



CHANGING FACE OF BANKING IN INDIA USING ARTIFICIAL INTELLIGENCE (AI)-AN ANALYTICAL STUDY

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Abstract

In the years since the pandemic and the rush to get the economy back on its feet, the banking industry has been at the forefront of widespread use of technology. Digitizing banking services helped institutions stay stable and allowed banks to offer services and solutions online, where a larger number of customers could access them. The demand for digital banking is changing the entire banking industry, which is leading to the creation of new solutions and a better experience for customers. Artificial intelligence (AI) is an area of technology that is advancing quickly all over the world. The financial services industry is quickly becoming one of the first to use AI. Financial institutions study and develop many different ways that technology can be used. Every day, new improvements are made to artificial intelligence that make it smarter and more advanced. In this article, we'll critically analyse the different ways that artificial intelligence is used in the Indian banking industry, as well as its benefits and the problems that India's AI is facing right now. The progress that artificial intelligence can make in the financial technology sector and the many ways it can improve how the banking industry in India works are discussed.

Keywords: AI, Banking, India, Artificial Intelligence, ML.

Introduction

"N. KAUR. Et.al., 2020" defines "artificial intelligence" as the capacity of a computer to think independently and carry out a task without the assistance of a human being. AI helps in the process of recognizing images, learning from experiences, using the learning to reason, understanding languages, and finding solutions to difficult problems.

A subset of artificial intelligence (AI), known as machine learning, gives computers the ability to comprehend without being specifically instructed to do so by humans. It is simply centered on the creation of computer programs that can adapt when presented with a new set of data. To put it another way, it is a tool for data analysis that can lead to the automation of the building of analytical models. The idea of machine learning is still relatively

new. It is a subfield of artificial intelligence that is currently under development to mimic human intelligence.

Hyper-automation technologies play a significant role in digitizing previously manual processes, improving the quality of service provided, and transforming business operations as the banking industry continues to embrace technological advancements. Because they streamline previously siloed processes and departments, connected technologies boost productivity across the board and enable the creation of game-changing innovations that benefit the entire sector. AI and low-code are instrumental in the evolution of banking because they allow for greater adaptability. As a result, creating applications is easier and quicker to create than ever before. These technologies are crucial for the future of the banking industry because they allow for more rapid solution implementation without sacrificing efficiency or quality of service to customers.

Financial institutions today must adopt digital innovations in order to remain competitive in the face of rising customer expectations and a more fragmented market ("De Oliveira Santini, 2018; Eren, 2021; Hua et al., 2019; Rajaobelina and Ricard, 2021"). Artificial intelligence (AI) has been the driving force behind many of the cutting-edge digital banking technologies of recent years (Dobrescu and Dobrescu, 2018). This has resulted in novel changes to banking methods ("such as ATMs, online banking, and mobile banking), services (such as check imaging, voice recognition, and chatbots"), and solutions ("such as artificial intelligence investment advisors as well as AI credit selectors").

The front desk ("via voice assistants and biometrics"), the middle desk (through anti-fraud risk monitoring and complicated legal and compliance workflows), and the back office are just a few of the places where AI could be useful in the banking industry. It is estimated that by 2023, \$447 billion will have been saved by financial

institutions thanks to the use of AI applications. Eighty percent of banks in the United States recognize the potential AI offers, according to ("Digalaki., 2022"). ("Malali et.al., 2020") state that the advent of AI has spawned a plethora of prospects in addition to risks. The use of artificial intelligence (AI) in the banking industry has facilitated the development of effective customer relationship management systems as well as streamlined sales processes, as reported by ("Tarafdar et al., 2019"). Before now, most attention was paid to computerizing things like credit scores, analyses, and the distribution of grants ("Mehrotra, 2019"). Capabilities, however, have developed over time to also back internal systems and processes ("Caron, 2019).

Review literature

("Medhi et al., 2016") highlighted the use of an AI-driven model to foresee outsourcing's success. Despite the many challenges that must be overcome, our study shows that AI tools are effective in operating efficient business practices. Some of these challenges stem from the lack of adequate human resources and an accommodating company culture ("Fountain et al., 2019"). More recent discussions ("Mohapatra, 2020") have put more emphasis on addressing some of the difficulties in introducing AI into financial institutions.

