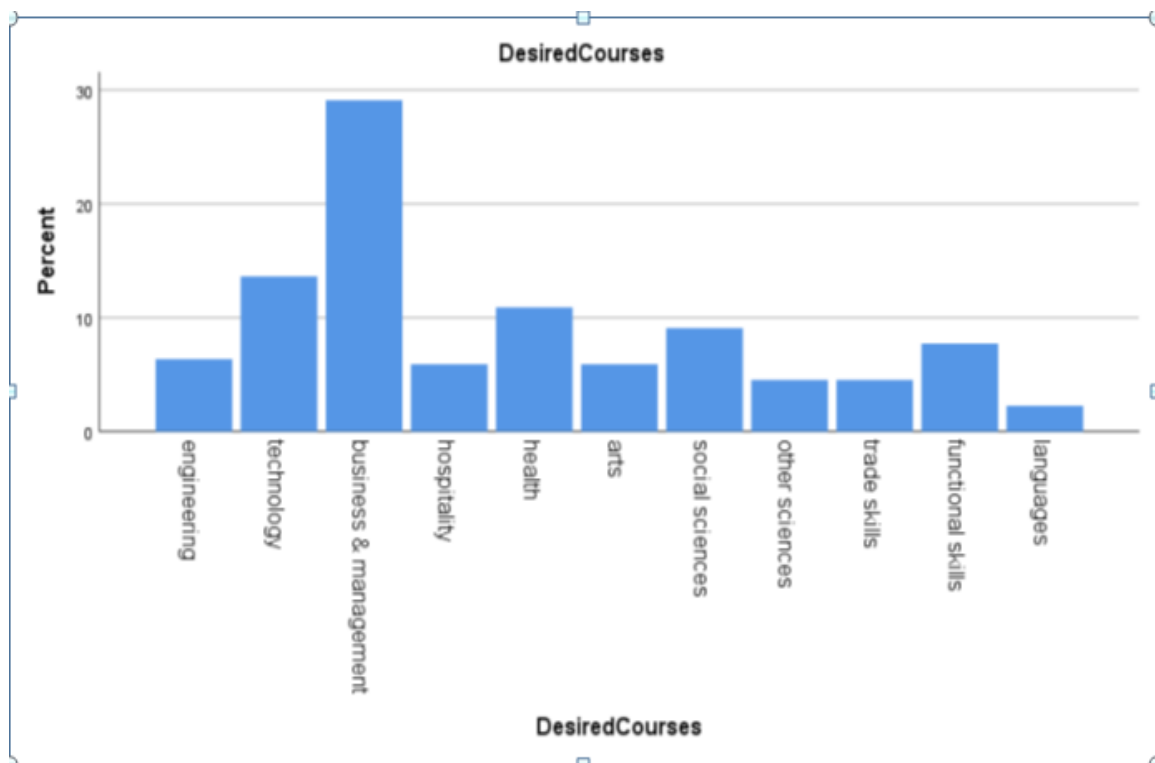


Figure 3: Desired Programmes of the Respondents – A detailed view:



Engineering	Technology	Business & Management	Hospitality	Health	Arts	Social Sciences	Other Sciences	Trade Skills	Functional Skills	Languages
Engineering	ICT	Business Management	Food & Beverage	Pharmacy	Journalism & Mass Communication	Psychology	Landscaping	Hair dressing & Beauty	Communication Skills	English
Electrical Engineering	Computer Science	Operations Management	Hospitality & Tourism Management	Pharmacology	Photography	Law	Architecture	Cosmetology	Stress Management	Swedish
Mechanical Engineering	Computer Programming and Software Development	Supply Chain Management	Culinary Arts	Clinical Medicine	Music & Music Theory	History Education	Geography Construction	Tailoring Carpentry	Presentation Skills Productivity Training	Spanish
Aeronautical Engineering	CCPLS	Risk Management		Medicine/Surgery	English Literature	Criminology	Environmental Science		Compliance Training	
	Cyber Security	Business Administration		Nursing		Public Relations	Chemical Engineering		Ethics Training	
	AutoCAD	HR Management		Health & Safety			Analytical Chemistry		Mindset Training	
	Records Management & IT	Retain Management		Health & Fitness			Science		Culture	
	Computer Engineering	Manufacturing		Adult Education			Mathematics		ISO	
		Sales & Marketing		Physiotherapy					Sis sigma/kanban/kaizen	
		Market Research		Physiology						
		Finance								
		Business English								
		Quality Management								
		Customer Service								
		Economics								
		Entrepreneurship								
		Auditing								

