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Artificial Intelligence as an Emerging Tool in the Banking Industry: Utilization and Challenges

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Abstract

Aim: The application of artificial intelligence (AI) offers an encouraging avenue for developments in the banking industry.

Methods: The study adopted a scoping review of methodology to provide a comprehensive overview of relevant research regarding the potential uses and challenges of AI in banking. Consumer expectations have evolved, emphasizing features such as payment gateways, swift transactions, and resilient banking services.

Results: Major utilization of the AI in banking industry includes enhanced customer engagement, satisfaction, and relationships, personalized financial guidance, smart digital wallets, regulation compliance and collaborative efforts, forecasting, tracking market trends, decision-making and problem-solving, anti-money laundering and fraud detection, automation of repetitive, large and time-intensive tasks, enhanced cybersecurity, and opportunity for digital financial inclusion.

Conclusion: Users encounter challenges involving security issues, privacy concerns, and the complexity of technology in AI-driven banking services.

Recommendation: While AI holds a crucial role in the banking industry, successful implementation demands ample allocation and consistent, predictable utilization of AI practices.

Keywords: *Machine learning, banking, industry, digitalization, innovation*

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INTRODUCTION

Artificial intelligence (AI) is a broad term that encompasses various techniques and approaches to replicate intricate abilities, including autonomous decision-making and language usage (Truby et al., 2020). It involves the theory and advancement of computer systems capable of undertaking tasks traditionally requiring human intelligence, such as decision-making, language transformation, visual insight, and speech identification. AI is characterized by machines exhibiting cognitive functions associated with human minds, such as perception, logic, interaction with the environment, acquisition, and problem-solving. The term was introduced by John McCarthy in 1956 and refers to systems that mimic human actions and thought processes rationally(McCarthy et al., 2006). AI shifted to the Web 2.0 era in 2005 after the result of the dot-com bubble in 2000. Even though the AI concept was developed several years ago, however, the extensive acceptance of AI is still in its early stages. The surge in data and information availability spurred increased research into AI and its importance (Larson, 2021). AI facilitates the application of progressive systematic tools and groundbreaking business determinations in the banking industry. Through AI-powered systems, banks can establish customer access, understand customer preferences, and customize services according to customer needs.

Research into intelligent decision support systems for banking has a history spanning over four decades. In 1984, Collins designed an expert system tailored for personal selling in banking applications (Collins, 1984). By the 1990s, intelligent decision models incorporating data mining were introduced to enhance fundamental bank operations, particularly in the realm of insurance (Anand et al., 1998). Despite these advancements, progress remained incremental, even in developed markets. Recent works have shifted focus towards upselling and management decision-making tasks, leveraging big data and artificial intelligence in the domain of digital banking. The integration of AI reduced technical inefficiency by up to 11% for Indian banks(Mor & Gupta, 2021), with the combination of big data enabling intelligent marketing strategies (Kushwaha et al., 2021; Verma et al., 2021).

AI is extensively applied in various facets of banking, spanning the front (i.e., voice assistants, biometrics, etc.), middle (i.e., fraud risk, complex legal, compliance workflows, etc.), and back (credit, contracts infrastructure, etc.) offices. In the banking landscape, AI's integration has not only facilitated more seamless transactions but has also played a pivotal role in shaping effective customer relationship management systems (Tarafdar et al., 2019). Historically, the emphasis was on automating credit scoring, analysis, and the grants process (Mehrotra, 2019). However, the capabilities of AI have evolved to support internal systems and processes within banks. According to Business Insider Intelligence 2023, a significant financial impact is anticipated, with banks projected to save $447 billion by 2023 through the implementation of AI applications.

In the United States, nearly 80% of banks acknowledge the potential benefits offered by AI (Business Insider Intelligence, 2023). Nevertheless, merely 85% of corporate leaders considered AI as a crucial instrument for furnishing companies with lasting competitive edges, and only 39% had a strategic blueprint for the implementation of AI (Ransbotham et al., 2017). The noteworthy incorporation of AI mediation into existing banking gateways has resulted in a remarkable reduction in daily operational charges. AI-mediated technologies are relevant and recommended, particularly as the future of banking services emphasizes personalized experiences. The emergence of AI in the banking sector presents a wealth of opportunities along with associated challenges.

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This study summarizes the rapidly expanding evidence from different studies on the potential use and challenges of AI in banking.

METHODS

For this study scoping review of literature was conducted in July 2024, using the keywords. We searched Scopus and google scholar database where 98 articles were identified and among them 37 were selected as being relevant to our study the research topic. The results were summarized with respect to the following AI Banking themes: (i) category of banking service where AI is used, and (ii) opportunities and benefits of using AI in Banking and (iii) challenges of using AI in Banking.