To ensure the long-term viability of AI in banking, ("Mohapatra., 2020") details some of the most significant difficulties connected to human-machine interactions. Despite the fact that most of the recent research has focused on technological advancements and integration.

The article ("Fountain et al., 2019") provided a conceptual overview of some obstacles to organizational adoption, including worker anxiety, company culture, and financial constraints. Despite the consistent emphasis on technological

development rather than technological implementation, the Strategy theme seemed to prioritize organizational uses of AI. However, the organizational difficulties that come with AI implementation are still under-discussed in the current literature.

Possible reasons for this include discussions about incorporating AI into stock market prediction and stock selection ("Kim et al., 2004; Tseng 2003 »). Many studies ("Baesens et al., 2005; Kao et al., 2012; Khandani et al., 2010 ») have examined the potential benefits of artificial intelligence (AI) for banks in the area of credit and loan analysis ("Larson, 2021"). To better predict loan defaults and prepayments, ("Baesens et al., 2005") used a neural based network approach. According to the results of a data mining analysis of credit scores ("Ince., et al., 2009 »), an "AI-driven data mining approach" is superior to more conventional methods of data mining. Similarly, the risk associated with consumer credit was effectively analyzed by machine learning-driven models, as was found in ("Khandani et al., 2010").

Data mining neural network techniques were looked at in this study ("Alborzi et al., 2016 ») to see if they could be used a clear uptick in studies looking at how AI can improve procedures besides credit analysis since 2013.

Using a neural network strategy, the authors of a study titled ("Arif et al., 2020") looked into the challenges that customers face when trying to switch to online banking. In their 2019 study, Belanche et al. look into what influences financial institutions to adopt AI-driven technology. Customers' motivations for using artificial intelligence (AI) enabled mobile banking services are the subject of the research presented in the article ("Payne et al., 2018"). Marketers in the banking industry see AI as a way to boost the effectiveness of their efforts to position, segment, and target audiences for their products and services.

To classify banking clients, ("Smeureanu et al., 2013") proposed a machine learning-based method. Resource allocation in targeted advertisements was analyzed by an AI-based method ("Schwartz et al., 2017"). The study of how AI affects the customer experience has become increasingly popular in recent years ("Soltani et al., 2019; Trivedi, 2019"). This subfield of study is gaining in popularity.

Objectives

1. To investigate the applications of AI in financial institutions
2. To investigate the role of AI in the financial industry

Research Methodology

The scope of the study is limited to the technological advancements in the Indian banking sector. The research design that is utilized is exploratory and descriptive in character. This is because the study in question is quantitative. The information comes from a wide variety of sources, including reports, publications, news articles, online resources, various bank portals are websites. and the RBI portal. The technique of simple random sampling has been chosen because it will provide a better understanding of the research problem.

Problem Statement

The literature that already exists contains a great deal of discussion about the development of AI, but the practical challenges that financial institutions face in the process of implementing AI are rarely brought up for discussion. The scope of the study is extremely broad, and it covers not only the most recent applications that have been adopted by the banks but also the features that are provided by applications that are AI enabled. The results of the study will paint a very accurate picture of the obstacles that the banking industry must overcome in order to implement AI. If

further descriptive research were to be done on the ideas that will be investigated, this study would be of great assistance.

Evolution of AI

AI has been talked about for hundreds of years, but it wasn't until the 1950s that its real potential was looked into. AI was the idea of a whole generation of scientists, mathematicians, and philosophers, but it was the British polymath Alan Turing who said that if humans could solve problems and make decisions by using information and logic, then machines could do the same. In 1950, Turing wrote a paper called *Computing Machinery and Intelligence*. In it, he explained how machines work and how to test how smart they are. John McCarthy and Marvin Minsky, considered founding “fathers of AI”, defined it as “the science and engineering of making intelligent machines” along with a group of researchers in 1956 at Dartmouth College in United States. This group of researchers were attempting to make machines use

language, form concepts and solve problems without human intervention.

