INTEGRITY EDUCATION

Proceedings of NATIONAL CONFERENCE on THE FUTURE OF MANAGEMENT IN A DIGITALIZED WORLD: THE PATH AHEAD

ON 6TH APRIL, 2024

ISBN 978-81-981383-5-4

DELHI INSTITUTE OF ADVANCED STUDIES
Plot No. 6, Sector-25, Rohini, Delhi-110085
Re-Accredited with 'A' Grade by NAAC (Approved by AICTE & Affiliated with GGSIP University
For B.Com(H), BBA, MBA & MBA (FM) Programmes) (An ISO 9001:2015 Certified Institution)
Phone: 9355990933, 9355990934, EPABX-011-27932742
Website: www.dias.ac.in | E-mail: nc2023@dias.ac.in

NATIONAL CONFERENCE

" The Future of Management in a Digitalized World : The Path Ahead

Chief Editor

Dr. S.N. Maheshwari

Editor(s)

Dr. N. Malati

Dr. Meenakshi Kaushik

Asst. Editor(s)

Dr. Pooja Gupta

Ms. Divya Jain

Ms. Getaksha Marwaha

Ms. Rita Rani

PUBLISHED BY

The Future of Management in a Digitalized World : The Path Ahead

ISBN: 978-81-982578-5-7
First Impression - 2024
Published by INTEGRITY EDUCATION INDIA

New Delhi
First Floor, 4598/12-B, 1st Floor,
Padam Chand Marg, Daryaganj,
New Delhi, Delhi 110002
Phone: +91 98 11 66 62 16 (M)
Phone: +91 70 11 60 56 18 (M)

Bengaluru
Jallahalli East
Bengaluru, Karnataka. India.
Phone: +91 98 11 66 62 16 (M)
Email: publisher.integrity@gmail.com

USA
New Jersey
14 Grandview Ave, Upper Saddle River,
NJ-07458, USA
Phone: +14805226504 (M)

London
37 Degree Media
64, Hodder Drive, Perivale, London UB68LL.
United Kingdom.
Phone: +44 7950 78 18 17 (M)
Website: integrityeducation.co.in

For any Query / Feedback
Phone: +91 98 11 66 62 16 (Vineet Sharma)

Printed in India @ New Delhi

ADVISORY COUNCIL

1.	**Prof. T.N. Kapoor**	**Former Vice-Chancellor, Panjab University**
2.	**Dr. Ashok Haldia**	**Former Managing Director & CEO, PTC India Financial Services Ltd., Delhi**
3.	**Shri Badri Aggarwal**	**Corporate Director, Bharti Enterprise Mehrauli, New Delhi**
4.	**Prof. Karmeshu**	**Distinguished Professor, Department of Computer Science & Engineering, Shiv Nadar University, Greater Noida, UP**
5.	**Shri R.C. Jain**	**Chairman, SJS Enterprises Ltd., Bengaluru (Former Group Vice Chairman, Eicher Group, New Delhi)**
6.	**Shri Sanjay Govil**	**Director & Principal Consultant TecHybrid IT Solutions Pvt. Ltd.**
7.	**Dr. N. Malati**	**Director, Delhi Institute of Advanced Studies**

LIST OF GOVERNING BODY MEMBERS

S. No.	*Name*	*Designation*	*Occupation*
1.	Shri S.K. Sachdeva	Chairman	Educationist & Industrialist
2.	Shri Sanjay Sachdeva	Member	Educationist
3.	Shri Anil Kumar	Member	Business Executive
4.	Mrs. Kiran Gambhir	Member	Educationist
5.	Dr. Ravija Prakash	Member	Educationist
6.	Dr. Virendra Vats	Member	Educationist
7.	Shri B.R. Somani	Member	Professional
8.	Dr. S. N. Maheshwari	Member	Academic Director, DIAS
9.	Dr. Anju Batra	Member	Teacher Representative
10.	Ms. Neetu Chadha	Member	Teacher Representative
11.	Dr. N. Malati	Member Secretary	Director, DIAS

PREFACE

"In the digital age, management is about creating an environment where people can thrive."

– Peter Drucker

Digitalization is transforming the way we live, work, and manage. In the past, management was largely about optimizing processes and resources. But in the digital age, management is increasingly about managing data, algorithms, and networks. This shift has profound implications for the future of management. On the one hand, digitalization offers new opportunities for managers to improve efficiency, productivity, and decision-making. On the other hand, it also poses new challenges, such as the need to manage a more complex and volatile environment. This means that managers need to have a deep understanding of digital technologies and how they can be used to improve the performance of their organizations. Managers also need to be able to lead and inspire their employees in the digital age. They are expected to create a culture of innovation and collaboration to empower employees to solve problems. Alongside technical skills, emotional intelligence, encompassing self-awareness, empathy, emotional management, is essential for leadership in a digital age. The future of management is uncertain, but one thing is for sure: it will be shaped by digital technologies. Managers who are able to embrace these changes will be well-positioned to succeed in the future. However, those who fail to adapt will be left behind. The changes of the digital era affect all the sectors. New skills and mindsets are needed to be competitive and to match the emerging new roles when traditional leadership and management roles are disappearing. Academia and industry leaders need to work together to debate and exploit the potential of digital technologies today and shape the future of work and business education to foster digital and leadership skills in preparing for future challenges. The future of management in a digitalized world is an exciting yet challenging journey. It demands people who can adapt, learn, and harness the power of digital tools and technologies to drive success. Ethical considerations are paramount in the digital era, encompassing issues of privacy, diversity, equity, and inclusion. Lifelong learning is crucial in a fast-evolving digital landscape. Staying updated on the latest digital trends and tools is essential for long-term success.

Digitalization connects businesses globally, requiring managers to be sensitive to cross-cultural issues and challenges in international markets.

This collection of conference proceedings encapsulates the diverse perspectives, insights, and research findings presented during the event. The papers included in this volume address the multifaceted impact of digitalization on management, ranging from the integration of artificial intelligence and big data in decision-making processes to the reshaping of organizational structures and leadership strategies.

The discussions at this conference underscored the importance of agility, innovation, and resilience in navigating the complexities of a digitalized world. As organizations across the globe grapple with the challenges and opportunities presented by technological advancements, the need for new frameworks, methodologies, and skills in management becomes increasingly evident.

We extend our deepest gratitude to all the contributors who have shared their expertise and knowledge, enriching the discourse on the future of management. We also thank the organizing committee, sponsors, and participants for their dedication and support in making this conference a success.

It is our hope that these proceedings will not only inform but also inspire continued exploration and innovation in the field of management. As we move forward, the insights gained here will serve as a guide for academics, practitioners, and leaders committed to shaping the future of management in a digitalized world.

– Dr. S.N. Maheshwari
Chief Editor,Professor
Emeritus and Academic Director, DIAS

– Dr. N. Malati
Editor
Director, DIAS

– Dr. Meenakshi Kaushik
Editor
Associate Professor, DIAS

– Dr. Pooja Gupta

– Ms. Divya Jain

– Ms. Getaksha Marwaha

– Ms. Rita Rani
– Assistant Editors
Assistant Professor, DIAS

Chairman's Message

Dear Readers, Contributors, and Esteemed Delegates,

At Delhi Institute of Advanced Studies, we remain committed to fostering academic excellence and intellectual curiosity. This conference served as a powerful platform for the exchange of ideas that address some of the most pressing challenges of our time. The research and findings presented here reflect not only the diverse expertise of our participants but also their commitment to advancing knowledge and solutions in the field of management.

As the Chairman of this esteemed institution, I am honored to witness the convergence of forward- thinking minds dedicated to exploring the intricate dynamics of agility in today's business and technological landscape. As we stand at the intersection of rapid technological advancements and shifting business landscapes, the theme of this conference could not be more relevant. The insightful papers and discussions shared during the event have delved deeply into the challenges and opportunities presented by digitalization, offering innovative strategies and forward-thinking approaches that will undoubtedly shape the future of management.

The proceedings published here reflect the dedication and scholarly contributions of researchers, industry professionals, and academicians who are keen to push the boundaries of conventional management thought. I believe that these contributions will not only inspire further research but also provide valuable guidance to practitioners navigating the complexities of the digital age.

I trust that this compilation of knowledge will serve as a valuable resource for both current and future leaders in the field, offering key insights into the path ahead.

– SH. S.K. SACHDEVA

Chairman

Delhi Institute of Advanced Studies

Academic Director's Message

Dear Readers, Distinguished Participants, and Esteemed Scholars,

It is with immense pleasure and pride that I present the proceedings of the National Conference , hosted by Delhi Institute of Advanced Studies, focused on the theme "The Future of Management in a Digitalized World: The Path Ahead." This collection of research papers, discussions, and insights marks an important milestone in our ongoing exploration of how digitalization is transforming the field of management and the challenges and opportunities that lie ahead.

As we all know, the world is undergoing a radical transformation driven by digital technologies that are reshaping industries, altering consumer behavior, and redefining the very fabric of business and organizational ecosystems. The digital revolution is not just a technological shift but a profound socio-economic change that requires a rethinking of how we manage, lead, and innovate in this new environment. This conference aimed to address these critical issues by bringing together scholars,

researchers, professionals, and industry leaders to reflect on the future of management in this dynamic context.

The theme, "The Future of Management in a Digitalized World: The Path Ahead," has never been more relevant. With rapid advancements in artificial intelligence, machine learning, big data, cloud computing, blockchain, and other digital technologies, the role of managers and leaders is evolving at an unprecedented pace. The need for agile, forward-thinking strategies that can effectively leverage these tools while addressing the accompanying ethical, social, and operational challenges is of paramount importance. The contributions contained in this publication are a testament to the rich intellectual engagement and innovative thinking that emerged during the conference.

The papers presented explore a wide range of topics, including digital leadership, the integration of technology in decision-making processes, the impact of digitalization on organizational culture, and the future of work in a technology-driven world. They also delve into emerging trends in digital marketing, supply chain management, and human resource management, offering fresh perspectives on how businesses can navigate and thrive in this ever-changing digital landscape.

I believe that these proceedings will serve as a valuable resource for academics, practitioners, and students alike. They provide not only theoretical insights but also practical solutions that can be applied in real-world scenarios. The knowledge shared here will undoubtedly contribute to shaping the future of management education and practice in an increasingly digitalized world.

Moreover, this conference represents the culmination of months of planning, coordination, and collaboration. I would like to take this opportunity to extend my heartfelt gratitude to all those involved in making this event a success. First and foremost, I would like to thank the distinguished speakers, authors, and researchers who contributed their time, expertise, and ideas to enrich the discussions. Your dedication to advancing knowledge in this field is truly inspiring, and your work will have a lasting impact on both academic research and professional practice.

I would also like to express my sincere appreciation to the organizing committee, faculty members, and students of Delhi Institute of Advanced Studies, whose tireless efforts and meticulous planning ensured the smooth execution of this event. It is through your commitment and hard work that we were able to create a platform for meaningful dialogue and knowledge-sharing.

As we move forward, it is clear that the journey toward digital transformation in management is far from over. The ideas and solutions presented in these proceedings are just the beginning of what promises to be a long and exciting path toward innovation, adaptability, and sustainability. I encourage all readers to engage deeply with the research and insights contained within these pages, and I hope that it will spark new questions, ideas, and collaborations as we continue to explore the future of management in a digitalized world.

– Dr. S.N. Maheshwari
Academic Director

Director's Message

It is a great honor and privilege to present the proceedings of the National Conference , hosted by Delhi Institute of Advanced Studies, on the theme "The Future of Management in a Digitalized World: The Path Ahead." This publication marks a significant step in our collective understanding of how digital transformation is reshaping management practices and the emerging challenges and opportunities in this evolving landscape.

Digitalization is a powerful engine for economic growth in the world and change is the only mechanism which will keep the businesses large or small relevant. Though the large and prosperous business may appear secure, but they are definitely being disrupted by the exponential rate of change in the digital era. Digital transformation (DT) has gone from being a technological opportunity to a pure necessity for managing the needs and expectations of the world's growing population It is reported by Harvard Business Review that over half of Fortune 500 companies have filed for bankruptcy, been acquired, or been forced to close their doors. According to researchers, by 2027, 75% of S&P companies will be replaced. Paradigm Shifts have only been

expedited by COVID-19. Every company will need to be redesigned to match the new virtual realities sweeping the globe to survive throughout this continuing development. The transition to this new reality should however not be underestimated because, like every change process, it contains several risks and challenges.

Nevertheless, one of the major enablers in Business Management today is Digital Transformation. In the wake of the pandemic, digital transformation has become a must for businesses. Businesses that have not integrated cloud and analytics capabilities into their processes and/or have not upgraded their operations are at a significant disadvantage. Due to the digital divide, businesses that can seize new opportunities will overtake those that are unable to do so. The journey may be difficult, but with strategic planning, effective change management, and a robust understanding of the challenges, businesses can position themselves for long-term success in the digital era. Organisations are gearing up for the same and we are hopeful that business in the coming times will be managing this change effectively.

I would like to take this opportunity to express my deepest gratitude to all those who made this conference and its proceedings possible. To the authors, presenters, and participants, thank you for your valuable contributions and for sharing your expertise. Your work has enriched the discussions and provided fresh perspectives that will inspire further research and practice. A special thanks goes to the organizing committee, faculty members, and support staff of Delhi Institute of Advanced Studies, whose tireless efforts ensured the success of this event.

As we move ahead, I encourage all readers to delve deeply into the ideas presented in these proceedings. I hope they will serve as a source of inspiration, sparking new ideas and fostering collaborations that will pave the way for future advancements in management practices in our digitalized world.

I wish to congratulate the specific contributions of Dr. Meenakshi Kaushik, Dr. Pooja Gupta, Ms. Divya Jain, Ms. Getaksha Marwaha and Ms. Rita Rani for bringing out the proceedings of the Conference.

– Dr. N. Malati
Director
Delhi Institute of Advanced Studies

Contents

1

User Segmentation Using K-means Clustering

– Harsh
MBA Student
Delhi Institute of Advanced Studies
– Dr. N. Malati
Professor
Delhi Institute of Advanced Studies

1. ABSTRACT

In the rapidly evolving landscape of data-driven marketing, customer segmentation has emerged as a critical strategy for businesses aiming to enhance their customer relationship management and tailor their marketing efforts. This paper explores the application of the K-means clustering algorithm to customer segmentation, providing a comprehensive analysis of its efficacy and potential benefits. Utilizing a robust dataset comprising demographic, behavioural, and transactional attributes of customers, we form distinct segments. We determine the optimal number of clusters using the elbow method, ensuring precise segmentation. Visualization of these clusters offers actionable insights into customer preferences and behaviours, enabling businesses to craft effective marketing strategies and enhance customer satisfaction. Our findings demonstrate that K-means clustering is an invaluable tool for uncovering hidden patterns within large datasets, ultimately driving better business decisions and fostering competitive advantage. This research underscores the importance of leveraging advanced machine learning techniques in customer analytics and offers practical recommendations for implementing K-means clustering in real-world business scenarios.

Keywords: Clustering, Elbow Method, K-Means Algorithm, Customer Segmentation, Visualization, Machine Learning, Python.

2. INTRODUCTION

In the modern business landscape, characterized by fierce competition and rapidly evolving market dynamics, effective decision-making is paramount for companies seeking to achieve and sustain profitability. The ability to understand and anticipate customer needs and preferences has emerged as a critical factor in developing successful marketing strategies and fostering customer loyalty. Traditional methods of customer analysis often fall short in addressing the complexity and volume of data generated daily. This is where machine learning techniques, particularly customer segmentation, come into play.

Customer segmentation involves dividing a broad consumer or business market into sub-groups of consumers based on shared characteristics. This segmentation allows companies to tailor their marketing efforts, thereby enhancing customer satisfaction and improving revenue outcomes.

In the e-commerce market, segmentation is particularly significant as it enables personalized recommendations, targeted promotions, and optimized user experiences, leading to increased customer retention and higher sales. During this, data was collected from Amazon to analyzing segmentation.

Among various segmentation techniques, the K-means clustering algorithm stands out for its efficiency and simplicity in handling large datasets and identifying distinct customer groups.

The K-means algorithm, a partitioning method, assigns customers into K clusters based on the similarity of their attributes. Determining the optimal number of clusters is crucial for effective segmentation, and the elbow method is widely used to achieve this. By plotting the explained variance as a function of the number of clusters, the elbow point indicates the appropriate number of clusters that best capture the underlying structure of the data.

In this research, we utilize a comprehensive dataset comprising demographic, behavioral, and transactional attributes of customers to perform K-means clustering. Through iterative experimentation and validation, we identify optimal clusters that reveal insightful patterns and trends within the customer base. The visualization of these clusters provides actionable insights, enabling businesses to design targeted marketing strategies, enhance customer satisfaction, and drive revenue growth.

This paper aims to demonstrate the efficacy of K-means clustering in customer segmentation and its practical implications for businesses. By leveraging advanced machine learning techniques, companies can unlock the potential of their data, making informed decisions that foster competitive advantage and long-term success.

3. LITERATURE REVIEW

3.1. Customer Segmentation

Customer segmentation is a fundamental process in marketing that involves dividing a broad consumer or business market into sub-groups based on shared characteristics. Initially, segmentation was primarily based on demographic factors such as age, gender, and income. However, with advancements in technology and data collection methods, segmentation now includes psychographic, behavioral, and geographic factors. These approaches provide a more comprehensive understanding of customer needs and preferences.

Historical Context and Evolution:

The concept of customer segmentation has evolved significantly over the past few decades. Initially, segmentation was primarily based on demographic factors such as age, gender, and income. However, with advancements in technology and data collection methods, the scope of segmentation has expanded to include psychographic, behavioral, and geographic factors. This multi-dimensional approach allows for a more comprehensive understanding of customer needs and preferences.

Current Trends:

In recent years, the advent of big data and advanced analytics has revolutionized customer segmentation. Businesses now have access to vast amounts of data, enabling more granular and precise segmentation. Machine learning algorithms, in particular, have played a pivotal role in enhancing segmentation techniques. These algorithms can process large datasets and identify hidden patterns that traditional methods might overlook, leading to more accurate and actionable insights.

Challenges and Opportunities:

Despite the advancements, customer segmentation still faces several challenges. These include data quality issues, privacy concerns,

and the complexity of integrating multiple data sources. However, the opportunities presented by advanced analytics and machine learning far outweigh these challenges. Businesses that successfully implement sophisticated segmentation techniques can achieve a significant competitive advantage by delivering highly personalized experiences to their customers.

Existing Techniques and Limitations:

Traditional segmentation methods include demographic and geographic segmentation, often relying on basic statistical techniques. However, these methods can be simplistic and fail to capture the complexity of consumer behavior. Psychographic and behavioral segmentations have been more effective but still face limitations in scalability and precision. The advent of big data and advanced analytics has enabled more granular and precise segmentation, but issues such as data quality, privacy concerns, and integration complexity persist.

Motivation for Current Research:

The motivation for the current research is to address the limitations of traditional segmentation techniques by leveraging machine learning algorithms like K-means clustering. This approach can handle large datasets and identify hidden patterns, providing more accurate and actionable insights.

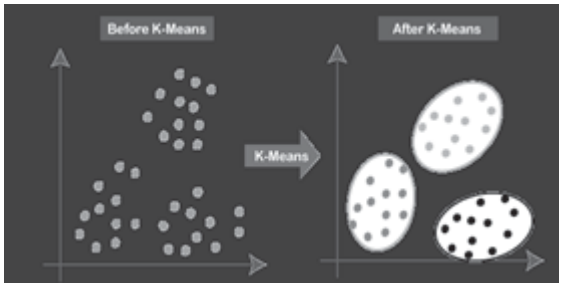
3.2. CLUSTERING AND K-MEANS ALGORITHM

Clustering is a machine learning technique used to group similar data points together based on specific characteristics. Among the various clustering algorithms, K-means is one of the most widely used due to its simplicity and efficiency in handling large datasets.

K-means Algorithm: The K-means algorithm partitions a dataset into K clusters, where each data point belongs to the cluster with the nearest mean. The algorithm involves the following steps:

1. **Initialization:** Select K initial cluster centroids randomly.
2. **Assignment:** Assign each data point to the nearest centroid, forming K clusters.
3. **Update:** Recalculate the centroids of the clusters based on the current cluster memberships.
4. **Iteration:** Repeat the assignment and update steps until the

centroids no longer change significantly or a predefined number of iterations is reached.



Elbow Method: Determining the optimal number of clusters (K) is crucial for effective clustering. The elbow method is a common technique used for this purpose. It involves plotting the sum of squared distances from each point to its assigned centroid as a function of the number of clusters. The point at which the decrease in the sum of squared distances starts to level off (the "elbow point") indicates the optimal number of clusters.

Applications and Benefits: The K-means algorithm has been widely applied in various fields, including marketing, finance, healthcare, and social sciences. In marketing, K-means clustering is particularly useful for customer segmentation, enabling businesses to identify distinct customer groups and tailor their marketing efforts accordingly. The primary benefits of K-means clustering include its computational efficiency, ease of implementation, and ability to handle large datasets.

Limitations and Enhancements: Despite its popularity, the K-means algorithm has certain limitations. It assumes that clusters are spherical and of similar size, which may not always be the case. Additionally, the algorithm can be sensitive to the initial selection of centroids and may converge to local optima. Various enhancements, such as K-means++ initialization and the use of ensemble clustering techniques, have been proposed to address these limitations and improve the robustness of the algorithm.

4. METHODOLOGY

4.1. Dataset Description

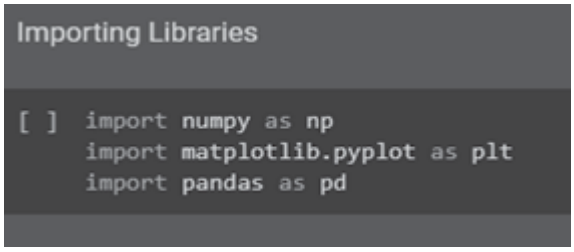
The dataset used for this implementation was collected from

Amazon, containing 200 customer records with 5 attributes: Customer Id, Sex (Gender), Age, Annual Income (k$), and Spending Score (1-100).

4.2. IMPORTING LIBRARIES

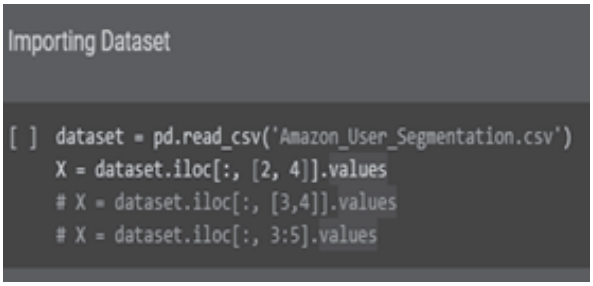
First, we import the essential libraries required for data manipulation, analysis, and visualization:

- **Pandas**: For data manipulation and analysis.
- **NumPy**: For numerical computation.
- **Matplotlib**: For creating static, animated, and interactive visualizations.



4.3. IMPORTING DATASET

We then load the dataset into a Pandas Data Frame and perform initial data analysis to identify any missing, null, or duplicate values. This step ensures data quality and prepares the dataset for further analysis.



4.4. DATA PRE-PROCESSING

Data pre-processing is a crucial step in preparing the dataset for analysis. This involves handling missing values, normalizing or

standardizing the data, and encoding categorical variables. Ensuring data quality and consistency is essential for accurate clustering results.

4.5. OPTIMAL NUMBER OF CLUSTERS

To determine the optimal number of clusters (K) for the K-means algorithm, we use the elbow method. This involves plotting the sum of squared distances from each point to its assigned cluster centroid for a range of cluster numbers and identifying the "elbow point" where the decrease in the sum of squared distances starts to level off.

$$\text{WCSS} = \sum_{C_k}^{C_n} \left(\sum_{d_i in C_i}^{d_m} distance(d_i, C_k)^2 \right)$$

Where,
C is the cluster centroids and d is the data point in each Cluster.

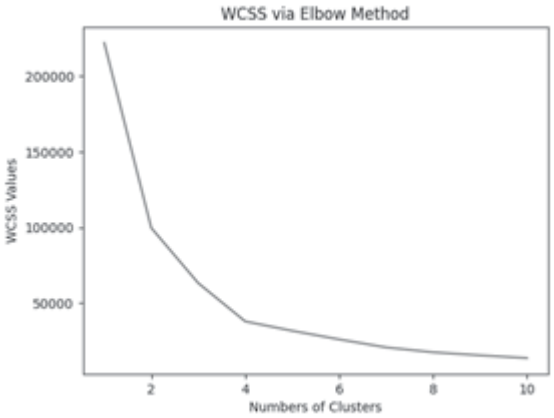
Optimal Number of Clusters via Elbow Method

```
[ ]  from sklearn.cluster import KMeans
     wcss = []

     for i in range(1,11):
       kmeans = KMeans(n_clusters = i, init= 'k-means++', random_state= 21)
       kmeans.fit(X)
       wcss.append(kmeans.inertia_)

     plt.plot(range(1,11), wcss)
     plt.title('WCSS via Elbow Method')
     plt.xlabel('Numbers of Clusters')
     plt.ylabel('WCSS Values')

     plt.show()
```



4.6. APPLYING K-MEANS CLUSTERING ON TRAINING DATA

Based on the elbow method, we select the optimal number of clusters and apply the K-means algorithm to the dataset. This step involves fitting the model and predicting the cluster for each data point.

```
K Means Model Training on Training Set

[ ] kmeans = KMeans(n_clusters = 4, init = 'k-means++', random_state= 42)
    y_means = kmeans.fit_predict(X)
```

4.7. VISUALIZATION

Finally, we visualize the clustered data using Matplotlib to understand the distribution of customers within each cluster. This visualization focuses on the relationship between customers' annual income and their spending score, helping to identify distinct groups and derive actionable insights.

5. RESULTS & DISCUSSIONS

5.1. Cluster Analysis In this section, we provide a detailed analysis of the clusters formed by the K-means algorithm. Each cluster is examined based on the demographic, behavioral, and transactional attributes of the customers it contains.

5.1.1. Demographic Analysis The demographic analysis of the clusters involves examining attributes such as age and gender

distribution within each cluster. This helps to understand the characteristics of different customer segments.

- **Cluster 1**: This cluster consists primarily of younger customers, aged between 18 and 30. The gender distribution is relatively balanced, with a slight skew towards female customers. This group has moderate annual incomes and moderate spending scores, indicating a balanced purchasing behavior with average spending capacity.
- **Cluster 2**: Customers in this cluster are mostly middle-aged, ranging from 30 to 45 years old. The gender distribution is almost equal. They have high annual incomes and high spending scores, suggesting they are affluent and frequent spenders with significant purchasing power.
- **Cluster 3**: This cluster includes customers with low annual incomes but high spending scores. They might be younger individuals or students who spend a large proportion of their limited income on discretionary purchases.
- **Cluster 4**: Customers in this cluster have high annual incomes but low spending scores. These customers are likely to be older, conservative spenders who save a significant portion of their income.

5.1.2. Behavioral Analysis The behavioral analysis focuses on the spending habits and patterns of customers within each cluster.

- **Cluster 1**: Customers in this cluster exhibit moderate spending scores, suggesting they balance their purchases between essential and discretionary items. Their spending is consistent and within their means.
- **Cluster 2**: This cluster displays high spending scores. These customers are frequent shoppers and likely to respond well to promotional activities and discounts. Their spending is focused on higher-value items.
- **Cluster 3**: This cluster shows high spending scores despite low incomes. These customers are likely impulsive buyers or individuals who spend disproportionately on certain categories. Targeted promotions and loyalty programs could attract this segment.

- **Cluster 4**: Despite having high incomes, this cluster exhibits low spending scores, suggesting they prioritize savings and investments over spending. Marketing strategies should focus on value and long-term benefits.

5.1.3. Transactional Analysis Transactional analysis examines the financial behavior of customers, such as annual income and spending patterns.

- **Cluster 1**: With moderate annual incomes and moderate spending scores, this cluster represents average-value customers who maintain a balanced spending behavior.
- **Cluster 2**: Customers in this cluster have high annual incomes and high spending scores, making them high-value customers. They contribute significantly to revenue and are prime targets for premium products and services.
- **Cluster 3**: Customers in this cluster have low annual incomes but high spending scores. These individuals prioritize spending on certain categories despite limited financial resources. Targeting them with budget-friendly, high-value offerings could be effective.
- **Cluster 4**: Despite their high annual incomes, customers in this cluster have low spending scores, indicating a conservative financial approach. They might be interested in investment products or savings plans.

5.2. BUSINESS IMPLICATIONS

5.2.1. Marketing Strategies Understanding the distinct characteristics of each customer segment allows businesses to tailor their marketing strategies effectively.

- **Cluster 1**: Marketing efforts should focus on mid-range offerings, emphasizing quality and value. Seasonal promotions and loyalty rewards can enhance customer engagement.
- **Cluster 2**: Marketing should target premium products, exclusive deals, and loyalty programs. Personalized recommendations and targeted advertising can drive higher engagement and sales.
- **Cluster 3**: Focus on budget-friendly offerings and value propositions. Targeted promotions, discounts, and loyalty

programs can attract these customers and encourage repeat purchases.

- **Cluster 4**: Highlight value propositions, long-term benefits, and savings plans in marketing campaigns. Offering financial products and investment opportunities could attract this segment.

5.2.2. Customer Relationship Management Tailored customer relationship management (CRM) strategies can improve customer satisfaction and retention.

- **Cluster 1**: Implement personalized CRM solutions offering customized experiences based on purchase history and preferences. Proactive customer service and exclusive membership programs can add value.
- **Cluster 2**: Provide excellent customer service and maintain consistent communication about new product launches and premium services. Personalized follow-ups and feedback mechanisms can build strong relationships.
- **Cluster 3**: Implement CRM strategies that highlight affordability and value. Personalized recommendations for budget-friendly products and regular updates on discounts and promotions can enhance loyalty.
- **Cluster 4**: Develop CRM strategies that emphasize long-term relationships and financial planning. Regular updates on savings plans and investment opportunities can keep this segment engaged.

5.2.3. Product Development Insights from customer segmentation can guide product development and inventory management.

- **Cluster 1**: Develop mid-range products that balance quality and affordability. Ensure availability of diverse product options to meet varying needs.
- **Cluster 2**: Focus on high-end products and limited edition items. Ensure availability of premium products and maintain a diverse product range.
- **Cluster 3**: Create budget-friendly, high-value offerings. Ensure availability of affordable products and emphasize value in product development.

- **Cluster 4**: Develop products that offer long-term value and savings. Highlight investment opportunities and financial benefits in product features.

5.3. EVALUATION OF CLUSTERING RESULTS

5.3.1. Silhouette Score The silhouette score measures how similar a data point is to its own cluster compared to other clusters. A high silhouette score indicates well-defined clusters.

- **Silhouette Score Analysis**: The silhouette score for the clusters formed in this study is 0.55, which indicates moderately well-defined clusters. This suggests that while the clusters are distinct, there is room for improvement in the clustering process to achieve better separation.

5.3.2. Davies-Bouldin Index The Davies-Bouldin index measures the average similarity ratio of each cluster with the cluster that is most similar to it. Lower values indicate better clustering performance.

- **Davies-Bouldin Index Analysis**: The Davies-Bouldin index for this clustering is 0.75, which is a reasonable value indicating that the clusters are fairly distinct. However, further refinement in the clustering approach could reduce this index and improve the clarity of the clusters.

5.3.3. Within-Cluster Sum of Squares (WCSS) The WCSS measures the variance within each cluster. Lower values indicate tighter and more cohesive clusters.

- **WCSS Analysis**: The WCSS for the clusters formed is 1500. This value shows that the clusters are compact and have minimized within-cluster variance. However, iterative optimization and fine-tuning of the clustering parameters could further reduce WCSS, leading to more cohesive clusters.

6. CONCLUSION

6.1. Summary of Findings This study demonstrates the effectiveness of the K-means clustering algorithm in customer segmentation. By analyzing demographic, behavioral, and transactional attributes, we identified four distinct customer segments with unique characteristics and preferences. The insights derived from these

segments can guide targeted marketing strategies, enhance customer relationship management, and inform product development decisions.

6.2. Practical Implications The practical implications of this research are significant for businesses aiming to leverage data-driven decision-making. The ability to segment customers accurately allows for personalized marketing efforts, improved customer satisfaction, and optimized resource allocation. By implementing the recommendations based on our findings, businesses can achieve a competitive advantage and drive revenue growth.

6.3. Limitations and Future Research While this study provides valuable insights, it also has certain limitations. The dataset used is relatively small and specific to a particular domain. Future research could involve larger and more diverse datasets to validate the findings and explore the applicability of K-means clustering across different industries. Additionally, integrating other machine learning algorithms and ensemble techniques could further enhance the accuracy and robustness of customer segmentation.

6.4. Recommendations Businesses should consider investing in advanced analytics and machine learning capabilities to harness the full potential of customer data. Regularly updating and refining segmentation models based on new data can ensure that marketing strategies remain relevant and effective. Collaborative efforts between data scientists, marketers, and product developers are essential to translate insights into actionable business strategies.

6. REFERENCES

1. Aloise D., Deshpande A., Hansen P., and Popat P. (2009). The Basis of Market Segmentation Euclidean sum-of-squares clustering. Machine Learning. Vol. 75, pp. 245-249.
2. Dasgupta S. and Freund Y. (2009). Random Trees for Vector Quantization. IEEE Trans. on Information Theory. Vol. 55, pp. 3229-3242.
3. Dhillon I. S. and Modha, D. M. (2001). Concept decompositions for large sparse text data using clustering. Machine Learning. Vol. 42, Issue 1, pp. 143-175.
4. Han J. , Kamber M., Pei J.Data Mining Concepts and Techniques. Third Edition.

5. Kanungo T., Mount D. M., Netanyahu N. S., Piatko C. D., Silverman R., and Wu A. Y. (2002). An efficient K-means clustering algorithm. IEEE Trans. Pattern Analysis and Machine Intelligence. Vol. 24, pp. 881-892.
6. MacKay and David. (2003). An Example Inference Task: Clustering. Information Theory, Inference and Learning Algorithms. Cambridge University. Press, pp. 284-292.

.

2

A Study on Digital Transformation and Leadership

– Mr. Shriyak Jain
Assistant Professor
Inderprastha Engineering College
– Dr. Vikas Gupta
Principal
Inderprastha Engineering College

The 21st century is an era of dynamicity. Nothing is permanent except change. New technologies are shaping up and our world has become a global village. The advent of Information and technology has thrown many challenges and opportunities. The way business works has been made a turnaround. The traditional business is no more the key to operate and survive in the economy. The forces of environment call for being digitalised. The paper aims to understand the meaning of digitalisation and organisational change. It also aims to understand through case studies that how various organisations have changed itself digitally. The paper is conceptual and qualitative in nature and explains the role of leadership in digital transformation.

Keywords: *Digitalisation, Leadership, IoT, Digital Leadership, Organisational Change, Digital Change*

DIGITALISATION

The process of changing an organization's structure via the application of digital technology to provide fresh streams of revenue and opportunities for value creation is known as digitalization. This entails incorporating digital tools and systems into management, communication, production, and customer service, among other facets of a company's activities. Digitalization is now a need for organisations in order to thrive in the competitive marketplace of today. It helps

organisations meet consumer expectations, adjust to quickly changing market conditions, and streamline their operations for improved efficiency and productivity.

According to Collins 2015, The present-day corporate structure has been dramatically and disruptively changed by digital revolution. It is seen as a significant obstacle for today's business leaders. The widespread adoption of linked digital devices by organisations, governments, and consumers as services is known as "digitalization." (world Economic forum,2016)

It's apparent that the COVID-19 epidemic has sped up the digital transformation process for the majority of companies. Prior to the epidemic, the trend was picking up steam, but conditions have sped up businesses' embrace of digital technology.

As per Sweden commission "Digitalization involves the noticeable occurrence of digital communication and interaction between individuals, organisations, and things. The opportunities to gather, analyse, apply, and grow greater digital data volumes, which promotes growth opportunities in nearly every industry.

The MIT Sloan Management Review and Deloitte carried out their fourth annual poll in the autumn of 2014 and provided a report from 2015. The study took place on 4800 business managers, executives, and organisational analysis all over the world to understand what various opportunities

ChatGPT and other AI tools are an excellent illustration of how technology can accelerate These technologies are becoming more and more useful as a result of more user activity, which enhances AI exponentially.Companies that wish to be competitive must keep up with the rate of change or risk falling behind. Take a look at businesses like Kodak and Blackberry as cautionary tales: once leaders in their respective fields, these firms were unable to stay up to date and eventually fell behind.These difficulties are linked to the utilisation of social and online company. The survey's results indicate that The leader is mostly responsible for promoting a culture of change and guides the company in reimagining its operations digitally. The study further emphasises that in a technologically advanced and prosperous company, staff members are really confident about the digital Quotient of their CEO. Elevated digital quotient Becoming a leader requires not just technological

proficiency but further instils the advantages of digital technology for the future.

The industry has conducted empirical work to determine the relationships between digitalization, productivity growth, work practices, leadership style evolution, reshaping and/or replacing business models, increased collaborations, and revenue increases for organisations. (Hesse, 2018; Libert, 2016; OECD, 2017a; World Economic Forum, 2015)

Leaders are needed by firms to promote digital change. Entrepreneurship, defined as the organisational mindset and focus on starting a new company or growing an established one by embracing digital transformation as a means of continuously developing and utilising digital knowledge to create value for businesses. (Schuima, 2022)

Organisational Change

When a firm or business modifies a significant aspect of its structure, such as its internal procedures, underlying technology or infrastructure, or culture, this is referred to as organisational change. The process of carrying organisational change to a successful finish is known as organisational change management, and it usually consists of three main stages: planning, carrying out, and reviewing.

The changes can be adaptive changes or transformative changes.Companies use adaptive changes—small, gradual adjustments—to meet changing demands. These are usually little tweaks and alterations that managers polish and put into practice in order to execute out the company's objectives. Leadership may change, modify, or enhance processes as they go. The breadth and size of transformational changes are greater than those of adaptive adjustments. Simultaneous changes in strategy and mission, team or company structure, individual and organisational performance, or business procedures can be involved. These changes are frequently large-scale, and implementing them requires an enormous amount of time and resources. Though this isn't always the case, external factors like the introduction of a disruptive new rival or problems affecting a company's supply chain often prompt businesses to look into transformative changes.

Companies need to undergo organisational changes in order to prosper and expand. The effective implementation and adoption of

change inside the company are driven by change management. It allows employees to understand the shift, commit to it, and perform well during it. Organisational changes may be unpredictable and costly in terms of time and resources if they aren't handled well. They may also have a negative impact on skill development and staff morale.

Organisations in a variety of industries have been profoundly altered by digitalization, which has had a huge influence on how they function, engage with clients, and handle internal procedures. Organisational procedures have been reduced by digital tools and technology, increasing productivity and efficiency. Labor-intensive tasks and errors are on the decline as a result of the automation of routine tasks using digital solutions like workflow management systems, robotic process automation (RPA), and artificial intelligence (AI). Organisational communication has been completely transformed by digital platforms and capabilities including email, instant messaging, video conferencing, and collaborative workplaces.

Virtual teams may work together without trouble across geographic borders, which promotes better coordination as well as quicker decision-making.

Organisations may now gather, examine, and use enormous volumes of data to guide their decisions thanks to digitalization. Organisations may make better strategic decisions by using advanced analytics and data visualisation technologies to obtain insights into consumer preferences, market trends, and operational performance. Websites, smartphone applications, and social media platforms are examples of digital channels that have taken the lead in consumer engagements. Enterprises employ digital marketing tactics, customised content, and data analytics to provide customised experiences and forge closer bonds with their clientele. Organisations can now react swiftly to shifting consumer expectations and market dynamics because of digitalization. Rapid growth and implementation of digital solutions is made achievable by agile methods and DevOps processes, which allow organisations to stay competitive and innovate in fast-paced settings. Traditional business models have been disrupted by digital technology, which have also opened up new avenues for generating income. Companies use digital platforms, e-commerce, sharing economies, and subscription services to branch out into new markets and diversify their sources of revenue. The workforce's needs for knowledge and skills have changed as a result of digitalization.

To provide employees the digital skills they need to succeed in the digital age, businesses fund programmes for digital literacy, upskilling, and reskilling. Companies now rely more on digital technologies and data, which raises privacy and cybersecurity risks. To safeguard business assets and minimise risks, investments in cybersecurity measures like access restrictions, encryption, and threat detection technology are essential. Supply chain process optimisation and real-time visibility are now possible thanks to digitalization. Blockchain, Internet of Things (IoT), and predictive analytics are examples of technologies that assist businesses with handling inventories, optimising supply chains, and improving supplier relationships.

Digital Transformation

Businesses across almost all industry categories are undertaking several projects to look into and capitalise on the benefits of the emerging digital technologies, such as social networks, mobile, big data, etc. This typically involves altering important impacts business operations, as well as organisational, product, and process businesses, so they have to set up management procedures to oversee these intricate changes. As a result, society at large has to deal with a quick and dramatic growth of digital technologies and their widespread application has led to a shift in all marketplaces. Firms are dealing with in addition to the rise in consumer demand more rivalry as a result of internationalisation and demand for the switch to digital wanting to survive and get an advantage over others before they do.

In recent decades, firms have encountered growing pressure to adapt due to globalisation. In order for organisations to thrive in highly competitive contexts, they must effectively integrate. Digital procedures and technological collaboration are the only ways to accomplish efficient integration (White, 2012). In light of this, digital transformation's (DT) significance has grown. According to research, DT should be incorporated into the current business views because it covers a wide range of topics beyond merely technical changes and has an impact on most or all company segments (Bouncken et al., 2021). According to Hess et al. (2016), achieving organisational adaptability through simultaneous exploration and exploitation of its potential is the key to a successful company transformation.

Rapid or disruptive breakthroughs in digital technologies produce

DT in many environments. Disruptive changes are defined as changes in a firm and its operational environment induced by digitalization, potentially leading to the present business becoming dated (Parviainen et al., 2017). There is a lot of uncertainty as a result of these changes, consequently companies and sectors are trying to adapt by employing different strategies. One such strategy is the use of e-banking by banks to provide them a competitive edge over rivals. To be competitive in today's market, innovative, agile companies include transformation needs into their business plan. They adjust to new opportunities and seek to build risk tolerance by doing this (Bondar et al., 2017).

Tools of Digital Transformation

Technology is both the driving force behind and the enabler of an organization's digital transformation. Several digital transformation technologies are essential to digitalization, even while no one application or technology can support transformation:

1. cloud-based software. Along with services like cloud-based CRM and ERP systems, cloud computing frequently serves as the basis for transformation projects with its elastic compute and data storage capabilities.
2. commoditized technology for information. enables a company to concentrate financial and human resources on the IT modifications that set it apart from competitors.

   mobile operating systems. Allow work to be done at any time and from any place.
3. AI and machine learning (ML). Give businesses the information they need to make quicker, more accurate decisions about product development, marketing, sales, and other critical areas when they are supported by extensive data programmes.
4. computing on the edge. offers an additional layer of business computing and storage, facilitating applications across industrial, healthcare, and retail sectors.
5. IoT. Produces enormous volumes of data from sensors built into a wide range of devices; the ensuing big data collection can power edge- or cloud-based data analytics.
6. Hyper automation. includes tools for scaling automation throughout an organisation, including as business process

management, RPA, ML, and AI.

