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A Study on Accelerating Digital Financial Inclusion for Positioning India Through AI-Enabled Banking Services

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Abstract:
This research paper examines the role of AI-enabled banking services in accelerating digital financial inclusion in India, with a focus on positioning the country for the future. Financial inclusion, granting access to financial products and services, is crucial for India's economic growth and development. Despite progress, challenges like the digital divide and limitations of traditional banking models hinder inclusion, particularly in rural areas. The study proposes that AI-enabled banking services can be a game changer. AI can personalize financial products, improve creditworthiness assessments for underserved populations, and enhance security. By leveraging AI, India can empower its citizens, promote financial literacy, and solidify its position as a global financial leader. The study also explores the potential benefits and challenges associated with implementing AI in the Indian banking sector, considering factors such as regulatory frameworks, infrastructure requirements, and user adoption. The research explores how AI can address existing hurdles and proposes strategies for leveraging AI responsibly and ethically for inclusive financial growth. The paper aims to contribute to the ongoing dialogue on utilizing AI to empower all Indians and achieve sustainable economic development. This study used review of literature and survey as primary data to assess the impact of AI on digital financial inclusion. The present study discovered that AI has a strong influence on digital financial inclusion in areas related to behavioral finance, customer satisfaction and service efficiency.

Keywords: AI, Framework, Financial Inclusion, Banking, Digital Divide

1. Introduction

Numerous advantages could result from the deployment of AI-driven banking services in public sector banks, including increased productivity, greater client experiences, and improved fraud detection capabilities. The banking sector has been significantly impacted by AI (Artificial Intelligence), which has changed a variety of operational factors, consumer experiences, risk management, and fraud detection. By utilizing cognitive technology and Artificial Intelligence (AI), banks may benefit from digitization and better compete with Fin-Tech competitors. A collaborative study by the National Business Research Institute and Narrative Science found that 32% of financial service providers are already utilizing AI technologies like voice recognition and predictive analytics, among others.

The use of advanced data analytics by artificial intelligence will transform banking in the future by reducing fraud and enhancing compliance. Anti-money laundering tasks that would typically take hours

or days can now be completed in a matter of seconds thanks to AI algorithms. Banks can manage massive amounts of data at lightning-fast speeds in order to gain insightful information from it thanks to AI. With the help of features like AI bots, digital payment advisors, and biometric fraud detection systems, a larger consumer base may benefit from higher-quality services. All of this results in higher sales, lower expenses, and higher profits.

1.1 Artificial Intelligence

Artificial Intelligence (AI) refers to the development and implementation of computer systems or machines that can perform tasks that typically require human intelligence. It is a broad field of study that encompasses various subfields, such as machine learning, natural language processing, computer vision, robotics, and expert systems. AI systems are designed to simulate or mimic human cognitive abilities, including learning, reasoning, problem-solving, perception, and language understanding. These systems can analyze and interpret vast amounts of data, recognize patterns, make decisions, and adapt to new inputs or changing environments.

1.2 Machine Learning

Machine learning is a crucial aspect of AI, where algorithms are trained on large datasets to learn from examples and improve performance over time. Deep learning, a subset of machine learning, uses artificial neural networks with multiple layers to extract complex representations from data.

Machine learning is a subfield of artificial intelligence (AI) that focuses on the development of algorithms and models that enable computer systems to learn from and make predictions or decisions based on data, without being explicitly programmed for each task.

1.3 Digital Financial inclusion

Financial inclusion refers to the accessibility and availability of financial services to individuals and communities, especially those who have been traditionally underserved or excluded from the formal financial system. Digital financial inclusion is a low-cost digital means of providing formal financial services to previously underserved populations. It aims to provide people with access to a range of affordable and appropriate financial products and services, such as savings accounts, loans, insurance, and payment systems. Financial inclusion is crucial for promoting economic growth, reducing poverty, and fostering social development. When individuals and communities have access to financial services, they can better manage their finances, invest in education and healthcare, start and expand businesses, and cope with unexpected emergencies. It empowers people by giving them control over their financial lives and opportunities to improve their overall well-being.

1.4 AI and Digital Financial Inclusion

Artificial intelligence (AI) has the potential to significantly contribute to Digital financial inclusion by enhancing access, affordability, and the quality of financial services. Here are some ways AI can support financial inclusion:

1.4.1Alternative Credit Scoring: In many developing countries, individuals and small businesses lack traditional credit histories, making it challenging for them to access loans from formal financial institutions. AI can leverage alternative data sources, such as mobile phone usage, social media activity, and transaction history, to create alternative credit scoring models. These models can assess creditworthiness and provide access to credit for underserved populations.