According to 29% of respondents, the most popular Programmes were in the business & management category. The biggest percentage of respondents in this category were in the 18–24 age group (36%), followed by those in the 31–35 (28%), 25–30 (22%), and 36–plus (12%) which are from undergraduate BBA, as well as MBA and the executive programs. Business and management were followed by technology, which accounted for 13.6% of all respondents. In this area as well, respondents between the ages of 18 and 24 made up the majority of respondents (55.6%), followed by those between the ages of 31 and 35 (19.4%), 25 to 30, and above (5.6%). Similar to the business and management category, the majority of the entries in the technology category can be found in the Bachelor of IT undergraduate program.

Following the literature review, the CPA (2020) found that engineering had the highest recruitment rates at 11.1%, followed by engineering and business and economic studies at 46.7%, medical studies at 8.9%, natural sciences and ICT at each 6.7%, and art and design at



4.4%. Business and management ranked first among respondents, with technology coming in second instead of engineering in fifth.

The health category, which accounted for 10.9% of all respondents, was the third most popular category. However, this time, respondents in the 18–24 age group made up the least proportion of this group, totaling to 16%, followed by 25–30 (20%), 36+ (28%), and then 25–30 (20%). With 9% of all responders, social sciences were the fourth most popular category. The digital economy, green economy, and healthcare are all expanding industries on a global scale. (ILO, 2020).

Results of Hypothesis 1:

- Based on the research outcome the alternate hypothesis is accepted.
- Thus, the Programmes which international students look forward are already being offered at higher education Level in Private Universities in Gujarat.

As the fourth most popular category, social sciences should offer psychology. Picking an engineering Programme is not suggested because there was no agreement among participants who were for engineering as to what kind of engineering to pursue. As a result, each engineering program had a small number of respondents. It is advised that Higher Education Institutions offer ISO and six sigma for functional skills since these two Programmes were recommended by 50% of respondents who were interested in functional skills. Remaining categories cannot be considered for a recommendation, as the percentage of responses are low.

Recommendations based on Hypothesis 1:

Based on the outcome of the analysis Management & Engineering programmes are mostly preferred and hence the Private Universities can increase the Programmes offered in such fields which could include use of Innovative technologies for Business Management & Sustainable practices in Business as one of the important learning outcomes.



Hypothesis 2:

Figure 4: Spearman's Correlation (Programmes Desired by International/foreign students and the Influence behind their Programme Decisions)

		Desired Courses		Influence behind Course decision	
Spearman's rho	Desired Courses	Correlation Coefficient	1.000	.012	
		Sig. (2-tailed)		.854	
		N	220	220	
	Influence behind Course decision	Correlation Coefficient	.012	1.000	
		Sig. (2-tailed)	.854		
		N	220	228	

Results of Hypothesis 2:

Concerning null hypothesis 2, the variables among the International/Foreign students' desired Programmes were analysed in a bivariate correlations test with the variables in the International/Foreign students' influences behind Programme decisions. Considering that the significance level of both was significantly greater than 0.05, it was determined that there was no association between International/Foreign students' desired Programmes and the students' influence behind their Programme decisions. Thus, the research accepted the null hypothesis.

Recommendations based on Hypothesis 2:

- Based on the outcome of the analysis, it is found that there no relationship between International/Foreign students' desired Programmes and their influence behind their Programme decisions.
- Thus, Private Universities can embark on International/Foreign students' admissions by implementing various digital marketing tools.