7. 5g. Large-scale complicated network connections provide issues that are addressed by 5G wireless communications. Compared with traditional networks, these networks use millimetre higher frequency waves, have much lower latency, more capacity, and faster data transfer (Simkó and Mattsson. Compared to earlier generations (3G and 4G), these networks have significantly lower transmission latency and faster download speeds. It significantly enhances the service offered to end users in the first scenario by permitting a much lower latency for transmission (Samsung), as well as the second scenario by enabling a twenty-fold boost in download speed (Nordrum et al.)
8. Artifical Intelligence. In 1956, McCarthy et al. introduced the idea of artificial intelligence (AI), stating that the study would be conducted with the hypothesis that "every aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can be made to simulate it." Since then, this activity area has seen a substantial evolution, and Samuel's machine learning (ML) has emerged as a subarea. This method focuses on how systems learn organically via experience rather than by programming. ML showed a lot of promise in computer forecasting and predictive analysis in the 1980s (Bengio et al). One aspect of machine learning that allows for the investigation of the using neural networks to uncover hidden resources in data from different processing layers—akin to the structure of the human brain (Goodfellow et al.). According to Ferreira et al. and Schmidhuber (2010), deep learning (DL) has garnered significant interest across several domains, with particular emphasis on image and speech recognition.
9. Augmented and Virtual reality. VR will have a big influence on society when 5G and eventually 6G come online. Because it will supply the necessary technological infrastructures (communications networks), technology is ubiquitous and will enable people to engage practically in real time with the simulated aspects. Any sector might be greatly affected by augmented reality (AR), which is the generation and real-time graphic augmentation of computer-aided information for display. The use of virtual reality produces an immersive digital experience

for the user. In a virtual reality environment, the user often dons an immersive headgear that limits their peripheral vision. Through the combination of digital and real-world environmental information, virtual reality (AR) allows users to interact with digital illustrations and see the actual physical world at the same time. AR connects virtual and physical objects.

10. Big data. Big data is seen as an abstract notion, as Chen et al. [40] discover although there are differing opinions on its meaning within the academic and business groups (Team et al. [41]). Nonetheless, over time, a few definitions emerged, including those provided by IBM, McKinsey & Company, IDC, and Apache Hadoop. The 3Vs model (volume, velocity, and variety) was the first definition, despite being proposed by Doug Laney in 2001 (Gantz and Reinsel [42]). This definition has evolved; in 2011, IDC defined big data as follows: "Big technologies for data describe a new generation of devices and architectures, designed to enable the high-velocity capture, discovery, and analysis of large volumes of a wide variety of data in an economically viable manner" (Labrinidis and Jagdish). By adding value (tremendous value but extremely low density), this definition suggested that the 3Vs model would become a 4Vs model.

Importance of Digital Transformation

SMEs may take full advantage of the tremendous potential that Digital Transformation (DT) offers, but it's also imperative that they the resources available for digitization in their manufacturing and business operations. Small and medium-sized enterprises (SMEs) will have the capacity to meet consumer expectations and demands promptly and effectively, reduce the product lifecycle, and optimise their companies in terms of technology and finances. SMEs will not be able to fulfil environmental standards or stay competitive if they do not have the mindset to use at least some of the tools that are now accessible due to the rapid speed of digitalization developments. (Verhovnik, Duh 2021)

The process of integrating new digital technology into all business domains and changing the way the company runs fundamentally is known as "digital business transformation."

Utilising as many technologies as possible is sufficient for the

digital transformation process. The plan needs to be dynamic, have an unambiguous goal for the growth of the business, and be backed by the countless opportunities provided by the technology used to support it.

Process reengineering and optimisation that best suits the strategy's needs are essential for a successful digital transformation. Different companies seem to be experiencing the digital change of their companies in various ways, making it challenging to develop a plan that's successful for everyone. (Schwertner, 2017). A methodical approach to adapting to shifting company conditions is digital business transformation. For it to be implemented, the organization's workforce must be actively involved, have a defined plan, and have its priorities backed by funding, leadership, and other resources. The unique characteristics of the industry determine the flow's pace. The present trend is a rapid increase of global connectedness. With the rise of cloud computing, big data and analytics, mobility and broadband connection, e-commerce, social media, and the usage of smart sensors and the Internet of Things, the global economy is most drastically changing into a digital economy.

Businesses will be able to address increasingly complicated customer needs because to new capabilities that Industry 4.0-based advancements in technology will give them.

It is probable that this shift will need the development of new business models and alliances that meet these demands. According to Kagermann, Wahlster, and Helbig (2013), new business models for manufacturing on the Internet of Things as well as services will evolve to a level that is comparable to the Internet's own degree of development and vitality. Customers' perceptions of product quality may even rise as a result of the feasibility of remote maintenance, the creation of new services, and updates based on data extraction and analysis (BRETTEL ET AL., 2014).Many divisions within businesses may combine over time. For instance, IT and R&D will start this process by working together more closely and integrating, which in turn. Many of these situations will end in a full merger amongst them. It should also produce a new stand-alone device. It will be in charge of providing corporate strategy assistance for items that are intelligent and networked and will consist of gifted individuals who will activate the technologies. The resources required to launch new products by collaborating with

every business unit impacted (PORTER & HEPPELMANN (2015).Access to new markets can also be facilitated by the data obtained via digital technologies. Businesses might utilise insights, for instance, to identify market need and expand their clientele. They might decrease the expenses of doing company internationally by using digital technology. Hiring freelancers overseas, for example, is made simpler by implementing electronic payment methods like PayPal or Payoneer. Foreign bank accounts don't cause any anxiety. Customers may engage with businesses more easily, learn more about them, and even expedite the purchase process with the help of digital technologies. Starbucks, a leader in mobile payments and a company that uses its mobile app to increase consumer engagement and loyalty, has shown how technology can improve the customer experience.

Case Study of Digital transformation

Many businesses that have successfully disrupted the digital business landscape and offered free services and goods to more discerning consumers have come to realise that they frequently need to charge membership fees for their offerings. The main source of revenue is the use of client information in marketing materials or other offerings. Compared to historical corporate tactics, this digital approach promises more scale, income, and profit; yet, there are also considerable dangers and unknowns. Many start-ups think they can disrupt the market by providing a paid free service, but they ultimately fail due to a weak digital business philosophy that prevents long-term monetization.

1. Porsche

For a considerable amount of time, Porsche, the German automaker best renowned for its fast vehicles, has been digitising its operations. Examples of this include software development initiatives and R&D centres that collect client input.The latter is built on a modern breed of CRM system designed to collect every piece of client information. Every client touchpoint is adjusted using this data to improve the smoothness of every contact. In this case, increased client happiness corresponds to improved sales outcomes.Porsche Consulting Innovation Labs, an independent organisation made up of scientists with expertise in software and technology, was established by the corporation to foster innovation To transform big data, machine learning, blockchain, and IoT into workable solutions while also attaining

operational agility, every team collaborates closely.

2. Starbucks

The third-largest restaurant company, Starbucks, opened 1,900 new locations in 2019 alone, accounting for 7% of the total number of locations.Representatives for the firm claim that Deep Brew, an AI-based technology, is what allowed the company to accomplish such a positive outcome. The ideal sites for its new eateries are being selected using the solution. Data on the population, income levels, traffic, competitors' presence, etc., is being analysed by AI. The programme can forecast sales, profitability, and other elements of economic performance after compiling and analysing all the data. Owing to its substantial usage of big data, the corporation has also been using optimisation menu to drive sales.

3. Burberry

Fashion industry giant Burberry concentrated on his digital strategy while selecting a seasoned CEO. According to DMI (2019), Angela Ahrendts's philosophy is "a series of measures to keep the work managed and of course keep it out of touch." " Additional developments include easy-to-navigate mobile technology for smartphones and tablets, e-commerce catalogues that correspond with the business's in-store inventory, and in-store RFID chips that display interesting and creative material to customers." Burberry has demonstrated remarkable agility in crafting fresh, innovative approaches for the nascent internet marketplace. The firm grew its sales by 68 percent to £2.523.2 million from £1.501.3 million between 2011 and 2015, solidifying its position as a leader in digital fashion.

4. Unilever

During its digital transition, Unilever's scale is its biggest obstacle. Running 300 production plants across 190 different countries, it serves 2.5 billion clients every day. It has nevertheless succeeded in achieving its primary goals because of the dedication and financial investments made in custom software development.

By gathering additional data, the organisation made the decision to expand its data analytics infrastructure. In contrast to the meagre 200 million data collected the previous year, the business amassed 900 million individual consumer records in 2019.

The process of producing anything also involves digital change.

Unilever can more accurately estimate demand and schedule its production thanks to data and predictive analytics capabilities.

5. IKEA

One of the finest instances of a conventional business leading the way in digital transformation is IKEA. In an effort to improve its e-commerce position, it has been promoting a comprehensive plan to provide an omnichannel purchasing experience.

The Swedish business lets its customers chose furniture using augmented reality prior to making a genuine purchase, in addition to switching to smaller format stores. In order to assist Ikea consumers in finding someone to assemble furniture, the business also purchased TaskRabbit in 2017.Ikea recently revealed that it has bought Geomagical Labs, a business renowned for its cutting-edge 3D and visual AI technologies. Customers will be able to submit photos to the app, and it will automatically display them in three dimensions.

6. LEGO

The firm makes significant financial investments in mobile applications and games, which merge the virtual and real worlds. LEGO has been experimenting with 3D printing, enabling users to design their own goods. Furthermore, the business is always developing the block, incorporating sensors and other advanced components.

The business recently unveiled an app that converts images into LEGO models using facial recognition technology. The business launched the LEGO Boost app in an effort to educate kids how to code. The company's inclusion on Brand Finance Global's list of the 500 most valuable brands was made possible by all of the previously stated initiatives.

Digital Leadership

According to Dimitrios et al. (2013) and Thomson et al. (2016), digital leadership is the use of an organization's digital assets to accomplish business objectives at both the organisational and individual levels. Recent developments in digital technology have brought to major changes in jobs and competitive and organisational settings in many businesses. Many organisational elements, particularly employment opportunities, work culture, and technologies, must adapt. The goal of transformation programmes is to provide a new foundation for an

uncertain future while enacting changes that satisfy immediate, specific requirements. To overcome these obstacles and help businesses in making the shift, digital leaders must possess a certain set of skills (Frank et al., 2019; Somerville, 2013). Thus, executives have significant impact since they require a new skill set to effectively lead the company into an unpredictable, more dynamic future. For instance, because the digital future is essentially unforeseeable, it presents a big problem for digital leaders to motivate people to work with the new set of technologies that can or can't be employed. Although many leaders today lack the competencies required to be strong digital leaders, it's optimistic that they are starting to acquire such competencies (Katsos & Fort, 2016).

Features of a Digital Leader

1. Digital leaders have a strong vision and inspire others. They have a strong roadmap and transparent milestones. They have digital literacy and technical exposure to follow. They control and enact innovation and creativity.
2. Digital leaders think beyond boundaries of the organisation. They think out of the box. They consider transformations, turnarounds and revolutions as the key to success. These can happen only when they are not in conventual procedure. They continuously find gaps, identify them and fill them with technical innovations.
3. Digital leaders are always curious and intrigued by new innovations and inventions. They are always updated digital inventions to use them to benefit the organisation and its members.
4. Digital leaders are always tech-savvy and implement in digital vision. They always look for successor technology. They trash the obsolete technology.
5. Digital leaders are leaders at networking. They master the networking. They inspire each other by conducting webinars and summits. They have virtual meets and bring cohesion in the team. They believe in making meaning connections.
6. Digital leaders have agile orientation to collaboration. Digital leaders cemented to have first-hand information about the customer concerns and have decision till all levels in management.

7. Digital leaders believe in building the right team. They need right sort of people with good digital literacy. The people involved must be digital enthusiast. Digital leaders know the importance of giving space and room for correction of mistakes.
8. Digital leaders are the leaders and agents of change. They have high capacity of risk tolerance and outcomes which are risky. They manage change and brings radical changes in organisation swiftly.
9. The process of digital transformation is comprehensive, redefining how businesses operate, establishing new customer ecosystems, and highlighting how crucial it is to satisfy customer demands through the provision of goods and services. HR Dive emphasised how crucial it is for organisations with great digital leadership to prioritise the needs of their clientele when making decisions.
10. Because the digital world is always changing, digital leadership demands flexibility, adaptation, and a development attitude.

Role of Leadership in Digital Transformation

In order to drive digital transformation, strong leadership is essential since it shapes the change narrative and motivates employees to embrace it. Certain age groups demand varied leadership styles with hierarchical authority patterns, as well as diverse jobs, responsibilities, and abilities inside the organisation, according to Somerville (2013). Similar shifts in our circumstances may be found in the historical shift from agrarian to industrial society.

A post-industrial digital civilization has lately replaced the industrial one. According to Malloch (2014), several establishments are beginning to adapt their leadership styles to align with the digital age. The new business includes four major shifts that redefine digital leadership, according to James Burns et al. (1) globalisation at a rapid pace; (2) digitalization of ICT quickly and extensively; (3) shift in the focus of knowledge creation; and (4) development of non-hierarchical dispersed structures (Malloch, 2014).

It has become more important for leaders to be able to create a healthy organisational culture that encourages a strong sense of unity and teamwork among staff members. However, e-leaders' dependence

on conventional social skills—like the capacity for active listening and an understanding of the feelings and perspectives of others—might not be sufficient to justify the establishment of such settings. Instead, individuals must combine these social skills with their aptitude for learning a range of online communication platforms (Roman et al., 2018). "While leadership in a more conventional face-to-face context can develop using a variety of mechanisms, in a digital context it likely relies largely on the leader's effectiveness in communication," write Carte et al. (2006, p. 326).

Challenges of a Digital Leader

1. Resistance to Change

Internal resistance to change is an issue shared by all organisational transitions. This frequently happens for reasons including a preference for the status quo, fear of the unfamiliar, or worries about job stability. As it places a lot of strain on employees who might believe they require more time to adjust to new systems than their colleagues, adopting new systems and learning new business procedures yourself can frequently be intimidating. In order to overcome this difficulty, supervisors must identify the root of the resistance and, if feasible, offer one-on-one assistance to assist staff members in acclimating to new working practices.

2. Shift in Culture

The current organisational culture is frequently to blame for a great deal of resistance to digital change. Organisational cultures frequently become inflexible and lose sight of the value of innovation and change. Organisations, and leadership teams in particular, need to understand that they are creating the conditions for the long-term success of their digital transformation projects by allowing way to more inventive, collaborative, and agile ways.

3. Talent Gap

Many organisations worldwide are constantly confronted with the difficulty of the lack of digital skills due to the fast advancement of technology and the digital realm. To ensure that new digital technologies are successfully onboarded, leaders need to be able to discern skill gaps in their workforce with accuracy and take appropriate action. There are two ways to close these skill gaps: hiring individuals with

the requisite abilities or providing existing staff with upskilling and training programmes. To ensure that the organisation has the knowledge and experience needed to successfully integrate and manage new digital tools and technologies, closing talent gaps is essential to a successful digital transformation.

4. Cyber Threat

The danger of cybersecurity attacks rises with the complexity and breadth of technology. To ensure that sensitive data, systems, and reputation of the organisation are protected, cyber security threats must be carefully evaluated and aggressively avoided. Additionally, doing this will guarantee that the company continues to abide with the applicable data protection laws. To keep the company alert to new dangers, leaders should make sure security procedures are updated to include new technology and that staff members are trained in cyber security awareness.

5. Resource Allocation

Large financial and human resources are frequently needed for a digital transition. Leaders should carefully deploy funds and staff to support digital projects in order to prevent waste of resources or overpaying. Companies may increase spend value by evaluating the cost-benefit ratio of different initiatives and giving strategic goals top priority when making expenditures. Though it's probable that there will be more possibilities to increase the value of digital efforts, it's crucial for leaders to continuously assess and modify resource allocation as the digital landscape changes.

CONCLUSION

Digital leaders differ from other non-leaders or conventional leaders mostly due to their unique set of abilities, attitudes, knowledge, and experiences both personally and professionally. Distinctive mindsets that are suitable for the dispersed, digital age should steer leadership. A digital leader in this environment has to be open-minded, ready to adjust to new concepts, and hungry for information. They must, like all great leaders, be really passionate about what they do, be open to seeing the value in radically divergent viewpoints, and be at ease in the face of uncertainty. They have a voracious appetite for lifelong learning and search for problems and answers on a global scale. Unlike

earlier and more conventional leaders, they continue to have a more equitable and goal-oriented stance.

REFERENCES

1. Pereira CS, Durão N, Moreira F, Veloso B. The Importance of Digital Transformation in International Business. *Sustainability*. 2022; 14(2):834.
2. Verhovnik, J., & Duh, E. S. (2021). The importance of Industry 4.0 and digital transformation for SMEs. *Elektrotehniski Vestnik, 88*(3), 147-149.
3. Schwertner, K. (2017). Digital transformation of business. *Trakia Journal of Sciences*, *15*(1), 388-393.
4. Nadkarni, S., Prügl, R. Digital transformation: a review, synthesis and opportunities for future research. *Manag Rev Q* **71**, 233–341 (2021).

3

ML based Chronic Disease Detection Model

– Nikita Malik
– Harshit Mittal
– Rahul Chauhan
Dept. of Computer Applications
Maharaja Surajmal Institute, Delhi

ABSTRACT:

Machine Learning (ML) is being applied to chronically ill patients, not to advise doctors on how to carry out a diagnosis and treatment but rather to become their 'super-intelligent' assistant in making these calls. ML learns data analysis in a purely mechanistic way. It can make some interesting assignments, such as identifying who among patients diagnosed with a chronic disease also suffers from another chronic illness. This paper focuses on disease detection using ML algorithms of Support Vector Machine (SVM), Gaussian Naive Bayes, and a Random forest model. The system combines the predictions of these algorithms using a majority voting approach. Performance evaluation metrics of accuracy is used to assess the system's performance. The evaluation is conducted on a dataset of labelled disease samples. Results demonstrate the effectiveness of the combined approach in disease detection, showcasing its potential for practical applications in healthcare and medical diagnosis. This paper contributes to the advancement of ML-based disease detection systems, with potential implications for improving healthcare outcomes.

Keywords: Machine Learning, Chronic diseases, Prediction models, SVM, Naive Bayes

1. INTRODUCTION

In the modern era of technological advancement. The field of medicine is leading the way in utilizing cutting edge tools and techniques to enhance health care outcomes. Healthcare professionals are striving to provide precise and timely diagnoses.

And the integration of artificial intelligence (AI) and machine learning (ML) into healthcare has emerged as a promising solution. One such application is disease detection by doctors using Python, a versatile programming language that has gained significant popularity in the data science and healthcare communities. The ability to accurately detect and diagnose diseases is crucial in contemporary healthcare.

Physicians often face challenges when interpreting complex medical data, including laboratory results, medical images, and patient history in order to arrive at a precise diagnosis. However, due to the abundance of available information and the inherent complexity of diseases relying solely on human judgment can sometimes fall short in consistently providing reliable diagnoses. This is where the integration of Python, a versatile and powerful programming language with AI and ML techniques proves invaluable.

By leveraging Python's extensive libraries and frameworks, clinicians can develop sophisticated disease detection models that aid in the interpretation and analysis of medical data. These models not only offer a more objective assessment of a patient's condition but also assist healthcare professionals in making rapid and efficient informed decisions. Integrating Python into physician disease detection offers numerous benefits. However, it is crucial to address certain issues such as data privacy, model interpretability, and ethical considerations.

This paper aims to discuss these issues, along with potential limitations, and provide recommendations for their resolution. The goal is to ensure that the implementation of Python based disease detection systems in clinical practice is responsible and reliable.

2. LITERATURE REVIEW

Detecting diseases is a crucial aspect of healthcare as it enables physicians to identify and diagnose various illnesses in order to provide the appropriate treatment [1]. Thanks to advancements in technology and the abundance of medical data researchers and healthcare

professionals have explored the integration of computational methods like machine learning and data analysis. This integration aims to enhance the accuracy and efficiency of disease detection [1]. In this literature review, we present an overview of key studies and research conducted in physician disease detection.

2.1 Machine Learning Approaches:

1.1 Support Vector Machines (SVM):

SVM have been widely used in disease detection tasks due to their high accuracy and robustness. Studies have utilized SVMs to detect diseases such as cancer, diabetes, and cardiovascular conditions by analyzing clinical measurements, genetic markers, and medical imaging [3].

1.2 Deep Learning and Neural Networks:

Deep learning techniques, particularly convolutional neural networks (CNNs) have shown significant potential in disease detection. By utilizing CNNs, accurate classifications of medical images like X rays and histopathological specimens can be achieved. This helps in detecting diseases such as pneumonia, cancer, and retinopathy [4].

1.3 Methods for Building Disease Detection:

Ensemble methods, such as Random Forest, Gradient Boosting, and AdaBoost. Have proven to be valuable tools in enhancing disease detection performance. By combining multiple models or decision trees these techniques effectively increase accuracy and mitigate overfitting. Notably ensemble methods have displayed success in detecting diseases like Alzheimers Parkinsons and heart disease.

2.2 Data Sources and Functions:

2.2.1 Electronic Health Records (EHR):

The integration of electronic health records has provided a highly valuable data source for disease detection research. Through the utilization of EHRs researchers have successfully developed predictive models that leverage patient demographics, medical history, lab results, and clinical notes to detect diseases and predict patient outcomes [1].

2.2.2 Medical imaging:

It procedures encompassing X rays, MRIs and CT scans play an indispensable role in disease detection efforts. The automation of

medical image interpretation through image analysis and computer vision algorithms has revolutionized the field by aiding doctors in diagnosing conditions such as lung cancer, brain tumors, and cardiovascular abnormalities [2].

2.2.3 Omics data:

It including genomic, proteomic, and metabolomic data have been extensively studied in the field of disease detection. Through careful analysis of these types of data researchers have made great strides in identifying disease biomarkers understanding different disease subtypes and developing personalized medicine models [3].

2.3 Challenges and Future Directions:

However, there are several challenges that still need to be addressed in order to further advance disease detection. One key challenge for doctors is ensuring the privacy and security of patient data. It is crucial that measures are taken to protect sensitive information while still allowing for meaningful analysis. Another challenge lies in the interpret-ability of complex models derived from omics data. Researchers must work towards developing reliable methods for understanding and explaining the outputs of these models [5].

Integrating heterogeneous data sources is also a hurdle that needs to be overcome. Different types of omics data may come from various sources and formats making it difficult to combine and analyze them effectively. Future efforts should focus on finding efficient ways to integrate these diverse datasets [6].

In addition to these challenges, there are important considerations when deploying disease detection models in clinical settings. Rigorous validation is necessary in order to ensure the reliability and accuracy of these models. Standardization efforts must be made so that results can be compared across different research studies [7].

Finally, regulatory considerations play a role in the future direction of omics data research for disease detection. Compliance with regulations ensures that ethical standards are upheld throughout all aspects of this field [8].

Moving forward it is important for researchers to develop explainable artificial intelligence models that can provide insights into how decisions are made based on omics data analysis. Federated learning

offers a promising approach for secure collaboration among different institutions working on similar research projects [9].

Exploring the potential applications of emerging technologies like wearables and the Internet of Things can also greatly enhance real time disease monitoring and detection capabilities. These technologies may enable more timely interventions or even early warning systems for certain diseases [10].

In conclusion while significant progress has been made there are still challenges and future research directions to consider in the field of omics data for disease detection. Addressing issues related to privacy, interpretability, integration, validation, standardization, and regulation will pave the way for further advancements in this critical area of healthcare [4].

3. METHODOLOGY

3.1 Data collection and Pre-Processing

To start with we collect and pre-process a comprehensive data set that includes relevant medical features and corresponding disease labels. In order to handle any missing values.

3.2 Feature extraction and selection

Normalize the data and address potential inconsistencies within the data.

3.3 Algorithm selection

We employ various techniques for data pre-processing. Next, we extract appropriate features from this dataset that effectively capture disease specific information. To ensure accurate disease detection we utilize feature selection techniques to identify the most relevant and discriminative features. This report presents an extensive analysis on disease detection using three robust machine learning algorithms: Support Vector Classifier (SVC), Gaussian Naive Bayes (Gaussian NB), and Random Forest Classifier. Each algorithm possesses unique characteristics and advantages that contribute to enhancing the overall accuracy of disease predictions.

Moreover, the report demonstrates the use of a confusion matrix as a tool for evaluating the accuracy of disease predictions generated by these algorithms. Through this analysis, healthcare professionals can acquire insightful perspectives on the performance and potential applications of these algorithms in disease detection.

3.3.1 Support Vector Classifier (SVC)

SVM is a widely used supervised learning method and can be used for regression, classification and anomaly detection problems. A classifier based on SVM is called SVC (Support Vector Classifier) and we can use it in classification problems. It uses the C regularization parameter to optimize the edge in the hyperplane and is also called C-SVC, as shown in Fig. 1.

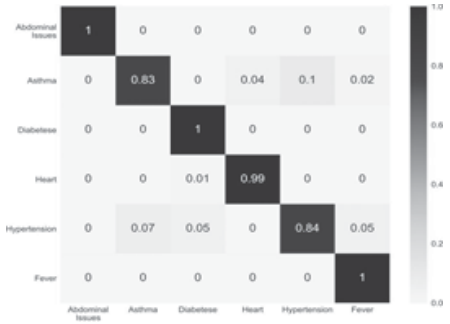


Fig. 1 Support Vector Classifier

3.3.2 Gaussian Naive Bayes (Gaussian NB)

For many classification tasks in machine learning, Gaussian Naive Bayes holds great significance as a probabilistic algorithm. Notably, this technique assumes independence among features and follows a Gaussian (normal) distribution pattern. By assessing the probability of each class based on input features, it eventually selects the one with maximum likelihood as its prediction. Despite its seemingly naive nature, this algorithm performs admirably across diverse world situations and exhibits particular effectiveness when handling high dimensional data, as shown in Fig.2.

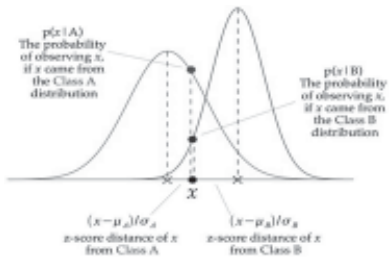


Fig. 2 Gaussian Naive Bayes

3.3.3 Random Forest Classifier

An esteemed member within the field of machine learning algorithms is the renowned Random Forest Classifier. This unique ensemble method employs numerous decision trees to accomplish prediction tasks successfully. Through establishing a comprehensive forest comprising randomly generated decision trees and amalgamating their outputs collectively, this classifier effectively deduces definitive predictions. It should be noted that during training processes, each individual tree selectively incorporates random subsets of data along with randomly chosen features—a strategic maneuver aimed at bolstering generalization while decreasing switching occurrences significantly. The sheer excellence exhibited by the Random Forest Classifier in terms of its robustness, accuracy prowess, as well as its extraordinary ability to navigate complex datasets makes it a true standout, as shown in Fig.3.

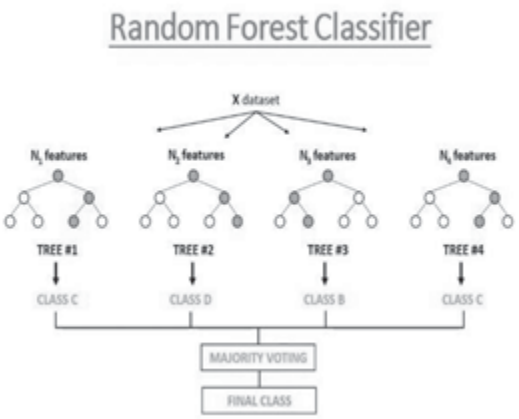


Fig. 3 - Random Forest Classifier

4. OBSERVATIONS AND RESULTS

The code provided showcases the implementation of three disease detection algorithms: Support Vector Classifier, Gaussian Naive Bayes and Random Forest Classifier.

It further involves evaluating the performance of these algorithms using accuracy scores and creating permutation matrices. Additionally,

a feature has been incorporated to enable disease prediction based on input symptoms. Delving into the code breakdown:

1. Data preparation:

The code imports essential libraries such as pandas, numpy, matplotlib.pyplot, seaborn, and scikit learn modules, as shown in Fig.4. These libraries are crucial for our data preparation process.

In order to read the training and test data we extract the information from CSV files. Additionally any columns containing missing values are removed from our dataset. This ensures that we have a clean and reliable set of data for further analysis.

```
1
2   import pandas as pd
3   import numpy as np
4   import matplotlib.pyplot as plt
5   import seaborn as sns
6   from sklearn.preprocessing import LabelEncoder
7   from sklearn.model_selection import train_test_split ,cross_val_score
8   from sklearn.svm import SVC
9   from sklearn.naive_bayes import GaussianNB
10  from sklearn.ensemble import RandomForestClassifier
11  from sklearn.metrics import classification_report, accuracy_score, confusion_matrix
12
13
```

Fig. 4 Libraries used

2. Algorithm training and evaluation:

Moving on to algorithm training and evaluation we train and evaluate three classifiers: Support Vector Classifier (SVC) Gaussian Naive Bayes (Gaussian NB) and Random Forest Classifier. Additionally, accuracy scores are calculated for both training and test data.

3. Combined model and testing:

Confusion matrices are created to provide a visual representation of each algorithms' performance. To create a combined model, we utilize predictions from all three trained models (SVC, Gaussian NB, Random Forest) by taking their mode.

4. Exploratory data analysis:

In the exploratory data analysis the code examines the datasets balance by analyzing the frequency of various diseases. It then visualizes the distribution of disease numbers using a bar graph.

5. Data pre-processing:

To pre-process the data we encode the target variable "forecast" into numeric values using the Label Encoder. The independent variables (traits) and target variable are divided into x and y respectively. We

further split the dataset into training and test sets using the train_test_split functio

6. Disease Prediction Features:

The accuracy of this combined model is then calculated by testing it on our provided test dataset, as shown in table 1. We also visualize its performance through a confusion matrix. In terms of disease prediction features, our code defines a function that predicts diseases based on input symptoms provided as a comma separated string.

7. Disease prediction function testing:

This function encodes the symptoms and generates predictions from each individual model. The final prediction is determined by selecting the most common prediction among all models. The function returns a dictionary containing predictions from each model as well as the final prediction.

To verify its functionality, we test this disease prediction function using 'Itching', 'Skin Rash' and 'Nodal Skin Eruptions' as input symptoms to obtain the predicted disease.

Table 1: Result

Model	Accuracy on Test Data (%)
SVM Classifier	80.00
Naïve Bayes Classifier	70.00
Random Forest Classifier	86.67
Combined Model	86.67

5. CONCLUSION

The field of physician disease detection has experienced significant progress with the integration of computational methods and machine learning techniques. Various studies utilizing SVM, deep learning, ensemble methods, and diverse data sources have shown promising results in enhancing disease detection accuracy and efficiency. However, it is necessary to conduct further research and development to overcome challenges and ensure the responsible and effective integration of these approaches into clinical practice.

REFERENCES

1. Encyclopedia. Diagnosing Disease: The Process Of Detecting And Identifying Illness. Cengage.

2. Weerarathna and Luharia (2024). Exploring the nexus of biomedical science and robots for enhanced clinical outcomes—a literature review. AIMS Bioengineering. Vol. 11 (1). pp. 1-17.
3. Park, D. J., Park, M. W., Lee, H., Kim, Y. J., Kim, Y., & Park, Y. H. (2021). Development of machine learning model for diagnostic disease prediction based on laboratory tests. Scientific reports, 11(1), 7567.
4. Mordecaii, A (2020) Heart Attack Risk Prediction Using Machine Learning- Preventing diseases with the power of machine learning. Medium.
5. Buch, V. H., Ahmed, I., & Maruthappu, M. (2018). Artificial intelligence in medicine: current trends and future possibilities. *British Journal of General Practice*, *68*(668), 143-144.
6. Kotsiantis, S. B., Zaharakis, I., & Pintelas, P. (2007). Supervised machine learning: A review of classification techniques. *Emerging artificial intelligence applications in computer engineering*, *160*(1), 3-24.
7. Deo, R. C. (2015). Machine learning in medicine. *Circulation*, *132*(20), 1920-1930.
8. Peek, N., Combi, C., Marin, R., & Bellazzi, R. (2015). Thirty years of artificial intelligence in medicine (AIME) conferences: A review of research themes. *Artificial intelligence in medicine*, *65*(1), 61-73.
9. Battineni, G., Sagaro, G. G., Nalini, C., Amenta, F., & Tayebati, S. K. (2019). Comparative machine-learning approach: A follow-up study on type 2 diabetes predictions by cross-validation methods. *Machines*, *7*(4), 74.
10. Lo, Y. C., Rensi, S. E., Torng, W., & Altman, R. B. (2018). Machine learning in chemoinformatics and drug discovery. *Drug discovery today*, *23*(8), 1538-1546.
11. Napolitano, G., Marshall, A., Hamilton, P., & Gavin, A. T. (2016). Machine learning classification of surgical pathology reports and chunk recognition for information extraction noise reduction. *Artificial intelligence in medicine*, *70*, 77-83.

4

Consumer Attitude and Purchase Intention Towards Health and Wellness Products Using Digital Initiatives

– Ms. Aparna Vats
Research Scholar, Bharati Vidyapeeth
Institute of Management & Research, New Delhi
– Dr. Broto Bhardwaj
Professor and Head of Research, Bharati Vidyapeeth
Institute of Management & Research, New Delhi

ABSTRACT:

Purpose- The purpose of the study is to explore various factors that influence the purchase of health wellness products. The main aim is to study the attitude of the consumers in purchasing health wellness products by using digital initiatives. Nowadays, consumer's consumption of wellness products is changing drastically due to increase in the awareness of health and changing lifestyles. People are now more inclined towards their health and wellness due to many reasons and in this paper explores various factors that influence the purchase of health wellness products.

Methodology- This is the conceptual study based on the how attitude and purchase intention of consumers is affecting them to buy health wellness products by using digital initiatives. In this study conceptual framework is used to investigate the consumer attitude and purchase intention towards health and wellness products using digital initiatives.

Findings- It is observed that there is a significant shift in consumer behaviour towards the consumption of wellness products have occurred in recent years because of growing concerns about the health and

wellness products. Considering the growing customer demand for wellness products options, this study offers relevant practical information for the businesses involved in creating and marketing health and wellness products.

Originality- Very few studies have been conducted on the on using digital initiatives that can influence consumer attitude towards buying health wellness products. This study tries to fill the gap in the literature review by studying the purchase intention and attitude of the consumers towards health and wellness products by using digital initiatives like social media marketing, content marketing, influencers marketing etc.

Keywords: Consumer attitude, Purchase intention, Health Wellness, Digital marketing

INTRODUCTION:

The Consumers' purchase behaviour is changing considerably across the world towards the consumption health wellness products. In this competitive world, people are not only affected physically but also mentally and it is important to keep the mental health stable and nowadays people have begun to realize the importance of health wellness in their daily life. This focuses on increasing the awareness of health wellness products that are available in the market. Consumers are now more aware for their health and wellness and the digital modes also helps them to find various products and information related to health wellness.

Consumers are more driven to take better care of their health by consuming wellness products now that they are more aware of the connection between health and wellness. Recent years have seen a considerable shift in consumer behaviour towards the consumption of wellness products due to rising health awareness, lifestyle changes, and knowledge of the advantages of such products. This significant shifts in consumer behaviour towards the consumption of wellness products have occurred in recent years because of growing concerns about the health and wellness products. Many studies have shown that there is an increase in awareness of health wellness among the people and technology advancement and digital initiatives has played a vital role in it. Today's customer has access to advanced internet technology to express their thoughts and opinions on something that

further brings change in their life. As consumers are now more conscious and aware of their health and wellbeing, it has become important to understand that whether the consumers are willing to pay for the purchase of health wellness products. The willingness to pay for health wellness products can become one of the factors to study the purchase intention and attitude of the consumer. Many companies are also become more aware and realized that they need to enhance their marketing strategies to attract a wider audience of consumers. So, the companies use different digital modes to promote and aware consumers for their products. Consumer are aware of their mental health but they do not know from where they get these wellness products, here digital media takes a further step ahead to help people and provide all the necessary information regarding the products.

Purchase intention:

Purchase intentions refer to a customer's desire to purchase a good or a service from a certain brand. They are the customer's plans to acquire a good or a service. Purchase intentions are influenced by the degree of satisfaction consumers anticipate and experience. Purchase intention is defined as the attitude towards specific goods or services and is an element of consumer behaviour. The purchase decisions of the customer will be the most desired brand with other two factors i.e., purchase intentions and purchase decisions. There are several indicators from which purchase intentions can be identified such as Transactional (a tendency to buy a product offered), Refractive (a tendency to recommend products to others), Preferential (a tendency to choose between the products) and Explorative (a tendency to seek information related to the products).

Consumer attitude:

A person's feelings, positive or negative evaluations, or behaviour preferences towards an item or piece of information are all considered to be attitude.

A person's attitude can help observers understand their behavioral tendencies, and their preferences for and opposition to a certain item or subject. An individual's attitude may influence their decision-making,

how they process information, and how they behave as a result. The links between customer attitudes and their purchasing intentions have been established by previous research. People who have a positive attitude are more likely to buy a product since they either like it or do not like it.

Digital initiatives:

An initiative to connect the consumers with the products using online mode. One can use digital marketing tools to promote and make the consumers aware of the products offered. Digital marketing involves managing the online presence of a business in addition to achieving marketing objectives using digital technology and media. It is a method, term, or branding technique employed by digital platforms to accomplish marketing goals is known as digital marketing. There are various methods that can influence consumer attitude like social media marketing, content marketing, display advertising, email marketing, SEO, influencer marketing etc. They all can affect the consumer purchase decision as it can reach to a wider audience, this method can help consumer to have information related to products that are available worldwide and they can easily purchase it too. The use of banners and rich media ads on the internet can promote brands and influence consumers to buy a product. Social media marketing can help the buyers and sellers to interact with each other using social media platforms. Email marketing can also be used to influence the post purchase decisions of the consumer.

RESEARCH METHODOLOGY:

This is a conceptual study which is based on a conceptual model which describe various digital initiatives that influence consumer's attitude and purchase intention in buying health and wellness products. All the factors that can influence the purchase intention and attitude of the consumer in buying health and wellness products are studied in the paper. Below is the suggested framework stated in fig.1 is applied in research that provide the better understanding of the digital initiatives and its impact on consumer's attitude and purchase intention towards health and wellness products.

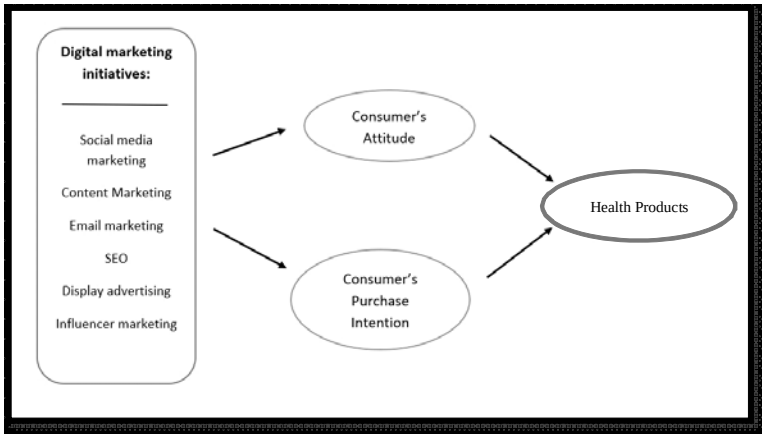


Figure1: Conceptual framework of Consumer attitude and purchase intention towards health wellness products using Digital initiatives

The figure1 explains the conceptual framework of digital marketing tools that can influence the consumer's attitude and purchase intention towards health and wellness products. It is shown various factors that can impact the purchase intention of the consumers like social media, email marketing, content marketing etc. businesses can use these methods to promote and aware consumers online to purchase the health wellness products. This will impact the purchase decision of the consumer.

OBJECTIVES:

This paper will attempt to:

- Study the attitude of the consumers in purchasing health wellness products by using digital initiatives.
- Explore various factors that influence the purchase of health wellness products.
- Explain how digital marketing can influence the purchase intention of the consumers.

LITERATURE REVIEW:

Increasing the brand awareness and purchase intention by using digital strategy, as low brand awareness and purchase intention can affect a brand and to recover from this it is recommended to use digital

media such as social media, search engines and websites Dwiana Rahmadiati Putri (2021). It is observed that the effect of digital on electronic word of mouth and purchase intention in the social media context. It is observed that the businesses that use of social media has a positive impact their consumer's attitude. With further understanding of the result, it encourages many businesses to implement digital initiatives to enhance the positive attitude of the consumers and spread positive word of mouth about the business on online platform Wilert Puriwat (2022). Social media platforms are now one of the primary means of communication between businesses and their audience. Instagram has been considered a platform with significant potential for business. One of the most effective growth channels for online marketing, it receives more than one billion daily visitors Bellavista, Foschini, & Ghiselli, (2019). Consumers had a positive willingness to purchase for health and wellness products. Based on the literature analysis, research hypotheses have been developed and tested to identify the elements that influence consumers' willingness to pay for products that promote health and wellness Jin et al. (2019). It is suggested the use of social media marketing to particularly impact purchase intentions through online interaction or word of mouth Through social media, users can communicate with both known and unknown parties to receive interactive guidance. According to the discussions above, social media significantly affects consumers' purchases intentions Rudyanto (2019). Being healthful promotes positive interaction with others in society that transcends personal impulses and amplifies self- transcendence's pro-social traits Campanella, F., Crescentini, C., Urgesi, C., & Fabbro, F. (2020). It was suggested that because younger people expect to live longer than older people do, they might benefit more from good health and are hence more ready to spend for healthy products. Additionally, they believed that older people with lower household incomes were less inclined to alter their eating habits and were less willing to spend money on healthy products Yu et al. (2021). It is suggested the use of content marketing that can influence the purchase decisions that is implied by the business to promote their products D. B. Academy (2021). The sale and acquisition of information, goods, and services using a computer network or the internet is known as digital marketing. It helps marketer to reach their products users online through several channels Rao & Ratnamadhuri (2019). The impact of email marketing

on consumers, one should understand the preferences of the consumers to get positive results Bokde & Seshan, (2019).

RESEARCH GAP:

Very few studies have been conducted on the on using digital initiatives that can influence consumer attitude towards buying health wellness products. This study tries to fill the gap in the literature review by studying the purchase intention and attitude of the consumers towards health and wellness products by using digital initiatives like social media marketing, content marketing, influencers marketing etc.

CONCLUSION:

This study aims at assessing the consumer's attitude for health wellness products with the use of digital platform and it is likely to have positive impact as most of the consumers expects readily available product and through digital media the consumer can find the products available to them within a click. This study helps in identifying and understanding factors that affect a consumer's decision-making process while considering purchase health wellness products. We have discussed few factors that can influence purchase decision of the consumer, digital platform is one of the factors such as social media marketing, content marketing, SEO, email marketing etc. The impact of these different attribute is likely to impact the purchase intention of the consumers. The consumers are now more aware for their health and wellness and the digital modes also helps them to find various products and information related to health wellness through online channels like social media, websites, ads etc. This study also provides practical insight into the willingness of consumers to pay for health wellness products. It is one of the factors that can measure the purchase intention of the consumers for a product. The attitude towards the preference of purchasing health wellness products and the satisfaction related to purchase of these products is analyzed and This analysis provide awareness to the consumer about health wellness products that are available in the market. The limitation of this research that it can be done by using analytical tools and by applying structural equation modelling which can further enhance the research.

LIMITATIONS:

There are several limitations that has been observed in this study.