OPPORTUNITIES, BENEFITS, AND UTILIZATIONS OF AI

The challenges associated with inconvenient physical bank visits and long queues could be eradicated through dependable smart virtual assistants and self-service chatbots that are available round the clock. AI could address issues related to human error and fatigue. Further improves customer understanding and targeting, enabling banks to customize their products and services to meet specific consumer needs, views, preferences, behaviors, and inspirations. Consequently, customers are likely to experience increased happiness, satisfaction, and faithfulness (Bilal Zoric, 2016; Ghandour, 2021; Jakšič & Marinč, 2019; Kaur et al., 2020; Königstorfer & Thalmann, 2020; Kumar et al., 2020; Lui & Lamb, 2018; Vijai, 2019)**.** Improvement of customer interaction and experience through features like targeted customer offers, chatbots, biometric authentication, voice banking, customer segmentation, and robo-advice (Patel, 2023; Theuri & Olukuru, 2022).

AI is employed to analyze market trends, consumers' financial goals, personal portfolios, perceptions, and other types of information, leading to the customization of financial services to individual needs. AI can provide ample market information to customers and able to help them with personalized monetary guidance (Bilal Zoric, 2016; Ghandour, 2021; Lui & Lamb, 2018; Mhlanga, 2020; Patel, 2023; Vijai, 2019). AI can enhance the use of digital currency. Cutting-edge digital wallets facilitate payment transactions via personal devices at any time and from anywhere, reducing dependence on physical money and promoting financial inclusion (Ghandour, 2021; Kumar et al., 2020; Patel, 2023; Vijai, 2019)

AI could ensure that regulatory requirements are followed and maintained on a real-time basis. Several banks are actively promoting the adoption of AI technology. Additionally, banks and regulatory bodies are collaborating with the banking industry to enhance the efficiency and effectiveness of AI adoption(Aziz & Andriansyah, 2023; Caron, 2019; Ghandour, 2021; Goncharenko & Miglionico, 2020; Lui & Lamb, 2018; Vijai, 2019).

The integration of personal robots, big data analytics, neural networks, machine learning, and predictive analytics with banking information systems is transforming forecasting, decision-making, and problem-solving processes. These systems provide valuable internal and external insights, facilitate financial planning and progress monitoring, improve forecasts, and enable proactive risk management. For example, expert systems and machine learning models can help commercial banks minimize lending-related losses by extracting detailed insights for more informed credit decisions. Additionally, neural networks may be employed to forecast bank risk based on statistical data related to past bankruptcies (Ghandour, 2021; Kasztelnik, 2020;

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Königstorfer & Thalmann, 2020; Kumar et al., 2020; López Iturriaga & Sanz, 2015; Mhlanga, 2020; Patel, 2023; Shrivastava et al., 2020; Tavana et al., 2018; Vijai, 2019).

The banking sector leverages AI models, machine learning algorithms, neural networks, and anomaly detection systems to enhance the accuracy of anti-money laundering and fraud detection processes (Ghandour, 2021; Kaur et al., 2020; Königstorfer & Thalmann, 2020; Mhlanga, 2020; Vijai, 2019). AI plays a pivotal role in enhancing security and risk control, encompassing fraud prevention, cyber risk prevention, detection and monitoring, enhanced risk control, anti-money laundering, anomaly detection, payment transaction monitoring, compliance monitoring, system capacity limit prediction, and data quality assurance, among other functions (Aziz & Andriansyah, 2023; Patel, 2023, 2023; Theuri & Olukuru, 2022). Intelligent robotic assistants automate and expedite routine tasks, leading to significant cost savings and increased employee productivity.(Ghandour, 2021; Kaur et al., 2020; Kumar et al., 2020; Vijai, 2019).

Through the use of machine learning, deep learning, big data analytics, blockchain, and predictive analytics, AI contributes to the proactive detection and prevention of suspicious financial activity, particularly in the realm of payment processing.(Ghandour, 2021; Goncharenko & Miglionico, 2020; Kaur et al., 2020; Königstorfer & Thalmann, 2020; Mhlanga, 2020; Vijai, 2019). AI plays a pivotal role in promoting digital financial inclusion by ensuring that individuals such as youths, women, low-income earners, and small businesses can participate in formal financial services. This includes offerings like payments, transfers, securities, credit, savings, and other services, addressing challenges such as financial risk control, information asymmetry, and providing robust customer support.(Ghandour, 2021; Mhlanga, 2020).