The AI movement began with major design goals to teach and enable machines to :

- i. reason and perform sophisticated mental tasks,
- ii. identify objects, people, and languages so they can interact with the real world as humans do,
- iii. plan and navigate the world around them so they can autonomously move around by navigating
- iv. process natural language so they can understand language and interpret conversations and themselves,
- v. perceive the way humans do using five senses.

Several breakthrough developments in AI over the decades have been supported by algorithms that were developed many years prior to the actual achievement. The average time from when an AI algorithm was first planned to the time a discovery took place has been recorded as 18 years.¹² This new phenomenon can be called new AI clearly differentiating the symbolism that was the fulcrum of the traditional AI. The timeline of developments in AI is depicted in Figure below:

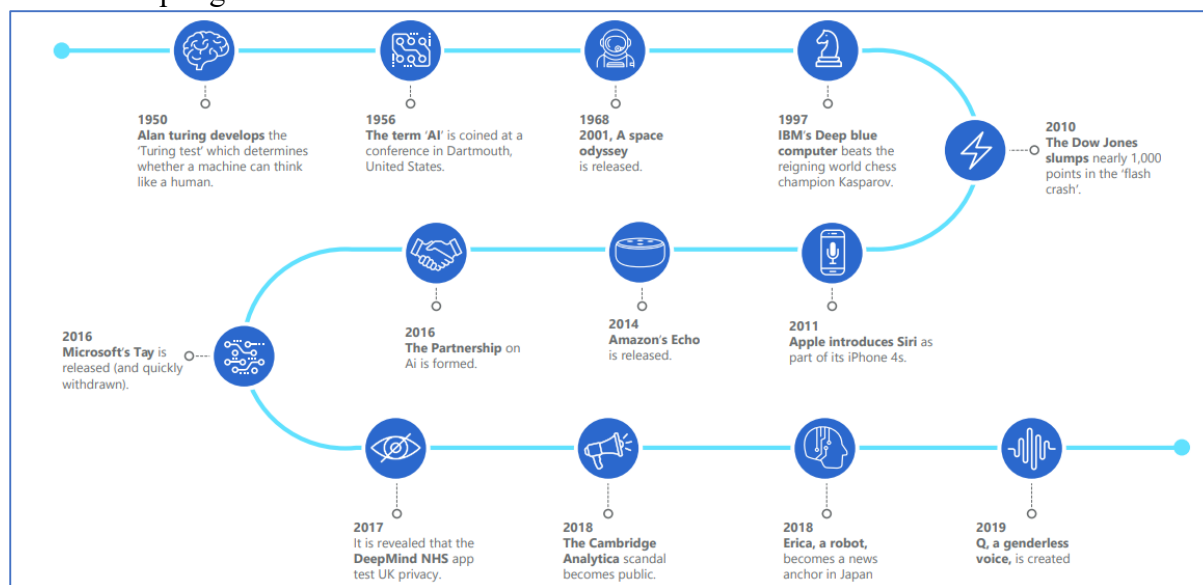


Figure 1 : Timeline of Developments in AI

Artificial Intelligence in Banking Industry

India's digital banking (including retail banking) and finance sector has witnessed immense growth in the past two decades. This transformation has been

primarily driven by an increase in digital payments across sectors and industries. The country's established financial institutions are now deploying fintech to provide end users agile, efficient, and differentiated experiences along the complete value chain of financial services. The rise in fintech use

will bring in financial innovations and transform India's financial landscape in two primary ways: (i) consumers will have a larger set of options at competitive prices, and (ii) lower operational costs can improve efficiency at financial institutions. The Indian government's 'DigiDhan Mission' recognizes that financial inclusion is still one of India's most pressing challenges, and that those who continue to be excluded from the formal financial system can gain access to formal financial services and benefits through the use of digital payments. Twenty different AI models are being used to find potentially fraudulent accounts and improve the scheme's efficiency. Present day situation in India is now at the forefront of the financial technology revolution. The unprecedented growth of India's financial technology sector in recent years can be directly attributed to the country's mobile technology explosion in recent years. Taking advantage of customers' shifting preferences due to the spread of digitalization, the industry has developed a wide range of cutting-edge products and services in response to the evolving needs of the economy. This class includes

electronic banking services such as online and mobile banking and mobile payment apps. As a result of this shift, more collaborations have formed between companies creating financial technology and the financial institutions that use it. With the rise of online banking and payment methods, financial institutions now have access to a wealth of transactional data. By doing so, financial institutions can track client activity, make informed predictions, and swiftly address any changes. The increasing demand for online banking and financial information offerings has created openings for the application of artificial intelligence in India's retail banking, financial, and investment services sector. In 2019, an interdepartmental panel on financial technology proposed a sweeping legal framework to safeguard users of digital services. The panel also suggested using AI, cognitive analytics, and ML to further automate their back-end operations.