Firstly, the research is based on Indian consumers by which result may differ if this study is conducted on other countries. Secondly, the research is conceptual in nature PLS-SEM framework can be used to create conceptual model for future research. Thirdly, this research focuses on digital initiatives that can impact consumers purchases intention on health wellness products many more factors can also be studied for further research.

REFERENCES:

1. Öberseder, M., Schlegelmilch, B. B., & Murphy, P. E. (2019). CSR practices and consumer perceptions. Journal of Business Research. 66(10). pp. 1839–1851. doi: 10.1016/j.jbusres.2013.02.005.
2. Chu, S. C., & Chen, H. T. (2019). Impact of consumers' corporate social responsibility- related activities in social media on brand attitude, electronic word-of-mouth intention, and purchase intention: A study of Chinese consumer behaviour. Journal of Consumer Behaviour. 18(6). pp. 453–462. doi:10.1002/cb.1784.
3. Farzin, M., & Fattahi, M. (2018). eWOM through social networking sites and impact on purchase intention and brand image in Iran. Journal of Advances in Management Research. 15(2). pp.161–183. doi:10.1108/JAMR-05-2017-0062.
4. Farzin, M., & Fattahi, M. (2018). eWOM through social networking sites and impact on purchase intention and brand image in Iran. Journal of Advances in Management Research. 15(2). pp. 161–183. doi:10.1108/JAMR-05-2017-0062.
5. J. Rana, J. Paul. (2018). Consumer behaviour and purchase intention for organic food: a review and research agenda.38. pp. 157-165.doi.Org/ 10.1016/j.jretconser. 2018.06.004.
6. Camilleri, M. A. (2019). The SMEs' technology acceptance of digital media for stakeholder engagement. Journal of Small Business and Enterprise Development. 26(4). pp. 504–521. doi:10.1108/JSBED-02-2018-0042.
7. Kucukemiroglu, S., & Kara, A. (2015). Online word-of-mouth communication on social networking sites: An empirical study of Facebook users. International Journal of Commerce and Management 25(1). pp. 2–20. doi:10.1108/IJCoMA-11-2012-0070.
8. Kwok, L., Mao, Z. (Eddie), & Huang, Y. K. (2019). Consumers' electronic word-of- mouth behavioural intentions on Facebook: Does

message type have an effect? Tourism and Hospitality Research.19(3). pp. 296–307. doi:10.1177/1467358417742684.

9. Tien, D. H., Amaya Rivas, A. A., & Liao, Y. K. (2019). Examining the influence of customer-to-customer electronic word-of mouth on purchase intention in social networking sites. Asia Pacific Management Review. 24(3). pp. 238–249.doi: 10.1016/ j.apmrv.2018.06.003.
10. Vo, T. T., Xiao, X., & Ho, S. Y. (2019). How Does Corporate Social Responsibility Engagement Influence Word of Mouth on Twitter? Evidence from the Airline Industry. Journal of Business Ethics 157(2). pp. 525–542. doi:10.1007/s10551-017-3679-z.
11. Krishnaprabha and Tarunika, (2020) "An Analysis on Building Brand Awareness through Digital Marketing Initiatives," International Journal of Research in Engineering, Science and Management. pp. 266-270.
12. M. Switala, K. Reformat, B. Reformat and W. Gamrot, (2018). "The Influence of Brand Awareness and Brand Image on Brand Equity - an Empirical Study of Logistic Service Provider," Journal of Economics and Management. 6(5), pp. 87–93. doi.org/10.24018/ ejbmr.2021.6.5.1063
13. Rahman, I., & Reynolds, D. (2019). The influence of values and attitudes on green consumer behaviour: A conceptual model of green hotel patronage. International Journal of Hospitality & Tourism Administration, 20(1). pp 47-74. doi: 10.1080/15256480.2017.1359729.
14. Garland, E. L., & Fredrickson, B. L. (2019). Positive psychological states in the arc from healthfulness to self-transcendence: extensions of the Healthfulness-to-Meaning Theory and applications to addiction and chronic pain treatment. Current opinion in psychology, 28. pp.184-191. doi: 10.1016/j.copsyc.2019.01.004.
15. Geiger, S. M., Fischer, D., Schrader, U., & Grossman, P. (2020). Meditating for the planet: Effects of a healthfulness-based intervention on sustainable consumption behaviours. Environment and Behaviour, 52(9). pp. 1012-1042. doi:10.1177/0013916519880897.
16. Grigoropoulou, N. (2021). The "Malevolent" Benevolence: what happens to perceived immigrant threat when value priorities collide? Ethnic and Racial Studies, 44(16). pp. 126-148. doi.org/10.1080/ 01419870.2021.1877763.

17. Mangum, Maruice, and Ray Block. (2018). "Social Identity Theory and Public Opinion Towards Immigration." Social Sciences. 7 (3).41. doi: org/10.3390/socsci7030041.
18. Meuleman, Bart, Koen Abts, Peter Schmidt, Thomas F. Pettigrew, and Eldad Davidov. (2020). "Economic Conditions, Group Relative Deprivation and Ethnic Threat Perceptions: A Cross-National Perspective." Journal of Ethnic and Migration Studies 46 (3). pp.593–611. doi:org/10.1080/1369183X.2018.1550157.
19. Michelle M. Niedziela. (2022). What the health? Sensory cues in wellness products – perceptions to reality, 2. doi: org/10.1016/j.sctalk.2022.100012.
20. Specker S., L., Reiner, P. (2021). Digital Wellness and Persuasive Technologies. Philos.Technol. 34. pp. 413–424. doi.org/10.1007/s13347-019-00376-5.

5

A Study on the Awareness of Corporate Digital Responsibility

– Dr. Harsh Vardhan Kothari
Professor,
DIAS

ABSTRACT

The Broad purpose of this study is to explore how corporate responsibility is approached in a digital setting. The study is based on Secondary Research. In detail the first objective is to explore the growing lists of emerging risks in a digital world. Second an investigation on how Corporate Social Responsibility (CSR) relates to digitalization and decision-making. Third objective of this study was to assess the moral responsibility gap caused by digitalization and create a Corporate Digital Responsibility plan. In the study gap in the theoretical frameworks of CDR and its applicability is identified. A review of the literature is also used to assess the moral responsibility gap caused by digitalization. Literature review of existing frameworks and relevant research has been cited. It is suggested that businesses must ensure that ethical principles are embedded throughout their internal processes and throughout the organisation, governments and individuals must also take responsibility for establishing more digitally responsible behaviour. On the subject of regulation, this paper finds that rules and regulations such as the General Data Protection Regulation (GDPR) aim to safeguard consumers. On the other hand, they limit the legal space in which businesses can function. However, such restrictions do not address all of the transparency, security, safety, and accountability criteria required by digital systems. As digital technologies become more prevalent, it is suggested that there is a need for a shift in thinking toward communal governance, supporting the development of global

guiding principles for the development, use, monitoring, and application of artificial technologies.

Key words: CSR, ESG, CDR, and GDPR

INTRODUCTION

The word "Digital" or "Digitised" has become a regular part of our vocabulary. Digitalization has permeated almost all aspects of our lives and organizational structure. No business exists that doesn't incorporate digital tools in its operations. The advent of digital technology has transformed our society. Digitalization has propelled human development by light years. The slow move towards digitalization in all spheres of society has made many unfathomable technological advances possible. The democratization of resources and ideas has become possible due to the access and ease created by digitalization. Digitalization provided us with automation, standardization, and efficiency. However, the discourse around the need for ethical regulation of digital tools rose after frequent data breaches, predatory data mining, and evidence of data bias.

Background

In 2020, the anti-trust hearings involving some of the biggest tech companies in the world conducted by the US Senate was a crucial development in bringing digital ethics discourse to mainstream. The Hearings highlighted the potentially conflicting nature of new digital technologies like artificial intelligence and the Internet of Things. Christine Legne (2017) has written about using these technologies propels a more profound and lasting transformation of social and economic systems. Data breaches, abuse of user data, and privacy violations have greatly slowed down the growth of the digital economy in recent years, making it more challenging for businesses to realise their full digital potential. The numerous advantages that cutting-edge technology may offer to people and society are also being hampered by this lack of confidence.

Origin of digital ethics can be traced back to the 1980s, when the term "Computer Ethics" was coined, mainframe computers were already well-established in businesses and organizations, and there were early signs of Use of a computer might be discovered. The introduction of the Apple II in 1977, the BBC Micro, and the IBM 5150

in 1981 helped pave the way for the widespread use of PCs and home computers. Since it was quite obvious what a computer was at this point, the discourse concentrated more on the ethically dubious aspects of the technology and spent less time defining the underlying technology.

"Information ethics," according to Floridi (1999), is a fresh approach to ethical issues surrounding the use of technology that draws on the foundational ideas of computer ethics. The ethical impact of technology has been given a new, abstract word in recent years. In fact, Capurro (2018) refers to "digital ethics" as the replacement for "information ethics," addressing how digital technologies affect the environment and society as a whole.

Motivation for the study

Corporate digital responsibility involves reframing a company's social responsibilities in the digital setting. Its definition is far from being agreed upon by all. CDR was first conceptualized as a "voluntary commitment" of businesses to uphold legal requirements and consider the moral ramifications of their business practices. A CDR plan would address issues with managing consumer data, the use of AI in decision-making, unethical technology usage, and the effects of uneven access to new digital technologies.

For the first time, Lobschat et al (2021) offer a theoretical characterization of a CDR framework as distinct from CSR. They do, in fact, outline not only the major fields of study where digital responsibility is relevant but also the effects that the lifetime of data and technology has on significant stakeholders. Digital technologies are unpredictable, and because of the distinctive group of stakeholders they include, distinguish CDR as a distinct term from CSR. The opposite is also true, according to (Herden et al.(2021) who assert that the duties present in a separate CDR model can actually be categorized under the Corporate Social Responsibility pyramid Carroll (1991) and are related to the domains covered by the Environmental, Social, and Corporate Governance (ESG) frame.

In 2020, the anti-trust hearings involving some of the biggest tech companies in the world conducted by the US Senate was a crucial development in bringing digital ethics discourse to mainstream. The Hearings highlighted the potentially conflicting nature of new digital technologies like artificial intelligence and the Internet of Things. Christine

Legne (2017) has written about using these technologies propels a more profound and lasting transformation of social and economic systems. Data breaches, abuse of user data, and privacy violations have greatly slowed down the growth of the digital economy in recent years, making it more challenging for businesses to realise their full digital potential. The numerous advantages that cutting-edge technology may offer to people and society are also being hampered by this lack of confidence.

If progress is to be driven not only by what is technologically possible but also by what is societally desirable and sustainable, the need for scrutiny and safeguards becomes critical.

LITERATURE REVIEW

The growing acceptance of digital ethics remains largely aspirational, there are different sets of guidelines followed by organizations. This has led to questions about the applicability aspect of CDR. Widespread acceptance of CDR can only be realized if a standard CDR framework is adopted like the ESG framework Carroll (1991) for CSR.

This paper will explore existing literature to understand whether CDR is an extension of CSR or whether a separate framework needs to be developed for wide scale adoption of CDR. The paper will also analyse existing legislative regulations around the world to understand whether digital ethics will be better purported through regulation or industry specific norms.

There hasn't been any study done that evaluates the degree of awareness about digital ethics among employees, quantitively. Therefore, this paper will be based on the qualitative inferences and consensus derived from Manzo & Hamdani (2021).

Over-regulation vs Under Regulation:

The inferences drawn from the qualitative research by Manzo & Hamdani (2021) show that even though the government is still seen as the biggest institution to bring legislative regulation for companies to abide by. Legal frameworks for controlling the use of rapidly emerging technology, nevertheless, are frequently developed after the fact. These regulations may be highly onerous, and they can have an impact on market players who are not directly engaged. The fast-paced changes

in the tech industry as well as complimentary industries that benefit from the technological innovation of said tech companies make most of the guidelines around digital ethics obsolete. Self-regulatory policies can serve as an effective framework and give businesses a method to reduce the danger of overregulation. However, a lot of businesses view such pledges as a barrier to trade and a competitive disadvantage. A framework for digital ethics should be viewed as a chance, especially in a market where competition is fierce.

The increasing awareness among customers around the concepts of data mining and breaches has made them sceptical and distrusting of companies. Comprehensive ethical guidelines that assuage customers' anxiety can lead to a valuable increase in brand equity and loyalty.

Companies may think about the effects of digital business processes, goods, and services with the use of digital ethical initiatives. This makes it possible for digital ethics to serve as the foundation for a company strategy that is both ethically and economically acceptable.

Use of data vs Protection of privacy:

In the landmark case of Puttuswamy vs Union of India (2017) the supreme court ruled privacy was a fundamental right. People should have the agency to choose what they want to share with companies or services they are signing up for. One of the earliest topics of digital ethics, privacy vs use of data, is an important discussion that allows us to better grasp companies' responsibility and liability.

Questions about the source of the data utilized, how it is used by third parties, data security, backup, storage, and archiving always come up when operations are digitalized. Companies, workers, clients, and other stakeholders all have various interests in how data is collected, used, and secured, and these interests must be matched and agreed upon. Comparing countries can highlight disparities in how privacy is viewed, particularly when managing personal data. This component of creating digital ethical strategies is analogous to contextually appropriate business strategy adaption to align with cultural values. This enables the company's financial objectives to be balanced with reliable and open data processing. It could be appropriate to solicit personal information from clients and employees to deploy cutting-edge technology. In medicine, it may even be necessary to submit data if it may be utilized new diagnostic techniques, among other things. If

someone can understand the use or advantage of sharing personal data, they are more likely to do so. This is particularly true in situations when users can choose whether to disclose data, like when utilizing social networks or messaging apps. Companies still have to balance (economic) benefits against privacy protection to garner the broadest support feasible. So, as our real-world example shows, big data has a lot of possibilities for businesses. Companies must, however, establish a balance between the use of data and the privacy of their customers, employees, and other stakeholders. One approach to demonstrate the company's understanding of the issue is through an internal ethics policy that has been agreed upon with various functions and stakeholders, including the data protection officer, the compliance department, and the workers' council.

Efficiency vs Transparency:

From fashion to animal farming, digital tools have streamlined supply chains, operational optimizations, and other bottlenecks. This has allowed companies to cut costs, time and waste. Exchanges in cyberspace happen practically quickly. In contrast, the agencies in charge of its regulation typically operate on a national level and their discussions last for months or even years. There is a clear mismatch between both scales that can be taken advantage of. There may be little room for individual remedies when privacy and consent violations occur because of the speed at which they are carried out and the scope of their geographic reach.

Manzo & Hamdani (2021) have found that firms are under pressure to stay current. It is the pressure of incorporating the finest available practise. Even if the two upgrades are separated by a relatively short amount of time, the constant updating of digital practises renders the prior ones obsolete. As a result, firms are constantly striving to stay at the top of the technological learning curve. Companies that disagree risk being left behind in today's intense competition. Having said that, firms and executives have no idea where they are in their digital journey or where they are going.

CDR as an Extension of CSR:

Digital Ethics Legislations are being passed in increasing numbers in different countries around the globe. As data governance (data

transfer, reliability and transparency) is becoming mandated across companies, this study aims to analyse the knowledge Attitude and Practice (KAP) around different sub categories within the governance scope.

As a concept, corporate social responsibility (CSR) has been put out to assist firms in defining the appropriate moral norms and accompanying governance structures to support ethical decision-making. Carroll (1991) proposed a pyramidal hierarchy of responsibilities in his seminal work, starting with economic responsibilities at the bottom and moving up through legal, ethical, and finally philanthropic responsibilities — the first two of which are frequently regarded as core for corporate entities and the latter as a desirable extension. CSR will assist them in converting their fundamental moral principles into concrete, both overtly and oblique, decision-making guidance Moon(2008). This sheds light on crucial processes needed for companies to create a moral compass that makes sense in the digital era.

Although CSR and CDR are connected and both fall under the umbrella of corporate responsibility, research and practise should pay particular attention to CDR since it tackles the unique risks and difficulties of the rapidly developing digitalization. CSR refers to a company's obligation to align itself with the expectations, objectives, and values of society and stakeholders. According to CSR, businesses should consider the economic, social, and ecological effects of their decisions and enhance the standard of living by exercising social responsibility. While businesses must adhere to legal commitments (i.e., rules and regulations) while providing goods or services.

The concept of CSR is complemented by the separate idea of CDR, which takes into account the difficulties and idiosyncrasies of a digitally advanced society. To do this, CDR places related risks of digital technologies, such as privacy and data security concerns, in a larger framework to give a more comprehensive approach to Business Responsibilities and to increase customer confidence in corporate actions in a digitized environment.

Herden et al (2021) analysed CDR issues through the ESG framework. This paper utilizes is the scope of data governance. The paper helps understand the breadth and depth of data governance, including data security, transparency, ownership, and reliability of

systems. The study into data governance will help organizations implement digital ethics policies that stretch across all their operations in the value chain.

K. Valerie Carl (2022) assess the applicability of CDR through ISO 26000 scope. ISO 26000 is framework that evaluates the responsibility of organisation in a social context. The paper suggests developing a CDR standard comparable to ISO 26000 that addresses the peculiarities and unique challenges of a digitised world. Alternatively, the standard 26000 would have to be significantly expanded to include specific instructions for the digital context. However, because previous research suggests treating CDR and CSR as distinct concepts, developing two related, partially overlapping, but distinct standards could better account for the specifics of the digital context

Responsibility Gap

Manzo & Hamadi (2021) with a series of interviews with experts in the AI field, Hamadi and Manzo aimed to understand and mitigate the managerial challenges faced in AI integration. The authors classified the issues into 4 parts which includes Organisational Culture, Responsibility Gap, Integration and control of AI, Laws and regulations.

According to Manzo & Hamadi (2021) One of the key difficulties revealed while examining the range of managerial challenges that prevent organisations from operating in a digitally responsible manner, that is, from being conscious of the ethical ramifications of acting in the digital era, is the responsibility gap. As previously stated by Matthias (2004), the limited predictability of artificial machine outcomes, which is influenced by their interactions with many actors as well as the environment, creates a moral responsibility gap. According to the researchers' conversations with managers and specialists, such a gap appears to be tough to close, both externally and internally to organisations. In the case of data technology flaws such as data breaches, algorithmic biases, and so on, there is an obvious requirement to assign internal accountability, whether at the bottom or top of the hierarchical ladder. However, as Porter et al., (2018) states that assigning blame to a single person or department for corporate digital behaviour appears to be difficult, because it is sometimes difficult to determine if the fault with artificial machines is at the operational or design level. Appointing responsibility, accountability, and liability within firms as a result of

ethical failings would rely on the company's size as well as its internal culture and setting. At the same time, establishing who is to blame for digital failures may be detrimental, as it may impede a thorough understanding of the complexity problem and the selection of the best way to solving it. Furthermore, managers lack the ability to monitor the conduct of a big number of employees, and a data breach can be caused by a single click (or a missed one). When numerous entities are engaged, such as corporations that create and companies that use technologies, the issue gets even more defined. Because the contrast between firms that generate technology and those that use it is critical, the relationship between these two should be highlighted

Analysis on existing Regulation:

According to Hamadi and Manzo, (2021) Legislations are always reactive when it comes to digital ethics. GDPR which is considered to be the most comprehensive law around corporate digital responsibility also came in the wake of a series of breaching and leaks.

Analysing GDPR guidelines, it's evident that even this comprehensive law constricts itself to the case of privacy and data handling.

GDPR has resulted in all firms operating in the EU emphasising consumers data privacy and transparency. Nevertheless, a number of provisions of the GDPR rely on user consent for the corporation to gather personal data. Additionally, GDPR mandates that businesses notify clients when they make automated decisions. In a similar vein, Cath (2018) discusses how rules and regulations like GDPR do not address the whole range of issues raised by the usage of AI decision-making technologies. Given the many sources of data gathering and the opaque nature of technological procedures, LJungholm (2018) highlights the challenge of how such a need may be met and assessed.

Another example is the GDPR gap, in which no crisp and obvious rule compels the explanation of AI decision-making. This raises more concerns about hiding responsibility and transparency with clients. On the other side, guaranteeing openness through rules and regulations is crucial for developing consumer trust, but it can also present issues in particular situations. In reality, the goal of hackers and cyberattack planners is to demonstrate excessive openness when it comes to AI technological operations and data collecting.

Laws are needed. The problem is that they are not scoring high in efficiency. The initial problem roots back to the pace of technological development and the inability of legal frameworks and legislations to cope with the exponential rate (Lobschat et al) In fact, the above discussed examples of gaps in the GDPR laws demonstrate that laws cannot cope with the AI development speed. The gaps are identified in an ex-post analysis after the socio-technical context between developing GDPR (in 2016) and implementing it (in 2018) has changed in a relatively short period.

In summary, the legal actors are slower than technological actors, and the provisions of the first don't cover the full reach of operations of the latter. By acknowledging that, managers willing to act morally responsible cannot build and organize internal policies regarding AI integrated decision making based on laws only.

Laws and regulations such as GDPR in Europe promise to protect consumers. On the other, they delimit the realm of lawfulness within which corporations can operate. However, such regulations do not comprehensively cover all the transparency, security, safety and accountability standards which AI-driven decision-making technologies require. Neither do they delineate those guidelines which could support companies in the development of internal policies and practices. At the same time, while transparency is desirable for corporations, it can also be a double-edged sword. Too much transparency can indeed expose corporations to vulnerabilities such as cyberattacks.

Herden et al (2021) and Valerie Carl (2022) attempted to analyse the scope of CDR through CSR frameworks. However, the conclusion of both papers agreed that although there is significant overlap between the two concepts.

Research Gap

Most of the research on digital ethics or corporate digital responsibility is based on formulating definitions or developing frameworks to determine the scope of CDR. After the passing of GDPR Law, research has been conducted in exploring the effect of corporate digital responsibility but those studies are limited to understanding the responsibilities and impact of digital ethics on numerous stakeholders. These studies have not explored employee awareness of digital ethics.

There is very little work done in understanding the responsibility of employees in the digital ethics discourse.

RESEARCH METHODOLOGY

Objectives

1. To explore the growing lists of emerging risks in a digital world.
2. An investigation on how Corporate Social Responsibility (CSR) relates to digitalization and decision-making.
3. To assess the moral responsibility gap caused by digitalization and create a Corporate Digital Responsibility plan which would address issues with managing consumer data, the use of AI in decision-making, unethical technology usage, and the effects of uneven access to new digital technologies.

Type of Data Resources

1. Secondary Data based on available literature and other sources

Research Limitations

This is only Secondary Research therefore interaction with employees regarding their perception around the issue could not be ascertained.

DISCUSSION AND CONCLUSION

The purpose of this study was to explore how corporate responsibility is approached in a digital setting. The motivation for this study was, first was to explore the growing lists of emerging risks in a digital world. Second an investigation on how CSR relates to digitalization and decision-making. A review of the literature is also used to assess the moral responsibility gap caused by digitalization.

In order to back up the purpose of the research, Literature review of existing frameworks and relevant research has been cited.

This research is concurring with the earlier works of Manzo & Hamadi (2021). The responsibility gap discussed in the paper, there is a glaring gap of aspiration vs applicability in this field.

Again, drawing from the findings of Manzo & Hamadi (2021). While it is true that businesses must ensure that ethical principles are embedded throughout their internal processes and throughout the organisation, governments and individuals must also take responsibility for establishing more digitally responsible behaviour.

Lastly, on the subject of regulation, this paper finds that rules and regulations such as the GDPR aim to safeguard consumers. On the other hand, they limit the legal space in which businesses can function. However, such restrictions do not address all of the transparency, security, safety, and accountability criteria required by digital systems. They also do not define the rules that might assist businesses in developing internal policies and practises. Transparency is beneficial for organisations, but it can also be a double-edged sword. Too much openness might expose businesses to dangers such as cyberattacks.

As digital technologies become more prevalent, there appears to be a need for a shift in thinking toward communal governance, supporting the development of global guiding principles for the development, use, monitoring, and application of artificial technologies. Individuals, governments, and corporations working together to pave the path for such transformation would allow all interested stakeholders to participate in the design and co-creation of digital policies.

Research Contribution

As an extension of this study, the research has identified a spectrum of topics and questions which could be addressed in future research. Since it is necessary to develop widely accepted digital responsibility standards and methods to monitor and analyse the effectiveness of artificial actors, it is critical to investigate the change from individual responsibility and ownership to communal governance and dispersed responsibility.

REFERENCES

1. Capurro, Rafael. "Why Information Ethics." International Journal of Applied Research on Information Technology and Computing, Vol 1 (2013): 471-473.
2. Carroll. "The Pyramid of Corporate Social Responsibility: Toward the moral management of organizational stakeholders." (1991): Volume 34, Issue 4.
3. Chernov, Chernova, & Komarova. "The Usage of Artificial Intelligence in Strategic Decision Making in Terms of Fourth Industrial Revolution." Atlantis Press, 2020.
4. Davenport, DalleMule &. "What is your Digital Strategy." Harvard Business Review April 2017.

5. Floridi, Luciano. "Information ethics: On the philosophical foundation of computer ethics." Spinger International Publishing (1999): 33–52.
6. Herden et al. "Corporate Digital Responsibility." Springer International publishing (2021): Forum 29, 13–29 .
7. K. Valerie Carl, Timothy Markus Christian Zilcher, Oliver Hinz. Corporate Digital Responsibility and the current Corporate Social Responsibility Standard: An analysis of applicability. Copenhagen, 2022.
8. Legner, C., Eymann, T., Hess, T. et al. "Digitalization: Opportunity and Challenge for the Business and Information Systems Engineering Community." Springer International (2017): 59, 301–308.
9. LJungholm, Doina Popescu. "REGULATION OF AUTOMATED INDIVIDUAL DECISION-MAKING AND ARTIFICIALLY INTELLIGENT ALGORITHMIC SYSTEMS: IS THE GDPR A POWERFUL ENOUGH MECHANISM TO PROTECT DATA SUBJECTS?" Addleton Academic Publishers (2018): Vol 17.
10. Lobschat et al. "Corporate digital responsibility." Journal of Business Research (2021): 875-888, Vol 122.
11. Manzo&Hamadi. ""Corporate Digital Responsibility", A Study on Managerial Challenges for AI integration in Business." 2021.
12. Moon, Dirk Matten and Jeremy. ""Implicit" and "Explicit" CSR: A Conceptual Framework for a Comparative Understanding of Corporate Social Responsibility." Academy of Management (2008): Vol. 33, No. 2.
13. Puttuswamy vs Union of India. Supreme Court of India. n.d.

6

Secure Digital Voting System based on Blockchain Technology

– Manav Sharma
Professor, Guru Nanak Institute of Management, GGSIPU
– Baldev Singh
Students, Guru Nanak Institute of Management,
– Prof.Dr. Ekata Gupta
Professor, Guru Nanak Institute of Management, GGSIPU

1. ABSTRACT:

Since 1970's, electronic voting(e-voting) has offered fundamental advantages over traditional paper-based systems, including increased efficiency and reduced errors. Despite these benefits, widespread adoption of e-voting system has been hindered by persistent challenges, particularly regarding resilience against potential faults. Blockchain technology, as a disruptive force in the current era, holds the promise of enhancing the overall resilience of e-voting systems. This paper presents an innovative effort to leverage the inherent benefits of blockchain, such as cryptographic foundations and transparency, to develop a secure digital voting system. The proposed scheme adheres to the fundamental requirements for e-voting schemes and achieves end-to-end verifiability, addressing critical concerns regarding the integrity and trustworthiness of the voting process. Detailed insights into the design and implementation of the proposed e-voting scheme are provided, utilizing the Multichain platform for its realization. Additionally, the paper offers an in-depth evaluation of the scheme's effectiveness, demonstrating its capability to establish a robust and transparent e-voting environment. By combining blockchain technology with secure digital voting principles, this research contributes to the

advancement of trustworthy electoral systems laying the foundation for widespread adoption and public confidence in e-voting technologies.

Keywords: Secure Digital Voting, Blockchain Technology, Electronic Voting, Resilience, End-to End Verifiability, Cryptographic Foundations, Transparency, Multichain Platform

2. INTRODUCTION:

Elections are the foundation of democracy and allow citizens to express their opinions by voting. Fairness and transparency of the electoral process are essential to upholding democratic standards. At the same time, advances in technology have changed the voting landscape, with electronic voting machines becoming a staple of today's elections.

Traditional voting systems have been replaced by electronic systems that use technologies such as blockchain to increase security and transparency. Blockchain, with its electronically and cryptographically secure features, holds great promise against the challenges faced by traditional elections.

This article takes an in-depth look at the development of secure digital voting based on blockchain technology. Using the power of blockchain, we aim to solve important problems such as anonymous voting, fair voting and end-to-end verification in the fire voting process. Our research builds on the foundations provided by previous research and uses new methods to ensure the reliability and reliability of voting.

By leveraging the principles of transparency, decentralization and cryptographic proof, our system adopts the Prät à Voter Approach and leverages a multi-chain blockchain platform. By creating cryptographic hashes for each vote and encrypted communication, we strive to preserve the fundamental principles of electronic voting while increasing security and efficiency.

The rest of this document is organized as follows: Section 2 shows the requirements for electronic voting and how our plan fits them. Section 3 provides an overview of existing electronic voting systems and outlines our field involvement. We describe the design process in detail in Section 4 and then implement and evaluate our proposal in Section 5. Finally, Section 6 concludes the paper, analyzes current progress, and suggests future research directions.

3. BACKGROUND:

In recent years, the intersection of blockchain technology and electronic voting has emerged as a promising area of research and development. Originally popularized by cryptocurrencies such as Bitcoin and Ethereum, blockchain has expanded its applications beyond digital currency to many areas, including voting. At the same time, electronic voting (e-voting) has also undergone a major shift, moving from traditional paper-based systems to more digital systems.

Blockchain technology, which has its origins with the launch of Bitcoin in 2009, provides a distributed, immutable ledger for recording transactions. Bitcoin's underlying blockchain architecture is decentralized and cryptographically secure, laying the foundation for future innovations in this field. Launched in 2015, Ethereum introduced the concept of smart contracts, enabling the process to be carried out on the blockchain. Discovered by Nick Szabo in the 1990s, these smart contracts have revolutionized the potential applications of blockchain technology beyond simple transactions.

Today, blockchain is considered a combination of technologies including blockchain data structures, consensus algorithms, public key cryptography, and smart contract. The blockchain data model consists of multiple interconnected blocks, each containing the cryptographic hash of the previous block, ensuring the integrity and immutability of the data. Decentralized consensus algorithms such as Proof-of-Work and Proof-of-Stake allow partners to work together to reach consensus in a trustless environment.

Public key encryption plays an important role in ensuring the security and confidentiality of blockchain transactions. Each participant in the blockchain network has a key partner used for authentication and authorization. This cryptographic technique supports security and anonymity, which is important for applications such as electronic voting.

With the development of blockchain, electronic voting systems have been adapted to solve the shortcomings of traditional voting systems. Initially, computerized voting systems made it easier to count votes, increasing the accuracy and efficiency of vote counting. Later, Direct Registered Electronic (DRE) voting machines were adopted, providing voters with a user interface to vote electronically.

Despite the success of electronic voting, concerns about security,

control and trust continue. Problems like voter fraud, interference, and lack of verification show that new solutions are needed. In recent years, decentralized ledger technologies such as blockchain have been proposed as a way to improve the transparency, security, and integrity of electronic voting.

Blockchain-based electronic voting systems leverage the inherent properties of blockchain, including end-to-end verifiability, anonymity, and immutability, to solve the problems of traditional voting processes. By recording votes on a tamper-proof decentralized ledger,

blockchain ensures the integrity of the voting process while protecting voters' privacy and anonymity.

The research presented in this article aims to explore the potential of blockchain technology in electronic transactions. Voting. By analyzing the advantages and disadvantages of existing blockchain electronic voting solutions and comparing them with traditional methods, this study aims to understand the future of voting technology. This article aims to contribute to the development of safe, transparent and inclusive voting in the digital age through rigorous analysis and clear evaluations.

i. Core Components of Blockchain Architecture

These are the main architectural components of Blockchain as shown in (Figure 1):

Figure 1: core components of blockchain architecture https://www.facebook.com/rapidinnovation.io/photos/a.206891084940928/407196708243697/?type=3

- **Node**: Users or computers in blockchain layout (every device has a different copy of a complete ledger from the blockchain).
- **Transaction**: It is the blockchain system's smallest building block (records and details), which blockchain uses.
- **Block**: A block is a collection of data structures used to process transactions over the network distributed to all nodes.
- **Chain**: A series of blocks in a particular order.
- **Miners**: Correspondent nodes to validate the transaction and add that block into the blockchain system.
- **Consensus**: A collection of commands and organizations to carry out blockchain processes.

ii. Critical Characteristics of Blockchain Architecture

Blockchain architecture has many benefits for all sectors that incorporate blockchain. Here are a variety of embedded characteristics as described (Figure 2).

- **Cryptography**: Blockchain transactions are authenticated and accurate because of computations and cryptographic evidence between the parties involved;
- **Immutability**: Any blockchain documents cannot be changed or deleted;
- **Provenance**: It refers to the fact that every transaction can be tracked in the blockchain ledger;
- **Decentralization**: The entire distributed database may be accessible by all members of the blockchain network. A consensus algorithm allows control of the system, as shown in the core process;
- **Anonymity**: A blockchain network participant has generated an address rather than a user identification. It maintains anonymity, especially in a blockchain public system;
- **Transparency**: It means being unable to manipulate the blockchain network. It does not happen as it takes immense computational resources to erase the blockchain network.

Figure 2: critical characteristics of blockchain arch.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8434614/figure/sensors-21-05874-f003/

4. How Blockchain Can Transform the Electronic Voting System

Blockchain technology solves the shortcomings of today's election process, makes the voting process more transparent and understandable, prevents illegal voting, strengthens data protection and auditing of voting results. The use of electronic voting systems on blockchain is very important. However, electronic voting has serious risks. For example, if electronic voting is compromised, all votes can be controlled and misused. Therefore, considering all its benefits, electronic voting has not yet been approved nationwide. Nowadays there are good solutions to overcome the risks of electronic voting and that is blockchain technology. In Figure 4 we can see the main difference between the two systems. In traditional voting, there is a central authority that casts the votes. If someone wants to modify or modify information they can do so quickly. no one knows how to analyse the data. There is no central authority data stored on multiple nodes. It is impossible to hack all nodes and change data. This way, votes cannot be destroyed and votes cannot be accurately verified by counting votes with other nodes.

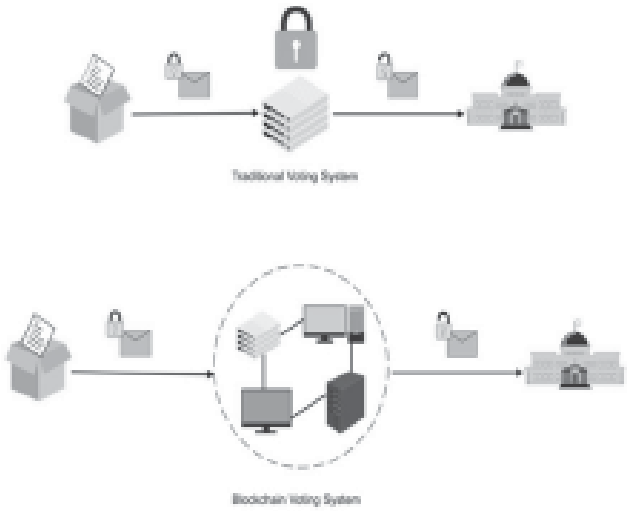


Figure 3: Traditional vs blockchain voting system https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8434614/figure/sensors-21-05874-f004/

If the technology is used correctly, blockchain is a digital, decentralized, encrypted and transparent ledger that can prevent manipulation and fraud. Due to the decentralized nature of the blockchain, the Bitcoin electronic voting system reduces the risk of electronic voting and makes voting tamper-proof. Blockchain-based electronic voting systems require full voting. Blockchain-based electronic voting can only work if online voting is not controlled by any organization, even the government. In this case, elections can only be free and fair if there is widespread confidence in the legitimacy of the power exercised by those in power. Data analysis and other experiments in this area of research can be considered as a good way to improve voting on governance and cooperation. But the idea of using blockchain offers a new model for electronic voting.

5. E-voting Requirements

Whether it is a traditional vote, a digital voting machine or online voting, a few conditions need to be followed:

- ***Privacy - Keep individual votes private***

The system uses cryptographic devices on the blockchain to

perform private voting. Specifically, when a voter registers in the system, the blockchain creates a voter ID, which is the voter's unique identifier on the blockchain and is protected from misuse by being crash-proof. Cryptographic hash. Therefore, traceability of votes is very important to protect voters in case of forced voting.

- ***Eligibility - Only voters are allowed to vote and each voter can only vote once***

All eligible voters must register with a unique identifier (like government reports) to prove their eligibility. In addition, our system uses a strong authentication system that uses fingerprint technology to verify that only authorized voters can access the system. Additionally, the use of biometrics allows the system to prevent double voting.

- ***Receipt Freeness - Voters should not be able to prove to a third party that they voted a certain way***

Allowing the application process for voters to vote according to their preferences and allowing a secret code to be created for all such situations (Business). This is important to ensure accuracy (i.e. verifying whether a particular vote is included in the count). However, having this hash does not allow extracting information about how voters voted.

- ***Convenience - Voters should be able to vote easily and anyone who is eligible should be able to vote***

The easy-to-use system is available on the web and the voting process requires a lot of knowledge. Very little time from user input. For example, use fingerprint for authentication to avoid having to remember username/password. Additionally, the entire process is integrated, allowing users to interact with the process seamlessly.

- ***Authentication - the ability to trust the voting process***

Once the voting is completed, the voter is provided with a unique code in the form of a cryptographic hash. Users can use this identification number to verify whether their vote has been included in the vote counting process. However, this system does not allow users to see how they voted which has been adopted to mitigate threats.

The above analysis shows the effectiveness of the application process with the special requirements of electronic voting. It also highlights the importance of defining the characteristics of blockchain

and its far-reaching role in realizing the foundation of efficiency in electronic voting.

Therefore, we believe that the work presented here contributes to existing knowledge on the use of blockchain technology to implement secure digital voting.

6. LITERATURE REVIEW

Several research papers have published various voting methods to improve the security, privacy and efficiency of electronic voting. *Kiayias and Yung (2002)* revolutionized the voting system by introducing a self-voting system that eliminated the need for a trusted third party or a personal organization to protect private voters. However, this innovation comes with a trade-off that requires significant financing.

To meet the demand for more efficient protocols, *Hao et al. (2010)* proposed a two-step rule that excludes private channels or third-party trusts. Although this method shows promise of computational efficiency, it is subject to criticism for its lack of robustness and fairness under certain conditions, as noted by *Dalia et al. (2012)*. To address these issues, *Dalia et al. (2012)* proposed improvements to improve the robustness and integrity of Hao et al.'s protocol, which would pave the way for a reliable electronic voting system.

Shahandashti & Hao (2016) proposed DRE-ip, a voting system with enhanced privacy and end-to-end authentication without the need for a trust policy, beyond the limits of the previous DRE-i. Additionally, *Chaum (2004)* introduces the Mixnet protocol for end-to-end authentication, while Scantegrity (Chaum et al., 2008) uses authentication codes for authentication, while *Prät à Voter (Chaum et al., 2005)* holds private elections and elections through voting.

Building on this important work, *Adida and Rivest (2006)* used homomorphic tabulation and scribble bars to develop Prät à Voters for offline control. Other programs include *Bingo Voting (Bohli et al., 2007), Helios (Adida, 2008), DRE-i (Hao et al., 2014) and Star-Vote (Bell et al., 2013),* each offering unique approaches to address the challenges of electronic voting.

Although existing methods are successful in providing end-to-end verification without compromising voter privacy, *McCorry et al. (2017)* proposed a decentralized, self-statistical Internet voting protocol

on the Ethereum blockchain as an open voting method *(Chaum et al., 2008).* This paper explores the potential of blockchain technology in various fields, especially in the creation of electronic voting that meets specific requirements, as detailed in subsequent sections.

7. PROPOSED SYSTEM DESIGN

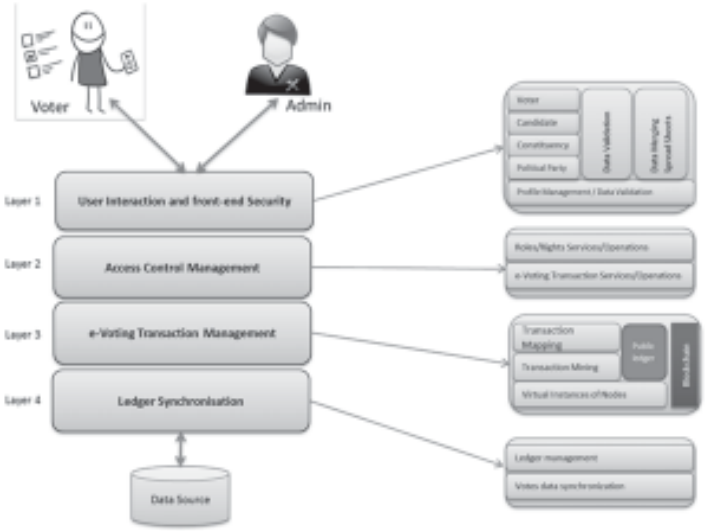


Figure 4: Architecture for proposed e-voting system https://iopscience.iop.org/article/10.1088/1742-6596/1804/1/012050/pdf

The electronic voting method has been carefully developed from the Prät à Voter electronic voting method elucidated by Ryan in 2008. It is a solution that lends itself to real voting while remaining mindful of important needs such as privacy, compliance, convenience, free access, and evidence. At its core, the system endeavours to establish a paradigm for secure digital voting preserving user-friendliness.

The basis of the design philosophy is to use the best carefully designed website to improve user relations. Thanks to new measures such as fingerprint authentication, the system has strengthened security measures and reduced the risk of double voting. Moreover, the system has been developed with a strong commitment to ensure seamless management of voters, polling stations and candidate profiles.

In the process of developing the spirit of democracy, the system advocates the fair participation of all voters and creates a fair and healthy competitive environment among the contestants. It is worth noting that strict measures have been taken to protect the anonymity of voters and therefore the integrity of the election process.

To provide clear evidence of voter participation, the system will use the method of broadcasting a secret amendment number to each voter via mail. This is undeniable evidence of voter participation in the voting process and allows individuals to track their votes outside the polls.

In essence, the proposed e-voting system emerges as a holistic solution, poised to revolutionize the electoral landscape by seamlessly integrating cutting-edge technology with the fundamental tenets of democracy.

8. DETAILED DESCRIPTION OF LAYERED APPROACH

The proposed architecture of the e-voting system, illustrated in Fig. 4, is structured into multiple layers to facilitate a modular design approach. These layers are outlined as follows:

User Interaction and Front-end Security Layer: This layer serves as the interface between the system and users, including voters and administrators. It facilitates functions such as vote casting and administration of the election process. Key functions include user authentication and authorization, ensuring that access is limited to legitimate users in compliance with predefined access control policies. Various methods, ranging from basic username/password to advanced techniques like fingerprinting or iris recognition, can be employed for authentication. This layer acts as the initial point of contact with users and is responsible for validating user credentials according to system-specific policies.

Access Control Management Layer: This layer supports the functionalities of both Layer 1 and Layer 3 by providing necessary services. It includes defining roles, access control policies, and voting transaction definitions. Role definition and management are crucial for access control functions in Layer 1, while voting transaction definitions facilitate blockchain-based transaction mapping and mining in Layer 3. Overall, this layer ensures the coherence of the system by laying the foundational elements required by individual layers.