1.4.2 Chatbots and Virtual Assistants: AI-powered chat-bots and virtual assistants can serve as accessible and affordable customer support tools for individuals who may not have easy physical access to banks or financial institutions. These digital assistants can help with basic banking transactions,

provide financial advice, and address customer queries, thereby improving financial literacy and accessibility.

1.4.3 Data Analytics for Financial Inclusion Strategies: AI and data analytics can help policymakers and financial institutions better understand the needs and behaviors of underserved populations. By analyzing large datasets, AI can provide insights on consumer behavior, identify gaps in financial services, and inform the development of targeted financial inclusion strategies.

1.4.4 Digital Payment Solutions: AI can facilitate digital payment systems, making financial transactions more convenient, secure, and accessible. AI-powered fraud detection algorithms can enhance security in digital transactions, and AI chatbots can assist users with payment-related queries. This enables individuals to participate in the digital economy and access financial services remotely, even without a physical bank account.

1.4.5 Credit scoring and lending: Traditional credit scoring models often rely on limited data and conventional indicators, making it difficult for underserved individuals or those without a formal credit history to access loans. AI can help overcome this challenge by leveraging alternative data sources, such as mobile phone usage, social media activity, and digital footprints, to build more accurate credit scoring models. By analyzing a wider range of data points, AI algorithms can provide more inclusive and fair assessments, enabling lenders to extend credit to previously underserved populations.

2. LITERATURE REVIEW

Kaur et al.[2],2020 argued that AI, often referred to as machine intelligence occasionally, is the simulation of human intellect in machines. In contrast to humans' innate understanding, it is the cognition displayed by robots. AI is developing rapidly, from Siri to self-driving cars.Generally speaking, there are just two core concepts in artificial intelligence. Studying human brains and how they think is the first step, and using machine learning to model those processes is the second. There is more to artificial intelligence in banking than chatbots..

Sadok et al.[7],2022 teases out the ramifications of artificial intelligence (AI) use in the credit analysis process by banks and other financing institutions. New information sources (big data) are now accessible for creditworthiness evaluations because to the distinctive characteristics of AI models and the growth of computational power. When AI and big data are used together, they can detect weak signals, such as interactions or non-linearities across explanatory variables, which seem to increase prediction accuracy compared to traditional creditworthiness metrics.

Truby et al.[10],2020 stated that a number of possible advantages of artificial intelligence in the financial sector include bettering financial services and strengthening regulatory compliance. This paper makes the case that supporting a proactive regulatory approach before any financial harm occurs is the best way to promote a sustainable future for AI innovation in the financial sector. In accordance with properly crafted international principles, this proactive approach should result in the implementation of logical regulations that incorporate jurisdiction-specific rules.

Kochhar et al.[3],2019 argued that the world is ruled by technological advancement, and artificial intelligence is one of the fields with the quickest rate of development globally. Artificial intelligence is being used by different industries, including the financial sector. The use of complicated data analytics by artificial intelligence will transform banking in the future by reducing fraud and enhancing compliance. Although AI won't replace people, it will improve their productivity and allow them to complete computations that would be challenging to complete manually in a much quicker and simpler

manner. Artificial intelligence also lowers risk and boosts income in the banking industry by enhancing client happiness.

Fares et al.[1],2022 identified research themes that show how AI is used in banking are developed and classified, and they are combined with earlier research to provide an AI banking service framework that fills the gap between academic study and practical experience. The results show how three important study areas—Strategy, Process, and Customer—are covered by the literature on AI and banking. Marketers and decision-makers in the banking industry may find these findings useful in developing their long-term strategies for utilizing and maximizing the value of AI technology in the banking industry. Future research prospects are also presented by this work.

Malali et al.[5],2020 stated that Artificial intelligence (AI) will provide banks and financial institutions the power to completely rethink how they operate, implement ground-breaking goods and services, and, most significantly, suffer interferences with the client experience. With the assistance of fin-tech companies, banks will find it tough to compete in the age of machines by utilizing cutting-edge technology that complement or even replace human workers with elegant algorithms. Banking and financial businesses will need to adopt AI and weave it into their company strategy and operations to maintain a sharp competitive advantage.