Use of AI in Banking

In India, the use of AI in banking is still in its early stages, but it is rapidly gaining momentum.

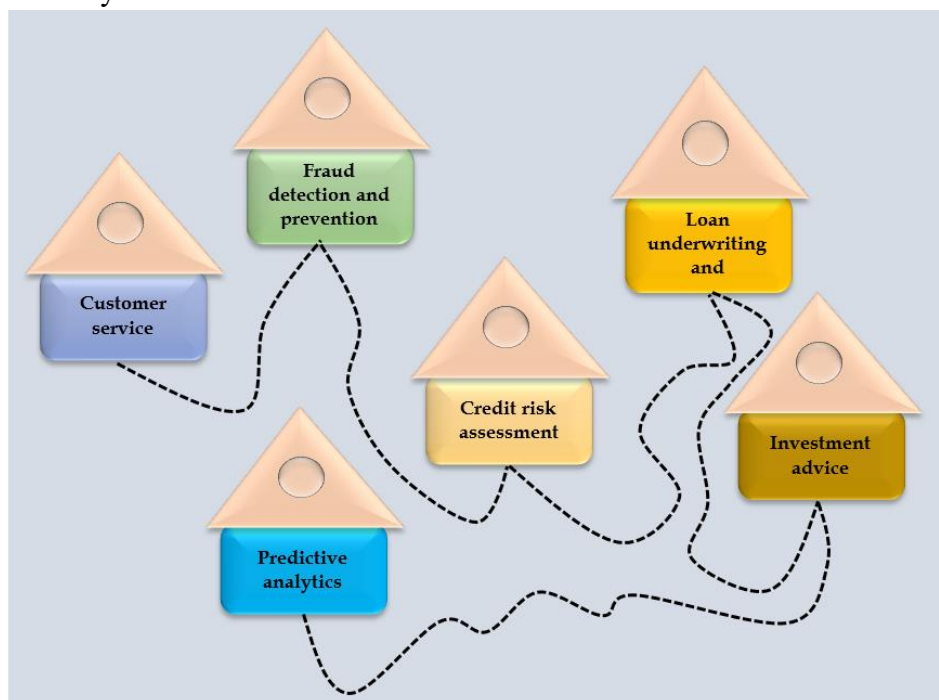


Figure 2: Use of AI in Indian Banking Sector

Here are some of the key areas where AI is being used in the banking sector in India:

- i. **Customer service:** AI-powered chatbots and virtual assistants are being used by banks in India to provide personalized and real-time customer service. Customers can get instant answers to their queries and concerns, leading to greater satisfaction and loyalty.
- ii. **Fraud detection and prevention:** Indian banks are using AI algorithms to analyze large amounts of data to detect and prevent fraud, ensuring the safety and security of customer accounts and transactions.
- iii. **Credit risk assessment:** AI models are being used to analyze credit risk, enabling banks to make more accurate lending decisions and reduce the risk of default.
- iv. **Loan underwriting and processing:** AI is being used to automate the

loan underwriting and processing process, reducing the time and resources required to approve loans.

- v. **Investment advice:** AI-powered robo-advisors are being used by banks in India to provide investment advice and portfolio management services to customers, enabling them to make informed investment decisions.
- vi. **Predictive analytics:** Indian banks are using AI models to analyze customer data to identify patterns and predict future behavior, enabling banks to offer personalized products and services to customers.

The use of AI technologies like Cloud computing, Blockchains, Machine Learning, APIS, and Robotics by banks and financial institutions has been shown to have positive effects on the bottom line, operational efficiency, data security, and the quality of service provided to customers.