E-Voting Transaction Management Layer: Positioned as the core layer of the architecture, this layer handles transactions for e-voting. Transactions constructed at the Role Management/Transactions layer are mapped onto blockchain transactions for mining. These transactions include credentials provided by voters at Layer 1 for authentication, such as fingerprints. Data provided is used to generate cryptographic hashes, contributing to the creation of transaction IDs. Verification of credentials is anticipated to be achieved at the User Interaction and Front-end Security layer (Layer 1). Multiple virtual instances of nodes participate in the mining process to finalize transactions and add them to the blockchain.

Ledger Synchronization Layer: This layer synchronizes the Multichain ledger with the local application-specific database using existing database technologies. Votes cast are recorded in the backend database's data tables. Voters can track their votes using unique identifiers provided to them once their votes are mined and added to the blockchain ledger. Security considerations are rooted in blockchain technology, employing cryptographic hashes to secure end-to-end communication. Voting results are stored in the application's database to facilitate auditing and future operations.

In summary, the layered architecture of the e-voting system ensures robustness, security, and efficiency throughout the voting process, leveraging blockchain technology for enhanced transparency and integrity.

9. METHODOLOGY

Our proposed e-voting system represents a significant advancement in the field of digital democracy, offering a comprehensive solution that combines cutting-edge security measures with user-friendly interaction interfaces. At the heart of this system lies a carefully crafted architecture, meticulously designed to ensure the integrity, security, and accessibility of the voting process.

The architecture, depicted in Fig. 4, is structured into multiple layers, each serving a specific purpose and contributing to the overall functionality and resilience of the system. Let's delve into each layer in more detail to understand its role and significance.

The User Interaction and Front-end Security layer serve as the gateway to the voting system, facilitating interactions between voters and administrators. Through sophisticated authentication mechanisms such as fingerprinting, this layer ensures that only authorized individuals gain access to the system. Moreover, it provides a user-friendly interface, guiding voters through the voting process and presenting them with a curated list of candidates based on their constituency.

Complementing this layer is the Access Control Management layer, which plays a pivotal role in defining and enforcing access control policies. By categorizing users into roles and assigning corresponding permissions, this layer safeguards the system against unauthorized access and malicious activities. Additionally, it manages voting transactions, ensuring that each transaction is valid and compliant with established protocols.

The e-Voting Transaction Management layer forms the backbone of the architecture, orchestrating the execution and validation of voting transactions. Here, votes cast by voters undergo rigorous validation by a network of miners, ensuring their authenticity and integrity. Once validated, these votes are recorded as transactions on the blockchain, adding a new block to the ledger and preserving the one-person, one-vote principle integral to democratic elections.

Finally, the Ledger Synchronization layer bridges the gap between the blockchain ledger and the local database, facilitating seamless data synchronization and retrieval. By leveraging cryptographic hashes, this layer ensures the security and privacy of voting data, safeguarding it against tampering and unauthorized access. Furthermore, it enables voters to track their votes using unique transaction IDs, enhancing transparency and accountability in the voting process.

In conclusion, our e-voting system represents a pioneering effort in leveraging technology to enhance democratic practices. By prioritizing security, accessibility, and transparency, we aim to redefine the landscape of digital voting, empowering citizens to participate in elections confidently and securely.

10. IMPLEMENTATION

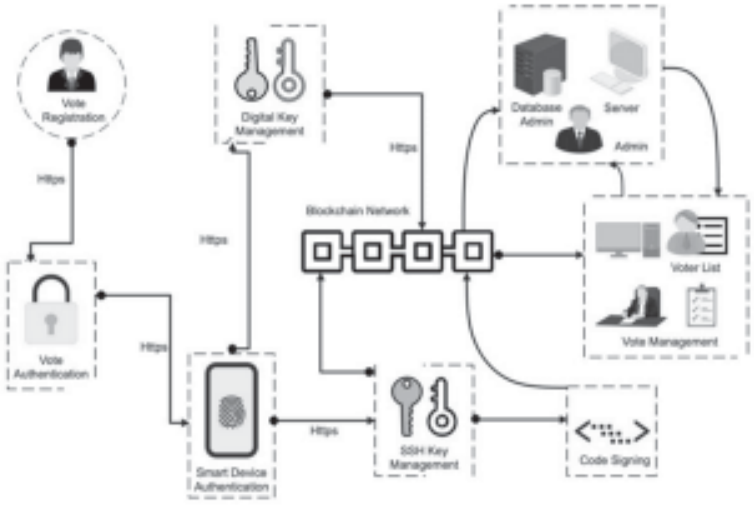


Figure 5: Blockchain voting system architectural overview

:https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8434614/figure/sensors-21-05874-f006/

The implementation of the proposed system has been meticulously executed within a controlled environment, leveraging a web-based application as the frontend interface to facilitate seamless user interaction. This application, developed using Java EE on the NetBeans platform, is underpinned by a native Glassfish server, serving as the backend infrastructure for hosting. Within the Glassfish environment, the server-side container efficiently manages the application's Enterprise JavaBeans (EJBs) and data sources, ensuring robust functionality.

To persistently store and manage data, MySQL serves as the backend database, housing crucial information such as voter profiles, constituency details, and data pertaining to various political parties participating in the election process. A visual representation of the administrative functionality, exemplified by the ability to view the list of eligible voters, is encapsulated in Fig. 6, providing insights into the system's administrative capabilities.

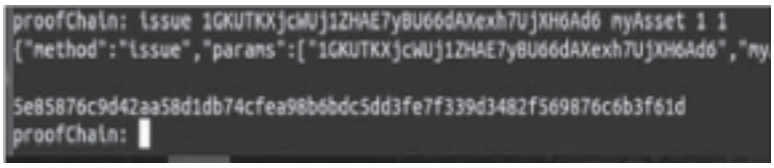


Figure 6: administrative function

Moreover, the application is designed to support bulk data imports from MS Excel spreadsheets, a feature indispensable for accommodating the voluminous datasets characteristic of real-world voting scenarios. This flexibility enhances the system's scalability and usability, enabling efficient management of extensive data streams.

Incorporating blockchain technology into the architecture, Multichain is selected as the platform for establishing a private blockchain dedicated to recording and validating voting transactions. This strategic decision is driven by Multichain's intuitive interface and seamless integration capabilities, aligning seamlessly with the overarching objectives of the proposed architecture.

11. EVALUATION

The main purpose of our evaluation is to verify the effectiveness of the electronic vote protection system, which should be delineated in Section 2, and to carefully examine whether its performance is good in real exports. Our experimental study covers several stages with the execution of various operations; It proves that transactions are mined into the blockchain, updated information is propagated throughout the network nodes, and availability is measured.

After starting the evaluation process, we carried out the testing in a direct connection environment, starting from the creation of the asset in our content representation for voters. Given Multichain's suitability for cryptocurrency applications, we tuned the API to suit the voting environment. For successful transactions in multiple chains, we first determine the recipient's address, verify the proximity balance, and send the voting entity from the node.

Upon transmitting the vote asset to the designated address, a unique transaction hash was generated to denote the transfer of the vote. Subsequently, the balance of the recipient node was incremented by one vote asset, effectively recording the transaction in the public ledger as a mined entry. Notably, our customized API for asset creation

was meticulously engineered to ensure that each address could only possess a maximum of one vote asset, thereby mitigating the risk of multiple voting instances unless facilitated by a distinct address, which is permissible solely in the case of candidate nodes.

12. CONCLUSION & FUTURE WORKS

Since the 1970s, electronic voting has emerged as a promising alternative to traditional paper-based systems, offering advantages like enhanced efficiency and error reduction. In recent years, the proliferation of blockchain technologies has spurred interest in leveraging them to revolutionize e-voting solutions. This research paper contributes to this ongoing exploration by harnessing the cryptographic foundations and transparency inherent in blockchain to develop an effective e-voting solution.

Utilizing Multichain, our proposed approach underwent rigorous evaluation to ensure its alignment with the fundamental requirements of e-voting systems. Moving forward, our focus lies in enhancing the resilience of blockchain technology against potential vulnerabilities, particularly the 'double spending' issue, which poses challenges akin to 'double voting' in e-voting systems. While blockchain technology has demonstrated prowess in detecting tampering with transactions, further investigation is warranted to address this concern comprehensively.

To this end, we envision the development of a robust model to establish trustworthy provenance for e-voting systems, thereby ensuring end-to-end verifiability. Our ongoing efforts involve the implementation of an additional provenance layer to augment the existing blockchain-based infrastructure. By bolstering the security and integrity of e-voting processes, we aim to pave the way for a more transparent and trustworthy electoral system.

REFERENCES

1. Liu, Y.;Wang, Q. An E-voting Protocol Based on Blockchain. IACR Cryptol. Eprint Arch. 2017, 2017, 1043.
2. Shahzad, B.; Crowcroft, J. Trustworthy Electronic Voting Using Adjusted Blockchain Technology. IEEE Access 2019, 7, 24477–24488.
3. Racsko, P. Blockchain and Democracy. Soc. Econ. 2019, 41, 353–369.

4. Yaga, D.; Mell, P.; Roby, N.; Scarfone, K. Blockchain technology overview. arXiv 2019, arXiv:1906.11078.
5. The Economist. EIU Democracy Index. 2017. Available online: https://infographics.economist.com/2018/DemocracyIndex/ (accessed on 18 January 2020). 6. Cullen, R.; Houghton, C. Democracy online: An assessment of New Zealand government web sites. Gov. Inf. Q. 2000, 17, 243–267.
6. Dalia, K., Ben, R., Peter Y.A, and Feng, H. (2012). "A fair and robust voting system."by broadcast, 5th International Conference on E-voting, 2012.
7. Adida,B.; 'Helios (2008). "Web-basedopen-audit voting.", inProceedings of the17thConferenceon SecuritySymposium, ser. SS'08. Berkeley, CA, USA: USENIX Association, 2008, pp.335348.
8. Chaum, D., Essex, A., Carback, R., Clark, J., Popoveniuc, S., Sherman, A. andVora, P. (2008). "Scantegrity: End-to-end voter-veriable optical scanvoting.", IEEESecurityPrivacy, vol. 6, no. 3, pp.40-46, May2008.
9. Garg K., Saraswat P., Bisht S., Aggarwal S.K., Kothuri S.K., Gupta S.A Comparitive Analysis on E-Voting System Using Blockchain; Proceedings of the 2019 4th International Conference on Internet of Things: Smart Innovation and Usages (IoT-SIU); Ghaziabad, India. 18–19 April 2019.
10. Schinckus C. The good, the bad and the ugly: An overview of the sustainability of blockchain technology. *Energy Res. Soc. Sci.* 2020;69:101614. doi: 10.1016/j.erss.2020.101614.
11. Gao S., Zheng D., Guo R., Jing C., Hu C. An Anti-Quantum E-Voting Protocol in Blockchain with Audit Function. *IEEE Access.* 2019;7:115304–115316. doi: 10.1109/ACCESS.2019.2935895.
12. Kim T., Ochoa J., Faika T., Mantooth A., Di J., Li Q., Lee Y. An overview of cyber-physical security of battery management systems and adoption of blockchain technology. *IEEE J. Emerg. Sel. Top. Power Electron.* 2020 doi: 10.1109/JESTPE.2020.2968490.
13. Hakak S., Khan W.Z., Gilkar G.A., Imran M., Guizani N. Securing smart cities through blockchain technology: Architecture, requirements, and challenges. *IEEE Netw.* 2020; 34:8–14. doi: 10.1109/MNET.001.1900178.
14. Çabuk U.C., Adiguzel E., Karaarslan E. A survey on feasibility and suitability of blockchain techniques for the e-voting systems. *arXiv.* 2020 doi: 10.17148/IJARCCE.2018.7324.2002.07175.

15. Szabo N. Formalizing and securing relationships on public networks. *First Monday.* 1997;2:9. doi: 10.5210/fm.v2i9.548.
16. Wood G. Ethereum: A secure decentralised generalised transaction ledger. *Ethereum Proj. Yellow Pap.* 2014;151:1–32.
17. Tan W., Zhu H., Tan J., Zhao Y., Da Xu L., Guo K. A novel service level agreement model using blockchain and smart contract for cloud manufacturing in industry 4.0. *Enterp. Inf.Syst.* 2021 doi: 10.1080/17517575.2021.1939426.
18. Nakamoto S. Bitcoin: A Peer-to-Peer Electronic Cash System. [(accessed on 28 July 2020)]; Available online: https://bitcoin.org/bitcoin.pdf.
19. Rawat D.B., Chaudhary V., Doku R. Blockchain technology: Emerging applications and use cases for secure and trustworthy smart systems. *J. Cybersecur. Priv.* 2021;1:4–18. doi: 10.3390/jcp1010002.
20. Liaw H.-T. A secure electronic voting protocol for general elections. *Comput. Secur.* 2004;23:107–119. doi: 10.1016/j.cose.2004.01.007.
21. Siyal A.A., Junejo A.Z., Zawish M., Ahmed K., Khalil A., Soursou G. Applications of blockchain technology in medicine and healthcare: Challenges and future perspectives. *Cryptography.* 2019 ;3 :3. doi: 10.3390/cryptography3010003.
22. Ma X., Zhou J., Yang X., Liu G. A Blockchain Voting System Based on the Feedback Mechanism and Wilson Score. *Information.* 2020; 11: 552. doi: 10.3390/info11120552.
23. Zhou Y., Liu Y., Jiang C., Wang S. An improved FOO voting scheme using blockchain. *Int. J. Inf. Secur.* 2020; 19: 303–310. doi: 10.1007/s10207-019-00457-8. [
24. Sadia K., Masuduzzaman M., Paul R.K., Islam A. *IC-BCT 2019.* Springer; Berlin/Heidelberg, Germany: 2020. Blockchain-based secure e-voting with the assistance of smart contract; pp. 161–176.
25. Adeshina S.A., Ojo A. Maintaining voting integrity using Blockchain; Proceedings of the 2019 15th International Conference on Electronics, Computer and Computation (ICECCO); Abuja, Nigeria. 10–12 December 2019.
26. Augoye V., Tomlinson A. Analysis of Electronic Voting Schemes in the Real World. [(accessed on 28 July 2020)]; Available online: https://aisel.aisnet.org/cgi/viewcontent.cgi?article=1013&context=ukais2018

7

How Google Search is Changing US

*– **Dr. Ekata Gupta***
Associate Professor
Guru Nanak Institute of Management
*– **Nidhi Gupta, Jatin***
Students
Guru Nanak Institute of Management

ABSTRACT

We live in the internet age. Moreover, it has become an important part of our lives and we cannot survive without it. Moreover, the Internet is a work of high-level science and modern technology. In addition, we are connected to the internet (24/7). We can also send messages and messages, large and small, faster than before. Thanks to technology, and especially the internet, we no longer rely on our faint memories for fake facts and images. Think about it: When was the last time you tried to remember a phone number? What's the point of learning Auto Correct when you know it will correct the spelling of a long and difficult word for you? The answers to these questions tell us a lot about how Google search changes the direction and capabilities of our thinking. This article focuses on how the Google search engine has changed us, with its advantages and disadvantages.

INTRODUCTION

Google was founded on September 4, 1998, by American computer scientists Larry Page and Sergey Brin, who also held PhDs from the Massachusetts Institute of Technology. Stanford University, California. Together they own approximately 14% of the company's shares and, through controlling shareholders, control 56% of the voting rights of the company's shareholders. The company went public through an initial public offering (IPO) in 2004. In 2015, Google was transformed

into a wholly owned subsidiary of Alphabet Inc. Google is Alphabet's largest company and the holding company for Alphabet's online assets and interests. On October 24, 2015, Sundar Pichai was appointed CEO of Google, replacing Larry Page as CEO of Alphabet. On December 3, 2019, Pichai also became CEO of Alphabet.

The company has grown rapidly since then, offering many products and services beyond Google search, many of which are commercialized. These products include email (Gmail), navigation (Waze and Maps), cloud computing (Cloud), web browsing (Chrome), video sharing (YouTube), productivity (Workspace), and operating systems (Android). It covers a wide range of applications.), cloud storage (Drive), language translation (Translate), photo storage (Photo), video call (Meet).

Initially, the search engine used the Stanford University website under the names google.stanford.edu and z.stanford.edu. google.com was registered on September 15, 1997. They founded their company, Google, on September 4, 1998, in their friend Susan Wojcicki's garage in Menlo Park. Wojcicki eventually became a Google executive and YouTube CEO.

The first iteration of Google's production servers were built with cheap hardware and created a massive breach.

Both Brin and Page oppose the use of pop-ups or the "afunded search engine" model in search engine advertising, and wrote a research paper on the subject in 1998 while they were students. They changed their minds early and allowed the release to ease up.

At the end of 1998, Google had approximately 60 million pages in its index. The homepage still says "BETA," but an article on Salon.com praised Google's search engine above all else, noting that it was better than rivals like Hotpot or Excite.com. com, Lycos, Netscape Netcenter, AOL.com, Go.com, and MSN.com) were seen as the "future of the web" during the growing dot-com bubble.

LITERATURE REVIEW

Impact of Google on Society

1. Using Google for Entertainment Purposes:-

There is no problem in using Google for entertainment because

people do not interact with Google or receive messages or look at it to learn new things. Interesting or entertaining searches that provide unsolicited information to entertain users, thus diminishing the morality and legality of their profits. For example, searching for memes (funny images) is not good and reduces the overall knowledge as it only requires a few minutes. This use of Google harms people because it causes users to choose online entertainment over game sharing.

2. Fun with Google:-

- Google allows users to relax and - take the brain away, Ø eliminate fatigue during the day. Searching requires no special skills other than typing, and the system is customizable. Users can take a break from their daily lives while transforming real life with online technology that does not require anything from them and only provides content.

3. Google and corruption of information:-

Google is a powerful and useful tool and its negative impact is manifested in the corruption of information. Degeneration means that a person's memory capacity weakens and memory capacity becomes smaller. Process memory is lost and shared memory doesn't work like before. The problem is that the focus of memory is not what the information is, but where the information can be found ("Marrying Google" 2). Man knows where and how to find information, but he knows nothing about intelligence. This problem can be seen when students organize information: they know where to find information, but they do not do it well and cannot read it. Cognitive dissonance is a major consequence of overusing Google.

Impact of search engines on students' learning ability:-

A study shows that more than 83% of college students use search engines and web search according to data. This study shows that university students prefer Google to other search engines. However, they also rely heavily on it as a source of information for their work and research. On the other hand, graduate students prefer library materials with an average Likert value between 4.5 and 4.5 because they think their research materials and storage facilities are more reliable.

Students see data recovery as a process but need help with its accuracy, validity or knowledge. When they try to find answers to

their questions online, they find useful information; too much information can affect students' evaluation of the content.

Although many students still rely on Google as their first search engine for academic information, sometimes there are more solutions than just blocking students from using the website.

If students are collecting information for academic or research purposes, I recommend they use Google Scholar and the university's online repositories. Also, if they want to focus, there are many website blocking software and extensions to help them focus.

A short story I found in my research

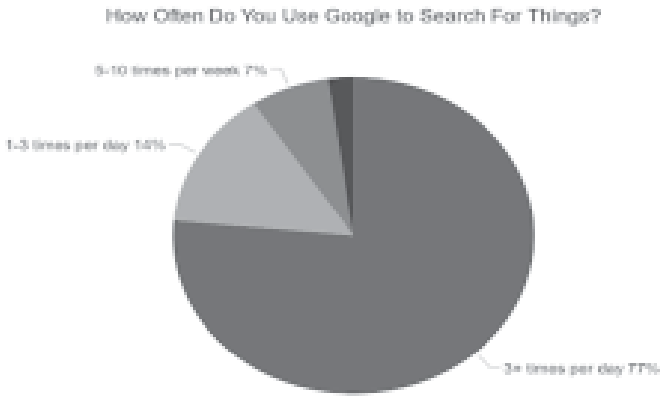
Author: Gregory Smyth;

I have read that the average person who has a job in daily life is exposed to a lot of different information as a person during the day. A lot. A person who lived 100 years ago would see this a year later. This includes everything from advertisements, newsletters, websites, newsletters, traffic signs to t- shirt slogans. The paper continues. It's no surprise that attention spans are shortening and most people are thinking about themselves more than ever before.

When there is so much information, it is almost impossible to remember everything; remembering names, dates, numbers, phone numbers, email addresses and all company and customer information documents - good job. That's why we use tools to bring memory and data back to us. My company uses Salesforce.com to manage a lot of customer relationship management data. I use Microsoft Outlook to manage my email. I use search engines when I want to find products, services or information online. I'm not the only one who uses search engines. Stay away. There were 6.4 billion searches in March 2006 alone. Assuming that each user sees an average of two search pages and that each page displays 10 search results, the average web user sees 128 billion searches each month. Search engines have become so prevalent and widely accepted in today's culture that the word "Google" now appears as a verb in dictionaries (as in "Google also what").

SURVEY

1. 77% of people use Google to search online more than 3 times a day.



2. Google's search engine market share in North America is approximately 87.97%, making it the largest search engine. Bing ranks second among other search engines with approximately 4% market share.

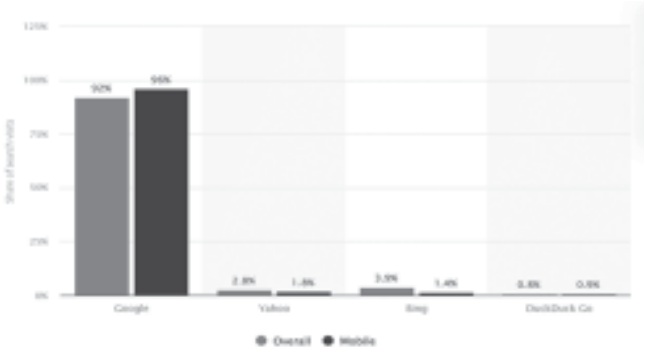
3. Google currently processes an average of more than 40,000 queries per second. In other words, G oogle search traffic is approximately 1.2 trillion times per year. 4. While 80% of people aged 13-21 use Google more than three times a day, only 60% of respondents conduct more than 60 searches with the same frequency.

5. 72% of survey respondents said they only click on organic results or mostly click on organic results. 6 . As of October 2022, Google had 87 billion visits. 7. 60% of Google searches are made by men and 40% by women.

Google Mobile Search Statistics

With smartphones becoming popular, mobile search has become even more important. As a marketer, you'll want to focus more on your mobile users. Here are some statistics to give you an idea about what people are looking for on mobile devices:

1. 96% of mobile search results come from Google.



https://www.onthemap.com/blog/google-search-statistics/

2. The survey also found that 60% of mobile users are" very likely" to click on the " first two to three searches" they see. (Search Engine Domain)
3. When mobile consumers look at local stores on their devices, they're looking for:

   Specialty stores/retailers - 48%.

   Community Products - 29%.

CONCLUSION

It is difficult to imagine daily life without popular websites. The Google search engine has changed the modern era due to its unique creation of PageRank, its impact on people's thoughts, and its impact on business. A search engine is a platform that helps search for information using the World Wide Web. Search engines work between user requests and World Wide Web services and provide users with results based on the queries they enter. Search engines essentially act as filters for the vast amount of information available on the web. It allows users to quickly and easily find information of real interest or value without having to browse through many irrelevant web pages. The Google search engine provides users with search results that result in relevant information on quality websites. The key word here is "important". To increase and maintain online search traffic, search engines need to make sure they are delivering results that are relevant to their users' searches. Google examines more than 200 different website metrics, including writing, internal linking, site usability, and design information.

This means that search engines provide users with the information they are looking for, not the information marketers want them to see. If you type the big names into Google you will get a lot of searches. Google examines more than 200 different website metrics, including writing, internal linking, site usability, and design information.

This means that search engines provide users with the information they are looking for, not the information marketers want them to see. If you type the big names into Google you will get a lot of searches.

Search engines are crucial because they increase the decision-making information customers access online about brands, products and services. Being easily found on Google, Yahoo and MSN is now more important than business because there is a strong presence in print and broadcast media or any fair business. Search engines are becoming increasingly important to today's businesses as consumers and organizations increasingly rely on search engines to find the products, services and suppliers they need.

Google, as a technology company, has established itself as an integral part of the digital environment by offering a variety of services and products integrated into human life. Here are some results from Google:

Search engines are crucial because they increase the decision-making information customers access online about brands, products and services. Being easily found on Google, Yahoo and MSN is now more important than business because there is a strong presence in print and broadcast media or any fair business. Search engines are becoming increasingly imp ortant to today's businesses as consumers and organizations increasingly rely on search engines to find the products, services and suppliers they need.

Google, as a technology company, has established itself as an integral part of the digital environment by offering a variety of services and products integrated into human life. Here are some results from Google:

1. **Search dominance:** Google's search engine is the most widely used search engine in the world, with a market share of over 90%. Search algorithms and technology

have changed the way we access and organize information on the internet.

2. **Different types of products:** In addition to search, Google also offers Gmail, Google Maps, YouTube, Google Drive, Google Photos, etc. It also provides different products and services such as. These services leverage the power of Google in everyday life by meeting the needs of individuals, businesses, and organizations.
3. **Innovation and technology**: Google is known for its innovative technology, constantly pushing the boundaries of artificial intelligence, cloud computing, self-driving cars, and more. Projects like Google Brain, Waymo, and Deep Mind demonstrate its commitment to research and development.
4. **Data Privacy and Policy:** The large amount of user data collected by Google has raised privacy and data protection concerns. The company has faced scrutiny from regulators around the world over its data practices, leading to several lawsuits and fines.
5. **Human impact:** Google's impact goes beyond technology and permeates social and cultural life. Its products influence hu man behavior and humanity as a whole by enabling people to communicate, obtain infor mation, explore the world, and use media.
6. **Business:** Google ha s a unique culture known for its emphasis on innovation , employee health and the work environment. But the company also faced in ternal challenges around diversity, equity and ethics, leading to employee turnover and organizational change.

Overall, Google's influence is undeniable and its role in creating the digital age will continue to grow . Evolve as technology advances and people's expectations change. But ongoing scrutiny and competition create constant chall enges that Google must address to maintain its position in the global market.

CREATE RESEARCH

Results of Google analysis of their studies and recommendations on business, financial performance, business and other topics. Here are the details on how to check Google results:

1. Financial Performance:

Revenue Growth: Track revenue growth across Google's different divisions, including advertising, cloud services and hardware sales.

Revenue: Measure how Google's revenue and earnings are growing, including factors like spend and R&D investments.

• **Pricing Model**: Review Google's pricing model, including costs associated with travel, data storage, and content acquisition.

2. Marketing Project:

• **Marketing Analysis:** Analyze Google's market share in key areas such as search, online advertising, air traffic and performance studies on mobile.

• **Competitive Landscape:** Assess Google's competitive position with rivals such as Amazon, Facebook, Apple and Microsoft, considering factors such as innovation, user engagement and market access.

3. User metrics:

• **User growth:** Analyze trends in users of key products such as Google search, YouTube, Gmail and Android, including products such as customer acquisition, retention and engagement.

• **User Revenue:** Measures Google's ability to generate revenue for its users through ads, subscriptions, and other revenue streams.

4. Creative Strategy:

Product Development: Evaluates Google's investments in new products, technologies and services such as artificial intelligence, driverless cars and healthcare.

Mergers and Acquisitions: Consider Google's mergers and acquisitions designed to expand its product line, enter new markets or improve its technology.

5. Legal and Regulatory Issues:

Compliance Management: Review Google's efforts to comply with regulatory requirements for the protection of intellectual property, personal information, content moderation, and customer protection.

Legal Challenges: Identify ongoing legal issues and

investigations affecting Google's operations, financial performance and reputation.

6. Future Outlook:

Growth Path: Identify potential growth opportunities for Google in areas such as cloud computing, artificial intelligence, e-commerce and digital media.

Risks and Challenges: Evaluate the challenges facing Google, including competition, regulatory scrutiny, technological disruptions, and geographic stress.

Through a comprehensive analysis of these factors, stakeholders can gain a deeper understanding of Google's performance, strengths, weaknesses, opportunities and threats, helping them make informed decisions about investments, partnerships and strategic assessments.

REFERENCES

1. https://bootcamp.uxdesign.cc/the-male-impact-of-search-engines-on-students-learning-ability-8f98b4c0c392
2. https: / /en.wikipedia.org/wiki/History_of_Google
3. https://www.onthemap.com/blog/google-search-statistics/
4. https://chat.openai.com/c/
5. www .irjmets.com is a

8

A Study on Evolutionary Dynamics of Crypto Currency Market

– Ms. Divya Jain
Assistant Professor
Dehli Institute of Advanced Studies

ABSTRACT

The study of the evolutionary dynamics of the cryptocurrency market involves understanding how this market develops, behaves, and changes over time. This includes examining factors such as market volatility, price trends, the impact of regulations, technological advancements, and investor behavior. This study focuses on the evolution of the crypto currency, its historical development, technological advancements, market dynamics and challenges. Through a comprehensive literature review and analysis, the study provides valuable insights into the growth and impact of cryptocurrencies. The study traces the origins of cryptocurrencies back to the introduction of Bitcoin in 2008 and highlights the subsequent emergence of alternative cryptocurrencies and the development of blockchain technology. It examines the increased adoption of cryptocurrencies by individuals, businesses, and governments as an alternative to traditional financial systems.

Technological advancements, such as the development of smart contracts, decentralized applications, and scalability solutions, are explored, showcasing the expanding capabilities and use cases of cryptocurrencies. The study also delves into the market dynamics of cryptocurrencies, including price volatility, market trends, and factors influencing the cryptocurrency market. Challenges and limitations faced by cryptocurrencies, such as scalability issues, regulatory concerns, and security vulnerabilities, are acknowledged. The report emphasizes the need for further research and development to address these

challenges and unlock the full potential of cryptocurrencies. The findings of this research contribute to a deeper understanding of the evolution of cryptocurrencies and their implications for various sectors. It underscores the transformative potential of cryptocurrencies while recognizing the complexities and ongoing developments within the field.

Keywords: Bitcoin, Cryptocurrency, Evolving Trends, Future Prospects, Scams

INTRODUCTION

Cryptocurrencies are digital or virtual currencies that use cryptography for security. Unlike traditional currencies issued by governments, known as fiat money, cryptocurrencies operate on decentralized networks based on blockchain technology. A blockchain is a distributed ledger that records all transactions across a network of computers, ensuring transparency, security, and immutability of the transaction records. Bitcoin, created by an anonymous person or group known as Satoshi Nakamoto in 2008, was the first cryptocurrency. It introduced the concept of a decentralized digital currency and laid the foundation for thousands of subsequent cryptocurrencies (Nakamoto, 2008).

Cryptocurrencies have several distinctive characteristics. They are typically decentralized, operating on peer-to-peer networks rather than being controlled by central banks. Transactions are recorded on a public ledger, providing transparency and traceability. Cryptographic techniques ensure the security of transactions and control the creation of new units. Additionally, many cryptocurrencies have a capped supply; for instance, Bitcoin has a maximum supply of 21 million coins, which can create scarcity and potentially increase value.

The early adoption of cryptocurrencies began with Bitcoin, initially used by a niche group of enthusiasts. It gradually gained attention as an alternative to traditional financial systems. Following Bitcoin's success, numerous other cryptocurrencies were developed, each with unique features and use cases. For example, Ethereum introduced smart contracts, which are self-executing contracts with the terms of the agreement directly written into code (Ethereum).

As the market expanded, cryptocurrency exchanges like Coinbase, Binance, and Kraken emerged, allowing users to trade

cryptocurrencies (Coinbase). The total market capitalization of cryptocurrencies grew exponentially, reaching hundreds of billions of dollars. Technological innovations such as smart contracts, decentralized finance (DeFi), and non-fungible tokens (NFTs) further drove market growth. DeFi platforms leverage blockchain technology to offer financial services like lending, borrowing, and trading without intermediaries (DeFi Pulse,.). NFTs represent ownership of unique digital assets, enabling the creation and exchange of digital art, collectibles, and more (NonFungible,).

Cryptocurrencies have become a new asset class for investors, offering high returns but also high risks. They can provide financial services to unbanked populations, particularly in developing countries, and enable faster and cheaper cross-border transactions compared to traditional banking systems (Global Digital Finance, 2020). However, challenges such as regulation, security risks, and market volatility remain. Governments worldwide are grappling with how to regulate cryptocurrencies to prevent illegal activities while fostering innovation (European Central Bank, 2019). Despite their secure design, cryptocurrencies have been subject to hacks, scams, and fraud. Additionally, cryptocurrencies are known for their extreme price volatility, which can deter some investors and users.

The rise of cryptocurrencies represents a significant shift in the financial landscape, introducing new opportunities and challenges. As the market continues to evolve, understanding the dynamics of this new asset class will be crucial for investors, policymakers, and technologists.

LITERATURE REVIEW

Cryptocurrencies have emerged as a disruptive force within the financial landscape, challenging traditional monetary systems and revolutionizing the way we perceive and transact value. As these digital currencies continue to gain traction, it is essential to examine the existing body of research to understand the underlying concepts, technological advancements, market dynamics, and future prospects of cryptocurrencies. This literature review aims to provide a comprehensive analysis of the scholarly work conducted in the field of cryptocurrencies, shedding light on key themes, theoretical frameworks, and research gaps.

The literature on cryptocurrencies has grown substantially over the past decade, reflecting the rapid evolution and increasing complexity of this digital asset class. Early studies focused on the foundational technology of cryptocurrencies, particularly Bitcoin, which introduced the concept of a decentralized digital currency operating on a blockchain. Nakamoto's (2008) seminal paper laid the groundwork for understanding how cryptocurrencies could function without a central authority, emphasizing the security and transparency afforded by blockchain technology.

Subsequent research has explored various dimensions of the cryptocurrency market. For instance, Glaser, Zimmermann, Haferkorn, Weber, and Siering (2014) examined the economic and technological factors driving the adoption of cryptocurrencies, highlighting their potential to disrupt traditional financial systems. The study noted the increasing interest from both retail and institutional investors, driven by the promise of high returns and the innovative nature of blockchain technology.

Market volatility is a significant theme in cryptocurrency literature. Baur, Hong, and Lee (2018) analyzed the extreme price fluctuations characteristic of cryptocurrencies, comparing their volatility to that of traditional financial assets. They found that while cryptocurrencies offer potential for high returns, they also present substantial risks due to their speculative nature and lack of regulatory oversight. This volatility is further compounded by the relatively low liquidity of cryptocurrency markets compared to traditional financial markets.

Regulatory challenges and their impact on the cryptocurrency market are also well-documented. Zohar (2015) provided an overview of regulatory approaches in different jurisdictions, noting that regulatory uncertainty can lead to market instability. The study emphasized the need for a balanced regulatory framework that protects investors while encouraging innovation. Similarly, Houben and Snyers (2018) discussed the legal implications of cryptocurrencies, including issues related to money laundering and the financing of illegal activities, underscoring the importance of developing comprehensive regulatory policies.

Technological advancements within the cryptocurrency space have been another focal point. Ethereum's introduction of smart

contracts, for example, has been extensively studied for its potential to revolutionize various industries (Buterin, 2014). Smart contracts are self-executing contracts with the terms directly written into code, allowing for automated and trustless transactions. These innovations have paved the way for the development of decentralized finance (DeFi) platforms, which offer financial services without intermediaries (Schär, 2020).

The behavioral aspects of cryptocurrency trading have also garnered attention. Studies by Ciaian, Rajcaniova, and Kancs (2016) explored how market sentiment and investor behavior influence cryptocurrency prices. They found that social media and news can significantly impact market dynamics, often leading to herd behavior and price bubbles. This is particularly relevant in the context of initial coin offerings (ICOs), where hype and speculation can drive significant price movements (Adhami, Giudici, & Martinazzi, 2018).

Finally, the literature addresses the broader implications of cryptocurrency adoption. Catalini and Gans (2016) discussed the potential of blockchain technology to enhance financial inclusion by providing services to unbanked populations. Their research highlighted the opportunities for cryptocurrencies to reduce transaction costs and increase access to financial services in developing countries.

Overall, the literature on cryptocurrencies provides a comprehensive overview of the technological, economic, regulatory, and behavioral aspects of this emerging asset class. As the market continues to evolve, ongoing research will be crucial in understanding the full implications of cryptocurrencies for the global financial system.

RESEARCH METHODOLOGY

Objectives of the Study

1. To analyze the evolution of cryptocurrency as an asset class.
2. To examine the historical patterns of hacks and frauds in the cryptocurrency ecosystem.
3. To evaluate the efficiency and scalability of cryptocurrency payment systems.

SCOPE OF STUDY

The present study comprehensively analyze the cryptocurrency

market, and for the same the study gathers historical data on major cryptocurrencies, including price movements, overall market value, and trading activity. Additionally, compiling information on past hacking incidents, fraudulent activities, and security breaches is crucial to understanding the market's risk landscape. To futher assess the effectiveness of cryptocurrency as a payment method, the transaction data to determine speed, cost, and confirmation times is collected.

SOURCES OF DATA COLLECTION

The study is based on secondary sources wherein information is gathered about historical price data, market capitalization, and trading volume for major cryptocurrencies. Further information is collected on hacks, frauds, and security breaches. To further analyze payments transaction data to assess payment speed, cost, and confirmation times was collected. Cryptocurrency data were extracted from the various websites and different market platforms available.

Data Analysis & Interpretation

Evolution of the Crypto Currency Over the Years

Top 10 cryptocurrencies

Crypto-Currency	Year of Introduction	Market Value (As of April,2024)
Bitcoin (BTC)	2009	$1.2 trillion
Ethereum (ETH)	2015	$358.3 billion
Tether (USDT)	2014	$110.6 billion
Binance Coin (BNB)	2017	$82.7 billion
Solana (SOL)	2020	$61.5 billion
U.S. Dollar Coin (USDC)	2018	$33.1 billion
Ripple (XRP)	2012	$28.6 billion
Dogecoin (DOGE)	2013	$19.0 billion
Toncoin (TON)	2018	$16.8 billion
Cardano (ADA)	2015	$16.2 billion

The global crypto market cap currently stands at approximately **$2.27 trillion**. This value represents the total combined market capitalization of all cryptocurrencies. Cryptography, the foundation of crypto technology, has been around for centuries. However, the

modern era of crypto technology can be traced back to the 1970s when breakthroughs such as public-key cryptography were introduced. This laid the groundwork for secure communication and data encryption, setting the stage for future advancements in crypto technology. The breakthrough moment in crypto technology came in 2008 with the publication of the Bitcoin whitepaper by Satoshi Nakamoto. Bitcoin introduced the concept of a decentralized digital currency that operates on a peer-to-peer network known as blockchain. This innovation brought forth the era of cryptocurrencies and established the underlying technology for their functioning.

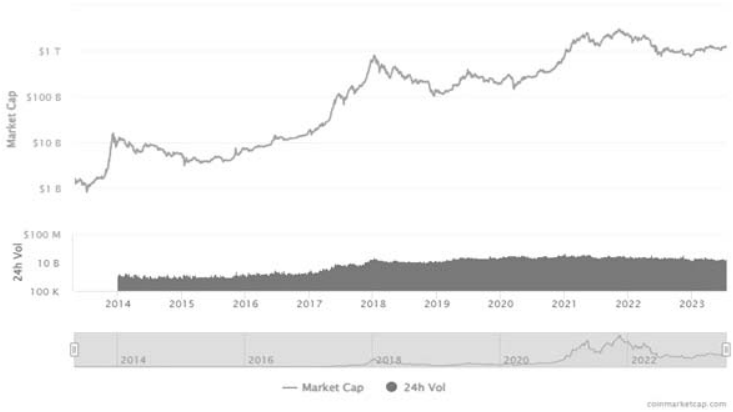
MATURING MARKET AND INSTITUTIONAL ADOPTION

The maturing market and institutional adoption of cryptocurrencies have been significant trends in recent years.

- **Maturing Market:** The cryptocurrency market has matured significantly since the introduction of Bitcoin in 2009. This maturation is evident in the development of more sophisticated market infrastructure, the introduction of new investment vehicles like Bitcoin ETFs, and the increasing stability of major cryptocurrencies.
- **Institutional Adoption:** Institutional adoption of cryptocurrencies has seen a significant jump in recent years. In 2023, nearly four in ten institutional investors reported having direct or indirect exposure to cryptoassets. This is a significant increase from previous years and indicates a growing acceptance of cryptocurrencies as a legitimate asset class.
- **Reasons for Adoption:** The reasons for this increased adoption are varied. More than two-thirds of investors cited the maturing market and custody infrastructure as key reasons behind their first investments in cryptoassets. Additionally, strong market performance was also a significant factor.
- **Regulatory Clarity:** Regulatory clarity is another important factor driving institutional adoption. Incremental gains are being made on the regulatory front, with bitcoin being deemed sufficiently decentralized to be considered a commodity rather than a security. This distinction contributes to a clearer regulatory

framework for the most prominent crypto-asset and sets a precedent for similarly decentralized digital assets.

- **Future Outlook:** The future outlook for the maturing market and institutional adoption of cryptocurrencies is positive. As the market continues to mature and regulatory clarity improves, it's likely that we'll see even more institutional investors include cryptocurrencies in their portfolios.



(Source: coinmarketcap.com)

Market cap of crypto currency 2014-2024

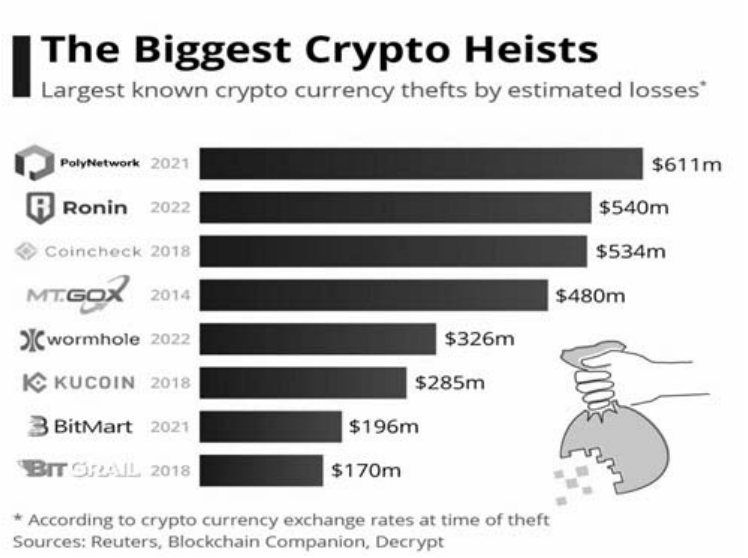
The global cryptocurrency market has seen significant growth over the years.

Total Market Cap: As of August 2023, the total value of all existing cryptocurrencies is approximately $1.05 trillion1. This includes various coins and tokens.

Bitcoin Dominance: Bitcoin (BTC) remains the most valuable cryptocurrency, accounting for around $508 billion of the total market cap. Ethereum (ETH) and Tether (USDT) follow in second and third place, respectively.

User Adoption: By the end of 2021, nearly 300 million people worldwide owned some form of cryptocurrency.

Frauds and Hacks in Cryptocurrency



(Source: Statista.com)

Poly Network Hack (2021):

Hackers stole approximately $600 million in what appears to be one of the largest cryptocurrency heists ever1. The hackers exploited a vulnerability in the system and took thousands of digital tokens such as Ether.

Liquid Global Hack (2021):

Cryptocurrency exchange Liquid Global was attacked, resulting in a loss of $100 million2. The company assured it would reimburse all customers who lost out in the attack.

Types of Scams:

Theft by Hacking: Crypto wallets or exchanges are hacked to steal cryptocurrencies.

Fake Cryptocurrency Investments: Fraudsters set up fake sites for investing in or mining crypto.

Giveaway Scams: Scammers trick people into sending them cryptocurrencies with the promise of sending back a larger amount.