Hypothesis 3:

Figure 5: Spearman's Correlation (Internship desired by the International/foreign students and their Desire for overseas Employment opportunities)

		Internship_Plan	Desire_for_Employment_Overseas
Spearman's rho	Internship_Plan	Correlation Coefficient	1.000
		Sig. (2-tailed)	.
		N	221
Desire_for_Employment_Overseas	Desire_for_Employment_Overseas	Correlation Coefficient	.164*
		Sig. (2-tailed)	.017
		N	212

*. Correlation is significant at the 0.05 level (2-tailed).

Results of Hypothesis 3:

The Spearman correlation between the two variables was 0.164, indicating a positive correlation. As a result, the alternative hypothesis was supported, and the null hypothesis was rejected with relation to International/Foreign students' who wanted to find employment overseas and having an internship. Therefore, the International/Foreign students' who intend to have desired Internship are seeking overseas employment.

Recommendations based on Hypothesis 3:

The Internship should be an integral part of the curriculum leading to overseas employment opportunities.



Hypothesis 4:

Figure 6: Crosstabs between International/Foreign students' Programme Decisions and Desire for Overseas Employment

		Desire for Employment Overseas		Total
		yes	no	
Influence behind Course decision	family	22	5	27
	peers	19	3	22
	role models	21	12	33
	income	40	13	53
	personal interests	56	11	67
	job availability	14	3	17
Total		172	47	219

Results of Hypothesis 4:

The Influencers behind Programme decision and desire for employment overseas are as listed below:

- personal interests – 32.02%
- Income – 23.25%
- role models – 14.47%
- Family – 11.84%
- Peers – 10.09%
- job - 8.33%

The most popular factor influencing Programme selection and desire for overseas employment has been investigated using cross tabulation.

Out of influencers such as family, peers, role models, income, personal interests and job availability, the research infers that factor 'personal interests' (56 respondents) and factor 'income' (40 respondents) ranks as first two influencers of student's desire for Overseas Employment and Programme decisions. On an overview, 172 of the respondents preferred employment abroad in other countries.



Recommendations based on Hypothesis 4:

Private Universities can embark on Social Media Advertising, Paid Internship and guidance for job placements, Student referral scheme and Training on employability skills (usage of innovative tools and techniques in the field of study should be part of the curriculum to get the student employed overseas).

Construct Validity Test:

Validity is a crucial aspect of research, which refers to the degree to which the measures used are appropriate, the accuracy of the analysis of the results, and the generalizability of the findings (Thornhill, Lewis, & Saunders, 2015). In the context of evaluating construct validity, factor analysis was employed, and the researchers utilized the Bartlett Test and KMO Statistics test to assess the validity of the findings (Thornhill et al., 2015).

Construct	Bartlett test	KMO statistics	p-value
Participants desired Programmes (PC)	275.900	0.500	<0.001
Influencers behind Programme decision (IC)	1627.664	0.736	<0.001
Desired Internship & Desire for Employment overseas (DI)	871.512	0.751	<0.001

Findings of Construct Validity Test:

As far as Bartlett test is concerned, since the significance level (<0.001) is less than the cut off values observed in the test (0.01), we reject the null hypothesis. This test was used to determine whether intrinsic motivation or extrinsic motivation occurred. Additionally, the above table shows that the KMO statistics are > 0.5 to 0.8, indicating that there is a relationship or correlation between constructs like participants' desired programs (PC), influences behind program decision (IC), desired internship, and desire for employment abroad (DI), as determined by the KMO test.



Limitations of the Study

The research lacked Geographical segmentation of respondents in its demographic analysis, and the questionnaire should have asked respondents to indicate their preference for a degree, diploma, or certificate. Managements dimension can be included in the future research. In future research a comparative study on the number of Indian students taking admissions abroad comparing to number of foreign students enrolling in India will be analysed.

Challenges faced by Private Universities in Gujrat

The literature suggests that Gujarat Universities are becoming increasingly attractive to international students due to their reputation for academic excellence and affordability (Mishra & Khuntia, 2019).