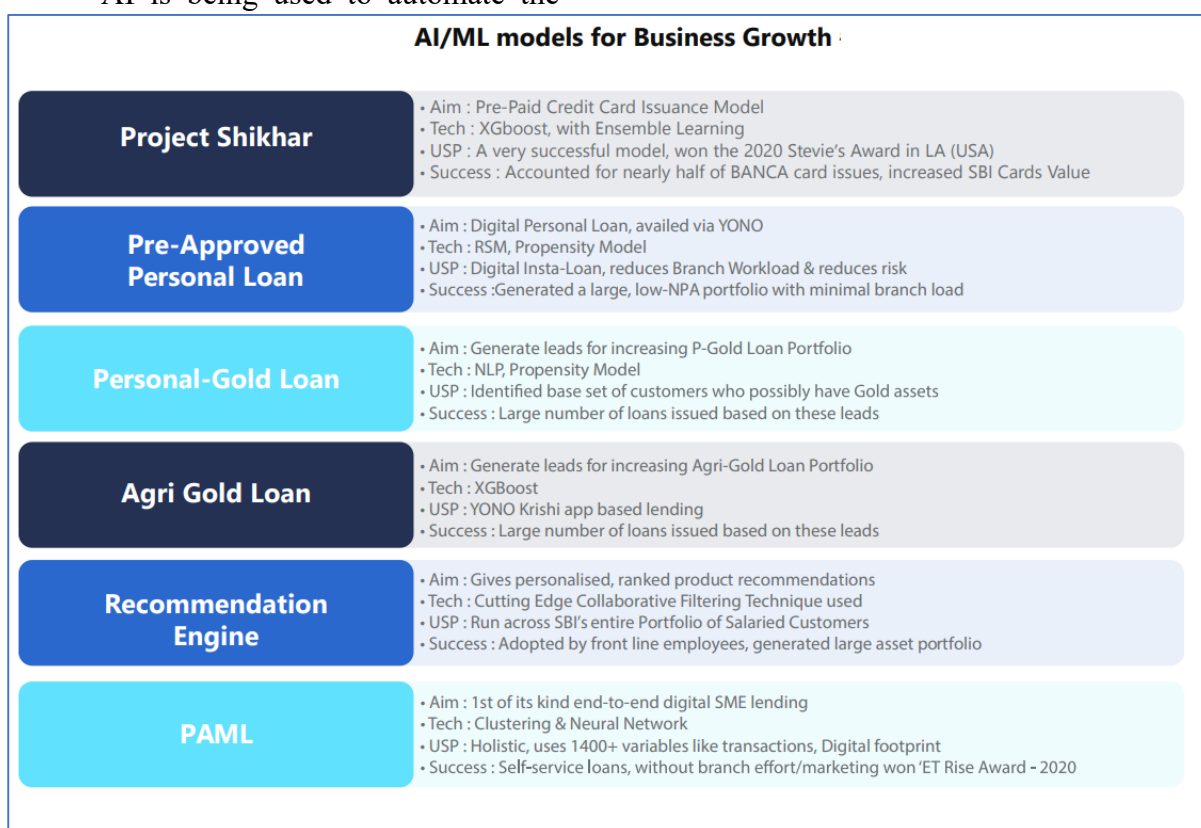


Figure 3: AI/ML Models for Banking Business Growth

The majority of large and global banks are currently implementing AI for use in both their back offices and their front-facing interactions with customers. Several large companies that provide financial services have already begun work on a proof of concept and the incorporation of some of the emerging technologies, such as cloud computing, block chain, and machine learning, into their operations ("PWC, 2020"). The applications of artificial intelligence in banking can be broken down into three broad categories: i. Enhancing the customer experience; ii. Empowering employees with AI; and iii. Generating AI-powered insights. The sub-categories that fall under these three main categories are detailed in the table that can be found below ("A S Ramasastry, 2020").

Current Status of AI industry in India

As of researcher's knowledge cutoff date of September 2021, the AI industry in India was growing rapidly and showing great potential for the future. India is one of the fastest-growing AI markets in the world, with the Indian government launching several initiatives to promote the adoption of AI and machine learning (ML) in various sectors.