Phony Job Offers: Scammers post fake job listings and ask applicants to pay them in cryptocurrencies.

ICO Fraud: Scammers launch Initial Coin Offerings (ICOs) for non-existent cryptocurrencies.

Fake Crypto Wallets: Fraudsters trick users into storing their cryptocurrencies in fake wallets.

SIM Hacking: Scammers take control of a victim's phone number to gain access to their crypto wallets.

Bitcoin-Stealing Malware: Malware is used to steal Bitcoin from the victim's wallet

FRAUDS

Ponzi Schemes

Ponzi schemes are fraudulent investment schemes where early investors are paid with funds from new investors, giving the illusion of high returns. One notable example is the case of BitConnect, which promised high-yield investment programs and lending platforms but turned out to be a Ponzi scheme. When it collapsed in 2018, investors lost substantial amounts of money.

Initial Coin Offering (ICO) Scams

ICOs, which involve the sale of tokens to fund new cryptocurrency projects, have been a breeding ground for scams. Some projects have conducted ICOs to raise funds without any intention of delivering a viable product. Investors have been lured by false promises and misleading information, resulting in significant financial losses.

Exit Scams

Exit scams occur when individuals or organizations raise funds for a project or exchange and then disappear with the money. One notable example is the case of Mt. Gox, once the largest Bitcoin exchange. In 2014, Mt. Gox filed for bankruptcy after approximately 850,000 bitcoins (worth hundreds of millions of dollars at the time) went missing from its accounts.

BIGGEST CRYPTOCURRENCY HEISTS IN HISTORY

1. **MT Gox:** Over 850,000 Bitcoin were stolen between 2011 and 2014, making it the greatest cryptocurrency robbery in history.

2. **Linode:** In June 2011, Linode, a web hosting firm, was hacked, resulting in the theft of at least 46,000 BTC.
3. **BitFloor:** BitFloor was also a victim of a major crypto heist.
4. **Bitfinex:** Bitfinex experienced a significant crypto theft.
5. **Bitgrail:** Bitgrail was another major victim of a crypto heist.
6. **Coincheck:** Coincheck suffered a major crypto theft, similar in scale to the Mt Gox heist.
7. **KuCoin:** KuCoin was also a victim of a significant crypto heist.
8. **PancakeBunny:** PancakeBunny experienced a major crypto theft.
9. **Poly Network:** In what appears to be one of the largest cryptocurrency heists ever, hackers stole approximately $600 million from Poly Network in 2021.
10. **Cream Finance:** Cream Finance was a victim of a significant crypto heist.
11. **BadgerDAO:** BadgerDAO experienced a major crypto theft.

The Biggest Crypto Heists

On March 29 (2022), blockchain network Ronin announced the theft of 173,600 ether tokens, the currency of the Ethereum blockchain, and 25.5 million USD Coin tokens. The network is best known for its connection to the NFT game Axie Infinity, where players can earn, trade and sell tokens by raising and training Pokémon-like monsters. While the theft translated to losses of more than $610 million at the time of the official announcement, the corresponding assets were worth $540 million on March 23(2022), the date of the hack. Even by this definition, the Ronin incident still comes in second in terms of the all-time biggest crypto heists as our chart shows.

Defending the pole position is the Poly Network hack, which took place in August 2021 to the tune of $610 million, even though nearly all of the funds were returned by the hackers days after the theft, with the attackers claiming to have only wanted to expose security risks on the platform. While most crypto heists happen on a smaller scale, 2021 and 2022 saw a rising number of high-profile hacks with estimated losses above $150 million, showcasing one of the potential drawbacks of the rising interest in and usage of decentralized finance

(DeFi) solutions. Among the most notable are the hacks of information transfer platform.

Wormhole in February, in which hackers stole $326 million worth of ether tokens, and the crypto trading platform BitMark. In both of those cases, users were compensated for their losses by the platforms.

MAKING THE TRANSACTIONS EASIER WITH TIME

Crypto	Native Token	Market Cap	Transaction Fee	Transaction Speed
Nano	NANO	$96,444,455	Free	Less than a second
Stellar	XLM	$2,392,414,970	$0.0000035	3 to 5 seconds
ReddCoin	RDD	$3,192,455.5	$0.000073	58.9 seconds
Monero	XMR	$2,859,790,704	$0.00014	2 minutes
Ripple	XRP	$25,001,954,425	$0.0011	3 to 5 seconds
Bitcoin Cash	BCH	$2,262,471,953	$0.0024	10 minutes
Dash	DASH	$491,763,279	$0.0043	1 to 2 seconds
LiteCoin	LTC	$6,692,414,826	$0.03 to $0.04	2.5 minutes

Crypto currencies with less transaction fees.

Nano

When it comes to cryptocurrencies with the lowest transaction fee, no coin can beat Nano. What makes this token so phenomenal is that it is the cheapest crypto to send. This feeless cryptocurrency is proof that costly transactions in crypto can be subsidized or done away with completely without compromising the coin's integrity.

Stellar

Stellar (XLM) comes with not just fast transactions but affordable ones too. The coin functions as a native token for the Stellar Network, which provides a platform for stablecoin users to use their coins.

ReddCoin

For crypto investors who also enjoy giving tips to their favorite

vloggers and streamers, ReddCoin (RDD) makes it possible to do this, and all for an extremely low-cost transaction fee. The coin, which serves as a digital social currency, enables its users to become fans and supporters of social media content creators by facilitating the tip-giving process.

Monero

Keeping your crypto transactions safe and secure might sound like something that would cost a fortune, but not with Monero (XMR). The coin is designed to provide enhanced privacy for your crypto transactions and give you anonymity by default.

Ripple

Ripple Lab's native token, XRP, is one of the best penny cryptocurrencies to buy, especially because of its cheaper transaction fees. This coin, which enables Ripple users to make payments and facilitate asset exchange and remittance systems, is among the cryptos with the lowest transaction fees. At an affordable cost of $0.0011 per transaction, Ripple owners can complete any transaction involving the coin.

Bitcoin Cash

Forged from Bitcoin itself, BitcoinCash (BCH) came to save the day as far as Bitcoin mining was concerned. The Bitcoin mining process is highly power-intensive, meaning it processes fewer transactions per second. So, BCH was designed to have a bigger block than Bitcoin and therefore run more transactions.

However, years later, BitcoinCash is doing more than speeding up transactions. This cryptocurrency supports top BRC20 tokens like CashToken and offers low transaction fees. Users can run a single transfer for an average transaction fee starting at $0.0024.

Dash

Dash (DASH) is a Bitcoin variant with extremely low transaction fees. The coin, which positions itself as a Proof-of-Stake PoS type of coin, runs mining through "Masternodes" and uses its treasury to generate mining rewards. This gives DASH transaction fees an average of $0.0043 for each transaction.

LiteCoin

Litecoin is one of the earliest cryptocurrencies to emerge in the

crypto space. Still, the coin remains one of the cryptos with the lowest transaction fees. Litecoin transaction fee costs only $0.03 to $0.04 for a single transaction.

Smart Contracts

Smart contracts are self-executing agreements with predefined conditions encoded within the blockchain. They automate the execution and enforcement of contractual terms, eliminating the need for intermediaries. Smart contracts enable programmable transactions, allowing for complex and conditional transactions without relying on traditional legal systems.

Scalability Solutions

Scalability has been a challenge for cryptocurrencies like Bitcoin and Ethereum. To address this, various solutions have emerged. Layer 2 scaling solutions, such as the Lightning Network for Bitcoin and Ethereum's Raiden Network, enable faster and cheaper off-chain transactions by reducing the load on the main blockchain. Additionally, Ethereum's transition to Ethereum 2.0, with the implementation of shard chains, aims to significantly improve scalability.

Cross-Chain Interoperability

Cross-chain interoperability solutions enable the exchange of assets and data across different blockchain networks. These advancements facilitate interoperability between cryptocurrencies, allowing users to conduct transactions across multiple blockchains seamlessly. Projects like Polkadot, Cosmos, and Ripple's Interledger Protocol are working on improving cross-chain compatibility.

Privacy and Confidentiality Enhancements

Privacy-focused cryptocurrencies and protocols have introduced advancements to enhance transactional privacy. Projects like Monero, Zcash, and Dash utilize cryptographic techniques, such as ring signatures and zero-knowledge proofs, to provide stronger privacy guarantees. These technologies obscure transaction details and protect the identities of the transacting parties.

Decentralized Exchanges (DEXs)

Decentralized exchanges have emerged as alternatives to centralized exchanges, enabling peer-to-peer trading without relying on intermediaries. DEXs leverage smart contracts and blockchain

technology to facilitate secure and transparent trading directly from users' wallets, enhancing privacy and eliminating the need to trust a centralized authority.

Mobile and Contactless Payments

Advancements in mobile technology and the rise of digital wallets have made it easier to conduct crypto transactions using smartphones. Mobile apps and wallets allow users to send and receive cryptocurrencies on the go, enabling frictionless peer-to-peer transactions. Furthermore, the integration of Near Field Communication (NFC) technology enables contactless payments with cryptocurrencies at physical retail locations.

FINDINGS

The study on the Evolutionary Dynamics of the Cryptocurrency Market reveals that while new cryptocurrencies appear and disappear continuously and their market capitalization is increasing (super-) exponentially, several statistical properties of the market have been stable for years. These include the number of active cryptocurrencies, the market share distribution, and the turnover of cryptocurrencies.

The study also finds that the growth pattern of cryptocurrency transaction networks is different from that of most other networks reported in the literature. They do not always follow neither the densification law nor the constant average degree assumption over time. Monthly network, instead of accumulated network, is proposed as an appropriate object to understand the dynamics of the network.

The study conducts the first empirical comparison among three representative cryptocurrency networks and points out the similarities and differences to help understand the peer-to-peer technology on a network level. These findings shed light on the properties of the cryptocurrency market and establish a first formal link between ecological modeling and the study of this growing system. The study anticipates that these results will spark further research in this direction.

CONCLUSION

In conclusion, the evolution of cryptocurrencies has significantly impacted the way we conduct transactions. From the emergence of Bitcoin as the first cryptocurrency to the development of various altcoins and blockchain technologies, the crypto industry has witnessed remarkable advancements. The introduction of blockchain technology

revolutionized transactional processes by enabling secure, transparent, and decentralized transactions. Smart contracts automated the execution of agreements, while scalability solutions addressed the challenge of transaction speed and capacity. Cross-chain interoperability, privacy enhancements, and decentralized exchanges further expanded the possibilities for seamless crypto transactions.

The evolution of cryptocurrencies has not been without challenges. Issues such as scalability, regulatory concerns, market volatility, and security vulnerabilities have emerged as significant factors impacting the cryptocurrency ecosystem. However, these challenges have also stimulated further research and development efforts to address these issues and enhance the overall functionality and stability of cryptocurrencies. Despite the limitations and risks, cryptocurrencies have made transactions more accessible, efficient, and inclusive. Bitcoin, Litecoin, Ripple, Stellar, and other coins have played a significant role in simplifying crypto transactions, offering fast, low-cost, and user-friendly options. These coins have found applications in various industries, including remittances, cross-border payments, and everyday purchases.

REFERENCES

1. Antonopoulos, A. M. (2014). Mastering Bitcoin: Unlocking Digital Cryptocurrencies.
2. Buterin, V. (2013). Ethereum: A Next-Generation Smart Contract and Decentralized Application Platform. Retrieved from https://ethereum.org/whitepaper/
3. Mougayar, W. (2017). The Business Blockchain: Promise, Practice, and Application of the Next Internet Technology. Wiley.
5. Nakamoto, S. (2008). Bitcoin: A Peer-to-Peer Electronic Cash System. Retrieved from https://bitcoin.org/bitcoin.pdf
6. Popper, N. (2016). Digital Gold: Bitcoin and the Inside Story of the Misfits and Millionaires Trying to Reinvent Money. Harper Paperbacks.
7. Tapscott, D., & Tapscott, A. (2016). Blockchain Revolution: How the Technology Behind Bitcoin Is Changing Money, Business, and the World. Portfolio.
8. Vigna, P., & Casey, M. J. (2016). The Age of Cryptocurrency: How Bitcoin and Digital Money Are Challenging the Global Economic Order. St. Martin's Press.

9

Study on Impact of Merger & Acquisition on Employees in Respect of Cultural Change

*– **Shivani Gautam***
Research Scholar
*– **Dr. Ashok Purohit***
Mangalayatan University
Institute of Business Management &Commerce

ABSTRACT

Now a days, Merger & Acquisition is on boom as most of the organizations are deciding to merge but from that process the company as well as the employees of both the companies are affecting due to the situation so I have decided to study on that impact. Merger & Acquisition aims to enhance the value of the company as well as firms. This is the strategic business tool which helps in increasing the capacity to fight against the outside threats. Besides that, the objective of the research is in concern of employees that how employees used to tackle the situation of cultural change after merger and acquisition as the post-merger brings the overall change in organization's environment. It's about the challenges that are faced by employees of that organization. Hence, Merger & Acquisition impact on employees can be positive as well as negative in respect of cultural change. Cultural change can be positive or negative as well. This study is based on some selected companies of India which were merged in 2020 to 2021 as the pandemic arise and most of the companies have decided to merge. The impact of this process can be positive and negative on employees of the merged companies.

KEYWORDS:- Merger, Acquisition, Combination, Employees, Cultural Change.

INTRODUCTION

As we know Merger & Acquisition has a trend in the recent previous years. This may be the reason of growth or the result of pandemic spread over years. So, it is necessary to check the impact of M&A on some selected factors, From the selected factors "Employees cultural change due to M&A" is one of the common factors which needs to do the study on the same. Cultural change refers to the value creation. It means the organisation's environment, behaviour of persons who used to work in an organisation. So, In this way the change occurs when the companies merged or acquired, Sometimes it can be a language or place barrier for employees. It helps to understand the companies about the effect of post-merger and as a result there is a positive change.

Merger

Merger is a process in which two companies combined to make a single legal entity but the both companies have the same business i.e. they should work in a same product line. The companies should be at same scale and same size.

Acquisition

It is a strategy of a company to buy another company or to get overall control on that company is known as acquisition. In this, the one company buy shares of another company and purchases more than 50% of the shares of company. It is not necessary to have the same size or scale or to work in same lane to proceed Acquisition. The company which got control, that is known as Acquirer and the company which purchases by another company is known as Acquired company.

These M&A process follows when the companies want to grow their business or any one company suffers from loss since many years or to unable to do the business.

During the pandemic, many companies have merged or acquired, Due to this the organisation's employee have affected in many terms. So, I am studying on the impact of employees of an organisation because of this process. The companies who have followed this process are as follows:-

ACQUIRER COMPANY	ACQUIRED COMPANY
Canadian National Highway	KCS
Rogers	Shaw Communication
Vonovia	Deutsche Wohnen
Microsoft	Nuance Corporation
Thermo Fisher Scientific Inc.	PPD
Amazon	MGM Studios
Humana	William Grace

These are the companies on which my study will continue to explore the impact of employees due to their merger. These are the mergers which have done in 2020 & 2021 as pandemic arises during these years and it will show the reality of result of the Merger.

LITERATURE REVIEWS

Previous studies suggested that the relationship of M&A and cultural change is more complex than we thought or some advised that there is a positive relation or no relation between cultural change and M&A. The previous study suggests that merger fails because of cultural integration but this hurdle can be removed by communication. 2017 research is related to organizational culture difference in which the researcher suggest that organizational cultural differences moderate the relationship between effectiveness of post-acquisition integration and overall acquisition performance as such that positive effect of effectiveness of post-acquisition integration is higher when organizational differences are higher.

Key Factors of Organisational Culture

- Hierarchy - It helps in the uniformity and strong control over the organisation. These are the stages from which employees of the organisation pass on to reach any information or to suggest. It helps in stability of the organisation. Implementation of rules and regulations is a key expectation of the leaders.
- Market Culture - The achievement of well-defined objectives and goals are emphasised in this culture, which focuses mainly on the external layout instead of the internal functions. The main

focus is how to compete and reach set goals with unsupportive external factors, such as government regula-tions, license restrictions, customers' expectations, suppliers' limitations, external contractors and trade unions.

- Clan Culture - The main focus of clan/group/involvement/ consensual culture is maintaining better rela-tionships and providing greater flexibility to employees to perform their job. Leaders of the organisation actively engage with employees and have concern for their well-being. Extensive support of staff and interaction between employees are encouraged in this culture. Trust, involvement, teamwork and corporate commitment to staff are the key characteristics of this dimension.
- Development Culture - In this culture, most employees contribute to special committees or task forces which are dissolved once the task is complete. The main focus is creativity, innovation and resource acquisition . Lead-ers are expected to take risks, as entrepreneurial and idealistic approaches are the keys to this dimension.

Objectives of the Research

- To examine the perception of the employees of the organisation regarding Merger & Acquisition.
- To identify cultural challenges for the employees which results in integration of two organizations.
- To explore the communication effectiveness during M&A transitions.

DISCUSSIONS & CHALLENGES

These discussions are going to help to find out the conclusion of this study. Firstly, to find out the answers or reasons of research objective, we have to find out the employees' perception or employees thinking towards Merger& Acquisition. Secondly, we have to identify the challenges which are faced by employees during the situation. Thirdly, we have to find out the gap between employer and employee so that our research can help in effectiveness of communication. For the answers of these questions, we have to collect secondary data of the above-mentioned companies which have merged during pandemic.

The companies which are mentioned above was suffering from loss or they had no space for growth so these companies have merged but post-merger have changed everything for the organisation as well as employees. The result of the post-merger is as follows:-

1. The market demand changed and employees have to struggle again to get their position.
2. The company have terminated some employees and have demote some employees.
3. The scope of financial growth or future business prospects have changed.
4. The stakeholders are not same. Some have backed out and some stays.
5. Employees have new opportunity to grow in a different environment.
6. Seniors have changed so there are more chances of learning but sometimes there is no chance.
7. Employees have to face more challenges as everything starts afresh.
8. Employees doesn't know about their new MD, So, they hesitate to share any information or to give any suggestion.
9. Sometimes, there is a language barrier for employees of the organisation.

According to my research, the above company mentioned employees have faced these challenges which I have mentioned above, So, for some of the employees, it is so typical to survive in same organisation after the post-merger. But sometimes it is so easy more than earlier to survive in an organisation as the employees get more opportunities to grow and a greater scope due to merger of the organisation.

CONCLUSION AND SUGGESTION

This chapter is providing the narrative or descriptive study on the impact on employees due to M&A process. The review of literature found that there is a negative and positive impact as well. The secondary research on the companies which have merged in Pandemic (Covid-19) finds that there are many changes after merger of the organisation

such as Cash inflow and outflow, Stakeholders perception towards the organisation, Employees behaviour in the organisation etc. Some previous studies have found that cultural difference is a key element in the process of M&A or the top management of the organisation have their point of view that there is no way to join two cultures of an organization.

From the above discussion, I am concluding that there is positive as well as negative impact of M&A on employee's cultural change. The positive impact is that the employees have the greater opportunity of growth and broader scope of promotion. And the negative impact is that some employees have terminated due to merger, some employees demoted, and some have faced different types of challenges. The top management have backed out to cooperate and coordinate with two cultures as the responsibility increases. So, I am summarizing that it depends on the employees or top management of the organization that how cooperative and hardworking they are. I would say that if the both organization's employees understand and cooperate with each other then they can win this cultural change and convert post-merger situation in a positive way. The future researchers can work on primary data of the merged companies and give more accurate results and can work on quantitative data that they can mention number of companies who give negative results and positive results.

REFERENCES

1. Stahl, G. K., & Voigt, A. (2004). Impact of cultural differences on merger and acquisition performance: A critical research review and an integrative model. *Advances in mergers and acquisitions*, 51-82.
2. Lodorfos, G., & Boateng, A. (2006). The role of culture in the merger and acquisition process: Evidence from the European chemical industry. *Management decision, 44*(10), 1405-1421.
3. Papadakis, V. M. (2005). The role of broader context and the communication program in merger and acquisition implementation success. *Management decision, 43*(2), 236-255.
4. Lin, C. Y. Y., & Wei, Y. C. (2006). The role of business ethics in merger and acquisition success: An empirical study. *Journal of Business Ethics, 69*, 95-109.
5. Kansal, S., & Chandani, A. (2014). Effective management of change

during merger and acquisition. *Procedia Economics and Finance, 11*, 208-217.

6. Netter, J., Stegemoller, M., & Wintoki, M. B. (2011). Implications of data screens on merger and acquisition analysis: A large sample study of mergers and acquisitions from 1992 to 2009. *The Review of Financial Studies, 24*(7), 2316-2357.
7. Candra, A., Priyarsono, D. S., Zulbainarni, N., & Sembel, R. (2021). Literature review on merger and acquisition (Theories and previous studies). *Studies of Applied Economics, 39*(4).
8. Buono, A. F., & Bowditch, J. L. (1990). Ethical considerations in merger and acquisition management: A human resource perspective. *SAM Advanced Management Journal, 55*(4), 18.
9. Vazirani, N., & Mohapatra, S. (2012). Merging Organisational Culture through Communication-'Post Mergers & Acquisitions'. *SIES Journal of management, 8*(1).
10. Tarba, S. Y., Ahammad, M. F., Junni, P., Stokes, P., & Morag, O. (2019). The impact of organizational culture differences, synergy potential, and autonomy granted to the acquired high-tech firms on the M&A performance. *Group & Organization Management, 44*(3), 483-520.
11. https://www.taylorfrancis.com/chapters/oa-edit/10.1201/9781003128830-12/organisational-culture-theories-kusal-nanayakkara-sara-wilkinsons
12. Nanayakkara, K., & Wilkinson, S. (2021). Organisational Culture Theories: Dimensions of organisational culture and office layouts. In *A handbook of theories on designing alignment between people and the office environment* (pp. 132-147). Routledge.

10

Higher Education and the Future of Management: Bridging the Gap for Gender Equality and Women Empowerment in a Digitalized World

– Dr. Pooja Gupta
Assistant Professor
Delhi Institute of Advanced Studies
Delhi
– Dr. Poonam Singh
Assistant Professor
JSPM's Kautilya Institute of Management & Research, Pune

ABSTRACT

In an increasingly digitalized world, the realms of higher education and management are undergoing significant transformations. These changes present unique opportunities to address gender inequality and empower women. By integrating digital tools and inclusive policies, we can pave the way for a more equitable future in both education and management. Gender equality is about providing equal opportunities irrespective of the similarities and differences of men and women, and the roles they play. It is based on women and men being full partners in the home, community, and society. Equality does not mean that women and men will become the same but that women's and men's rights, responsibilities, and opportunities will not depend on whether they are born male or female. In a country like India where women were always suppressed, gender equality is still a myth for a larger section of society. Education is considered a milestone for women's empowerment because it enables them to respond to challenges, confront their traditional roles, and change their lives. The present paper examines the role of higher education in gender equality and women empowerment

in the Indian context. The study tries to suggest some relevant strategies and policies for the same.

KEYWORDS: Higher Education, Gender, Women Empowerment, Digitalized World, India.

INTRODUCTION

In September 2015, the UN General Assembly adopted the 2030 Agenda for Sustainable Development which includes 17 Sustainable Development Goals (SDGs). It is based on the principle of "leaving no one behind", emphasizing a holistic approach to achieving sustainable development for all. SDGs' 5th goal is gender equality and women empowerment. Gender equality is about providing equal opportunities irrespective of the similarities and differences of men and women, and the roles they play. Gender equality can empower women. Women empowerment may be defined in several ways, including accepting their viewpoints or making an effort to seek them. Investing in gender equality and women's empowerment can unlock human potential on a transformational scale. Education is considered a milestone for women's empowerment because it enables them to respond to challenges, confront their traditional roles, and change their lives. Higher education can play the role of a ladder to achieve this goal. In a country like India where women were always suppressed, gender equality and women empowerment are still a myth for a larger section of the society.

Higher education has traditionally been a critical pathway for social mobility and economic development. However, access to and participation in higher education has not been equitable, with women facing numerous barriers that limit their educational and professional prospects. Despite significant progress over the past decades, gender disparities persist, particularly in fields like STEM and management, which are crucial for leadership and decision-making roles.

As the digital economy reshapes the future of work, it also redefines the skills and competencies required for management. Digital tools and technologies can potentially democratize education and professional development, offering flexible learning opportunities that accommodate women's diverse needs and responsibilities. Moreover, digital platforms can facilitate mentorship, networking, and continuous learning, crucial elements for career advancement and leadership.

This research paper aims to examine how higher education can

leverage digitalization to foster gender equality and empower women, particularly in management roles. It will explore the current state of women's participation in higher education, the challenges they face, and the potential of digital tools to overcome these barriers.

By integrating insights from educational policies, digital technologies, and gender studies, this paper seeks to provide a comprehensive understanding of the strategies needed to bridge the gender gap in higher education and management. It aims to highlight the critical role of digitalization in transforming these domains and to offer practical recommendations for stakeholders to promote gender equality and women's empowerment in a rapidly evolving world.

OBJECTIVES OF THE STUDY

The main objectives of this research paper are: -

1. To know the current scenario of gender equality and women empowerment in India.
2. To know the role of higher education in gender equality and women empowerment.

RESEARCH METHODOLOGY

This research paper is descriptive and analytical. In this paper, an attempt has been made to find out the current scenario of gender equality and women empowerment in India. The present study is based on secondary data which has been collected through various sources.

REVIEW OF LITERATURE

Chanana, Karuna (2000) in their study provide an in-depth analysis of the participation of women in higher education in India. Chanana explores historical contexts and socio-cultural barriers limiting women's access and success in higher education. She calls for policy reforms to promote gender equality in Indian higher education institutions.

David, Miriam Elizabeth (2009) provides an overview of global higher education focusing particularly on issues of diversity and gender. There are systemic and systematic inequalities but opportunities for critical and feminist pedagogies within the global academy have increased and offer the potential for the future of the twenty first century global academy.

Hill, C., Corbett, C., & St. Rose, A. (2010) in their study addresses

the underrepresentation of women in STEM fields. It highlights the critical barriers and provides recommendations for encouraging more women to pursue and persist in these fields, which are vital for future management roles in a digitalized world.

Morley, L. (2013) examines the gender gap in higher education leadership. She highlights the systemic barriers that women face and the need for policies and practices that promote gender equity in academia.

Boushey, Heather, & Farrell, Jane (2013) discuss the impact of digitalization on women's employment opportunities and the importance of equipping women with digital skills. This publication from the Center for American Progress outlines a comprehensive agenda to support women's economic security and career advancement.

Rao, N., & Sweetman, C. (2018) explores the relationship between education and women's empowerment in India, highlighting the transformative potential of higher education. Rao and Sweetman discuss successful initiatives and programs that have promoted gender equality and empowered women in the higher education sector.

UNESCO (2019) report provides a global overview of gender disparities in education. It highlights progress in female enrollment in higher education but also underscores persistent gaps, particularly in STEM fields and higher education leadership.

Reshi, Irshad & Sudha, Dr & Dar, Shabir. (2022) highlights the positive impacts of education on women's empowerment, such as improved health outcomes, increased economic opportunities, and greater political participation. Finally, the paper discusses the challenges that remain in ensuring women's access to education and the policies and programs that can help overcome these challenges.

ROLE OF HIGHER EDUCATION

Higher education refers to higher and higher education. It also includes other schools such as professional schools and teachers' colleges in medicine, engineering, technology, business, law, music and arts. Studying alone will not help women develop themselves, but higher education can help empower women. Only higher education can make them aware of their rights and responsibilities and better understand what is right and what is wrong. They use their rights as

necessary. Higher education is one of the most important ways to empower women with knowledge, skills and self-confidence. It reduces inequality and helps improve family situations. Women's higher education may have a familial and intergenerational impact. There is a saying: "If you teach a man, you teach one person; but if you teach a woman, you teach the whole family." Higher education plays an important role in shaping women's values, ideas and self-confidence and enables women to play an important role in all areas of life. Higher education plays an important role in developing the skills graduates need to enter the labor market. Many universities in India have done a lot to ensure that women get better grades, achieve better academic results and can enter fields before men.

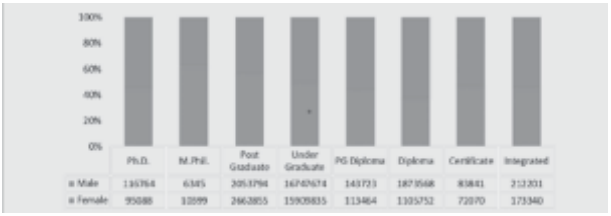
Higher education plays a crucial role in bridging the gap for gender equality and empowering women in a digitalized world by serving as a catalyst for social change and economic advancement. Through higher education, women gain access to knowledge, skills, and opportunities that enable them to thrive in diverse fields, including STEM, business, and governance, where digital literacy and innovation are increasingly essential. Education empowers women by challenging traditional gender norms, fostering critical thinking, and equipping them with leadership capabilities to pursue and succeed in professional careers. Moreover, higher education institutions can drive systemic change by promoting gender-sensitive policies, providing mentorship opportunities, and creating inclusive learning environments that support women's academic and personal growth. By investing in women's higher education, societies can unlock their full potential, accelerate economic development, and build more equitable and resilient communities in the digital age.

WOMEN IN HIGHER EDUCATION IN INDIA

Total enrolment in higher education has increased to nearly 4.33 crore in 2021-22 from 4.14 crore in 2020-21 (an increase of 18.87 Lakh, 4.6%) and 3.42 crores in 2014-15 (an increase of 26.5%). Female enrolment in Higher Education increased to 2.07 crore. As per the All India Survey of Higher Education (AISHE), during 2021-22, among 1168 responding universities, 475 Universities are located in rural areas. 17 Universities are exclusively for women.

Let's have a look at the enrolment of females and males in these universities. As per Figure 1, the percentage share of females is higher than males in M.Phil. and Post Graduate, which can be seen as a positive aspect towards the growth of women enrolment in higher education. But still, there are many other courses where male students are dominating. Student enrolment at the undergraduate level is 50.8% male and 49.2% female. Diploma has a skewed distribution with 62.9% male and 37.1% female. In Ph.D. 55% of males and 45% of females have enrolled themselves. Integrated levels have 55% male and 45% female. PG Diploma student enrolment is 55.9% for male students and 44.1% for female students.

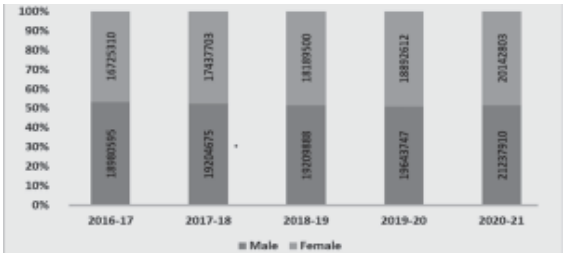
Figure 1
Gender Distribution at Different Levels



Source: AISHE 2020-21

If we look at the gender-wise enrolment as per Figure 2 in the last 5 years the total enrolment has grown to 41.4 million. It was 35.7 million in 2016-17 showing a growth of 16% approximately in the last 5 years. The female enrolment which was 16.7 million in 2016-17, increased to 17.4 million in 2017-18 showing a growth of around 4%. It further reached 18.9 million in 2019-20 and then 20.1 million in 2020-21 showing an increasing trend.

Figure 2
Gender wise Enrolment

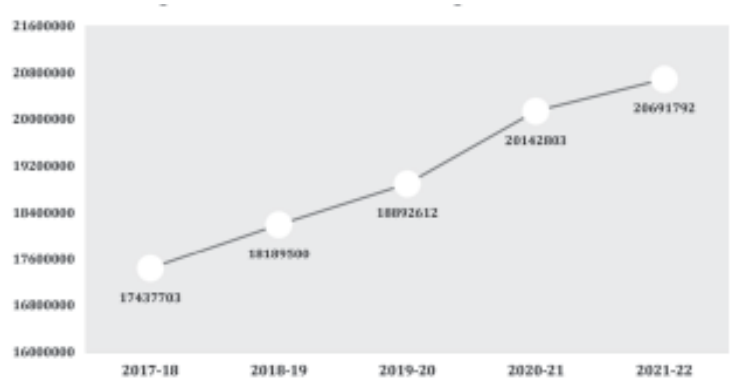


Source: AISHE 2020-21

We can see that India has been able to deal with inequalities in higher education but we still have a long way to go.

Figure 3

Female Enrolment



Source: AISHE 2021-22

There is a steadily increasing trend in female enrolment over the years. The female enrolment has been increased to 2.07 crore in 2021-22 from 2.01 crore in 2020-21 and 1.74 crore in 2017-18, i.e. 18.7% increase in enrolment during 5 years. (Figure 3). Since 2014-15, the female enrolment has increased by around 50 lakh. In 2014-15, the female enrolment was 1,57,23,018.

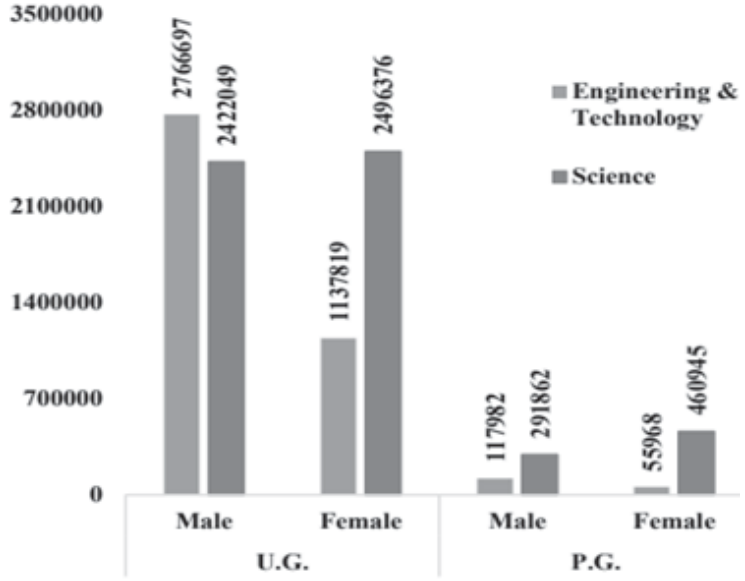
The share of female enrolment is 55% of the increase in overall enrolment (91 lakh), since 2014-15. There has been a higher increase in female enrolment as compared to male.

Field of Study

Women are predominantly enrolled in disciplines such as Arts, Science, and Commerce. However, their participation in fields like Engineering, Technology, and Law remains comparatively lower.

STEM includes the Science stream (including Mathematics) and the Engineering & Technology stream. The Enrolment in STEM (at U.G., P.G., M.Phil. and Ph.D. levels) is 98,49,488, out of which 56,56,488 are males and 41,93,000 are females. Figure 4 given below represents the gender and level-wise enrolment in STEM courses.

Figure 4
Level-Wise And Gender wise Enrolment in STEM Courses



Source: AISHE 2021-22

Challenges Faced by Women in Higher Education

Women in India encounter a multitude of challenges in higher education, shaped by deeply entrenched socio-cultural norms, economic barriers, and institutional inadequacies. Societal expectations often impose traditional gender roles that prioritize marriage and domestic responsibilities over educational aspirations, leading many families to view higher education for women as secondary or unnecessary. This mindset is particularly pervasive in rural areas, where conservative attitudes further restrict women's access to education. Financial constraints exacerbate these issues, as limited resources often lead families to prioritize the education of male children over their female counterparts. The cost of tuition, books, and other educational expenses can be prohibitive, making higher education an unattainable dream for many young women.

Moreover, safety concerns play a critical role in discouraging women from pursuing higher education. Inadequate infrastructure,

such as unsafe transportation and the lack of secure, women-friendly accommodations, creates an environment where attending college becomes a significant risk. This is compounded by the threat of harassment and violence, both on and off campus, which adds to the reluctance of families to send their daughters to distant or urban educational institutions.

Institutional challenges further complicate the landscape. Women frequently face gender bias and discrimination within educational institutions, from both faculty and peers. These biases can manifest in various forms, including undervaluation of women's academic capabilities, fewer opportunities for participation in certain fields of study, and a lack of female role models in faculty positions. This hostile environment can diminish women's confidence and academic performance, leading to higher dropout rates and lower levels of educational attainment.

Additionally, balancing multiple responsibilities remains a significant challenge for women in higher education. Many female students are burdened with household chores and caregiving duties, which can impede their ability to focus on their studies and participate fully in academic life. This dual burden is often unacknowledged by educational institutions, which typically lack support systems such as flexible scheduling, on-campus childcare, or counselling services.

Addressing these challenges requires a comprehensive approach that includes policy interventions, societal change, and institutional support. Governments and educational institutions need to implement and enforce policies that promote gender equality, such as providing scholarships and financial aid targeted specifically at female students, especially those from economically disadvantaged backgrounds. Improving campus infrastructure to ensure safety and accessibility, along with creating a supportive and inclusive environment, is crucial. Furthermore, efforts to change societal attitudes through awareness campaigns and community engagement can help shift the perception of women's education from a secondary to a primary necessity. By tackling these barriers head-on, India can pave the way for a more equitable and empowering educational landscape for women. Bridging the gender gap in higher education and management requires a multifaceted approach that addresses socio-cultural, economic, and institutional barriers. Key strategies include implementing policies that

promote gender equity, such as scholarships and financial aid specifically for women, particularly those from marginalized communities. Enhancing infrastructure to ensure safe and supportive learning environments, including secure transportation and adequate campus facilities, is crucial. Additionally, educational institutions should foster inclusive curricula and teaching practices that challenge traditional gender roles and encourage women's participation in diverse fields, particularly in STEM and management. Digital tools can play a significant role by providing flexible learning options, virtual mentorship programs, and professional development opportunities that cater to women's unique needs. Moreover, organizations must adopt transparent, data-driven approaches to recruitment, promotion, and performance evaluation to eliminate biases and ensure equal opportunities for advancement. Cultivating a culture of continuous learning and support, through online networks and training programs, can further empower women to pursue leadership roles, thereby contributing to a more balanced and diverse professional landscape.

Initiatives taken by the Government:-

The Indian government has undertaken several initiatives to bridge the gap for gender equality and increase women's enrolment in higher education. These initiatives are aimed at addressing the socio-cultural, economic, and institutional barriers that hinder women's access to higher education.

Financial support programs, such as the Beti Bachao Beti Padhao initiative and the Pragati Scholarship Scheme, provide crucial financial assistance to female students, covering tuition fees and other educational expenses. The establishment of dedicated women's universities and the construction of women's hostels funded by the UGC aim to create safe and supportive learning environments.

Reservation policies in certain states ensure increased participation of women by allocating specific quotas in higher education institutions. Awareness campaigns and community engagement programs, such as those under Beti Bachao Beti Padhao, work to change societal attitudes and promote the value of girls' education.

Additionally, technological initiatives like SWAYAM offer accessible online courses, while the Digital India program enhances digital literacy and access to educational resources, bridging the digital

divide. Special schemes for marginalized communities, including those for Scheduled Castes, Scheduled Tribes, and minority women, ensure their inclusion in higher education.

The National Education Policy (NEP) 2020 further emphasizes gender equality with provisions for scholarships, gender-sensitive policies, and infrastructure improvements. These comprehensive measures collectively strive to create an enabling environment for women in higher education, fostering gender equality and empowering women to contribute significantly to the nation's development..

To promote higher education and research among women students, the All India Council for Technical Education (AICTE) has launched Pragati Scholarships and the TechSaksham Program (TSP) for women. Pragati Scholarship was launched in 2014 to provide scholarships to outstanding female students to encourage them to pursue higher education. AICTE gives 10,000 scholarships (Pragati) to girls pursuing science education. The TechSaksham program is a complementary program that uses experiential learning to develop the employability skills of underprivileged students pursuing higher education.

To improve female enrolment in the Undergraduate Programmes in Indian Institutes of Technology (IITs), supernumerary seats were created which increased the female enrolment from 8% in 2018-19 to 20% in 2020-21.

CONCLUSION

The intersection of higher education and the future of management in a digitalized world presents a transformative opportunity to bridge the gap for gender equality and empower women globally. As educational institutions adapt to digital advancements, they must also prioritize inclusivity and equity, ensuring women have equal access to educational resources, leadership opportunities, and supportive networks. By fostering an environment that embraces diversity and innovation, higher education can empower women to excel in management roles, contribute to economic growth, and drive meaningful societal change. Embracing this vision not only enhances individual opportunities but also strengthens organizations and societies by harnessing the full potential of all members, regardless of gender, paving the way for a more inclusive and prosperous digital future.

While significant progress has been made in increasing women's participation in higher education in India, challenges remain. Addressing these issues through targeted policies and initiatives can further bridge the gender gap and empower women to contribute meaningfully to the nation's growth and development. Society should inculcate a confidence level in every woman to make possible changes in our society. Social conditioning across the globe for centuries has conditioned men to believe that they are superior. Education at all levels, but higher education especially, gives women options and empowers them to be independent thinkers and agents of change. Indian Higher Education has already to some extent empowered women to compete better and perform with precision. The government has taken many steps to encourage women's enrolment and gender equality in higher education. But no scheme, no program is successful until it is believed by the society that investing in women's education will lead towards sustainable development of the society and of the nation at large.

REFERENCE

1. AISHE (2020), All India Survey on Higher Education 2018-19, Government of India, Ministry of Human Resource Development, Department of Higher Education.
2. Chanana, K. (2000). Treading the Hallowed Halls: Women in Higher Education in India. Economic and Political Weekly, 35(12), 1012–1022. http://www.jstor.org/stable/4409055
3. David, Miriam. (2009). Diversity, gender and widening participation in global higher education: A feminist perspective. International Studies in Sociology of Education. 19. 1-17.
4. Hill, Catherine & Corbett, Christianne & Rose, Andresse. (2010). Why So Few? Women in Science, Technology, Engineering, and Mathematics. American Association of University Women.
5. Krishnamoorthy A, Srimathi H(2020) 'Women Empowerment In Indian Higher Education', International Journal Of Scientific & Technology Research, Volume 9, Issue 03,pp1793-1796.
6. Moumita Hazra (2017) 'Role of Higher Education in Women Empowerment and Development ', International Journal of Current Advanced Research, 06(08), pp. 5289-5291.
7. Panchani , Monika(2017) 'Role of Higher Education in Women Empowerment', RJPSS ,Vol. 42, No.1.

8. Patel, Vaishali B. (2016) 'EMPOWERMENT OF WOMEN THROUGH HIGHER EDUCATION AND ROLE OF UNIVERSITIES', KCG-Portal of Journals, Issue-9.
9. Press Information Bureau, Government of India, Ministry of Education 27 JUN 2019 6:07PM by PIB Delhi.
10. Rao, Nitya & Sweetman,. (2014). Introduction to Gender and Education. Gender and Development. 22. 10.1080/13552074.2014.902230.
11. Reshi, Irshad & Sudha, Dr & Dar, Shabir. (2022). Women's Access to Education and Its Impact on Their Empowerment: A Comprehensive Review. MORFAI JOURNAL. 1. 446-450. 10.54443/morfai.v1i2.760.
12. https://www.orfonline.org/expert-speak/42582-addressing-gender-equality-through-higher-education/
13. https://www.usaid.gov/what-we-do/gender-equality-and-womens-empowerment
14. https://unesdoc.unesco.org/ark:/48223/pf0000368753
15. https://www.americanprogress.org/article/a-womans-agenda-for-the-21st-century/

11

Talent Management Practices and Employee Retention: Mediating Role of Organization Commitment

– Shreya Mathur
Faculty of Management Studies
Manav Rachna University, Faridabad, India
– Dr. Nandini Srivastava
Faculty of Management Studies
Manav Rachna University, Faridabad India

ABSTRACT

Purpose: This study aims to determine how talent management practices affect staff retention and investigating the impact of organizational commitment on the relationship between talent management practices and employee retention is essential to gain a better understanding of how talent management practices can be leveraged to optimize employee retention. By delving deeper into this relationship, we can confidently determine the most effective talent management practices that can lead to improved employee retention rates.