Königstorfer et al.[4],2020 argued that in business and society, artificial intelligence (AI) is gaining more and more attention. The earliest applications of AI in banking were successful, but today, most implementations of AI are in investment banking and backend services that don't involve direct consumer interaction. With its emphasis on customer connection, AI in commercial banking hasn't gotten much attention up until this point. AI implementation in commercial banking could alter operational procedures and customer interactions, opening up new behavioral finance research possibilities. We did a structured literature review to find applications of AI in commercial banks and the difficulties in adopting AI based on this research gap.

Shanmuganathan[8],2020 focused on technological difficulties linked to behavioral finance and the real and potential effects of applications based on artificial intelligence (AI). However, the field of AI-based applications within the financial services sector has seen tremendous growth, particularly in behavioral finance. The most current advancements in AI-related algorithms for financial advice services are discussed in this paper. Its effectiveness in creating trustworthy portfolios based on investors' behavior through a theoretical framework-based learning model in the financial arena is known as robo-advising.

Ris et al.[6],2020 said that Just as other industries have modernized, such as with medical checks, medical reports, and evaluations, banks can implement new Virtual Assistants and Artificial Intelligence (A.I.) machine learning technologies. This research paper will elaborate and emphasize the impact of artificial intelligence implementation on the banking sector processes. By utilizing a variety of analytical techniques, including SPSS, this research is based on both quantitative and model-based evidence of system performance.

Singh et al.[9],2020 insinuated that Nowadays, everyone is worried about the changes that will come soon or, in a sense, the changes that are already taking place in the globe. Yes, I'm referring to the upcoming fourth industrial revolution, which will lead to the creation of a large number of new employments as well as the elimination of a large number of current ones. Everyone is discussing artificial intelligence, including its advantages and disadvantages, but we wanted to include other perspectives as well.

3. Theoretical Framework

This study is based on TAM model. The TAM model, or Technology Acceptance Model, is a widely used theoretical framework in the field of information systems and technology management. It was initially proposed by Fred Davis in 1986 and has undergone several variations and extensions since then. The model aims to explain how and why users accept or reject new technology, particularly information systems and software applications. The TAM model has been influential in guiding research and understanding user behavior towards technology adoption.

The core premise of the TAM model is that these two factors, perceived usefulness and perceived ease of use, directly influence a user's attitude and intention to use a technology, which in turn affects their actual usage behavior.

4. Objectives

- To understand the current state of financial inclusion and analyze the factors contributing to financial exclusion.
- To explore the potential impact of AI-enabled banking services on expanding financial access and promoting financial literacy.
- To understand the potential benefits and challenges associated with implementing AI in the Indian banking sector.

5. Challenges associated with implementing AI in the Indian Banking Sector

- **Customer Acceptance and Trust**:

Customers may be wary of AI-driven services and decision-making processes. Building trust and ensuring transparency is essential. Ensuring that AI applications enhance the user experience without being intrusive or complicated is crucial for customer acceptance.

- **Cultural and Organizational Challenges**:

There can be resistance to adopting AI from within the organization due to fear of job displacement and reluctance to change established processes Successfully implementing AI requires a cultural shift within the organization, with emphasis on continuous learning and adaptation.

- **Cost and ROI Concerns**:

The initial cost of AI implementation can be prohibitive, especially for smaller banks. This includes costs for software, hardware, and skilled personnel. Measuring the return on investment (ROI) from AI initiatives can be difficult, making it hard for banks to justify the expenditure.

- **Infrastructure and Technological Constraints**:

Implementing AI requires substantial investment in infrastructure, including high-performance computing resources and cloud services, which can be a barrier for smaller banks. There is a shortage of skilled professionals who can develop, implement, and manage AI systems. Training and retaining talent is a significant challenge.

- **Data Privacy and Security**:

AI systems require access to vast amounts of sensitive customer data, raising concerns about data breaches and cyber threats. Ensuring customer data privacy and gaining customer trust are significant hurdles. Banks must implement robust security measures to protect data.

- **Regulatory and Compliance Issues**:

Banks must adhere to stringent regulatory frameworks, which can complicate the integration of AI syst-

ems. Compliance with data protection laws, such as the Personal Data Protection Bill, adds another layer of complexity.AI implementations may require approval from regulatory bodies, which can be a slow and meticulous process.