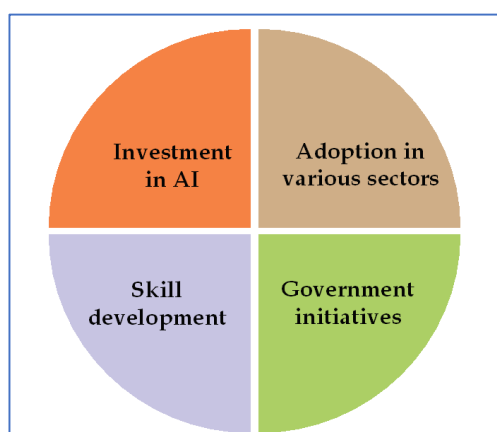


Figure 4: AI's Current Status in India

Some of the key developments in the AI industry in India:

Investment in AI: According to "a report by the International Data Corporation (IDC), the Indian AI market is expected to grow at a CAGR of 30.8% between 2019

and 2024, reaching \$880.5 million by 2024". Various Indian startups have also raised significant funding to develop AI-based solutions for various sectors.

Adoption in various sectors: AI is being adopted in various sectors, including healthcare, finance, agriculture, and education. AI-powered chatbots are being used in customer service, while AI-based solutions are being developed for fraud detection, risk management, and other financial applications. AI is also being used for predictive analytics in agriculture to improve crop yields as well as reduce losses due to pests & diseases.

Government initiatives: The government of India has initiated a number of programs with the goal of increasing the use of AI across a variety of industries. The goal of India's National AI Strategy is to elevate the country to the forefront of "artificial intelligence (AI) and machine learning (ML) research and development". In addition, the government has established the National Centre for AI with the purpose of developing AI-based solutions for a variety of industries.

Skill development: The government has launched several initiatives to develop the skills required for AI and ML, including the National Programme on Technology Enhanced Learning (NPTEL) and the Skill India programme.

Results & Discussion

1. Critically Analysing Challenges to opt AI in banking sector in India

While there are many potential benefits to using AI in the banking sector in India, there are also several challenges that need to be addressed. **Here are discussing the results of the key challenges:**

Data quality: In order to make reliable inferences and predictions, AI requires high-quality data. However, many Indian banks struggle with data quality issues, including incomplete or inaccurate data. This can make it difficult to implement effective AI models.

Talent shortage: Because there is a lack of skilled AI professionals in India, it can be difficult for banks to locate and recruit the right talent for the creation and execution of AI solutions. This can make it challenging for banks to compete in the global market.

Regulatory challenges: The use of “AI in banking” is subject to various regulatory and legal requirements, which can create challenges for banks seeking to implement AI solutions. For example, the “Reserve Bank of India (RBI)” has issued guidelines on the use of AI in banking, which require banks to have appropriate governance frameworks in place to ensure the responsible use of AI.

Resistance to change: Many employees and customers may be resistant to the use of AI in banking, either due to concerns about job displacement or privacy and security issues. This can create challenges for banks seeking to implement AI solutions.

Cost: Developing and implementing AI solutions can be costly, especially for smaller banks that may not have the resources to invest in AI technology.

2. Critically analyse public & private sector banks as an example

India, which is the most important center for banking in both the public and private sectors, has achieved a lot of success thanks to artificial intelligence, machine learning, and data analytics. For eg:- SBI's Project Shikhar, which issues credit cards and is based on AI models, was recently put into action. In a similar vein, digital instant loan utilizes the AI application via its mobile application Yono. "The Punjab National Bank is another public sector financial institution that makes use of AI and ML to forecast credit card defaults, delinquencies in MUDRA Loan repayments, to analyze the utilization of the National Automated Clearing House debit mandate, and to generate additional revenue through the sale of third-party products". Artificial intelligence has been utilized by HDFC Bank in the process of

aligning the business verticals, mapping of the skills, and competency, etc by "J. J. Funke, 2020". The focus of this research is on the various applications of artificial intelligence that have been implemented by banks in India. Even though the majority of financial institutions have made significant investments in the development of digital banking applications, they continue to face difficulties in persuading the general public to begin utilizing these applications.