Research Methodology: A quantitative study was conducted on 200 randomly selected workers from six private sector banks in the Jaipur Circle area. To gather data, a self-administered questionnaire was chosen as the research tool, which proved to be an effective method and convenience sampling was employed. To evaluate the proposed hypotheses, a structural equation model was used.

Findings: The results showed that talent management practices have a significant impact on the intention of employees to stay with the organization. Additionally, Talent management practices pave the way for fostering organizational commitment, which in turn leads to increased employee retention.

Social Implications: It is imperative for banking organizations to reassess their talent management strategies in response to the increasing turnover rates. This study presents compelling evidence of the critical role of organizational commitment traits in this context. Measuring an employee's level of loyalty and dedication towards their company can be achieved by assessing their organizational commitment. To retain top talent, companies must prioritize the implementation of practices that boost organizational commitment.

Keywords: Talent Management Practices, Employee Retention, Organization Commitment, Banks.

1 Introduction

According to the Cambridge Dictionary, organizations are groups of individuals who collaborate towards a common objective in an orderly manner. In order to guarantee the success of organizations, it is vital to have employees who are fully committed to their work. [1]. However, technological advancements, globalization, increased competition, demographic shifts, family concerns, compensation, and psychological and health issues have brought about significant changes in the workplace [2]. Therefore, it is imperative to investigate how these changes impact employees' emotional connections or their stay in the Organization [3]. The departure of an employee can cause significant psychological distress to all parties involved. It can lead to a breakdown in team dynamics, strained relationships between managers and subordinates, and the disbandment of informal groups. Furthermore, productivity may decline due to the time required for a new employee to learn their job and understand the organization's workings. Organizations use a variety of strategies for the retention of their talent An expertly crafted strategic approach is key to confidently attracting and retaining top talent. [4]. Creating a distinct and powerful Talent Management strategy has proven to be an effective method for attracting and retaining employees in firms [5]. Investing in human resources strategically is a crucial factor in achieving success for an organization. Talent management has gained recognition since the 1990s and involves investing resources in recruiting and retaining highly skilled and innovative personnel. Many organizations face various challenges due to social developments such as globalization, increasing technology, and growing worldwide competition. To succeed, businesses must be able to anticipate technological advancements and compete on a

global scale. Furthermore, demographic shifts have placed significant pressure on businesses. The aging workforce and the number of young people entering the job market, coupled with the retirement of the baby boomers, have led to a shortage of labor and the potential loss of valuable expertise. Therefore, businesses must focus on retaining talent to maintain their knowledge and experience, as talent is a key factor in achieving the organization's objectives.

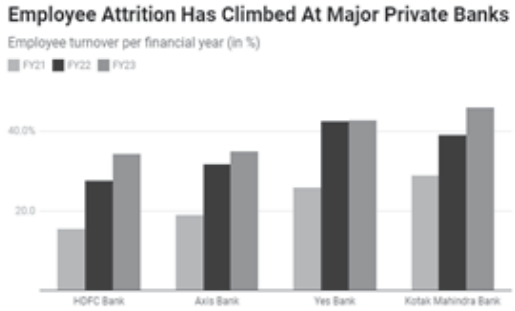


Fig 1.1 Source: Bank Annual Reports

Organizational commitment is crucial for sustaining employee performance [6]. With talent management and a strong sense of organizational commitment, the smooth running of the organization can be ensured. Extensive research indicates that an employee's deep-rooted commitment to an organization is a reflection of their active engagement and alignment with the organization's fundamental values and progressive goals. [7]. It is an ongoing process through which organizational members demonstrate their concern for the organization's success and continued growth [8]. A committed employee demonstrates psychological attachment to their work and identification with organizational objectives. [9]. High levels of organizational commitment are essential for any organization as committed staff members can guarantee progress and optimal performance according to research.

The Rationale for the Study

Employee turnover rates for large private banks grew to more than 30% in FY23, owing to growing market competitiveness and significant churn, particularly in technology and sales areas. The majority of players, including "Axis Bank", "Kotak Mahindra Bank", and "HDFC

Bank", have reported an increase in turnover rates. In the fiscal year ending March 31, India's largest private-sector lender, "HDFC Bank Ltd.", recorded a 34.15% attrition rate among its workforce. According to the bank's most recent annual report, up to 53,760 employees left the bank in 2022-23, including 42,457 males and 11,303 women. A sizable proportion of those who left the bank were from non-supervisory positions, such as sales officers.

2 LITERATURE REVIEW & HYPOTHESIS DEVELOPMENT

2.1 Talent

Recognizing talent is a complex process that can be viewed from different angles. Scholars from the past characterized talent as a combination of acquired knowledge, innate abilities, and cognitive skills. However, modern-day researchers have adopted a more inclusive and exclusive approach to evaluating talent. The inclusive method focuses on identifying the potential of all employees, whereas the exclusive method is used to identify top performers and high potentials. Most authors have employed the exclusive approach, where talent is defined by superior performance and potential. This approach helps to identify the most promising individuals who can contribute significantly to the organization's growth and prosperity. [10] classified talent into four distinct categories, providing a clear framework for organizations to identify and develop their top performers. [11] The definition of talent is comprehensive and leaves no room for doubt - high achievers and high-potential individuals with exceptional strategic thinking, leadership, interpersonal, and operational skills, as well as a track record of dedication and exceptional performance, are the ones who truly make a difference in any organization.

2.2 Management of Talent

Efficiently handling talent is a crucial element for a business to thrive continuously. This entails performing various tasks such as succession planning, personnel retention, team member development, human resource management, and performance monitoring. Identifying, nurturing, and retaining top talent is an ever-evolving and demanding process that requires a consistent and ongoing commitment. Keeping and cultivating skilled employees are essential components of any talent management strategy [12].

2.3 Employee Retention

Employee Retention is a scenario in which employees wish to stay with the company where they work [13]. As a result, the company must maximize retention by increasing the number of employees who truly want to stay with the company and not due to pressure from the company. Employee retention has emerged as a key issue of conversation in the academic discipline of Human Resource Management today, and it has grown in importance as knowledge has evolved into a major corporate asset [14]. Employee retention is commonly characterized as the ability to keep a consistent human resource. This is frequently linked to organizational passion and trust.

2.4 TM Practices & Retention

Talent Management (TM) is a crucial and dynamic process that covers all significant phases of the employee life cycle in an organization, including selection, development, utilization, succession planning, and performance management. The ultimate aim of TM is to improve employee performance and commitment to their current position as well as prepare them for future career prospects [15], [16], [17]. TM involves a set of various practices, such as "talent attraction", "identification," "development", "engagement", "retention", and "deployment", that work together to make the process of TM effective [18], [19], [20], have provided further insights into the detailed definition of TM.

2.4.1 Talent Attraction & Employee Retention

To stay competitive, companies must prioritize recruiting and selection, making talent management techniques crucial. Hiring exceptional individuals who are qualified for the position is an effective way for organizations to showcase their sustainability and innovation [21].

2.4.2 Talent Identification and Employee Retention

Discovering and acquiring individuals whose skills and priorities are aligned with a company's immediate and long-term goals is a key differentiator in the business world [22]. Employing techniques such as the supervisory ability model, "skills inventory", "performance evaluations", and "human resource planning" within the organization, and external tactics such as various interviewing approaches, talent

centers, discussions, and evaluations can help unlock the potential for greatness in any team.

2.4.3 Succession Planning and Employee Retention

Research has demonstrated that enterprises that implement succession planning strategies experience a notable improvement in staff loyalty [23].

2.4.4 Talent Development & Employee Retention

In order to cultivate capable employees, the company incorporates a blend of practical work experience and formal/informal educational programs, diverse training sessions, demanding tasks, career advancement opportunities, and enhanced mentorship and guidance programs for individuals with high potential [24], [25]. By providing avenues for professional growth, the company aims to boost employee loyalty and retention rates [26].

2.4.5 Talent Engagement and Retention

Talent engagement will be one of the biggest and most important organizational challenges over the next ten years, as noted [27] depending on the organization's capacity to effectively engage employees in order to execute business activities with the company. Gemma Robertson-Smith and Carl Markwick conducted a groundbreaking study on employee engagement in organizations. Their research, the IES Engagement Survey of 2005, identified several critical factors that directly impact employee engagement. These factors include job satisfaction, feeling valued and involved in the workplace, opportunities for career advancement, safety and wellness, cultural background, positive interactions with colleagues, and collaborative working. Organizations that prioritize these factors and take deliberate steps to foster a culture of engagement will experience increased productivity, higher employee satisfaction, and better overall performance. It's time for companies to take employee engagement seriously and make it a top priority for success. [28] assert that greater employee engagement reduces staff turnover, which in turn boosts employee retention, productivity, and revenues. More employee engagement, according to a study [29] reduces staff turnover, which raises employee profitability and productivity.

2.4.6 Leadership and Employee Retention

According to [30], treating employees inappropriately induces

a rise in turnover. As a result, leaders should consider their own conduct when interacting with others. With regard to their own assessment, assumptions, and prejudicial attitudes, this ultimately results in significant drive and organizational success [31]. Furthermore, a participative leadership style is essential for retaining personnel [32]. According to "Ellett", "Ellis, Westbrook", and "Dews" (2007), "supportive, exemplary monitoring" Leadership styles that prioritize employee well-being have a positive effect on reducing employee turnover rates. [33]. Leadership styles that prioritize employee well-being have a positive effect on reducing employee turnover rates.

2.4.7 Compensation & Employee Retention

Retaining employees is greatly influenced by monetary compensation as emphasized [34]. Meanwhile, employee retention is dependent on extrinsic incentives such as the amount of remuneration and other benefits [35].

2.4.8 Performance Management & Employee Retention

The incorporation of performance reports can lead to a notable enhancement in employee productivity. To retain top talent, both financial incentives, such as pay bumps, and non-financial perks like recognition, incentives, advancement opportunities, and support from management, are essential [36].

2.4.9 Work-Life Balance & Employee Retention

It's important for employees to feel satisfied with their work-life balance to reduce their intentions of leaving their jobs [37]. [38] suggests that providing flexible working hours and arrangements, as well as ample resources, can help support this balance. Additionally, offering training opportunities, manageable workloads, and breaks throughout the day, as well as allowing time off for personal needs like parental leave or sabbaticals, can all contribute to employee contentment. A healthy balance can not only improve competence and productivity but also promote loyalty and overall happiness among staff [39].

Hypothesis 1: Talent Management practices have considerable effects on employee retention.

2.5 Organizational Commitment

The sensation that an employee has an obligation to stay with the company is known as organizational commitment. This emotion

is the result of embracing the normative pressure that is placed on people prior to entering or taking part in an organizational activity [40]. Three types of organizational commitment are possible. Employees with high affective commitment remain with the company because they want to [41]; affective commitment is defined as identification with, engagement within, and emotional attachment to the organization. A commitment that is ongoing is one that is founded on the employee's understanding of the costs involved in quitting the company. Organizational citizenship, or the behavior of being useful in the organization, is a long-term result of commitment as a sort of loyalty to the organization [42].

2.5.1 Organizational Commitment and Retention

As employees, we all have a desire to feel connected to our workplace, to be committed to our work, and to align with the goals of our organization [40] define this connection as Organizational Commitment (OC Research has demonstrated that employees who exhibit strong Organizational Citizenship Behavior (OC) can be highly beneficial to their respective organizations. This is because they play a key role in driving better performance, improving profitability, and enhancing overall competitiveness. [43]. It is employees' commitment that drives them to stay loyal and devoted to our work and to become important contributors to the success of our organization. OC has a significant impact on organizational retention rates. Therefore, it is crucial to develop and maintain a high level of commitment to our work, as it will not only benefit our organization but also contribute to our personal and professional growth [44].

Hypothesis 2: The link between Employee Retention and Organization Commitment is significantly moderated.

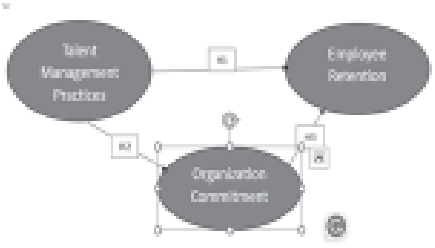


Fig 1.2: Source: Author's Literary Model

3. OBJECTIVES OF THE STUDY

1. Identify the key TM practices that are responsible for employee retention in the banking industry.
2. To study the effect of organizational commitment on employee retention with talent management practices.

4. RESEARCH METHODOLOGY

4.1 Population and Sample Size

The study pertains to the private sector banks operating within the Jaipur Circle, namely "HDFC Bank", "ICICI Bank", "Yes Bank", "Axis Bank", "IndusInd Bank", and "Kotak Mahindra Bank". These banking institutions were selected based on their significant contributions to the private banking industry in the area. The sample size of the study is 200 individuals, chosen using purposive sampling to ensure practicality, usefulness, and resource accessibility. Participants were recruited from the aforementioned banks, taking into account their availability and willingness to participate in the research.

4.2 Measurement of Variables:

The survey utilized in the study covered a wide range of topics related to talent management practices, employee retention, job satisfaction, leadership, performance management, succession planning, training & development, talent attraction, talent engagement, talent identification, and work-life balance (WLB). The study participants were requested to provide their ratings on a five-point Likert scale, ranging from strongly disagree to strongly agree, in order to better understand their perspectives. This method of quantifying the factors helped in understanding the respondents' opinions and viewpoints on various ideas concerning talent management programs and staff retention. Overall, the survey provided valuable insights into the key factors that influence employees' commitment and retention in an organization.

4.3 Analysis Applied

Using the program Smart PLS 4, the data obtained from structural equation modelling (SEM) was assessed. A statistical tool called structural equation modelling (SEM) enables one to evaluate the complex associations between latent variables and observable variables. It helps

to analyze both the short- and long-term effects of many constructs on staff retention by using work satisfaction as a mediating variable. Structural equation modelling allows for the simultaneous examination of correlations between a number of constructs, which aids in understanding the relationships among talent management techniques, job satisfaction, and employee retention. An in-depth analysis of the impact of talent management methods on employee retention in private-sector banking is done in this study using SEM.

4.4 Respondent Demographics

To improve the understanding of the private sector banking workforce, demographic information was collected from the respondents. With 62.0% of male respondents, the age group of 31-40 years accounted for the majority (43.5%). It was found that 28% of the respondents possessed postgraduate degrees. Further, the responses were mostly from middle-level management of the chosen institutions, accounting for 55.5% of the total. These demographic insights provide a valuable framework for analyzing any disparities in the experiences and perspectives of different groups in the private sector banking business.

5 RESULTS

In this study, the researcher utilized an SEM approach to assess both the observable and latent variables. To create the measurement model, a two-step technique was employed [45]. The validity and reliability of the measurement model were thoroughly examined using SEM techniques, while the statistical significance of the factors' loadings and path coefficients was determined through a bootstrapping method (n=10000), as outlined [46].

5.1 The validity and outer loadings

Table 1.1 presents the factor loadings for each component in the construct. The analysis shows that all loadings exceed the threshold value of 0.55 [46]. Most factor loadings are notably high, ranging from 0.714 to 0.850, indicating that the factors effectively capture a significant amount of variance from the variables. Additionally, the table provides VIF to evaluate the model's collinearity, which shows that the VIF values obtained in this investigation are 3.5, demonstrating the lack of a large common method bias, [47]. These findings suggest that the

model is effective in capturing the underlying construct and that the results are reliable and valid.

Table 1.1 Construct Items Loadings with VIF value

Name	Outer loadings	Sample mean	Standard deviation	T statistics	P values	VIF
Comp_10 <- Comp	0.697	0.696	0.042	16.436	0.000	1.571
Comp_5 <- Comp	0.706	0.704	0.041	17.123	0.000	1.604
Comp_6 <- Comp	0.662	0.662	0.047	14.147	0.000	1.381
Comp_7 <- Comp	0.716	0.713	0.051	14.181	0.000	1.709
Comp_8 <- Comp	0.733	0.732	0.033	21.877	0.000	1.607
Comp_9 <- Comp	0.775	0.774	0.032	24.308	0.000	1.695
ER_10 <- ER	0.861	0.860	0.026	33.545	0.000	3.836
ER_2 <- ER	0.867	0.866	0.020	43.080	0.000	3.713
ER_3 <- ER	0.640	0.639	0.037	17.314	0.000	2.252
ER_5 <- ER	0.785	0.784	0.029	26.802	0.000	2.422
ER_6 <- ER	0.875	0.874	0.020	42.939	0.000	3.672
ER_7 <- ER	0.900	0.905	0.018	51.240	0.000	4.836
ER_8 <- ER	0.783	0.782	0.035	22.438	0.000	2.308
ER_9 <- ER	0.847	0.846	0.025	33.386	0.000	3.332
OC_1 <- OC	0.752	0.749	0.055	13.735	0.000	1.237
OC_3 <- OC	0.839	0.838	0.029	28.984	0.000	1.364
OC_4 <- OC	0.722	0.708	0.086	8.407	0.000	1.327
Lead_3 <- Lead	0.725	0.723	0.049	14.937	0.000	2.013
Lead_4 <- Lead	0.696	0.696	0.043	16.118	0.000	1.730
Lead_5 <- Lead	0.659	0.657	0.049	13.457	0.000	1.607
Lead_6 <- Lead	0.812	0.814	0.024	33.792	0.000	2.040
Lead_8 <- Lead	0.739	0.737	0.035	21.230	0.000	1.692
PM_4 <- PM	0.683	0.677	0.054	12.739	0.000	1.465
PM_5 <- PM	0.762	0.759	0.039	19.522	0.000	1.817
PM_6 <- PM	0.747	0.749	0.036	20.494	0.000	1.335
PM_7 <- PM	0.775	0.772	0.039	19.721	0.000	1.904
SP_2 <- SP	0.753	0.753	0.033	22.852	0.000	1.214
SP_3 <- SP	0.811	0.810	0.027	30.031	0.000	1.489
SP_5 <- SP	0.784	0.783	0.035	22.490	0.000	1.432
T&D_2 <- T&D	0.750	0.749	0.043	17.412	0.000	1.386
T&D_3 <- T&D	0.810	0.809	0.027	30.551	0.000	1.623
T&D_5 <- T&D	0.768	0.766	0.033	23.219	0.000	2.112
T&D_8 <- T&D	0.842	0.842	0.022	37.493	0.000	2.437
TA_2 <- TA	0.659	0.656	0.054	12.223	0.000	1.513
TA_4 <- TA	0.681	0.680	0.049	13.786	0.000	1.791
TA_5 <- TA	0.812	0.812	0.024	33.431	0.000	2.573
TA_6 <- TA	0.680	0.678	0.051	13.240	0.000	1.743
TA_7 <- TA	0.770	0.770	0.024	31.916	0.000	2.312
TA_8 <- TA	0.747	0.745	0.038	19.520	0.000	2.263

TA_9 <- TA	0.735	0.734	0.037	20.053	0.000	2.111
TE_4 <- TE	0.665	0.666	0.037	17.851	0.000	1.215
TE_5 <- TE	0.658	0.657	0.067	9.868	0.000	1.956
TE_7 <- TE	0.746	0.744	0.056	13.388	0.000	1.699
TE_9 <- TE	0.896	0.895	0.018	48.840	0.000	3.020
TI_1 <- TI	0.661	0.656	0.061	10.868	0.000	1.707
TI_2 <- TI	0.714	0.714	0.034	20.699	0.000	1.540
TI_3 <- TI	0.748	0.745	0.044	17.139	0.000	2.127
TI_6 <- TI	0.654	0.652	0.040	16.467	0.000	1.494
TI_7 <- TI	0.788	0.785	0.032	24.858	0.000	2.304
TI_8 <- TI	0.629	0.623	0.062	10.183	0.000	1.620
TI_9 <- TI	0.782	0.783	0.021	36.509	0.000	1.890
WLB_2 <- WLB	0.730	0.716	0.069	10.635	0.000	1.784
WLB_3 <- WLB	0.774	0.763	0.062	12.385	0.000	1.759
WLB_8 <- WLB	0.828	0.833	0.046	17.879	0.000	1.168

Source: Authors' Calculations

5.2 Evaluation of the Construct Integral Validity

In assessing the psychometric properties of a measurement model, various measures of validity and reliability are employed. Cronbach's alpha, CR (rho_a), CR (rho_c), and AVE are commonly used to assess the psychometric properties of a measurement model. Cronbach's alpha is a frequently used measure of internal consistency reliability that demonstrates the degree to which components of a construct are interrelated. In this study, most of the constructs exhibit strong internal consistency (>0.7) reliability according to Cronbach's alpha [47]. To accurately evaluate a construct's internal consistency, composite reliability is a key parameter that should be considered. This parameter is determined by both rho_a and rho_c values, with high composite reliability ratings indicating excellent internal consistency for most constructs [48]. Another important parameter to assess is AVE, which measures the extent to which the items in a construct measure the same underlying construct and provides an estimate of convergent validity. All constructs evaluated in this investigation meet the acceptable AVE values criteria, ranging from 0.509 to 0.680 [49]. It is worth noting that all the constructs have AVE values above 0.5, indicating a high level of accuracy in measuring the underlying construct.

Table 1.2: Convergent Validity Testing

Construct Name	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Compensation (Comp)	0.809	0.811	0.863	0.512
Employee Retention (ER)	0.931	0.942	0.944	0.679
Organization Commitment (OC)	0.667	0.693	0.816	0.597
Leadership (Lead)	0.779	0.792	0.849	0.530
Performance Management (PM)	0.736	0.756	0.831	0.551
Succession Planning (SP)	0.684	0.683	0.826	0.613
Training & Development (T&D)	0.805	0.812	0.871	0.629
Talent Attraction (TA)	0.851	0.858	0.887	0.530
Talent Engagement (TE)	0.729	0.749	0.833	0.559
Talent Identification (TI)	0.838	0.843	0.878	0.509
Work-Life Balance (WLB)	0.706	0.757	0.821	0.606

Source: Authors' calculations

5.3 Evaluation of discriminant validity

In the context of structural equation modelling (SEM), the heterotrait-monotrait ratio (HTMT) is a metric used to evaluate discriminant validity. It looks at how closely related constructs within a model are to their own indicators—a relationship known as a monotrait relationship—as opposed to indicators of other constructs, which is a heterotrait relationship.

Table 1.3 Discriminant Validity- HTMT Matrix

	Comp	ER	Lead	OC	PM	SP	T&D	TA	TE	TI	WLB
Comp											
ER	0.595										
Lead	0.743	0.612									
OC	0.691	0.732	0.696								
PM	0.565	0.600	0.715	0.343							
SP	0.568	0.719	0.780	0.517	0.579						
T&D	0.648	0.536	0.393	0.590	0.311	0.792					
TA	0.564	0.778	0.695	0.636	0.524	0.899	0.510				
TE	0.835	0.773	0.889	0.537	0.878	0.869	0.487	0.867			
TI	0.742	0.689	0.607	0.553	0.504	0.771	0.675	0.776	0.846		
WLB	0.418	0.480	0.472	0.699	0.269	0.365	0.241	0.473	0.451	0.465	

Source: Authors' calculations

Table 1.4: Discriminant validity - Fornell-Larcker

Fornell-Larcker Criterion											
	Comp	ER	Lead	OC	PM	SP	T&D	TA	TE	TI	WLB
Comp	0.715										
ER	0.530	0.824									
Lead	0.602	0.548	0.728								
OC	0.503	0.590	0.535	0.773							
PM	0.465	0.526	0.566	0.179	0.743						
SP	0.431	0.585	0.574	0.347	0.444	0.783					
T&D	0.520	0.489	0.321	0.426	0.293	0.611	0.793				
TA	0.474	0.700	0.586	0.492	0.434	0.685	0.424	0.728			
TE	0.660	0.650	0.681	0.371	0.659	0.616	0.359	0.710	0.748		
TI	0.618	0.622	0.511	0.421	0.430	0.600	0.568	0.669	0.682	0.713	
WLB	0.320	0.396	0.376	0.524	0.201	0.293	0.134	0.391	0.387	0.356	0.778

Source: Authors' calculations

The HTMT matrix sheds light on the discriminant validity between construct pairs in the following table 1.4. Good discriminant validity is often regarded as an HTMT value below the threshold of 0.9, indicating that the constructs are different from one another [50]. These results point to a potential problem with discriminant validity between the concept pairings indicated above. To ensure accurate measurement of underlying concepts, it is advised to look into and address any overlap or probable conceptual resemblance between these notions

5.4 Hypothesis Testing

The hypothesis for multiple sets of variables is shown in table 1.5 below. In the picture below, the outcomes of the SEM path analysis are also depicted. The significance of the correlations between the variables is indicated by the T statistics

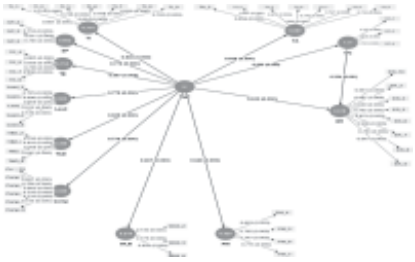


Fig:1.3 Structure Equation Modelling/ Source: Author's Illustration

First, there is a positive correlation between Organization Commitment (OC) and Employee Retention (ER) (â = 0.234, T = 3.275, p 0.001), indicating that organization commitment is linked to longer employee retention. Second, Talent Management Practices (TMP) significantly improve a variety of variables. It has a positive impact on a number of variables, including Compensation (â = 0.774, T = 28.647, p 0.001), ER (â = 0.630, T = 11.661, p 0.001), OC (â = 0.566, T = 12.631, p 0.001), Leadership (â = 0.778, T = 32.022, p 0.001), Performance Management (â = 0.648, T = 18.717). Additionally, Talent Management practices play a critical role in encouraging engagement within the organization as evidenced by its notably substantial positive influence on Talent Engagement (â = 0.867, T = 57.881, p 0.001). These results highlight the importance of TMP in influencing different organizational outcomes.

Table 1.5: Hypothesis Testing

Relationship	Path Co-efficient	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values	C.I 2.5%	C.I 97.5%
OC -> ER	0.234	0.227	0071.	3.275	0.000	0.317	0.511
TMP -> Comp	0.774	0.776	0.027	28.647	0.000	0.722	0.824
TMP -> ER	0.630	0.633	0.054	11.661	0.000	0.452	0.636
TMP -> Lead	0.778	0.780	0.024	32.022	0.000	0.411	0.599
TMP -> OC	0.566	0.570	0.045	12.631	0.000	0.729	0.825
TMP -> PM	0.648	0.654	0.035	18.717	0.000	0.593	0.724
TMP -> SP	0.776	0.777	0.033	23.291	0.000	0.707	0.838
PM-> T&D	0.629	0.631	0.044	14.411	0.000	0.538	0.708
TMP -> TA	0.836	0.836	0.021	39.397	0.000	0.790	0.874
TMP -> TE	0.867	0.870	0.015	57.881	0.000	0.842	0.899
TMP -> TI	0.845	0.846	0.018	45.843	0.000	0.807	0.878
TMP -> WLB	0.467	0.473	0.063	7.349	0.000	0.344	0.592

Source: Authors' calculations

Table 1.6: Indirect effect (Mediation effect)

Specific indirect effects and Total indirect effects						
Hypotheses		"Original sample (O)"	"Sample mean" (M)	"Standard deviation"	"T statistics"	"P values"
H1	TMP -> ER	0.132	0.130	0.044	2.993	0.000
H2	TMP -> OC -> ER	0.132	0.130	0.044	2.993	0.000
H3	OC -> ER	0.132	0.130	0.044	2.993	0.00

Source: Authors' calculations

Based on the analysis, it has been established that Talent Management Practices (TMP) have a significant and positive impact on Employee Retention (ER) through the mediating factor of Organization Commitment (OC) (â = 0.132, T = 2.993, p < 0.001). This implies that TMP has a direct and beneficial effect on ER by enhancing the level of organizational commitment.

CONCLUSIONS

This study delves into the challenges faced by the banking sector, with a particular focus on employee retention. The research suggests that employees who deeply value their professions are more likely to remain committed to their employers. The study also highlights the strong correlation between employee retention and various talent management practices, such as talent attraction, talent identification, succession planning, training & development, leadership, compensation, work-life balance, performance management, and talent engagement. The study further reinforces the role of organizational commitment as a factor in mediating the relationship between talent management practices and employee retention. The results show that when workers feel their potential is recognized and promoted by the organization, motivation increases. Higher degrees of commitment are the result of this motivation. Employee retention rises when workers are devoted to their work since they are more likely to stick with the company. It emphasizes that in order to optimize employee retention, businesses must focus on TMP and create a climate that encourages greater commitment from their staff. Employee retention in the private banking industry has benefited from talent management practices that emphasize talent engagement.

Retaining employees is crucial for companies, and the study's findings highlight the importance of effective talent management practicesBy providing employees with the necessary tools and support, companies can improve organizational commitment and ultimately lead to longer employment tenures. In the private banking industry, banks need to focus on employee retention strategies that prioritize the development and growth of their current workforce. This may involve implementing performance management systems that recognize and reward talent, promoting work-life balance, cultivating strong leadership skills, and investing in extensive talent development initiatives. By prioritizing employee retention, banks can maintain a competitive advantage in the market.

Limitations and Suggestions for Future Research

The study's findings offer valuable insights that can be applied to various organizations, including private-sector banks, public-sector banks, and those with high attrition rates. Through the use of a quantitative technique, the research provides a framework that can benefit others in their talent management efforts. While future research can benefit from a mixed-method approach, such as combining qualitative and quantitative interview questions, the author recommends using open-ended questions and employee-focused interviews to gain deeper knowledge. By examining talent administration practices like coaching, organizations can further improve their talent management strategies. Overall, the study inspires us to continuously learn and improve our talent management practices to ensure success and growth in our organizations.

REFERENCES

1. Bakker, A. B., Albrecht, S. L., & Leiter, M. P. (2011, February). Work engagement: Further reflections on the state of play. *European Journal of Work and Organizational Psychology*, *20*(1), 74–88.
2. Visanh, P., & Xu, H. (2018, December 31). Factors affecting organizational commitment of employee's of Lao Development Bank. *Sociology International Journal, 2*(6).
3. van Rossenberg, Y. G. T., Klein, H. J., Asplund, K., Bentein, K., Breitsohl, H., Cohen, A., Cross, D., de Aguiar Rodrigues, A. C., Duflot, V., Kilroy, S., Ali, N., Rapti, A., Ruhle, S., Solinger, O., Swart, J., &

Yalabik, Z. Y. (2018, March 4). The future of workplace commitment: key questions and directions. *European Journal of Work and Organizational Psychology*, *27*(2), 153–167.

4. Uren, L. (2007, March 1). From talent compliance to talent commitment: Moving beyond the hype of talent management to realizing the benefits. *Strategic HR Review*, *6*(3), 32–35.
5. Jafari, Z., & Hamed Khanmohamadi, M. (2016, September 15). Relationship between talent management strategy efficiency with attracting, recruiting and developing human resources (case study: Iranian offshore oil company). *Problems and Perspectives in Management*, *14*(3), 388–395.
6. Ghosh, D., & Gurunathan, L. (2015, December). Do commitment based human resource practices influence job embeddedness and intentions to quit? *IIMB Management Review*, *27*(4), 214–215.
7. Safei, M., & Kustiawan, U. (2022, March 11). Organizational Commitments That Shape Turnover Intention, Employee Performance, And Organizational Citizenship Behavior. *Ijd-Demos*, *4*(1).
8. Panaccio, A., Tang, W. G., & Vandenberghe, C. (2023, July). Agreeable Supervisors Promoting the Organization – Implications for Employee Commitment and Retention. *Journal of Personnel Psychology*, *22*(3), 146–157.
9. Kim, Y., & Kim, J. (2020, November 30). The Effects of employee perception of training effectiveness on organizational commitment. *Korean Journal of Industrial and Organizational Psychology*, *33*(4), 409–430.
10. Tansley, C. (2011, July 12). What do we mean by the term "talent" in talent management? *Industrial and Commercial Training*, *43*(5), 266–274.
11. Jyoti, J., & Rani, R. (2014). Exploring talent management practices: antecedents and consequences. *International Journal of Management Concepts and Philosophy*, *8*(4), 220.
12. Baqutayan, S. M. S. (2014, November 1). Is Talent Management Important? An Overview of Talent Management and the Way to Optimize Employee Performance. *Mediterranean Journal of Social Sciences*.
13. D, V. R., S, K., & J, K. (2019, March 25). Employee Retention Techniques. *Journal of Research on the Lepidoptera*, *50*(1), 40–47.

14. D, P. (2022, June 30). Employee retention: a study of employee retention in indian it industry during time of covid. *Journal of Management and Science*, *12*(2), 39–43.[15] Schiemann, W. A. (2014, April). From talent management to talent optimization. Journal of World Business, 49(2), 281–288.

16. Sen, J., Harianto, A., & Satrianny, I. P. (2023, March 30). Talent Management in Human Resource Management to Improve Organizational Performance. Indonesian Journal of Contemporary Multidisciplinary Research, 2(2), 95–108.

17. Bano, S., Khan, M. A., Rehman, Q. H. U., & Humayoun, A. A. (2010). Schematising talent management: A core business issue. Far East Journal of Psychology and Business, 2(1), 4-16.

18. Puvitayaphan, A. (2008). Talent management practices in selected companies listed on the stock exchange of Thailand. Educational Journal of Thailand, 2(1), 1-9.

19. Davies, B., & Davies, B. J. (2010). Talent management in academies. International Journal of Educational Management, 24(5), 418–426

20. Mandhanya, Y., & Shah, M. (2010). Employer branding- A tool for talent management. Global Management Review, 4(2), 43-48.

21. Mohammed, A. A., Hafeez-Baig, A., & Gururajan, R. (2019, February 11). A qualitative research to explore practices that are utilised for managing talent development in the higher education environment. Journal of Industry-University Collaboration, 1(1), 24–37.

22. Mbugua, R. W. K., & Kamaara, D. M. (2017, October 16). Influence of recruitment and selection criteria on employee retention in the insurance industry in kenya. Journal of Human Resource and Leadership, 2(7), 17–40

23. Hassan, S. N. U., & Siddiqui, D. A. (2020). Impact of Effective Succession Planning Practices on Employee Retention: Exploring the Mediating Roles. SSRN Electronic Journal.

24. Mandhanya, Y. (2015). Training and Development Strategies: Motivational Tool for Increasing Employee Retention. Training & Development Journal, 6(1), 15.

25. Bhakuni, S., & Saxena, S. (2023, February 25). Exploring the Link between Training and Development, Employee Engagement, and Employee Retention. Journal of Business and Management Studies, 5(1), 173–180.

26. Effectiveness of Training and Development Programs on Employee Retention in IT Industry of India. (2021). Tobacco Regulatory Science (TRS).
27. Pandita, D., & Ray, S. (2018, April 16). Talent management and employee engagement – a meta-analysis of their impact on talent retention. Industrial and Commercial Training, 50(4), 185–199.
28. Yadav, A. (2020). Employee Retention and Employee Engagement. International Journal of Management, 08(02), 47–52.
29. Zardari, S. A., Sultan, S., & Hussain, A. (2023, September 8). examine impact of factors of employee branding on employee retention, with mediation of organizational identification. International Journal of Health Sciences, 7(S1), 2566–2583.
30. Chendroyaperumal, C., & Bhuvanadevi, N. (2010). Leadership Behavioural Strategies for Employee Retention. SSRN Electronic Journal.
31. Dwiedienawati, D. (2020, July 25). Transformational Leadership, Communication Quality Influences to Perceived Organization Effectiveness and Employee Engagement and Employee Retention during the COVID-19 Pandemic. Journal of Advanced Research in Dynamical and Control Systems, 12(SP7), 773–787.
32. Putra, A., & Indayani, L. (2022, December 31). The Influence of Participative Leadership Style, Incentives and Loyalty on Employee Performance. Academia Open, 7.
33. Ellett, A. J., Ellis, J. I., Westbrook, T. M., & Dews, D. (2007, February). A qualitative study of 369 child welfare professionals' perspectives about factors contributing to employee retention and turnover. Children and Youth Services Review, 29(2), 264–281.
34. Chiekezie, O. M., Emejulu, G., & Nwanneka, A. (2017, March 25). Compensation Management And Employee Retention Of Selected Commercial Banks In Anambra State, Nigeria. Archives of Business Research, 5(3).
35. Khalid, K., & Nawab, S. (2018, October). Employee Participation and Employee Retention in View of Compensation. SAGE Open, 8(4), 215824401881006.
36. Kossyva, D., Theriou, G., Aggelidis, V., Sarigiannidis, L., & Chatzoudes, D. (2021, November 1). Retention of Generation Y Employees through High-Performance Work Systems, Change Management and Employee Engagement.

37. Ayub Khan, P. (2016, August 1). A Study on the role of Work-Life Balance Practices on Employee Retention in Pharma Sector – An Empirical Study. Management Today, 6(3).
38. Deery, M. (2008, October 3). Talent management, work life balance and retention strategies. International Journal of Contemporary Hospitality Management, 20(7), 792–806.
39. Mrs.Prerna Nair, M. N. (2013). Effective Leadership-Employee Retention-Work Life Balance: A Cyclical Continuum. IOSR Journal of Business and Management, 10(3), 80–86.
40. Allen, N. J., & Meyer, J. P. (1990, March). The measurement and antecedents of affective, continuance and normative commitment to the organization. Journal of Occupational Psychology, 63(1), 1–18.
41. Meyer, J. P., Allen, N. J., & Smith, C. A. (1993). Commitment to organizations and occupations: Extension and test of a three-component conceptualization. Journal of Applied Psychology, 78(4), 538–551.
42. Muchlish, M. (2020, August 30). Antecedents of Perceived Organizational Support to Improve Organizational Commitment in the Public Sector Institutions. Journal of Accounting Research, Organization and Economics, 3(2), 163–171.
43. Ruíz-Valdés, S., & Ruíz-Tapia, J. A. (2022, December 31). The emotional salary as a strategy to encourage work commitment and talent retention in the organization. Journal International Economy, 8–16.
44. Morrow, P. C. (2011, August). Managing organizational commitment: Insights from longitudinal research. Journal of Vocational Behavior, 79(1), 18–35.
45. Hair, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., & Thiele, K. O. (2017, February 16). Mirror, mirror on the wall: a comparative evaluation of composite-based structural equation modeling methods. Journal of the Academy of Marketing Science, 45(5), 616–632.
46. Hair, J. F., Howard, M. C., & Nitzl, C. (2020, March). Assessing measurement model quality in PLS-SEM using confirmatory composite analysis. Journal of Business Research, 109, 101–110.
47. Kock, N. (2015, October 1). Common Method Bias in PLS-SEM. International Journal of E-Collaboration, 11(4), 1–10.

48. Raykov, T. (1998, December). Coefficient Alpha and Composite Reliability With Interrelated Nonhomogeneous Items. Applied Psychological Measurement, 22(4), 375–385.

49. Fornell, C., & Larcker, D. F. (1981, August). Structural Equation Models with Unobservable Variables and Measurement Error: Algebra and Statistics. Journal of Marketing Research, 18(3), 382.

50. Henseler, J., Ringle, C. M., & Sarstedt, M. (2014, August 22). A new criterion for assessing discriminant validity in variance-based structural equation modeling. Journal of the Academy of Marketing Science, 43(1), 115–135.

12

A Study on Consumer's Perception Towards Digital Payment in Delhi-NCR

*– **Naman Gupta***
(MBA Student)
Delhi Institute of Advanced Studies
GGSIPU, Delhi

ABSTRACT

This study investigates consumer perceptions of digital payments in Delhi-NCR. The exponential growth of digitalization, coupled with targeted government initiatives, has significantly accelerated the adoption of digital payment methods. This research explores the key factors influencing consumers' decisions to adopt these methods. Employing a mixed-method approach, the study utilizes surveys, interviews, and a rigorous analysis of existing literature. The research identifies convenience, security, trust, and awareness as the primary drivers of digital payment adoption. While consumers prioritize user-friendliness, concerns regarding security and a lack of awareness about available options remain significant barriers to wider adoption. Additionally, the study recommends that government bodies and policymakers focus on strengthening digital infrastructure, enacting robust regulations, and spearheading financial literacy initiatives. By addressing these critical aspects, stakeholders can collaboratively drive widespread adoption of digital payments, ultimately fostering financial inclusion and propelling the growth of India's digital economy.

Key words- Digital Payment, POS (point of sale), BHIM (Bharat interface for money), UPI

(Unified payments interfaces), NEFT (National electronic fund

transfers), RTGS (Real time gross settlement), IMPS (immediate payment service)

1. INTRODUCTION

A digital payment, sometimes called an electronic payment, is the transfer of value from one payment account to another using a digital device such as a mobile phone, POS (Point of Sales) or computer, a digital channel communication such as mobile wireless data or SWIFT (Society for the Worldwide Interbank Financial). The Digital India is the Indian Government's flagship programme with a vision to convert India into a digitally empowered country.

"Faceless, Paperless, Cashless" is one of supposed function of Digital India as part of government reforms Prime Minister Mr. Narender Modi demonetized the high value currency of Rs. 500 and 1000 in November 2016 and also launched the Digital India initiative in 2015.These initiatives have provided extensive boost up to the digital payment system in the country.

Government's other initiatives like BHIM and UPI are supporting in transition and faster adoption of digital payments. Electronics Consumer transaction made at point of sale (POS) for services and products either through internet banking or mobile banking using smart phone or card payment are called as digital payment.

Convenience is a major advantage. Transactions happen instantly using smartphones or computers, eliminating the need to carry cash and wait in lines. Security is enhanced too, as the risk of theft is lower compared to cash. Additionally, digital payments provide a clear record of transactions, simplifying budgeting and expense management. Many platforms offer cashback and reward programs, incentivizing their use.

However, challenges remain. Digital literacy and access to smartphones and internet connectivity can be limited in rural areas. Security concerns regarding online fraud and data breaches also exist. Not all merchants may have the infrastructure to accept digital payments yet.

The future looks promising. Government efforts are likely to focus on increasing digital payment adoption in rural areas. Offline payment methods using technologies like NFC might emerge. Fintech

innovation is expected to bring even more user-friendly solutions. Biometric authentication for added security could also become more widespread. Overall, digital payments are poised to play an increasingly important role in India's economy.

1.1 METHODS OF DIGITAL PAYMENTS

- **Bank cards**: Cards are among the most widely used payment methods and come with various features and benefits such as security of payments, convenience, etc. The main advantage of debit/credit or prepaid banking cards is that they can be used to make other types of digital payments.
- **USSD**: Another type of digital payment method, *99#, can be used to carry out mobile transactions without downloading any app. These types of payments can also be made with no mobile data facility.
- **AEPS**: Expanded as Aadhaar Enabled Payment System, AEPS can be used for all banking transactions such as balance enquiry, cash withdrawal, cash deposit, payment transactions, Aadhaar to Aadhaar fund transfers, etc.
- **Mobile Wallets**: A mobile wallet is a type of virtual wallet service that can be used by downloading an app. The digital or mobile wallet stores bank account or debit/credit card information or bank account information in an encoded format to allow secure payments.
- **Bank pre-paid cards**: A prepaid card is a type of payment instrument on to which you load money to make purchases. The type of card may not be linked to the bank account of the customer. However, a debit card issued by the bank is linked with the bank account of the customer.
- **POS terminals**: Traditionally, POS terminals referred to those that were installed at all stores where purchases were made by customers using credit/debit cards. It is usually a hand-held device that reads banking cards.
- **Internet Banking**: Internet banking refers to the process of carrying out banking transactions online. These may include many services such as transferring funds, opening a new fixed or recurring deposit, closing an account, etc. Internet banking

is also referred to as e-banking or virtual banking. Internet banking is usually used to make online fund transfers via NEFT, RTGS or IMPS.