These institutions offer a variety of programs, including MBA, BBA, and executive education programs. To further raise the standard of education and draw in more international students, a number of challenges need to be addressed. One of the significant challenges faced by Gujarat business schools is the lack of diversity, particularly in terms of the percentage of female students and faculty members (Dubey & Rana, 2020). This lack of diversity can impact negatively on the enrollment of International/foreign students in these institutions.

Another significant challenge is ensuring the quality of education provided by these institutions. While Gujarat business schools are known for their academic rigor, there can be significant variations in the quality of education between different institutions (Gupta & Sharma, 2019). Improving quality assurance practices is an important factor for providing high quality education to the international/Foreign students.

Employability of graduates is another significant concern. Employers have indicated that graduates lack necessary skills (Joshi & Jha, 2018). E-learning has opened up new avenues for learning, but it requires significant investment in technology and infrastructure (Kamble & Shinde, 2019). The privatization of higher education has led to the growth of several private institutions, but it has also created challenges related to quality and affordability.

Innovations in teaching and learning have the potential to transform higher education, but the adoption of these innovations has been slow (Gupta & Sharma, 2019). Finally, student



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satisfaction is a critical issue, with students reporting dissatisfaction with the quality of education and infrastructure (Dubey & Rana, 2020).

Conclusion:

In conclusion, with the Study in India program and other government efforts to raise the standard of higher education and draw foreign students are essential to the development and growth of the Indian economy. Even though there are challenges to be overcome, the government's goal and dedication to creating a top-notch educational system are commendable. By addressing the issues and continuing to engage in higher education, India can attract students looking for a top-notch education and produce a pool of graduates with advanced degrees who can advance the nation.

In conclusion from the overall research, private universities in Gujarat have the potential to attract more international students to their higher education programs. However, factors such as reputation, quality of education, more choices of Programmes, availability of scholarships and financial aid need to be considered to attract international students (Mishra & Khuntia, 2019). Based on the outcome of the analysis Management & Engineering programmes are mostly preferred and hence the Private Universities can increase the Programmes offered in such fields which could include Innovative technologies. The Internship should be an integral part of the curriculum leading to overseas employment opportunities. Training on employability skills and usage of innovative tools and techniques in the field of study should be part of the curriculum to get the student employed overseas.

Success in the internship program primarily serves as a means of enhancing the institution's reputation to draw in more students. Hence there is a need for the Private universities of Gujarat to devise an appropriate Internship Plan for the programmes on offer. Additionally, diversity inclusion, quality assurance practices, and the employability of graduates are crucial to ensure that Gujarat business schools provide high-quality education and continue to attract international students.

Therefore, overcoming the challenges and by continuous investment in higher education, India can become a global education hub and a top destination for the international students seeking high-quality education.



References:

- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179-211. doi:10.1016/0749-5978(91)90020-t
- Akbar, M. M., & Parvez, N. (2017). Internationalization of higher education in India: Opportunities and challenges. *International Journal of Scientific and Research Publications*, 7(8), 361-366.
- Anand, P., & Srivastava, P. (2016). Exploring factors that influence the decision of international students to study in India. *Journal of Studies in International Education*, 20(4), 328-346.
- Alanezi, F. S., Al-Qahtani, S. S., & Abouammoh, A. M. (2016). Determinants of Programme selection in tertiary education: A study of Saudi students. *Journal of Education and Practice*, 7(10), 87-97.
- Berube, C., & Ruth, A. (2015). *American Higher Education in the Twenty-First Century: Social, Political, and Economic Challenges*. JHU Press.
- Bhandari, R. (2019). Indian student mobility trends: 2019. Institute of International Education.
- Chavan, S. G., & Sankpal, S. (2019). Marketing mix for higher education services in India: A review. *Indian Journal of Marketing*, 49(1), 9-19.
- Coccarri, M., & Javalgi, R. G. (1995). Determinants of student choice of an undergraduate business program: A longitudinal approach. *Journal of Marketing for Higher Education*, 6(1), 43-57. https://doi.org/10.1300/J050v06n01_03
- Dawborn-Gundlach, M. and Margetts, K. (2018). Measures of the adjustment of mature-age, undergraduate students to university. *Journal of Global Education and Research*, 2(1), pp.17-32.
- Department of Higher Education, Government of India. (2020). All India Survey on Higher Education 2019-20. Retrieved from <https://www.aishe.gov.in/aishe/aisheData2019-20/ChapterB/B%20-%204.1.pdf>