Many people, even those with higher levels of education, have fallen prey to scams that took place online at some point. There have been a lot of different initiatives taken to stop them. Helpline numbers have been established for the purpose of reporting cybercrime, which has enabled a significant number of victims to reclaim their lost financial assets ("J. Of and C. Reviews., 2020").

3. Critically analysing how AI can transform the future of banking:

Results to discuss improvement in scalability & adaptability- According to a number of studies, the implementation of AI in banking has resulted in increased adaptability and resilience. This has been accomplished through the optimization of processes, which has resulted in significant time and resource savings. The technologies are scalable, which enables the institutions to make essential adjustments in order to fulfill the requirements of the future market. In addition, the technology makes it easier to integrate best practices into ongoing operations while causing the fewest possible disruptions.

During the pandemic, people had to work from home and keep their distance from others. The AI-powered digital workforce made sure that business continuity and productivity were kept up without changing any of the functions that were already in place. Innovative ways to meet customer needs have changed the future of banking by giving customers access to digital banking and services they can use from

home. Incorporating the digital workforce also makes it possible to handle a large number of operations to help a wide range of customers and stakeholders while also making sure that people will still have jobs.

In the past, the process of onboarding new customers, which included the creation of their accounts as well as the application for new loans, could require a number of steps, as well as time-consuming manual reviews. Customers and institutions alike. These laborious and manual processes have, however, been transformed into real-time decision events by the implementation of just one, "if not all of the following hyper-automation technologies with business rule-driven processes; robotic process automation (RPA); optical character recognition (OCR); and artificial intelligence (AI)". Because of these significantly improved experiences for customers, a number of organizations have been able to demonstrate the significance of their investments and differentiate themselves from their rivals by adopting various technological advancements.

Results to discuss the effects of enhanced security – It has been observed that the banking sector is continually researching new methods to withstand cyberattacks, hinder data leaks, detect fraud, as well as to ensure that operations are conducted with the highest possible level of security. Implementation of technology enables greater control over data as well as access to live data, which facilitates the making of informed decisions. In order to detect fraudulent activity with greater precision, many companies have begun to implement processes based on artificial intelligence. These same companies have also begun to implement low-code processes in order to inform customers and solicit their feedback.

In addition, it is possible to reduce the number of mistakes and omissions, which will save both time and resources. Audits and reviews that take up a lot of time can be made more efficient through the use of automation. This paves the way for records

to be monitored and validated around the clock, which helps to maintain high levels of transparency, trust factor & accountability.

Results to discuss the user experience and customer support- Utilizing technologies that enable hyper-automation has improved onboarding and backend functions, which has led to an overall improvement in the quality of the customer experience. "AI on the front end to streamline customer identification and authentication, imitate live employees through chatbots and voice assistants, deepen customer relationships, and provide personalized insights and recommendations for customers. The digital workforce enables round-the-clock support for customers, freeing up the human workforce to concentrate on relationship-building and cognitive tasks".

Robotic process automation, also known as RPA, is a technology that can be used to help provide a more streamlined audit trail of transactions and requests, which can lead to improved reporting accuracy and transparency. Institutions are now able to support customers on a case-by-case basis thanks to technologies that enable hyper-automation. These technologies offer solutions that are highly flexible and customizable.

Results to discuss an innovative solutions and compliance - The adoption of artificial intelligence technologies has made it possible for the financial services and banking industries to experience a significant increase in the rate of innovation. These technologies have made it possible to increase the integration of already-existing and secure customer data with new digital-first processes. Many of these processes will need to shift their attention to increased compliance requirements as the industry transitions. Platforms that require little to no coding have made it possible for businesses to rapidly implement business-rule-driven processes while also enabling artificial

intelligence to monitor and regulate compliance with those processes. They also encourage human intervention whenever there is a disagreement or a point that calls for having confidence in the decision made by the AI. These rules begin to work together, which provides the organization with increased processing speed, greater transparency into each customer transaction, and an overall improvement in the quality of the experience provided to customers.

The adoption of new technology has begun to shape not only the digital transformation journeys of banks as well as other financial institutions but also the customer experience and the expectations of those customers. The implementation of hyperautomation technologies within the industry has given rise to a number of customer expectations, including the availability of remote banking, a reduction in the amount of time required to process transactions, and an increase in the level of safety. We do not anticipate that the rate of change will slow down in the near future.