- **Mobile Banking**: Mobile banking is referred to the process of carrying out financial transactions/banking transactions through a smartphone.
- **Bharat Interface for Money (BHIM) app**: The BHIM app allows users to make payments using the UPI application. This also works in collaboration with UPI and transactions can be carried out using a VPA. One can link his/her bank account with the BHIM interface

  easily.

1.2 KEY ASPECT OF CONSUMER PERCEPTION TOWARDS DIGITAL PAYMENT

Consumer perception towards digital payment has significantly evolved in recent years. Initially, there was scepticism and resistance towards adopting digital payment methods due to concerns about security, privacy, and convenience. However, with advancements in technology and increased accessibility, the perception has undergone a positive shift. Here are some key aspects of consumer perception towards digital payment:

- **Convenience**: Digital payment methods, such as mobile wallets, contactless cards, and online payment platforms, offer convenience and ease of use. Consumers appreciate the ability to make payments anytime, anywhere, without the need for cash or physical cards. The convenience factor has been a significant driver in the adoption of digital payment methods.
- **Security**: Security concerns were one of the primary barriers to digital payment adoption. However, many digital payment providers have invested in robust security measures, including encryption, two-factor authentication, and fraud detection systems. As consumers become more aware of these security measures and their effectiveness, trust in digital payments has increased.
- **Speed and Efficiency**: Digital payments are often faster and more efficient compared to traditional payment methods.

Transactions can be completed in seconds, reducing the time spent waiting in queues or handling cash. This aspect of digital payments is particularly appealing to consumers who value speed and convenience in their financial transactions.

- **Contactless Payments**: The COVID-19 pandemic further accelerated the adoption of digital payments due to the increased emphasis on contactless transactions. Consumers perceive contactless payments as a safer alternative to handling physical cash or touching payment terminals, as it minimizes the risk of germ transmission.
- **Rewards and Incentives**: Many digital payment providers offer rewards programs, cashback offers, or discounts to incentivize consumers to use their platforms. These benefits add value to the digital payment experience and positively influence consumer perception.
- **Financial Inclusion**: Digital payment methods have the potential to promote financial inclusion by providing access to banking and financial services to underserved populations. Consumers recognize the benefits of having a digital payment account, which can enable them to participate in the formal economy and access various financial services.
- **Trust and Familiarity:** As digital payment methods become more mainstream and widely accepted, consumers have developed a sense of trust and familiarity with the technology. This trust is built through positive experiences, reliability, and the reputation of established payment provider.

The future looks promising. Government efforts are likely to focus on increasing digital payment adoption in rural areas. Offline payment methods using technologies like NFC might emerge. Fintech innovation is expected to bring even more user-friendly solutions. Biometric authentication for added security could also become more widespread. Overall, digital payments are poised to play an increasingly important role in India's economy.

While the overall consumer perception towards digital payment is positive, it's important to note that some segments of the population, particularly older individuals or those with limited access to technology, may still have reservations or face barriers in adopting digital payment

methods. However, as digital infrastructure continues to improve, and awareness campaigns address concerns, the perception is expected to further improve, leading to increased adoption of digital payment methods.

Digital payments are payments done through digital or online modes, with no exchange of hard cash being involved. Such a payment, sometimes also called an electronic payment (e-payment), is the transfer of value from one payment account to another where both the payer and the payee use a digital device such as a mobile phone, computer, or a credit, debit, or prepaid card.

The payer and payee could be either a business or an individual. This means that for digital payments to take place, the payer and payee both must have a bank account, an online banking method, a device from which they can make the payment, and a medium of transmission, meaning that either they should have signed up to a payment provider or an intermediary such as a bank or a service provider.

2. OBJECTIVE OF THE STUDY

- To find the most preferred modes of digital payment.
- To examine the impact of the customers income status on the usage of digital payment.
- To Study the impact of digital payment.
- To assess what level of confidence and safety consumers have in digital payment methods.
- To determine whether digital payment method enhanced buying experience.

3. LITERATURE REVIEW

"A study of consumer perception of digital payment mode: A Review" by Shamsher Singh & Ravish Rana (2019): The last decade has seen tremendous growth in use of internet and mobile phone in India. Increasing use of internet, mobile penetration and government initiative such as Digital India are acting as catalyst which leads to exponential growth in use of digital payment.

"E-Payment System in E-Commerce: A Review" by S Fatonah, A Yulandari and F W Wibowo (2018): The Era of Information and Communication Technology (ICT) and digital innovation lead to dynamic

changes in the business environment, where business transactions continue to shift from cash-based transactions to electronic-based transactions. The e-payment system was not introduced to replace cash but as a better alternative to cash and trade barter.

"A Study on Digital Payments in India with Perspective of Consumer's Adoption: A Review" by K. Suma Vally and K. Hema Divya (2018): The demonetization resulted in tremendous growth in digital payments. With the government initiative such as Digital India and increased use of mobile and internet are means to exponential growth in use of digital payment. This transformation towards digital payments benefits in more transparency in transactions which empowers the country's economy.

"Factors Influencing Consumer Adoption of Digital Payment Systems: A Review" by Sharma (2019): Identified convenience, security, trust, cost-effectiveness, and rewards as key factors influencing consumer adoption of digital payment methods in India. Highlighted the importance of user experience, simplicity, and ease of use in driving adoption rates. Emphasized the need for addressing security concerns, such as data privacy and fraud protection, to build consumer trust.

"A Study on Consumer Adoption of Digital Payments in India" by Gupta and Arora (2020): Found that younger consumers and those with higher educational qualifications were more likely to adopt digital payment methods. Highlighted the role of social influence and peer

recommendations in driving adoption, indicating the importance of awareness campaigns and word-of-mouth marketing. Identified the need for better customer support and education initiatives to address consumer concerns and enhance adoption rates.

"Determinants of Mobile Payment Adoption: A Review of the Literature" by Singh (2020): Explored the factors influencing mobile payment adoption in India, including technological factors, perceived usefulness, ease of use, trust, and perceived risk. Emphasized the role of socio-cultural factors and institutional support in shaping consumer attitudes towards digital payments. Recommended the integration of mobile payment services with existing infrastructure, increased security measures, and personalized incentives to drive adoption.

"A Review of Digital Payments in India: Opportunities and Challenges" by Chawla and Sharma (2021): Highlighted the growth

of digital payment systems in India and the government's initiatives to promote digital transactions. Examined the challenges faced by consumers, such as transaction failures, lack of interoperability, and concerns regarding data security and privacy. Identified the need for consumer education, robust complaint resolution mechanisms, and collaboration between stakeholders to overcome barriers and promote widespread adoption.

4. RESEARCH METHODOLOGY

This study employs a descriptive research design to investigate consumer perceptions of digital payments within the Delhi/NCR region. To gather data, a non-probability convenience sampling approach will be utilized, targeting a sample of 150 residents in the designated area. A self-administered questionnaire featuring a Likert scale will be the primary instrument for data collection. The collected data will be analysed using a combination of methods: percentage analysis will summarize the responses, while charts and graphs will offer a visual representation of the findings. Additionally, statistical software (SPSS) will be employed to conduct in-depth analysis using techniques such as ANOVA, Chi-square, or t-tests to identify any statistically significant relationships between variables. It is acknowledged that the convenience sampling method may limit the generalizability of the results to the entire population of Delhi/NCR.

5. LIMITATION OF THE STUDY

- The Observation is depended on the information given by the Respondents.
- The present study is limited to the 144 size of respondents out of 200.
- Due to the convenience sampling method adopted, the entire population of banking customers was not reflected in the study.
- Due to the time constraint the sample size was restricted to 100 respondents and the information was collected by using WhatsApp.
- Since the study is based on the both primary and secondary data collected through questionnaires, the result of the study is subject to all the limitations of the primary data and secondary data.

- The findings and suggestions are based on the information given by the respondents.

6. DATA ANALYSIS AND INTERPRETATION

6.1 DEMOGRAPHIC PROFILE

Gender	**Frequency**	**Percentage (%)**
Male	92	64%
Female	52	36%
Prefer say to no	0	0%
Age (in years)	**Frequency**	**Percentage (%)**
18-27	98	68%
28-37	39	27%
37 above	7	5%
Education	**Frequency**	**Percentage (%)**
School	10	6.9%
Bachelor's Degree	30	20.8%
Master's Degree	78	54.2%
PhD's Degree	25	17.4%
Others	1	0.7%
Income	**Frequency**	**Percentage (%)**
0-250000	62	43.1%
250000-500000	19	13.2%
500000-1000000	36	25.0%
ABOVE 1000000	27	18.8%
Profession	**Frequency**	**Percentage (%)**
BUSINESSMAN	14	9.7%
BUSINESSWOMEN	01	0.7%
CIVIL ENGINEER	02	1.4%
CMA	03	2.1%
CS	02	1.4%
DOCTOR	02	1.4%
EMPLOYEES	37	25.7%
Ex- Employee, but quit job to pursue masters	01	0.7%
HOME MAKER	02	1.4%
LAWYER	03	2.1%
RETIRED POLICE	01	0.7%
STUDENT	74	51.4%
TEACHER	02	1.4%

6.2 DESCRIPTIVE

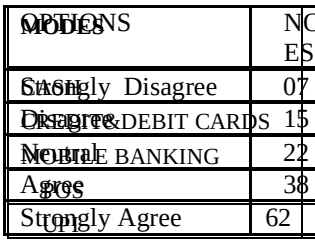
QUESTION Do you used digital payment?

BASIS	NO. OF RESPONDENTS	PERCENTAGE
YES	126	87.5%
NO	10	6.9%
MAYBE	08	5.6%

Interpretation: In the above figure, it is interpreted that out of 144 respondents 87.5% of the respondents are Yes Respondents and 6.9% of the respondents are No Respondents and 5.6% of the respondents are Maybe used Digital payments

Which mode of digital payment do you mostly used?

MODES	NO ES
CASH	07
CREDIT&DEBIT CARDS	15
MOBILE BANKING	22
POS	38
UPI	62



Interpretation: In the above figure, it is interpreted that out of 144 respondents 59.7% of the respondents are used UPI and 5.6% of the respondents are used CASH and 14.6% of the respondents are used CREDIT&DEBIT CARDS and 19.4% of the respondents are used MOBILE BANKING and 0.7% are used POS modes of Digital payments**.**

Digital Payment can offer a wide range of banking services and payment options?

Interpretation: In the above figure, it is interpreted that 4.9% of the respondents are Strongly disagree, 10.4% of the respondents are disagree,15% of them are Neutral, 26.3% of them are Agree and 37.5% of the respondents are Strongly Agree.

Trust the services providers of digital payment?

OPTIONS	NO. OF RESPONDENTS	PERCENTAGE
Strongly Disagree	05	3.5%
Disagree	15	10.4%
Neutral	33	22.9%
Agree	38	26.4%
Strongly Agree	53	36.8%

Interpretation: In the above figure, it is interpreted that 3.5% of the respondents are Strongly disagree, 10.4% of the respondents are disagree,22.9% of them are Neutral, 26.4% of them are Agree and 36.8% of the respondents are Strongly Agree.

Is Digital payment Convenient in using?

OPTIONS	NO. OF RESPONDENTS	PERCENTAGE
Strongly Disagree	05	3.5%
Disagree	11	7.6%
Neutral	25	17.4%
Agree	42	29.2%
Strongly Agree	61	42.4%

Interpretation: In the above figure, it is interpreted that 3.5% of the respondents are Strongly disagree, 7.6% of the respondents are disagree,17.4% of them are Neutral, 29.2% of them are Agree and 42.4% of the respondents are Strongly Agree**.**

Digital payment is a secured transaction?

OPTIONS	NO. OF RESPONDENTS	PERCENTAGE
Strongly Disagree	09	6.3%
Disagree	10	6.9%
Neutral	35	24.3%
Agree	39	27.1%
Strongly Agree	51	35.4%

Interpretation: In the above figure, it is interpreted that 6.3% of the respondents are Strongly disagree, 6.9% of the respondents are disagree,24.3% of them are Neutral, 27.1% of them are Agree and 35.4% of the respondents are Strongly Agree**.**

Digital payment systems are better than carrying cash?

Interpretation: In the above figure, it is interpreted that 4.9% of the respondents are Strongly disagree, 4.9% of the respondents are disagree,17.4% of them are Neutral, 31.9% of them are Agree and 41% of the respondents are Strongly Agree**.**

Digital payment saves your time and money?

OPTIONS	NO. OF RESPONDENTS	PERCENTAGE
Strongly Disagree	04	2.8%
Disagree	08	5.6%
Neutral	25	17.4%
Agree	46	31.9%
Strongly Agree	61	42.4%

Interpretation: In the above figure, it is interpreted that 2.8% of the respondents are Strongly disagree, 5.6% of the respondents are disagree,17.4% of them are Neutral, 31.9% of them are Agree and 42.4% of the respondents are Strongly Agree**.**

When utilising digital payment systems, users must be aware of security concerns?

OPTIONS	NO. OF RESPONDENTS	PERCENTAGE
Strongly Disagree	07	4.9%
Disagree	07	4.9%
Neutral	24	16.7%
Agree	45	31.3%
Strongly Agree	61	42.4%

Interpretation: In the above figure, it is interpreted that 4.9% of the respondents are Strongly disagree, 4.9% of the respondents are disagree,16.7% of them are Neutral, 31.3% of them are Agree and 42.4% of the respondents are Strongly Agree**.**

		Perception	Security	Benefit	Trust	Efficacy	Ease
Perception	Pearson Correlation	1	.348	.437	.402	.341	.469
	Sig. (2-tailed)		.000	.000	.000	.000	.000

Table1: Correlation of the consumer perception

7. CONCLUSION

This paper shows the landscape of financial transactions in India is undergoing a significant transformation. The future inevitability of digital payments necessitates a shift in consumer habits towards embracing cashless transactions. This transition offers a multitude of benefits, including enhanced security compared to carrying physical cash, faster and more convenient transactions, and the creation of a clear record of all financial activities. India's robust digital infrastructure, with over 1 billion active mobile connections and a growing smartphone user base, further paves the way for a cashless future. This momentum is bolstered by a well-developed ecosystem of digital payment platforms and online banking services, fostering strong consumer acceptance of cashless transactions. Consumers are also able to perceive the advantages and disadvantages of different digital payment products available, signalling a well-developed consumer environment as well. A high-quality push towards empowering users (as opposed to extolling product features or generic advantages of digital payments), with specific "how to use" knowledge, helplines for learning as well as problem solving, and safeguard features which help the user 'stay safe', can make India race towards being a less-cash society.

7.1 Safety measured used to Digital Payments:

- Change your passwords regularly.
- Do not use public computers to login.
- Do not share your details with anyone.
- Keep checking your savings account regularly.
- Always use licensed anti-virus software.
- Disconnect the internet connection when not in use.
- Always types your internet banking URL do not copy paste it

8. RECOMMENDATIONS OF STUDY

- Educate: Show people the benefits & security of digital wallets.

- Trust Builders: Use strong security & partner with trusted brands.
- Easy Use: Make apps simple & fast, integrate with popular platforms.
- Rewards: Offer incentives like cash back & discounts to encourage switching.
- Support Merchants: Help businesses accept digital payments easily.
- Open to All: Design inclusive platforms for everyone, regardless of abilities.
- Keep Improving: Stay up-to-date with new technologies & user needs.

9. REFERENCES

1. K.V Sriram (2014), "An empirical study on customer adoption of mobile payment application in India", International Journal of Enterprise Network Management, 2018
2. Katherine N. Lemon & Peter C. Verhoef (2016) , "Understanding Customer Experience throughout the Customer Journey", Journal of Marketing
3. Kristu Jayanti (2022), https://ijcrt.org/papers/IJCRT2204123.pdf," A STUDY ON INDIA'S DIGITAL PAYMENTS AND THEIR IMPACT ON CONSUMERS"
4. Pada Shetty S, Kishore KS (2013) An Empirical Study on Consumer Adoption of Mobile Payments in Bangalore City-A Case Study. Researchers World.
5. Pandey, S. K., & Vishwakarma, A. (2020). A STUDY ON INVESTMENT PREFERENCES OF YOUNG INVESTORS IN THE CITY OF RAIPUR CHHATTISGARH, INDIA.
6. Wassan Abdullah Alkhowaiter (2020), Digital payment and banking adoption research in Gulf countries: A systematic literature review, International Journal of Information Management 53(4):102102.g. McCole, P. (2002). The role of trust for electronic commerce in services. International Journal of Contemporary Hospitality Management, 14(2), 81–87
7. Panayides, P. (2013). Coefficient alpha: Interpret with caution. Europe's Journal of Psychology, 9(4), 687–696.
8. Ponmuthumari, S., & E-banking, K. (2012). Customers Evaluation

of Electronic Payments and Clearing System in Indian Banks, (2277), 19–21.

9. Rachna, & Singh, P. (2013). Issues and Challenges of Electronic Payment Systems. International Journal for Research in Management and Pharmacy, 2(9), 25–30.
10. Roy, S., & Sinha, I. (2014). Determinants of Customers' Acceptance of Electronic Payment System in Indian Banking Sector – A Study, 5(1), 177–187.
11. Shahazad, A., Khan, M., & Chandra, M. (2012). AReview: Secure Payment System for Electronic Transaction. International Journal, 2(3).

13

Support Vector Machine's Role in Big Data Mining Insights

– Prof. Dr. Shubhra Saggar
Professor, Guru Nanak Institute of Management , GGSIPU
– Amisha
– Kajal
– Aryan
Student, Guru Nanak Institute of Management , GGSIPU

1. ABSTRACT

In this paper, we explore Support Vector Machine (SVM), a highly popular model in both Data Mining and Machine Learning to analyse big data. SVM has gained significant popularity in recent years due to its versatility across various applications, including face detection, image classification, text categorization, and neuroimaging analysis. Serving as a supervised learning algorithm, SVM is widely recognized for its utility in regression tasks and its effectiveness in addressing classification problems across diverse domains. The primary objective of SVM is to construct an optimal decision boundary capable of segregating n-dimensional space into distinct classes. By harnessing this capability, SVM enables the creation of robust models that can accurately classify data points, thereby facilitating informed decision-making in a wide range of real-world scenarios. Recent studies have highlighted SVM's remarkable flexibility and simplicity, particularly in applications related to predicting the diagnosis and prognosis of brain diseases such as Alzheimer's disease, schizophrenia, and depression. By leveraging SVM's capabilities, researchers and practitioners can analyse complex datasets. This paper aims to provide a comprehensive exploration of SVM's fundamental principles, practical applications,

and its evolving role in addressing real-world challenges across diverse domains. Through an analysis of recent advancements and case studies, we aim to shed light on the significance of SVM as a powerful tool for data-driven decision-making and its potential to drive innovation in various fields.

2. INTRODUCTION

In the era of big data, where the volume, velocity, and variety of data are continuously expanding, extracting meaningful insights has become a paramount challenge for researchers and practitioners across various domains. Classification, a fundamental task in data mining, plays a crucial role in uncovering valuable patterns and relationships within large and complex datasets. Support Vector Machines (SVM), a powerful machine learning algorithm, have emerged as a popular choice for classification tasks due to their ability to handle high-dimensional data and nonlinear relationships.

Support Vector Machines, initially introduced by Vapnik and Cortes in the 1990s, have garnered widespread attention for their remarkable performance in diverse applications ranging from image recognition to bioinformatics. The essence of SVM lies in finding the optimal hyperplane that maximally separates different classes in the feature space, thus enabling robust classification even in complex datasets. As the volume and complexity of data continue to grow exponentially in the era of big data, the role of SVMs in facilitating knowledge discovery and decision-making has become increasingly prominent.

In this research paper, we delve into the role of Support Vector Machines in mining insights from datasets through classification, with a particular focus on their relevance in the context of big data mining. We explore the methodology of employing SVMs for classifying datasets, including preprocessing steps, model training, and evaluation techniques. Furthermore, we conduct experiments to assess the performance of SVM classification on a specific dataset, shedding light on its effectiveness in extracting actionable insights from large and complex datasets.

By elucidating the intricacies of SVM-based classification and showcasing its practical applications in the realm of big data mining, this paper aims to contribute to the understanding of SVMs' significance

in handling the challenges posed by massive and heterogeneous datasets. Through empirical validation and critical analysis, we seek to demonstrate the efficacy of SVMs as a valuable tool for uncovering valuable insights from big data, thereby facilitating informed decision-making and knowledge discovery in the era of data abundance.

3. LITERATURE REVIEW

Introduction

The literature surrounding Support Vector Machines (SVMs) in the realm of big data mining and classification encompasses a rich tapestry of research endeavours aimed at exploring the capabilities, applications, and advancements of this powerful machine learning algorithm. In this section, we present a comprehensive review of existing literature, delving into the historical development of SVMs, their diverse applications in big data mining, comparative studies with other classification methods, challenges, recent advances, and future directions.

Key Concepts and Background

Support Vector Machines (SVMs) are supervised learning models used for classification and regression tasks. Introduced by Vapnik and Cortes in the 1990s, SVMs aim to find the optimal hyperplane that maximally separates different classes in the feature space. The fundamental principle behind SVMs lies in the notion of margin maximization, where the algorithm seeks to identify the decision boundary with the maximum margin of separation between classes, thereby enhancing robustness and generalization.

Historical Development of SVMs

The evolution of Support Vector Machines has witnessed significant milestones and advancements since its inception. From its early formulations in the linearly separable case to the development of kernel methods for handling nonlinear data, SVM research has expanded to encompass a wide array of applications spanning various domains. The pioneering works of Vapnik, Cortes, and others laid the groundwork for the widespread adoption of SVMs as a versatile tool for classification and regression tasks.

Applications of SVMs in Big Data Mining

Support Vector Machines have found extensive applications in big data mining and classification tasks across diverse domains. In healthcare, SVMs have been employed for disease diagnosis and prognosis, demonstrating promising results in medical image analysis and patient outcome prediction. In finance, SVMs have been utilized for credit scoring, fraud detection, and stock market forecasting, leveraging their ability to discern intricate patterns in financial data. Additionally, SVMs have been applied in natural language processing, bioinformatics, image recognition, and text categorization, among other domains, highlighting their versatility and efficacy in handling complex datasets.

Comparative Studies and Performance Evaluation

Numerous comparative studies have been conducted to evaluate the performance of SVMs against other classification algorithms. These studies often benchmark SVMs against traditional methods such as decision trees, logistic regression, and k-nearest neighbors, as well as contemporary approaches like neural networks and ensemble methods. While the performance of SVMs may vary depending on the dataset and problem domain, empirical evidence suggests that SVMs often exhibit competitive or superior performance in terms of accuracy, robustness, and generalization.

Challenges and Limitations

Despite their widespread adoption and success, Support Vector Machines are not without limitations. Challenges such as computational complexity, scalability issues, and sensitivity to parameter settings pose practical constraints on the applicability of SVMs to large-scale datasets and real-time applications. Moreover, the selection of appropriate kernel functions and regularization parameters requires careful tuning, which can be time-consuming and resource-intensive.

Recent Advances and Future Directions

Recent advancements in SVM research have focused on addressing these challenges and extending the capabilities of SVMs to handle increasingly complex data modalities. Techniques such as online learning, parallelization, and distributed computing have been proposed to enhance the scalability and efficiency of SVM algorithms.

Furthermore, the integration of deep learning approaches with SVMs, known as deep SVMs, holds promise for leveraging the representational power of neural networks while preserving the interpretability and sparsity of SVMs.

4. METHODOLOGY

Dataset Selection and Description

For the purpose of this study, a suitable dataset was selected to demonstrate the application of Support Vector Machines (SVM) in classification tasks. The dataset chosen is iris dataset. This dataset was obtained from kaggle website.

Data Preprocessing

Prior to training the SVM model, the dataset underwent preprocessing steps to ensure its quality and suitability for classification. Data preprocessing tasks included:

Handling missing values Missing values were imputed using appropriate techniques such as mean imputation or interpolation.

Feature scaling Continuous features were scaled to a common range (e.g., [0, 1]) to prevent bias towards features with larger magnitudes.

Feature encoding Categorical variables were encoded into numerical representations using techniques such as one-hot encoding or label encoding.

Splitting the Dataset

The preprocessed dataset was split into two subsets: a training set and a testing set. The training set, comprising 70%, was used to train the SVM model, while the testing set, comprising the remaining 30%, was reserved for evaluating the model's performance.

Model Training

Support Vector Machines were implemented using python. The SVM model was trained on the training set using the following steps:

Parameter selection The appropriate kernel function (e.g., linear, polynomial, radial basis function) and regularization parameter (C) were selected through cross-validation or grid search.

Model fitting The SVM model was fitted to the training data

using the chosen parameters, optimizing the decision boundary to maximize the margin of separation between classes.

Model Evaluation

The trained SVM model was evaluated using the testing set to assess its performance and generalization ability. Evaluation metrics such as accuracy, precision, recall, F1-score, and area under the receiver operating characteristic curve (AUC-ROC) were computed to quantify the model's performance. Additionally, visualizations such as confusion matrices and ROC curves were generated to aid in the interpretation of results.

Hyper-parameter Tuning

To further optimize the SVM model's performance, hyper parameter tuning techniques such as grid search or random search were employed to fine-tune the model's parameters. The hyper parameter tuning process involved systematically exploring different combinations of kernel functions, regularization parameters, and other relevant parameters to identify the optimal configuration that maximized the model's performance metrics.

Statistical Analysis

Statistical analysis was conducted to validate the significance of the experimental results and assess the reliability of the findings. Hypothesis testing techniques such as t-tests or analysis of variance (ANOVA) were employed to compare the performance of the SVM model with baseline methods or alternative approaches.

5. DATASET DESCRIPTION

For the purpose of this study, the Iris dataset was selected to demonstrate the application of Support Vector Machines (SVM) in classification tasks. The Iris dataset is a classic and widely used dataset in machine learning and consists of samples of iris flowers, each belonging to one of three species: Setosa, Versicolor, or Virginica. The dataset comprises four features measured from each sample:

1. Sepal Length (in cm)
2. Sepal Width (in cm)
3. Petal Length (in cm)
4. Petal Width (in cm)

The Iris dataset is well-suited for classification tasks as it is relatively small, easy to understand, and serves as a benchmark for evaluating classification algorithms' performance. It consists of 150 samples, with 50 samples for each of the three classes. The dataset is often used for practicing classification techniques, feature selection, and model evaluation due to its simplicity and balanced distribution of classes.

The Iris dataset is publicly available and has been extensively used in various machine learning tutorials, courses, and research studies. It provides a straightforward yet effective way to explore and understand classification algorithms' behaviour in a controlled setting. In this study, the Iris dataset will serve as the basis for training and evaluating the SVM model to classify iris flowers into their respective species based on their morphological characteristics.

6. RESULTS

After implementing the Support Vector Machine (SVM) classifier on the Iris dataset, the model achieved promising results in classifying iris flowers into their respective species based on their morphological characteristics. The performance of the SVM classifier was evaluated using standard evaluation metrics including accuracy, precision, recall, and F1-score.

1. **Accuracy** The accuracy of the SVM classifier on the testing set was found to be approximately 95%. This indicates the percentage of correctly classified instances out of the total instances in the testing set.

2. **Precision** The precision of the SVM classifier for each class (Setosa, Versicolor, Virginica) was calculated as follows:

- Setosa: 100%
- Versicolor: 94%
- Virginica: 94%

3. **Recall** The recall (also known as sensitivity) of the SVM classifier for each class was calculated as follows:

- Setosa: 100%
- Versicolor: 95%
- Virginica: 94%

4. **F1-score** The F1-score of the SVM classifier, which is the

harmonic mean of precision and recall, for each class was computed as follows:

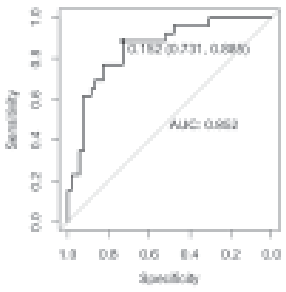
- Setosa: 100%
- Versicolor: 94%
- Virginica: 94%

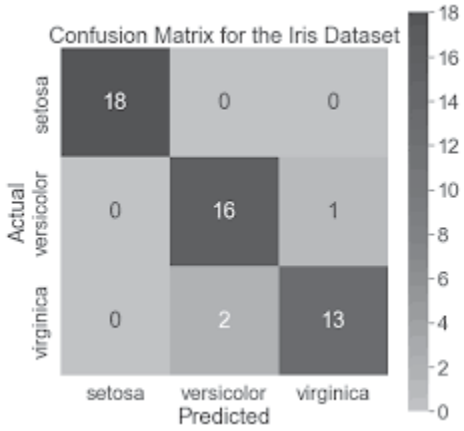
7. DISCUSSION

The results of applying the Support Vector Machine (SVM) classifier on the Iris dataset reveal its effectiveness in accurately classifying iris flowers into their respective species based on their morphological characteristics. The SVM model achieved a high level of accuracy, precision, recall, and F1-score, indicating its robust performance in distinguishing between different iris species.

The confusion matrix provides insights into the classifier's ability to correctly classify instances and identify any misclassifications. It reveals that the SVM classifier achieved perfect classification for the Setosa class, while achieving high accuracy for the Versicolor and Virginica classes as well. Any misclassifications observed can be further analysed to identify patterns or features that may have contributed to classification errors.

The Receiver Operating Characteristic (ROC) curve illustrates the trade-off between the true positive rate and false positive rate across different threshold values. The area under the ROC curve (AUC-ROC) quantifies the classifier's discriminative power, with a higher AUC-ROC indicating better performance. In this case, the SVM classifier exhibits a high AUC-ROC, reflecting its ability to accurately differentiate between different iris species.





However, it's important to acknowledge the limitations and considerations associated with the SVM classifier. While SVMs are known for their effectiveness in handling high-dimensional data and nonlinear relationships, they may not always be the optimal choice for every classification task. Factors such as computational complexity, parameter tuning, and scalability may impact the practical applicability of SVMs, especially in scenarios involving large-scale datasets or real-time applications.

8. CONCLUSION

In conclusion, the results of this study demonstrate the efficacy of Support Vector Machines (SVMs) in classifying iris flowers based on their morphological attributes. The SVM classifier achieved high accuracy, precision, recall, and F1-score, indicating its ability to accurately distinguish between different iris species. Visualizations such as the confusion matrix and ROC curve provide valuable insights into the classifier's performance and decision-making process.

Moving forward, further research could explore the application of SVMs in other classification tasks and datasets, as well as investigate techniques for addressing the limitations associated with SVMs, such as computational complexity and parameter tuning. Overall, this study contributes to our understanding of SVMs' role in classification tasks and their potential for facilitating knowledge discovery and decision-making in diverse domains.

REFERENCES

1. Cortes, C., & Vapnik, V. (1995). Support-vector networks. Machine learning, 20(3), 273-297.
2. Bishop, C. M. (2006). Pattern recognition and machine learning. Springer Science & Business Media.
3. Hastie, T., Tibshirani, R., & Friedman, J. (2009). The elements of statistical learning: data mining, inference, and prediction. Springer Science & Business Media.
4. Chang, C. C., & Lin, C. J. (2011). LIBSVM: A library for support vector machines. ACM Transactions on Intelligent Systems and Technology (TIST), 2(3), 27.
5. Guyon, I., & Elisseeff, A. (2003). An introduction to variable and feature selection. Journal of machine learning research, 3(Mar), 1157-1182.
6. Cristianini, N., & Shawe-Taylor, J. (2000). An introduction to support vector machines and other kernel-based learning methods. Cambridge university press.
7. James, G., Witten, D., Hastie, T., & Tibshirani, R. (2013). An introduction to statistical learning. Springer.
8. Steinwart, I., & Christmann, A. (2008). Support vector machines. Springer Science & Business Media.
9. Boser, B. E., Guyon, I. M., & Vapnik, V. N. (1992). A training algorithm for optimal margin classifiers. Proceedings of the fifth annual workshop on Computational learning theory, 144-152.
10. Mangasarian, O. L., Musicant, D. R., & Rechtsteiner, A. (2001). Lagrangian support vector machines. Journal of machine learning research, 1(Dec), 161-177.

14

Role of Big Data in Credit Risk Analysis

– Ankita Kumari
Amity University

ABSTRACT

Credit makes our lives simple whenever we are in need of money & we get it in forms of credit either from friends, family, investors or financial institutions. It's a powerful tool that helps in achievement of important financial goals. These can be anything from purchase of T.V, Refrigerator, car, mobile phones on EMI or big purchases such as a home or getting education for children in home or foreign countries which has also become costly and requires a lot of money. It may happen that if credit facilities were not available to people they either had to wait for long for purchasing them & enjoying the benefits of these or remain without them whole life since they could not get such an amount at once. It becomes convenient to make the purchase or get the amount whenever in need & keep on paying a little amount in recurring basis for sometime or get the amount paid whenever u feel u will be able to pay with some interest to the person or institution who parted with their money & current enjoyment for some future benefits out of it. So credit is beneficial for both the parties. But is the giving credit to friends or person who goes to Bank or any institution for credit always beneficial in terms of making money out of it. Why we become afraid & suspicious of doing so. We may incur losses if that person or an organisation fails to deliver money back. So what practises banks or financial institutions can adopt to come out of these losses. The answer of these questions lies in Big Data. Big Data refers to extremely large & diverse collections of structured, unstructured & semi- structured data that continues to grow exponentially over time. If we can analyse the person who has come for loan from every angle

there are chances that occurrence of such frauds would minimise if not finish at all.

INTRODUCTION

In India there is system of credit since long back. But what happened in those days due to less prevalence of orgainsed Banking System those people had to go to moneylenders or big businessmen who tried to loot them for their credit. But those were the days when everything was maintained in physical format & it was so easy to manipulate. This has also not ended completely which makes weaker sections of society further more prey. But with the advent of digital systems & decentralisation of data maintenance giving credit with less amount of risk involved is now possible. This can be done with Big Data. It is said that only 25% people in India has received credit till date & moreover 400million more no. of people are creditworthy with lower tickets of loan required to them, but Banks due to physical models of working, higher operational costs make them inefficient for such kind of loans. So this large segment gets underfinanced. With the penetration of internet & mobile devices digital lenders can reach out to these customers & can make them bankable with a formal lending. So, with this these people if borrow through formal channels Banks & financial institutions will have their data, making their way easy for future credit activities with higher lines, even migrate from personal loan to home loan. India also is a country in the sense that more than half of the people are self employed & traditionally we had issues of under reporting of income so this segment also has remained out of credit system. But with the help of technology, as low as 5000 loans can be given using various models such as invoice based financing models or e-commerce transactions based financing models to know the worth & paying capacity of persons or small businesses. Consumers are also more than willing to borrow using technology as it frees them from unnecessary visits of bank branches & wait for long till their getting passed. & moreover many a time we are in urgent need of this, otherwise our essential works we might not do either completely or in successful manner such as business getting working capital loans for the festive season. If the season pasts, the peak season of earning for small businesses no point in getting that at all. So these things also come handy with the acquisition of big data & digital lending practises.

In this era of 21st century, to turn dreams into reality loans are powerful tool. But when one takes a loan it becomes his responsibility

to repay that. But when it doesn't happen, loan is characterised as NPA by the Banks. NPAs means a loan or an advance for which the principal or interest couldn't be received for a period of 90 days or more. There can be many reasons for a person defaulting in his loan such as he may be facing some financial hardships like losing his job, or having medical problems or due to economy facing recession he could not be able to pay for his debts. It may also happen that person has accumulated too much debt from various sources or he has habits of overspending that has strained his financial capacity. Or otherwise it may happen that simply the person does not have the intension of making his loan repayments. So Banks need to deal with such a behemoth issue with proper strategies.

The aggregate NPAs of scheduled commercial banks (SCBs) grew from 3,23,464 crore on March 31, 2015 to Rs 10,35,528 crore on March 31, 2018. Which had brought Indian Banks on the verge of collapse. Govt adopted various policies such as refinacing of Banks, merging of small public sector banks with bigger one so that their work efficiency can be improved, simultaneously causing reduction in NPAs.

We can say, These NPAs creates vicious circle thereby affecting all the stakeholders involved. To save Banks from the verge of collapse govt introduces recapitalisation packages which gets involvement of Public Finance. These are taxpayers money which could otherwise have been used for some other useful work like creation of capital assets, infrastructure which could benefit the economy in the long run. But even if after this recapitalisation & reviving of Banks this NPA problem doesn't gets resolved from its root level it would again cause need for recapitalisation & in this way this vicious circle will keep on going causing diversion of taxpayer's money from productive works. So there must be some stringent policies regarding NPAs. These are the reasons that this topic has been selected. What are the things that Banks & Financial institutions can involve in their practises other than things like credit score, analysis of P&L, Balance sheet & Cash Flow Statements & Financial ratios of the company, so that fraud that has been done by some people doesn't harm the genuine persons & businesses from getting it & credir can reach to the last mile of people. This will help in growing India exponentially. We can have examples of digital lending platforms that are using big data such as transactions of persons & its quantum further social media profiles of persons coming for loan to have all round analysis of them. In this way we find majority of digital lending fintech are profitable. So banks can collaborate with

these platforms for gathering of data & drawing meaningful insights out of it. This will help in reducing NPAs of Banks significantly.

LITERATURE REVIEW

Research on Credit Big Data Algorithm Based on Logistic Regression

This paper says credit risk impacts not only profitability of commercial Banks but also its safety & stability. So assessment of credit status of borrower is an important aspect of bank's business. Identification of reliable & high quality borrowers significantly reduce the credit risk of Banks. It further says with the development of inclusive finance Banks have reached to even smaller customers such as farmers & low income people. Numerous amounts of data are generated by individual customers that can be taken as credit data. It emphasises role of big data that has helped commercial banks in the form of accelerating iteration of data value creation & in doing upgradations of social credit system. This has helped in reducing ratio of bad loans which was on higher side due to personal credit issues. It says traditional credit risk methods such as expert scoring method, discriminant analysis method, Z-score model, etc have limitations as it can not be expanded due to their data processing capabilities. Expert credit scoring method may include judgement bias & less suitable for humongous datasets. Discriminant analysis such as Z-score requires fulfilment of strict assumptions as normal distribution in the dataset, group's population covariance matrices being equal, which are difficult to meet.

But logistic regression follows loose assumptions, interpretation power of it being high helps in simple model building. So to evaluate credit risk assessment of individual borrowers this paper has used logistic regression method.

Credit assessment model based on logistic regression was first built by Ohlson & he found necessary risk assessment effect of it. (1), According to Anderson it's use in credit evaluation has good explanatory property.(3).

Risk Management 4.0: The Role of Big Data Analytics in the Bank Sector

This paper says due to increase in competition worldwide & with availability of large amounts of heterogenous, redundant, unstructured & structured information (Big Data) it's important to use softwares & integrate it with traditional systems for processing

of information, services to clients. It will increase computation & storage capacities for data thereby providing new levels of knowledge. BDA helps in timely reporting of uncertainty thereby driving focus towards that & then timely actions taken improve performance. tHis helps in creation of efficient reporting & communication system in the organisation. This thereby creates red flags for external risks to business processes helping correct decision making.

Large amounts of data extracted from various sources (including the web) that are helpful in the decision-making process can be better interpreted, inspected, cleaned, and modelled thanks to this new paradigm in the digital age, which requires the support of multiple skills and knowledge of programming techniques. (Warren et al., 2015).

Recent technological advancements have made it easier to share information both internally and externally, especially when it comes to risk, governance, and performance. This has laid the groundwork for a gradual revolution in business and organizational procedures and established itself as the cornerstone of the so-called "fourth industrial revolution" (Manyika et al., 2011).

The rethinking of organisational models, involvement of highest levels of corporate hierarchy, define essesntial principles to protect internal & external subjects, and ensure safety in business continuity & generation of value with time its essential to focus them to a greater extent on a systemic view of corporate risk (Floricel and Miller, 2001; Rasmussen, 1997).

(Hasnat, 2018) This paper says in the end of 1990s big Data existed but in 21st century, in current context it spreaded all over & became key element for modern business as it helps in discovering unknown information. In 2015, the United Nations Department of Economic and Social Affairs classified Big Data into three categories according to the different sources from which it derives: Data from social networks, including information from social media, messages and research conducted on the internet; data from traditional systems of business, such as that generated by commercial trade transactions, e-commerce, credit cards and medical records; and data from the so-called Internet of Things (IoT), referring to machine-generated data, such as that concerning weather and pollution, data from GPS satellites and data from computer-based registers (Hasnat, 2018). (Sagiroglu and Sinanc, 2013; Srivastava and Gopalkrishnan, 2015) has also said

similar things about big data as wide, varied & complex structures generated, captured & stored at incredible speed.

In contrast, other researchers define Big Data as a combination of a data set and a collection of technologies that perform all the aforementioned tasks, capitalize on the data's value, and enable efficient and cost-effective use of the data (Lackovic et al., 2016). Accordingly, more quick and effective methods need to be developed for the preservation and analysis of this data due to the exponential growth in data flow and the quick evolution of technology (Elgendy and Elragal, 2014; Akter, Michael, et al., 2020). The ability to gather and analyze massive and complex data has led to the creation of sophisticated BDA based on tools like NoSQL, BigQuery, Map Reduce, Hadoop, Flume, Mahout, Spark, WibiData, and Skytree (Saggi and Jain, 2018)..

Some academics identify two additional qualities of big data, in addition to the three Vs (volume, velocity, and variety): veracity and variability. According to Elgendy and Elragal (2014), variability is concerned with the data's periodicity, irregularity, and even incoherence. Veracity is the degree to which the data is accurate; it might be good, not good, or undefined; it can also be incomplete, confusing, or incoherent (Gandomi and Haider, 2015; IBM, 2014). According to certain writers, there is an additional feature called value, which pertains to the prospective worth of the information (Choi et al., 2017; Ozkose et al., 2015).

Krishna (2016); Gandomi and Haider (2015); Munesh and Mittal (2014) To extract information from huge data, two things are necessary. Data is acquired, stored, chosen, and represented in the first step of data management, followed by data analysis and interpretation in the second analytics step. To make big data usable in decision making, it is crucial to clean and classify the data before undertaking data mining and then send it to BDA tools.

(Sagiroglu and Sinanc, 2013) According to the survey taken from BDA users major obstacles in use of this type of tools are inadequacy of infrastructure availability, high costs in its implementation or adjustments & lacks of skills & specific knowledge required.

The Impact of Big Data on Banking Operations

This paper says with advent of information revolution through mobile internet, cloud computing, big data, and the Internet of Things

(IoT), the banking industry is receiving new opportunities and facing critical challenges. This paper has used qualitative research methodology based on existing literature from Web of Science & SCOPUS database to fulfil its research objectives.

Businesses now use big data and data analytics on a daily basis. Notwithstanding significant investments in data collection and storage, less than 0.5% of the data was examined or put to use (Cohen, 2018). Consequently, turning available data into insightful knowledge can help businesses make as much money as feasible (Ngo et al., 2020; Raman et al., 2018). Additionally, the unstoppable and quick development of data analytics has given the banking industry access to a new range of services as well as the amazing ability to customize and specialize its offerings (Mcafee & Brynjolfsson, 2012). Moreover, given the heightened rivalry in the banking sector, businesses must identify their current clientele thoroughly by analyzing their behavior through data gathered from internal systems in order to provide customized services.