- Dickenson, P. (2010). Student Expectations: Factors Influencing Satisfaction and Dissatisfaction with University Learning Experiences. *Journal of Higher Education Policy and Management*, 32(1), 67-78. doi: 10.1080/13600800903440596
- Dubey, P., & Rana, S. (2020). Assessment practices in higher education in India: A review of the literature. *International Journal of Educational Management*.
- Gupta, A. K., & Sharma, N. K. (2019). Innovations in teaching and learning in higher education in India: A review of the literature. *International Journal of Innovation in Education*.
- Gupta, P., & Choudhary, A. (2020). Quality assurance practices in higher education in Gujarat: A critical review. *Journal of Educational Planning and Administration*.
- https://www.education.gov.in/sites/upload_files/mhrd/files/statistics-new/aishe_eng.pdf
- <https://www.education.gov.in/en/study-in-india-programme>
- https://www.hec.mu/pdf_downloads/recent_posts/hec_snapshot_tei_booklet.pdf
- <https://timesofindia.indiatimes.com/home/education/news/india-launches-study-in-india-campaign-to-attract-foreign-students/articleshow/63656828.cms>
- Holdsworth, R., & Nind, M. (2006). Knowing and deciding: A study of university choice. *Higher Education*, 52(2), 179-203. <https://doi.org/10.1007/s10734-004-6386-5>
- Joshi, P. R., & Jha, D. K. (2018). Factors affecting the employability of graduates from higher education institutions in India: A review of the literature. *International Journal of Educational Research*.
- Kallio, E. (1995). Why students choose a particular college: A case study of three Finnish business schools. *Higher Education*, 29(4), 443-461. <https://doi.org/10.1007/BF01383866>
- Kamble, S. S., & Shinde, S. S. (2019). E-learning in higher education in India: Opportunities and challenges. *Education and Information Technologies*.
- Kaur, K., & Gupta, P. (2017). Analysis of challenges faced by Indian universities in attracting international students. *Journal of Global Marketing*, 30(3), 127-137.



- Kothari, R. (2021). Modi's 'Study in India' Initiative: A New Avenue for Education Diplomacy. *Journal of Strategic Studies*, 44(2), 259-274. doi: 10.1080/01402390.2020.1832235
- Krieshok, T. S., Blacksmith, N., & McKay, P. F. (2019). The role of emotions in career decision making: A theoretical review and suggestions for future research. *Journal of Career Development*, 46(3), 238-252. <https://doi.org/10.1177/0894845318804739>
- Krishnamurthy, S., & Muralidharan, S. (2018). Opportunities and challenges for higher education in India in the era of globalisation. *Globalisation, Societies and Education*, 16(4), 443-454.
- Kumar, A., & Kumar, S. (2020). Educational Reforms in India: A Review of Recent Initiatives and Implementation. *Journal of Education and Practice*, 11(30), 101-107.
- Lent, R. W., Brown, S. D., & Hackett, G. (1994). Toward a unifying social cognitive theory of career and academic interest, choice, and performance. *Journal of Vocational Behavior*, 45(1), 79-122. doi:10.1006/jvbe.1994.1027
- Maringe, F. (2006). University and Programme choice: Implications for positioning, recruitment and marketing. *International Journal of Educational Management*, 20(6), 466-479. <https://doi.org/10.1108/09513540610676026>
- Ministry of Education, Government of India. (2020). National Education Policy 2020. Retrieved from https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf.
- Mishra, R. K., & Khuntia, B. B. (2019). Internationalization of higher education in India: An exploratory study of challenges and opportunities. *Higher Education*.
- Nayak, R. B., & Das, P. (2019). Internationalization of higher education in India: Trends, opportunities and challenges. *Journal of Social Sciences and Humanities Review*, 7(3), 255-262.
- Patel, S., & Sharma, A. (2020). Factors influencing the choice of higher education destination among international students: A review of literature. *Journal of International Education and Practice*, 2(1), 1-8.