6. Methodology

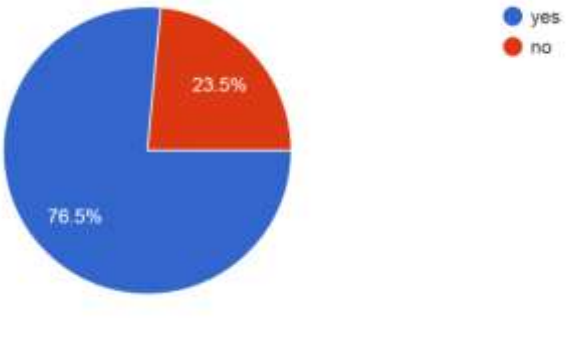
The research mainly focuses on the customers who are using AI enabled banking services.

- **Research design**: The mixed methodology was adopted to assess the relevance and usage of Artificial Intelligence enabled banking services in digital financial inclusion among customers of Delhi.
- **Data collection**: The quantitative data has been gathered from literature review of the related topic and for qualitative data, a questionnaire was designed with close ended questions for the purpose of collection of primary data.
  Sampling: A stratified random sampling technique has been used to select a representative sample of customers from Delhi. The strata will be determined based on the education of the customers. The research was conducted among 134 respondents for the purpose of collecting primary data. Respondents are mainly from Delhi.
- **Data analysis**: Percentage technique has been adopted for the analysis of data.
- **Ethical considerations:** The research will comply with ethical standards, such as obtaining informed consent from participants, ensuring confidentiality and anonymity of data, and minimizing any potential harm or discomfort to participants.

7. Data analysis and Interpretation

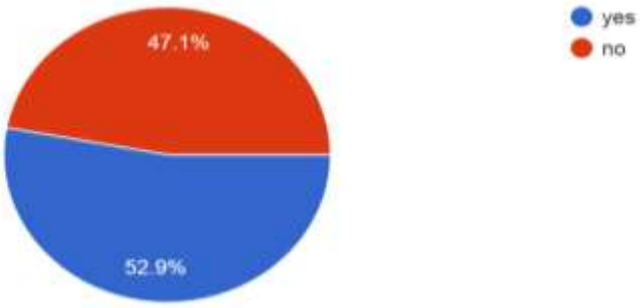
The results are shown with the help of data interpretation as follows:

First Pie chart illustrates the result of a survey in which respondents were asked about the familiarity with the concept of digital financial inclusion. Here two options have been given i.e., yes or no.



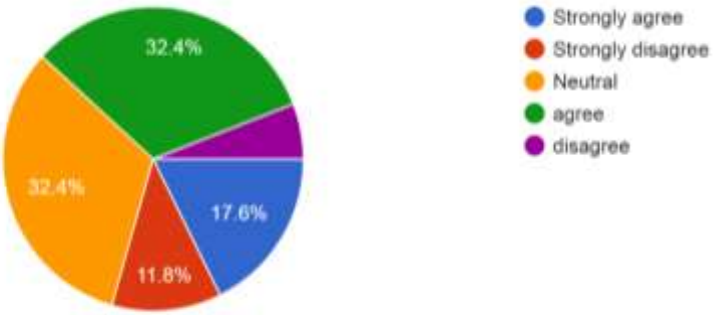
From the above pie chart, it is clear that majority of respondents are aware about the concept of digital financial inclusion and a small minority are unaware. It clearly ensures that individuals and communities, particularly those who are traditionally underserved or financially excluded, have access to affordable and convenient digital financial services. It aims to bridge the gap between the unbanked or under banked populations and the formal financial system by leveraging digital technology.

Second figure represents the percentage of those respondents who use AI enabled digital banking services like chat-bot, voice-bot and RPA.



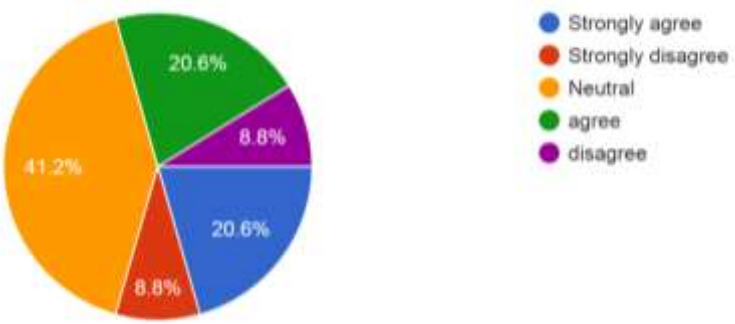
It is evident from the above chart that just over half of the respondents were agreed that they use the AI enabled digital banking services but others are not. Which clearly denotes that AI is still new to Bank's customers so there is need to convince the customers to integrate AI and digital financial inclusion.