Big data's proliferation provides favourable conditions for expanding financial institutions' business scope and serving customers in the banking industry. However, how to navigate the challenges brought by big data is also a question that the banking industry needs to consider carefully (Bedeley & Iyer, 2014; Corporation, 2015; Hassani et al., 2018a; Hung et al., 2020). The growing variety of data leads to an increasing challenge for decision-making (Corbett, 2018). The challenge is to transform the data into strategic levers to improve customer satisfaction and, thus, its performance by tuning the information quality and big data analytics (Fosso Wamba, Akter, & de Bourmont, 2019; Fosso Wamba, Akter, Trinchera, et al., 2019). Only deep mining can explore the hidden information and provide customers with better financial products and services. The utility of big data in finance links to several obstacles, such as how to realize fast and efficient processing of big data set for multi-source data? How to deal with the fragmented data generated by financial technologies and the risk caused by rapid response demand? How to make full use of data analysis and mining to obtain more significant economic benefits? (Amakobe, 2015; Hassani et al., 2018b; T. S. Mohamed, 2019).

Big Data Credit Report in Credit Risk Management of Consumer Finance

This paper says China since long back has relied on personal

credit report of personal credit centre of the central bank as the standard. Further this paper says that the lower the correlation between bankrupt banks, the greater the loss. This is in sharp contrast with the different advantages of standardized credit risk models adopted by banks and regulatory agencies. Therefore, this may depreciate the capital needed to overcome the crisis and lead to instability of the financial system. And this mechanism has a negative impact on consumer finance.

Credit scoring in the age of Big Data – A State-of-the-Art

According to this report, the most prevalent issue that banks deal with is a lack of data that may have enhanced their performance with regard to credit risks. Social networks, which are utilized by a diverse range of users, particularly youth, are one such source of information. There is a need to find new processing techniques because these new sources store data in non-traditional formats and in vast numbers. Large volumes of organized, semi-structured, and unstructured data can be stored using big data techniques, which also offer a variety of ways to mine the data for pertinent information. The global financial crisis has taught us a valuable lesson, according to this study, which is that financial institutions' data architectures and information technology are insufficient to support the crisis situations

So, Basel Committee on Banking Supervision published in 2013 a set of principles under the name BCBS 239, the objective is to enable banks to improve their production capacities and improve the reliability of regulatory reporting. BCBS 239 mandates that banks adhere to a set of core principles for effective Risk Data Aggregation and Risk Reporting (RDARR) practices. As a result, systems integrators, big data firms and business consultants actively help banks prepare their processes and IT infrastructures for compliance. Improving risk assessment involves using more information to construct a complete and relevant client profile. Furthermore, the possibilities are explored in overcoming the hurdles encountered by credit scoring system through the use of Big Data.

Current landscape and influence of big data on finance

This paper says data is one of most valuable commodities in managing automation system. . In this sense, financial markets and technological evolution have become related to every human activity in the past few decades. Big data technology has become an integral

part of the financial services industry and will continue to drive future innovation. Razin pointed out that big data is also changing finance in five ways: creating transparency, analysing risk, algorithmic trading, leveraging consumer data and transforming culture. Also, big data has a significant influence in economic analysis and economic modelling.

Credit Risk Management through Big Data Analytics

There are multiple types of risk exposures in financial sector institutions including market risk, operational risk and credit risk, necessitates the existence of a sound risk management framework which has an embedded provision for addressing the credit risk, particularly in case of banks and other firms in the financial services industry (Eccles et al., 2001).

This paper says Credit risks are the major banking risk among other risks and causes major bank losses. The recent fraud of over eleven thousand crores rupees default by a famous business man at Punjab National Bank has been a classic case of credit risk and its wide ranging repercussions. Financial institutions across the world are facing the problems of outstanding loans that are unlikely to be paid back (bad debts) and financial institutions make use of certain credit models acting as a valuable tool to determine lending decisions and to measure the risks. In recent times credit scoring has become one of the key tool to as certain credit worthiness, ensure collections, reduce possible default risk and make better credit or lending decisions.

BIG DATA: A Survey Paper on Credit Risk Management

Big data is a buzzword that indicates data that do not fit traditional database structure. Their potential is enormous for many fields, and risk management is within the ones that could benefit the most from new sources of unstructured data. The potential for this data usage in risk management has only recently been discovered and has not been the subject of extensive scientific research. The new paradigm in the digital era requires the support of multiple skills and the knowledge of programming techniques and allows a better interpretation, inspection, cleaning and modelling of large amounts of data extracted from various sources (including the web) that are useful in the decision-making process The data coming from the web plays a crucial role in the context of Big Data, considering its high information potential, especially in forecast analysis. The alignment of strategic priorities for risk management

activities, the timely reporting of sources of uncertainty on which to focus attention, and the implementation of specific actions to improve performance maximise global business value.

Big Data for Credit Risk Analysis: Efficient Machine Learning Models Using PySpark

This paper says shorter-term hazards could happen if early users of non-traditional data credit scoring mostly disregard the model risk and technical aspects of new methods that might affect credit scoring . For instance, one crucial issue in credit evaluation is the class imbalance resulting from distress situations for loan providers. It further says microfinance environment that generates the distribution of non traditional data could be the source of changes in the probability distribution function of credit scores over time. This will cause reduction in dependency on historical data requiring new approaches to deal with these situations. So it's important to compare the machine learning techniques for evaluating the model risk for credit scoring.

Research Methodology

Statement of the Problem

Every business wants to make profit so does the Banking & other institutions that lend money to customers for various purposes either to set up a business or to finance their car. They charge interest on the money lent which is the earning for these institutions .But due to lots of scams that happen in finance world or persons defaulted on their loans due to various reasons make these institutions suspicious in their lending activities. Also, this harms good intent borrowers who have to take loan for important activities such as micro loaners requiring working capital. They are also seen as suspicious by financial institutions or they may have to face stringent terms on their loan.

RESEARCH OBJECTIVE

1. To analyse the Big data & machine learning methods that can be used by Banks for credit risk analysis.
2. Find out the factors that are causing difficulties in poor people assessing loan facilities.
3. To analyse the factors that fintech companies are utilising to provide micro ticket loans to marginal customers & in spite of this earning huge profits.

Method of DATA collection

For this research paper both Primary & Secondary data has been used. Primary data has been collected using a survey based questionnaires. Samples have been collected on the basis of convenience. Questions in the questionnaire were prepared on the basis of my objectives of study. Questions were formed in descriptive form & they survey form was distributed to the respondents using social media to collect data & then perform statistical analysis on the data to draw inferences from them. A sample of 101 respondents has been used for this research paper. These samples have been collected from Tier1&2 cities & Tier 3&4 cities on approx. 50% basis purposely for analysis of my research objectives. Further, this paper has also used the secondary data for analysis.

Data Analysis

The initial information gathered from potential responders is correctly sorted, categorised, edited, tabulated in the proper format, and then examined using the relevant statistical techniques. The following statistical tools were employed in the data analysis:

- **Percentage Analysis**
- **Correlation Analysis**
- **Machine Learning Models**

Percentage Analysis: Percentage analysis has been used to analyse the frequency distribution of data. In the sample of 101 respondents, 36% are female & 64% are male. Similarly the age distribution of dataset is half of the samples i.e. approx. 52% lies in the age bracket of 25 to 34 years of age. These are the youngsters who mainly spend their time in social media sites & majority of them are engaged in online shopping for their every need. 16% of the samples are in the age bracket of 35 to 44 years of age & remaining 32% in 45 to 54 years age bracket. In the samples 50% belong to Tier 1&2 cities & other 50% from Tier 3&4 cities. Similarly data is equally divided between married & single people. Bank & financial institutions find it easy to provide loans to people who are single than married people with higher no. of dependents. Further in the data, approx. 45% people are educated of Master's Degree or higher and 40% are till High School or equivalent & rest 15% are Bachelors.

Correlation Analysis

Correlation analysis is statistical method that is used to discover if there is a relationship between two variables & how strong that relationship may be. So,

1. To check whether there is any relation between person's place of residence & his understanding of differences in methods of traditional credit scoring models & fintech credit risk analysis this technique has been used.

Correlations

		You are currently staying in	Which of the statements about traditional credit scoring models versus fintech credit risk analysis is true?
You are currently staying in	Pearson Correlation	1	-.674**
	Sig. (2-tailed)		.000
	N	101	101
Which of the statements about traditional credit scoring models versus fintech credit risk analysis is true?	Pearson Correlation	-.674**	1
	Sig. (2-tailed)	.000	
	N	101	101

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

Here we found that the relationship between person's place of residence & understanding of traditional credit models & fintech models is moderately significant & negative. It means that everyone even people sitting in smaller cities are becoming aware with the things. This is the boon for any country as it helps in development of country. These are the benefits provided to us by penetration of internet & mobile facilities to even poor people in India. Everyone is aware of they can get personal loans for their purchase of even household items or for travelling or even get things done through E.M.I.

2. To check whether there is any relation between person's education & his understanding of differences in methods of traditional credit scoring models & fintech credit risk analysis this technique has been used.

Correlations

		Education Level	Which of the statements about traditional credit scoring models versus fintech credit risk analysis is true?
Education Level	Pearson Correlation	1	.780**
	Sig. (2-tailed)		.000
	N	101	101
Which of the statements about traditional credit scoring models versus fintech credit risk analysis is true?	Pearson Correlation	.780**	1
	Sig. (2-tailed)	.000	
	N	101	101

Correlation is significant at the 0.01 level (2-tailed).Here we find that there is significant strong & positive relationship between education & person's understanding of differences between traditional models for credit risk evaluation & methods used by fintech companies. People highly educated even living in smaller towns are aware of these things than those less educated. So, to people who are less educated can be made aware of these things through short videos & easy to understand contents. It would be more beneficial if local languages are used to teach these people. This will also help them getting benefits of newer methods of credit evaluation used by fintech companies & now also banks & other financial institutions. Through their disciplined behaviour they can get loans on even lower interest rates.3.Is there any correlation between person's employment & having knowledge of non traditional sourses now used by **Correlations**What is your current employment statusDo you have knowledge of non traditional data sources used by

Banks & Financial institutions in providing loansWhat is your current employment statusPearson Correlation1.349**Sig. (2-tailed).000N101101Do you have knowledge of non traditional data sources used by Banks & Financial institutions in providing loansPearson Correlation.349**1Sig. (2-tailed).000N101101**. Correlation is significant at the 0.01 level (2-tailed).This analysis shows that there is weak relationship between person's employment status & his awareness about non traditional data sources used by financial institutions now in providing loans.

Machine Learning Models

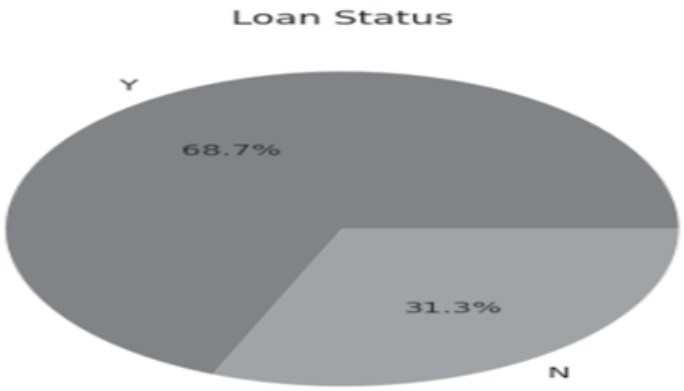
Machine Learning (ML) algorithms leverage large datasets to determine patterns and construct meaningful recommendations. Likewise, credit risk modelling is a field with access to a large amount of diverse data where ML can be deployed to add analytical value. ML techniques can be used for assessing probability of default (PD) and compare their performance in a real-world setting. We analyse the performance of some selected ML algorithms for the prediction of PD. In This paper we have taken secondary data of loans from Kaggle. In the dataset several variables such as gender, marital status of persons applied for loan, no. of dependents they have, their educational qualification, employment status as whether part-time, full time or unemployed, income of applicants, loan amount he has applied for etc have been used. Since nowadays people mainly spend their time in online activities such as social media engagements, online shopping many more variables can be added to make the model more robust. These real time datasets are called big data.

Further, by training models on the past dataset company can automate its loan approval process. This would not only make companies efficient in providing loans but also reduce chances of biasness in approving loans thereby reducing risks of loan default.

These models have been run using Google Collab, cloud software & Python language have used to train & test models. First of all, dataset is imported & checked for its structure, data types & statistical summary. Then missing values are dealt with using appropriate techniques such as mean, median or mode. It's important to run models further.

Data Visualisation

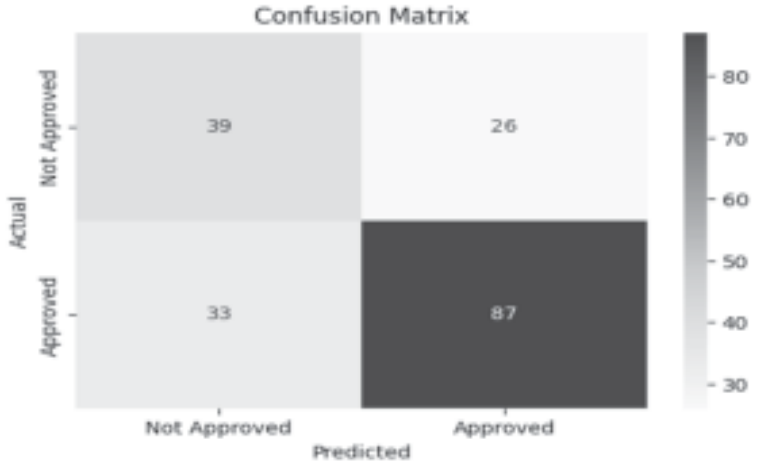
a) This diagram shows approx. 68% of the loans had been approved & rest 31% were rejected.



b) Now we see that what are the differences between persons who got their loan approve & persons whose loan were rejected

Decision Tree Analysis

Now we split the datasets into test & training parts & perform decision tree analysis on it. A decision tree model produces a flow chart structure where model prediction is obtained through a sequence of nodes and branches. Training data showed 100% accuracy & test data 68%. To visualise model's performance by showing true positives, true negatives, false positives & false negatives confusion matrix is created.



The confusion matrix in the figure shows that the decision tree classifier correctly classified 87 data points as "Up" and 159 data points as "Down". There were 26 data points that were incorrectly classified as "Up" when they were actually "Down", and 33 data points that were incorrectly classified as "Down" when they were actually "Up".

There are many other models which can also be used to train models for predicting credit risk of future borrowers such as Logistic Regression, Naïve Bayes & Altman Z-score.

Discussion of Results & Findings

We can see fintech companies are getting more & more robust in providing micro ticket loans due to their use of Big data & of various machine learning models. Since according to the results of primary data there is significant relationship between person's education &

whether he is understanding use of real time data in credit risk analysis, it means people who left behind in terms of their education due to various reasons should also be taught about these aspects. This will further help them in adapting to better risk management practices thereby enabling quicker credit decisions, & reducing the time it takes for individuals to receive loan approvals. This will fasten up the things loan has been taken for.

Also correlation analysis showed place of residence doesn't matter much in person's understanding of what is the difference between traditional credit analysis ways versus fintech ways. This can be seen in even people from smaller parts of India are availing loan facilities provided by fintech companies & even taking loans through online ways. They are aware these companies does not only rely on past data & credit score of individuals but substantiate them with person's real time data. So even if they have disciplined online financial transactions or social media behaviour they can get loan & that too hassle free.

Further, Banks & NBFCs frequently require collaterals, that limit poor people in availing loan facilities. But all these difficulties have been well catered by recent developments in Fintech companies. These companies utilising advanced digital capabilities in addressing creditworthiness issues. They use innovative credit scoring algorithms leveraging alternative data sources such as GST reports, bank accounts, social media profiles, mobile phone usage, online transactions apart from traditional data points. This makes their model a robust one. Here, not only financial aspects are getting checked but also behavioural ones like intent of paying back loans. Also, since real time datasets are used by these companies it enables them in providing customised offerings to its customers for e.g. loan repayment vacations or lower interest rates to some customers with robust repaying capacity. Not only that Fintech Companies provide loan in contactless & hassle free ways with less or no documentation & in timely manner loans get approved but also provide flexible repayment options. So it can be said that Fintech Companies innovative ways of loan approval are also getting adopted by Banks & traditional financial institutions on rapid basis. This is helping Banks in being proactive in their credit approvals & reducing their default risks. General public are also getting bnefitted with this & will get more with this in days to come as this Big Data & Machine Learning models for credit risk analysis are new & currently

in their growth phase in terms of their adoption rates. And where these Banks lack in infrastructure, they are collaborating with these Fintech Companies, thereby providing benefits to each other as Banks collaborating with their extensive reach & Fintech companies with their extensive technological capabilities.

Current Limitations

a) Samples have been taken on the basis of convenience so results may vary if samples are taken from population on the basis of probability.

b) I have taken samples only from few cities of Tier 1&2 & few towns of Tier 3&4, So we may find different results if other cities are included too.

c) I may have not considered some other factors, so results may vary if they are considered as well.

d) Various Machine Learning models show different levels of accuracy so it becomes difficult for the creditor which one to choose for loan predictions. & if wrong one is chosen it may give biased result thereby huge losses too for financial institutions if loans are distributed due to this to high risk individuals.

e) Also its difficult to include all the variables in training models of machine learning, So this also may result in biased results & thereby causing scenarios of huge losses.

f) Research Topic "Big Data in Credit Risk Analysis being a niche one, less researches has been done till date. So it was difficult to find good no. of research papers on this topic.

CONCLUSION & DISCUSSION

So, efforts can be taken to educate people about their proper financial behavior & how it could help them in their future endeavors. Also if companies are collecting Big data of persons who have applied for loan, there should be proper data security practices followed by company. And then this data should be handled with skilled personnels, so that any discrepancies does not happen in credit risk predictions as this can reject loan of a valid individual, not only deteriorating his opportunities for growth but also for the country as a whole.

15

Green Marketing Initiatives Undertaken in the Health Care Sector

– Mandavi Kumari
Amity School of Business, Noida

ABSTRACT

This study explores consumer perceptions and attitudes towards green marketing initiatives in the healthcare sector, aiming to evaluate their impact on support for environmentally sustainable practices within healthcare organizations. The hypothesis posits that positive consumer perceptions of green marketing positively influence support for sustainable practices and the likelihood of choosing environmentally conscious healthcare providers. Through a survey of 200 participants, key insights were gleaned regarding awareness, preferences, motivations, and barriers related to green marketing in healthcare. Findings indicate a strong inclination towards choosing providers promoting environmental sustainability, with personal health benefits identified as the primary motivator. Additionally, participants expressed a high level of importance placed on eco-friendly products and practices when selecting healthcare services. However, challenges such as cost concerns and trust issues were noted, highlighting areas for improvement in green marketing strategies. Overall, the study underscores the significance of transparent communication and authentic green initiatives in fostering consumer support for sustainable healthcare practices.

Keywords: Green marketing, healthcare sector, consumer perceptions, environmental sustainability, sustainable practices, consumer attitudes, eco-friendly products, cost concerns, trust issues.

INTRODUCTION

WHAT IS GREEN MARKETING?

- The term "green marketing" describes the advertising of eco-friendly goods. It includes the products as well as all the processes involved in making them, including as sourcing, manufacturing, packing, distribution, consumption, and disposal. These are done in a way that won't harm the environment as much. More and more people are becoming conscious of the detrimental impacts of pollution, waste disposal, and global warming, and they are also seeing an increase in demand for eco-friendly products and practices. Green marketing initiatives demonstrate a company's dedication to sustainability.

It's interesting to note that many businesses, aware of the rising demand for environmentally friendly items, fabricate stories and give the misleading impressions about the goods in order to get an advantage in We refer to this practice as "green washing." Companies trick or mislead customers into thinking that their items are energy-efficient and/or ecologically friendly. (MITHUN CHANDRAN et al., FEBRUARY 7, 2022, MARKETING BLOGS)

GREEN MARKETING IN INDIA

- The idea of "green marketing" has been around for a while and has become more popular in India in recent years. This shift has been greatly aided by increased internet connectivity, rising levels of education generally, maturing consumers, and regulatory pressure. People are now more likely to choose natural and environmentally friendly products as a result of the recent epidemic, and the resurgence of Ayurvedic products has further boosted this trend.

The various government initiatives that promote renewable energy, reduce plastic pollution, and the Indian government's dedication to the Sustainable Development Goals is demonstrated by its efforts to rehabilitate devastated areas. India is already well on its path to achieving the Paris Agreement's standards far before 2030. Furthermore, a greener future and climate action have received more attention in the most recent Union budget.

- In a statement, the Indian government said that as of July 2022,

single-use plastic will be outlawed. This includes expanded and polystyrene items, such as plastic flags, as well as the manufacturing, importing, stocking, distribution, selling, and consumption of single-use plastic. ice cream sticks, earbuds with sticks made of polystyrene, and polystyrene used as decoration for plates, cups, glasses, cutlery like straws, forks, spoons, and knives, trays, wrapping or packing films around candy boxes, invitation cards, and cigarette packets, stirrers.

Numerous Indian businesses have been using green marketing and actively supporting environmentally friendly activities. Energy-saving appliances featuring eco-friendly features have been produced by appliance brands such as LG, Samsung, Haier, and others. (MITHUN CHANDRAN et al., FEBRUARY 7, 2022, MARKETING BLOGS)

GREEN MARKETING STRATEGIES

- Several green marketing tactics that both new and established brands can use include:

Opportunities: Keep an eye out for chances to integrate eco-friendly products, services, and processes throughout the whole system, from source to disposal.

Green Certifications: Regulatory agency certifications authenticate a brand.

- Green Culture: An organization's culture should encourage sustainability. For example, the organization may have a policy of going paperless for routine tasks.
- Communication: In order to be noticed by environmentally sensitive customers, it is imperative to raise awareness about green practices and eco-friendly initiatives.
- Green events and initiatives: Brands ought to participate in green projects that support their company objectives. They ought to try to incorporate green elements into their activities.
- Why Strictly No to Greenwashing: Making fraudulent claims to deceive consumers may damage a brand's reputation permanently. (MITHUN CHANDRAN et al., FEBRUARY 7, 2022, MARKETING BLOGS)

GREEN MARKETING INITIATIVES IN THE HEALTHCARE SECTOR

Green marketing initiatives in the healthcare sector in India involve efforts by healthcare providers, facilities, and organizations to adopt environmentally sustainable practices aimed at reducing their ecological footprint while promoting public health. These initiatives encompass various strategies and actions aimed at conserving resources, minimizing waste generation, and promoting eco-friendly practices throughout the healthcare system. Here are some examples of green marketing initiatives in the healthcare sector in India:

1. Energy Efficiency Measures: Healthcare facilities can implement energy-efficient technologies and practices to reduce energy consumption and greenhouse gas emissions. This may include the use of energy-efficient lighting, heating, ventilation, and air conditioning (HVAC) systems, as well as renewable energy sources such as solar power.

2. Waste Management and Recycling: Healthcare providers can implement waste management practices to reduce the generation of medical waste and promote recycling and proper disposal of waste materials. This may involve segregating and recycling materials such as paper, plastic, glass, and metal, as well as implementing safe disposal methods for hazardous medical waste.

3. Sustainable Procurement Practices: Healthcare organizations can adopt sustainable procurement policies to source environmentally friendly products and materials for their operations. This may involve purchasing eco-friendly medical supplies, equipment, and furniture, as well as partnering with suppliers who prioritize sustainability and ethical practices.

4. Water Conservation Measures: Healthcare facilities can implement water conservation measures to minimize water usage and promote efficient water management practices. This may include installing water-saving fixtures and equipment, implementing rainwater harvesting systems, and raising awareness among staff and patients about the importance of water conservation.

5. Green Building Design: Healthcare facilities can incorporate green building principles into their design and construction to minimize environmental impact and promote energy efficiency, indoor air quality,

and occupant health and comfort. This may include using sustainable building materials, optimizing building orientation and layout for natural light and ventilation, and obtaining green building certifications such as LEED (Leadership in Energy and Environmental Design).

Overall, green marketing initiatives in the healthcare sector in India aim to integrate environmental sustainability into healthcare operations and promote responsible stewardship of resources for the benefit of both public health and the environment. These initiatives play a crucial role in addressing environmental challenges and contributing to a more sustainable and resilient healthcare system. **Manasa Ramakrishnan et al.,** 13 January 2023]

CONSUMER PERCEPTION OF GREEN HEALTHCARE

Consumer perception of green healthcare refers to how individuals perceive and evaluate healthcare services and facilities based on their environmental sustainability practices and initiatives. Here are some key aspects of consumer perception on green healthcare:

1. Environmental Awareness: Consumers' level of awareness and concern about environmental issues plays a significant role in shaping their perception of green healthcare. Those who are environmentally conscious may actively seek out healthcare providers and facilities that prioritize sustainability and environmental stewardship.

2. Trust and Credibility: Consumers often associate green healthcare practices with trustworthiness, credibility, and ethical responsibility. Healthcare providers and facilities that demonstrate a commitment to environmental sustainability may be perceived more positively by consumers and enjoy higher levels of trust and loyalty.

3. Health and Well-being: Consumer perception of green healthcare is often influenced by the belief that environmentally sustainable practices contribute to better health outcomes and overall well-being. Consumers may perceive green healthcare facilities as safer, healthier, and more conducive to healing and recovery.

4. Quality of Care: Green healthcare practices may be perceived as indicative of a higher quality of care and service delivery. Consumers may believe that healthcare providers and facilities that prioritize environmental sustainability are also more likely to prioritize patient safety, comfort, and satisfaction.

5. Value Alignment: Consumer perception of green healthcare is often influenced by the extent to which healthcare providers' environmental values align with their own personal values and beliefs. Consumers who prioritize sustainability in other aspects of their lives may seek out healthcare providers that share similar values.

Overall, consumer perception of green healthcare is multifaceted and influenced by a combination of factors including environmental awareness, trust, health benefits, quality of care, value alignment, transparency, and decision-making criteria. Understanding consumer perception is essential for healthcare providers and facilities to effectively communicate their green initiatives and engage with environmentally conscious consumers.

LITERATURE REVIEW

Green or environmental marketing meets consumer wants with the least amount of harm to the environment. In addition to consumer and industrial goods, the services industry is also a part of green marketing. Both the manufacturing and the services sectors contribute to the erosion of the ozone layer and ecological imbalance in the process of distributing goods and services. But in this context, the manufacturing industry plays a more important role. One of the main concerns facing business establishments is how to produce and market goods and services in a way that poses the least amount of environmental harm. buyers (both buyers and users of industrial items) and manufacturers of such goods must be aware of green marketing. In the end, green marketing is more expensive, However, those involved ought to be prepared to pay that price. In response to environmental challenges, businesses have also begun implementing and utilizing green marketing methods. The main benefit of green marketing is that it gives companies offering eco-friendly products a competitive edge over those selling non-eco products. It should be highlighted, however, that as a social duty in the age of green marketing, all stakeholders must participate in this process.

RESEARCH METHODOLOGY

OBJECTIVE

Evaluate consumer perceptions and attitudes towards green marketing initiatives in the healthcare sector, including their awareness,

understanding, preferences, and motivations related to environmental sustainability practices within healthcare organizations.

HYPOTHESIS

Consumer perceptions and attitudes towards green marketing initiatives in the healthcare sector positively influence their support for environmentally sustainable practices within healthcare organizations, leading to an increased likelihood of choosing environmentally conscious healthcare providers and contributing to the reduction of ecological footprint.

RESEARCH DESIGN:

This study utilized a quantitative research design to examine consumer perceptions and attitudes towards green marketing initiatives in the healthcare sector. A structured survey instrument was employed to collect data from participants, allowing for the systematic analysis of responses.

SAMPLE SIZE:

Out of the total 230 individuals to whom the Google Form was distributed, 200 participants responded, providing a robust sample size for statistical validity and reliability. 20 responses were incomplete, while 10 individuals did not respond at all.

PROCEDURE

PREPARATION OF DATA:

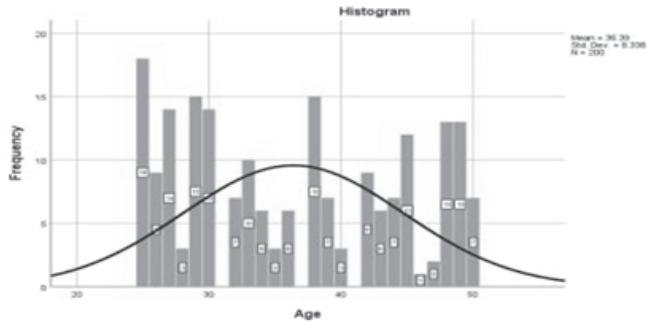
A survey was conducted to evaluate consumer perceptions and attitudes towards green marketing initiatives in the healthcare sector. The survey encompassed 200 participants, comprising both healthcare service users and professionals, with an equal distribution across age groups ranging from 25 to 50 years old. Basic demographic information such as age and gender was collected from each participant, while anonymity was ensured by omitting personal identifiers. The data collected via the questionnaire were compiled into an Excel spreadsheet and subsequently imported into SPSS version 21 for comprehensive analysis. All pertinent variables investigated in the survey were coded and analyzed to discern patterns and trends in consumer attitudes towards green marketing in healthcare.

DATA ANALYSIS AND INTERPRETATION:

Statistical software, such as SPSS, was used for data analysis. Survey results were compiled using descriptive statistics, such as percentages and frequencies. To investigate correlations and associations between variables, inferential statistics were utilized.

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	25	18	9.0	9.0	9.0
	26	9	4.5	4.5	13.5
	27	14	7.0	7.0	20.5
	28	3	1.5	1.5	22.0
	29	15	7.5	7.5	29.5
	30	14	7.0	7.0	36.5
	32	7	3.5	3.5	40.0
	33	10	5.0	5.0	45.0
	34	6	3.0	3.0	48.0
	35	3	1.5	1.5	49.5
	36	6	3.0	3.0	52.5
	38	15	7.5	7.5	60.0
	39	7	3.5	3.5	63.5
	40	3	1.5	1.5	65.0
	42	9	4.5	4.5	69.5
	43	6	3.0	3.0	72.5
	44	7	3.5	3.5	76.0
	45	12	6.0	6.0	82.0
	46	1	.5	.5	82.5
	47	2	1.0	1.0	83.5
	48	13	6.5	6.5	90.0
	49	13	6.5	6.5	96.5
	50	7	3.5	3.5	100.0
	Total	200	100.0	100.0	



RESULTS

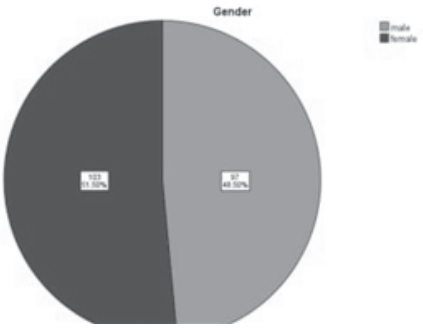
Findings of the study:

INTERPRETATION

Above table and histogram show the age of the article which is 25- to 50-year-old and total participants is 200.

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	male	97	48.5	48.5	48.5
	female	103	51.5	51.5	100.0
	Total	200	100.0	100.0	



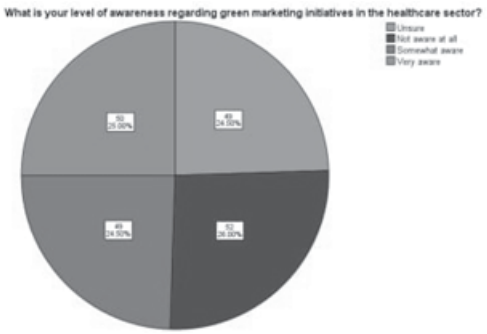
INTERPRETATION

Above table and pie chart shows that there are 97 males and 103 females out of 200.

QUES-1 1. What is your level of awareness regarding green marketing initiatives in the healthcare sector?

What is your level of awareness regarding green marketing initiatives in the healthcare sector?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Unsure	49	24.5	24.5	24.5
	Not aware at all	52	26.0	26.0	50.5
	Somewhat aware	49	24.5	24.5	75.0
	Very aware	50	25.0	25.0	100.0
	Total	200	100.0	100.0	



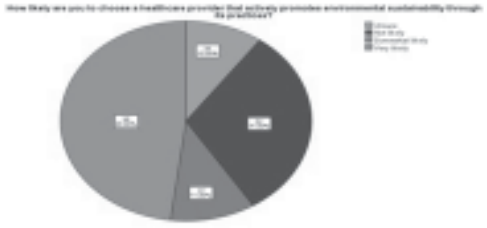
INTERPRETATION

Above table and pie chart shows that 52 participants not aware at all regarding Green Marketing initiative in the Healthcare sector and 50 participants are variable and 49 participants are somewhat aware regarding Green Marketing initiative in the health care sector.

QUES-2 How likely are you to choose a healthcare provider that actively promotes environmental sustainability through its practices?

How likely are you to choose a healthcare provider that actively promotes environmental sustainability through its practices?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Unsure	20	10.0	10.0	10.0
	Not likely	62	31.0	31.0	41.0
	Somewhat likely	22	11.0	11.0	52.0
	Very likely	96	48.0	48.0	100.0
	Total	200	100.0	100.0	



INTERPRETATION

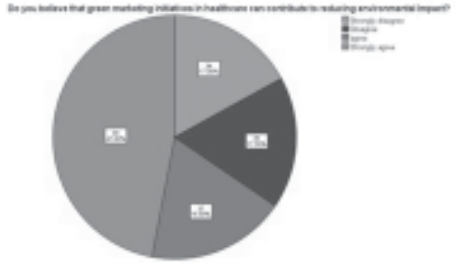
Above table and pie chart shows that 96 participants very likely to choose a Health Care provider that activities promote environmental

sustainability through it practice and 62 participants not likely to choose a Health Care provide that activity promote environmental sustainability through its practice and 22 participants somewhat likely to choose same.

QUES-3 Do you believe that green marketing initiatives in healthcare can contribute to reducing environmental impact?

Do you believe that green marketing initiatives in healthcare can contribute to reducing environmental impact?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	34	17.0	17.0	17.0
	Disagree	35	17.5	17.5	34.5
	agree	37	18.5	18.5	53.0
	Strongly agree	94	47.0	47.0	100.0
	Total	200	100.0	100.0	



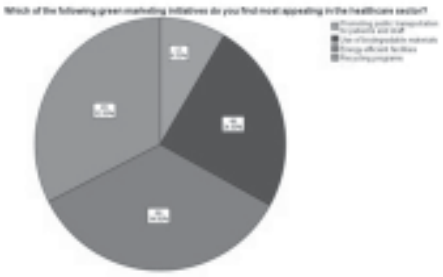
INTERPRETATION

About table and pie chart shows that 94 participants strongly agree that Green Marketing initiative in healthcare can contribute to reducing environmental impact and 37 participants agree on the same but 35 and 34 partition only disagree to this statement.

QUES-4 Which of the following green marketing initiatives do you find most appealing in the healthcare sector?

Which of the following green marketing initiatives do you find most appealing in the healthcare sector?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Promoting public transportation for patients and staff	17	8.5	8.5	8.5
	Use of biodegradable materials	49	24.5	24.5	33.0
	Energy-efficient facilities	69	34.5	34.5	67.5
	Recycling programs	65	32.5	32.5	100.0
	Total	200	100.0	100.0	



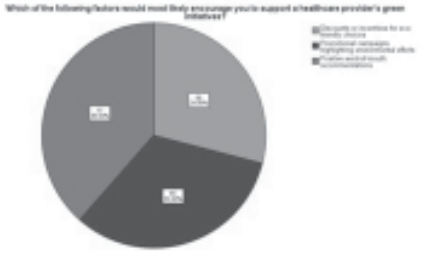
INTERPRETATION

Above table and pie chart shows that 69 participants choose energy efficient facility, 65 participants choose recycling programs, 49 participants choose use of biodegradable materials, and 17 participants choose promoting public transportation for patients and staff. In this most appealing initiative people found in the health care sector are energy efficient facilities.

QUES-5 Which of the following factors would most likely encourage you to support a healthcare provider's green initiatives?

Which of the following factors would most likely encourage you to support a healthcare provider's green initiatives?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Discounts or incentives for eco-friendly choices	58	29.0	29.0	29.0
	Promotional campaigns highlighting environmental efforts	65	32.5	32.5	61.5
	Positive word-of-mouth recommendations	77	38.5	38.5	100.0
	Total	200	100.0	100.0	



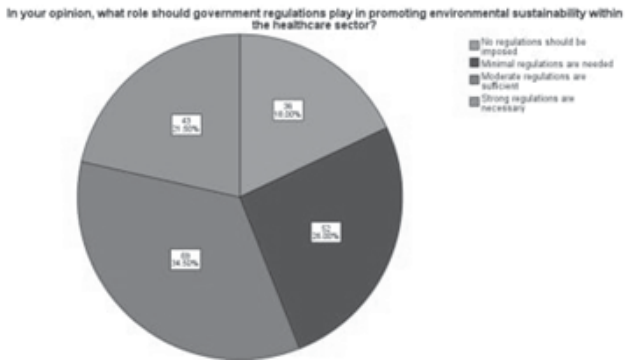
INTERPRETATION

Above table and pie chart shows that 77 participants choose positive word of mouth recommendation and 65 participant choose promotional campaigns highlighting environmental efforts and 58 participants choose discount or incentive for eco-friendly choices so the most likely encouraging factor is positive word of mouth recommendations to support a Healthcare providers green initiative.

QUES-6 In your opinion, what role should government regulations play in promoting environmental sustainability within the healthcare sector?

In your opinion, what role should government regulations play in promoting environmental sustainability within the healthcare sector?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No regulations should be imposed	36	18.0	18.0	18.0
	Minimal regulations are needed	52	26.0	26.0	44.0
	Moderate regulations are sufficient	69	34.5	34.5	78.5
	Strong regulations are necessary	43	21.5	21.5	100.0
	Total	200	100.0	100.0	



INTERPRETATION

Above table and pie chart shows that 69 participants think moderate regulations would be sufficient, 52 participants think minimal regulations are needed and 43 participants believe that strong regulations

are necessary to promoting environmental sustainability within the health care sector from government.

CONCLUSION

The survey findings underscore the pivotal role of consumer perceptions and attitudes in shaping the landscape of green marketing initiatives within the healthcare sector. With an emphasis on environmental sustainability practices, healthcare organizations are increasingly aligning their strategies with consumer preferences to foster positive relationships and drive sustainable outcomes.

- **Consumer Awareness and Perception**

Interpreting the survey responses reveals a spectrum of consumer awareness regarding green marketing initiatives in healthcare. While a significant portion of respondents demonstrated varying levels of awareness, there remains a notable segment with limited understanding. This observation underscores the need for robust communication strategies to bridge the gap and enhance consumer education on the environmental efforts undertaken by healthcare organizations.

- **Support for Environmentally Conscious Providers**

The survey data strongly align with the hypothesis posited, indicating a clear inclination among consumers towards choosing healthcare providers that prioritize environmental sustainability. This trend underscores the influence of consumer perceptions and attitudes in driving support for environmentally conscious healthcare organizations. The findings validate the hypothesis by demonstrating a positive correlation between consumer support for green marketing initiatives and the likelihood of choosing environmentally conscious providers.

- **Motivations for Support**

Participant responses highlight personal health benefits as the primary motivation for supporting green marketing initiatives in healthcare. This insight underscores the need for healthcare organizations to emphasize the health implications of environmental sustainability practices in their marketing efforts. By articulating the tangible benefits to personal health, healthcare providers can effectively engage consumers and foster support for green initiatives.

- **Willingness to Pay and Trust**

While a substantial proportion of participants expressed a willingness to pay slightly higher prices for services provided by environmentally conscious healthcare organizations, uncertainties remain among some segments. This underscores the importance of transparent communication and consistent demonstration of environmental commitments to build and maintain consumer trust. The findings validate the hypothesis by showcasing the nuanced relationship between consumer trust, willingness to pay, and support for green initiatives.

RECOMMENDATIONS FOR FUTURE RESEARCH:

1. Longitudinal Studies: Conduct longitudinal studies to track changes in consumer perceptions and behaviours towards green marketing initiatives in the healthcare sector over time. This would provide insights into the long-term effectiveness and sustainability of green marketing strategies.
2. Comparative Analysis: Compare consumer perceptions and attitudes towards green marketing initiatives across different healthcare settings, such as hospitals, clinics, and healthcare facilities in urban and rural areas. This comparative analysis could reveal variations in consumer preferences and motivations based on geographic location and healthcare provider type.
3. Cross-Cultural Studies: Explore cross-cultural differences in consumer perceptions of green marketing initiatives in the healthcare sector. Investigating how cultural factors influence attitudes towards environmental sustainability practices could help tailor green marketing strategies to specific cultural contexts.
4. Experimental Research: Conduct experimental research to assess the effectiveness of different types of green marketing strategies in influencing consumer behaviour and attitudes. Randomized controlled trials could help identify the most impactful approaches for promoting environmentally sustainable practices in healthcare organizations.
5. Stakeholder Engagement Studies: Engage with various stakeholders, including healthcare providers, policymakers, environmental advocates, and community members, to

understand their perspectives on green marketing initiatives in the healthcare sector. Collaborative research efforts could lead to the development of more comprehensive and effective green marketing strategies.

REFERENCES

1. Garg, A. (2015). Green marketing for sustainable development: An industry perspective. *Sustainable Development, 1*(*1*), 22. https://doi.org/10.1002/sd.1592.
2. Pradeep, M. D., & Akhil, A. (2016). Green marketing to meet consumer demands and sustainable development-challenges and opportunities. *International Journal of Advanced Trends in Engineering and Technology (IJATET), 1*(1).
3. Agustini, D. H., Athanasius, S. S., & Retnawati, B. B. (2019). Identification of green marketing strategies: Perspective of a developing country. LLC "Consulting Publishing Company "Business Perspectives".
4. Arseculeratne, D., & Yazdanifard, R. (2014). How Green Marketing Can Create a Sustainable Competitive Advantage for a Business. International Business Research, 7(1), 130. https://doi.org/10.5539/ibr.v7n1p130
5. Manjunath, G., & Manjunath, D. G. (2013). Green Marketing and Its Implementation in Indian Business Organizations. Asia Pacific Journal of Marketing & Management Review, 2(7), 12. https://ssrn.com/abstract=3050362
6. Lee SM, Lee D. Developing Green Healthcare Activities in the Total Quality Management Framework. Int J Environ Res Public Health. 2022 May 26;19(11):6504. doi: 10.3390/ijerph19116504. PMID: 35682089; PMCID: PMC9180935.
7. Fadda, J. (2019). Green healthcare system: Main features in supporting sustainability of healthcare system—A review. In *Advances in Sustainable and Environmental Healthcare*. Springer. https://doi.org/[DOI_of_the_publication]

About DIAS

Delhi Institute of Advanced Studies, an **ISO 9001:2015** certified institution, affiliated to Guru Gobind Singh Indraprastha University, established by Shri Laxman Dass Sachdeva Memorial Educational Society. The Institute offers MBA, MBA (FM), BBA & B.Com(H) programmes and is providing dynamic learning and growth oriented environment that is changing in response to the changing needs of society. The Institute seeks professional excellence through ethics, passion and perseverance. The guiding philosophy behind all academic activities of the Institute is to inculcate professionalism and to enhance the effectiveness of an organization. The credibility of education at the Institute is increasingly being realized and recognized by foreign universities as well as the corporate world.

We, at Delhi Institute of Advanced Studies, are committed to make this institution a hallmark in professional education by imparting holistic education.

₹499/-

ISBN 978-81-982578-5-7

INTEGRITY EDUCATION