Findings of the study

There have been several studies and reports on the impact of artificial intelligence on the banking industry in India. **Here are some notable findings:**

- According to a report by NASSCOM, the Indian banking industry can save up to \$3.87 billion annually through the use of AI and automation.
- A report by PwC India states that AI can help Indian banks reduce customer acquisition costs by up to 50%, improve customer retention rates by up to 30%, and increase revenue by up to 20%.
- A study by KPMG India found that AI can help Indian banks improve operational efficiency by up to 40% and reduce fraud losses by up to 25%.
- The Reserve Bank of India (RBI) has also recognized the potential of AI in

the banking sector and has set up a working group to study the use of AI in financial services.

- Some of the leading banks in India, such as HDFC Bank, ICICI Bank, and Axis Bank, have already implemented AI-powered chatbots and virtual assistants to enhance customer service and improve operational efficiency.

These findings suggest that AI has the potential to significantly transform the banking industry in India, enabling banks to offer faster, more efficient, and more personalized services to customers while also reducing costs and improving operational efficiency.

Conclusion

The "artificial intelligence (AI)" revolution is driving a sea change in the financial industry, and the world of banking is changing at a faster rate than it ever has before. Numerous artificial intelligence technologies have been implemented in various facets of the banking industry, including core banking, operational success, client service, as well as analytics. Instead of focusing solely on specific physical locations, AI banking now takes into account a vast new universe of modern financial institutions. The provision of innovative banking services by contemporary financial institutions contributes to the expansion and growth of those institutions. Technology makes it possible to conduct transactions of low value, with increased cost effectiveness, and increased banking system penetration. Technology also makes it possible to conduct transactions of low value. When technology is utilized in an efficient manner, both the expansion and development of banks are accelerated. The use of AI in banking is expected to bring significant benefits in terms of improving efficiency, enhancing customer experience, and reducing operational costs in India as well. The challenges suggest that while the use of AI in banking has great potential in

India, there are also several hurdles that need to be addressed to ensure successful implementation. Banks will need to address these challenges and develop effective strategies for integrating AI into their operations in order to fully realize the benefits of this technology.

The AI industry in India is growing rapidly and showing great potential for the future. However, there are still challenges to be addressed, such as the need for more investment in research and development, the development of ethical and regulatory frameworks, and the need for skilled professionals in AI and ML. As a result of this, an increasing number of customers are interested in the application of artificial intelligence, which in turn contributes to the expansion of the banks. AI can be utilized by financial institutions to improve the overall "customer experience by enabling frictionless, round-the-clock client interaction". This can be accomplished through the use of AI. Despite this, the use of artificial intelligence in banking applications is not restricted to the provision of retail banking services alone. In investment banking and all other areas of money-related supervision, artificial intelligence is currently being utilized to improve back- and middle-office operations.

Future Scope

The difficulty arises from the fact that banks were not designed to perform to the standards of customer expectations in an ever-changing environment. If we think about individual technologies like blockchain or the smart phone, we might consider them as a data solution for financial institutions. But if one takes a step back from those particular technologies, they will notice that the world is becoming increasingly digitized. When it came to transactions, the demands placed on the banking system increased, which meant that new technology had to be implemented in order to keep up with those demands. The

use of AI not only results in a reduction in foot traffic, but it also helps banks reduce the costs associated with their operational expenses. Despite the many obstacles, AI has the potential to assist banks in optimizing the use of their already established operations and procedures. AI can assist in the efficient monitoring of transactions, including the tracking of transactions that are of an unusual nature. Additionally, AI can assist in the creation of a unified view of a customer across domestic and international databases. In addition, AI tools are helpful in the analysis of government documents, which helps to retrieve information about shareholders who have ownership stakes. Digital channels have virtually eliminated the need for the vast majority of customer service executives. As a result of the widespread adoption of digital banking, a plethora of new data sources that contain essential customer insight have become available. Additional research may concentrate on the utilization of AI in the event that crypto currencies make a contribution to the digital economy.

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