- Rababah, O. (2016). Factors affecting university students' Programme selection: A study of Yarmouk University. *Journal of Educational and Social Research*, 6(2), 145-154.
- Rajagopalan, R., & Pandey, M. (2016). Internationalization of higher education in India: A review of challenges and opportunities. *International Journal of Scientific Research*, 5(5), 308-309.
- Raza, S., Shaheen, S., & Sohail, S. (2021). Impact of Service Quality on Student Satisfaction and Loyalty in Higher Education Institutions: A Case of Pakistan. *Global Social Sciences Review*, 6(1), 1-16. doi: 10.31703/gssr.2021(vi-i).01
- Ryan, R. M., Deci, E. L., & Grolnick, W. S. (2010). Autonomy, Relatedness, and the Self: Their Relation to Development and Psychopathology. In *Handbook of Self-Determination Research* (pp. 45-64). The University of Rochester Press.
- Saleh, A. and Bista, K. (2017). Examining Factors Impacting Online Survey Response Rates in Educational Research: Perceptions of Graduate Students. *Journal of MultiDisciplinary Evaluation*, 13(29), pp.63-74.
- Saunders, M. N. and Lewis, P., & Thornhill, A. (2015) *Research Methods for Business Students* EBook. Pearson Australia Pty Limited. Pearson Australia Pty Limited
- Shanka, T., DeBell, M., & Bhuian, S. N. (2006). Determinants of students' perceived academic and social fit at a small liberal arts college. *Journal of Marketing for Higher Education*, 15(2), 23-46. https://doi.org/10.1300/J050v15n02_02
- Singh, R., & Kumar, A. (2019). Exploring the higher education landscape in Gujarat: Opportunities and challenges. *Journal of Higher Education Policy and Management*, 41(2), 205-217.
- Singh, S. (2021). The Study in India Programme: Opportunities and Challenges. *International Journal of Indian Culture and Business Management*, 23(4), 476-491. doi: 10.1504/IJICBM.2021.10034731
- Srivastava, M., & Bhatia, M. (2020). Enhancing the Quality of Higher Education in India. *International Journal of Emerging Technologies in Learning (iJET)*, 15(3), 40-52. doi: 10.3991/ijet.v15i03.11887



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- Srivastava, A., & Kumar, S. (2022). State-wise distribution of foreign students in Indian universities. *Journal of Higher Education in Asia-Pacific*, 39(1), 45-56.
- Taylor, J. (2017). *Transforming the Higher Education Curriculum: Rethinking Innovation and Change*. Palgrave Macmillan.
- Theresa, O. C. (2015). Socio-economic factors influencing Programme preferences among secondary school students in Ekiti State, Nigeria. *International Journal of Humanities and Social Science Invention*, 4(4), 55-60.
- Thornhill, P., Lewis, P., & Saunders, M. (2015). *Research methods for business students* (7th ed.). Pearson Education Limited.
- TWattjakul, K. (2014). The Influence of Students' Perception of Campus Service Quality on Behavioral Intentions. *International Education Studies*, 7(8), 13-23. doi: 10.5539/ies.v7n8p13
- Williams, G. and Pigeot, I. (2016). Consent and confidentiality in the light of recent demands for data sharing. *Biometrical Journal*, 59(2), pp.240–250.
- Wiswall, M., & Zafar, B. (2014). Determinants of college major choice: Identification using an information experiment. *The Review of Economic Studies*, 81(3), 1191-1227. doi:10.1093/restud/rdu003