Third chart gathers the opinion of respondents regarding AI can replace CIBIL and CRIF rating models by using behavioral financing for accelerating financial inclusion. A five-point scale ranging from strongly agrees (SA) to strongly disagree (SD) has been given to the respondents.



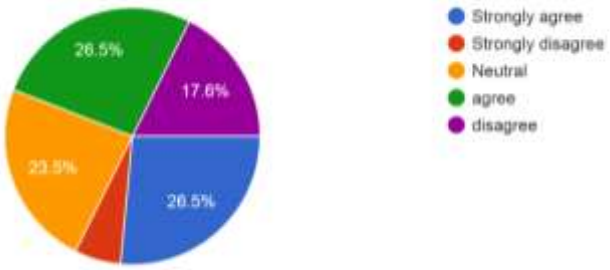
On this parameter nearly a third of the respondents agree that behavior financing(Special application of AI) can replace traditional method of bank financing to accelerate financial inclusion while other one third of the respondents were neutral. 11.8% and 17.6% of the total respondents were strongly disagree and strongly agree respectively.

Fourth pie chart represents the data of respondents regarding the comparison of chat bot, voice bot versus traditional mode of banking



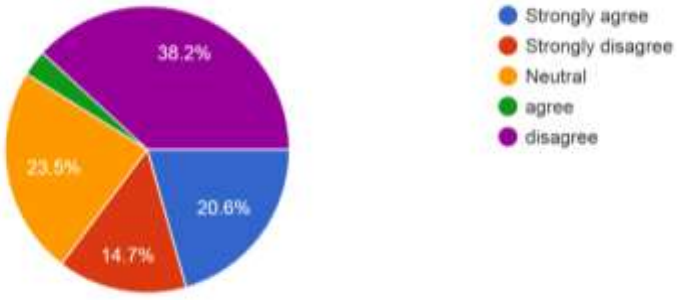
It is evident form the above pie chart that in comparison of traditional mode of banking, AI enabled banking has been preferred by only 20.6% of respondents. Further, 41.2% of respondents are neutral which shows they are comfortable in using both the modes of banking. So we can say that there is a digital divide between users of AI enabled banking and traditional mode of banking.

Fifth chart represents the result of the question in which respondents were asked about the acceleration of financial inclusion through chat-bot, voice bot and RPA.



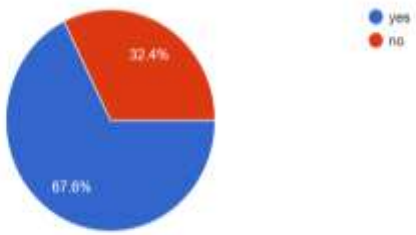
Above pie chart clearly shows that more than half of the respondents are agree with the statement that AI can accelerate the financial inclusion. On the other hand23.5% and 17.6% of total respondents are neutral and disagree respectively.

Sixth pie chart illustrates the opinion regarding the AI trained robots talking to the rural customers in regional/ local language are better than branch staff or not.



In response to this only 20.6% of respondents gave positive reply as they feel talking robots are much better than staff of the branch staff. While 14.7% and 38.2% of respondents are strongly disagree and disagree respectively. So on the basis of overall pie chart, we can say that majority of bank customers are still feel comfortable to talk to the staff present in their vernacular language.

Seventh question is related to the recommendation of the AI enabled services to others.



On this parameter majority of the respondents recommend AI enabled Banking services to others while only32.4% do not want to recommend. So we can say that those who do not use AI enabled banking services, have a strong desire to use and recommend others.

8. Implications:

Research study clearly indicates that digital financial inclusion involves leveraging technology, such as AI-enabled banking services, to provide access to financial services for previously unbanked or under-banked populations but AI is still a new concept and Banks have started to invest in AI technologies. To accelerate financial inclusion, financial literacy programs should be conducted by Banks in semi-urban and rural areas and a brief demo should be provided about usage of AI tools .

9. Conclusion and Policy Recommendations

The research on "Accelerating Digital Financial Inclusion for Positioning India through AI-enabled Banking Services" highlights the transformative potential of AI technologies in reshaping the financial landscape of India. AI-enabled banking services have the potential to position India as a leader in digital financial inclusion. By leveraging AI's capabilities, India can bridge the financial gap, empower its citizens, and drive economic growth. However, achieving these goals requires a balanced approach that considers technological advancements, regulatory compliance, and ethical standards. Continued research and innovation in this field will be crucial in realizing the vision of an inclusive and digitally empowered India.

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