Improved customer experience is a key benefit of AI implementation in banking. AI facilitates a deeper understanding of customers and their behaviors, allowing banks to tailor financial products and services with personalized features. This leads to more intuitive interactions, fostering meaningful customer engagement and the establishment of strong, lasting relationships between banks and their customers (Theuri & Olukuru, 2022). This functionality facilitates the automation of various information-intensive, costly, and error-prone banking services, such as claims management. By doing so, it ensures a return on investment, lowers costs and guarantees precise and swift processing of services at every stage. Cognitive process automation essentially automates a set of tasks, continually improving upon previous iterations through ongoing machine learning (Lacity et al., 2017).

Chatbots can discern context and emotions in text chats, responding appropriately. These cognitive machines not only save time and enhance efficiency but also contribute to significant cost savings for banks (Mogaji et al., 2021). Cognitive systems that emulate human thought processes offer optimal solutions based on real-time data. These systems maintain a knowledge database containing expert information, aiding bankers in making strategic decisions (Javaid, 2024). AI, through Robotic Process Automation, evaluates and streamlines processes. This allows for the automation of approximately 80% of repetitive tasks, freeing up knowledge workers to focus on value-added operations that demand a high level of human intervention (Met et al., 2020).

CHALLENGES AND ISSUES

The high costs associated with implementing and operating large-scale AI systems can be a significant obstacle, particularly for smaller banks with limited resources. Ongoing expenses

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include the need for competent data science talent to sustain efficient AI operations (Ghandour, 2021; Kaur et al., 2020; Kumar et al., 2020; Lui & Lamb, 2018). Customers lacking modern personal devices, internet connectivity, and advanced technology skills may face barriers in accessing and utilizing AI-driven banking systems. This could limit digital contribution, particularly for individuals with lower socioeconomic statuses (Ghandour, 2021; Kumar et al., 2020).

While AI brings efficiency, it cannot fully replace human emotions in banking. Human bankers and branch networks play a crucial role in fostering close contact with customers, necessitating a reevaluation of the roles of human bankers to maintain personalized interactions (Ghandour, 2021; Jakšič & Marinč, 2019; Lui & Lamb, 2018). There is no doubt that AI is an innovative, compelling, and powerful tool in the banking industry. Some have raised concerns about the ethical implications of AI, challenging its use in the banking industry and questioning its ethical foundations. Critics have also contended that AI infringes on individuals' privacy (Fernandes & Pinto, 2019). However, the ongoing debates and uncertainties surrounding these issues have not yielded solutions; instead, they have perpetuated the argument by emphasizing various shortcomings and fallacies.

The most significant challenges lie in the biases and the lack of transparency within the algorithms integrated into AI solutions. Many present AI models operate as closed systems, with unclear training methodologies. They resemble black boxes: input is provided, a seemingly magical process occurs, and a specific output is generated. A notable 51% of business executives express the importance of AI transparency and ethics for their businesses. Correspondingly, 41% of senior executives acknowledge that they have halted the deployment of an AI tool due to concerns related to potential transparency and ethical issues (Capgemini Research Institute, 2023).

It is important to ensure that regulators, policymakers, and supervisors possess adequate knowledge and understanding of AI technology and its impact on the banking industry. It is essential to collaborate and dialogue between different stakeholders, policymakers, data security authorities, bankers, and lawyers. A Pew Research Center study revealed that 30% of Americans had a high level and 31% had low awareness of a common use of AI. AI application awareness varies with education, income, and education level (Kennedy et al., 2023).

Education programs require to enhance the skills and knowledge of professionals such as data scientists, project managers, mathematicians, and engineers. Additionally, there is a recommendation for establishing effective systems for re-skilling to meet evolving demands in the field of AI (Theuri & Olukuru, 2022). Many AI technologies rely on big data. However, the challenge lies in the availability of such datasets, which may not always be ample for training and testing AI algorithms (Ghandour, 2021; Königstorfer & Thalmann, 2020; Kumar et al., 2020; Mhlanga, 2020; Patel, 2023).

While running state-of-the-art machine learning (ML) models on pre-packaged datasets have become more accessible, the design and implementation of systems supporting ML in real-world applications present significant challenges. ML-based applications require novel types of software, hardware, and engineering systems. Investment is required to train and retain competent human resources to maintain the effectiveness of AI. These concerns become especially crucial as ML

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applications extend to critical domains like driving, medicine, finance, and law enforcement, where human interactions have a significant impact (Patel, 2023; Theuri & Olukuru, 2022).

Excessive reliance on AI for decision-making and problem-solving may diminish creativity and adaptability among employees, impacting the overall innovation potential of the workforce (Ghandour, 2021; Königstorfer & Thalmann, 2020). Concerns arise regarding the potential inefficiency of certain skills due to AI-driven automation in banking, leading to job changes and skill downgrading. This could pose a significant challenge in gaining user acceptance of AI in banks (Ghandour, 2021; Kaur et al., 2020; Königstorfer & Thalmann, 2020; Vijai, 2019).

The effectiveness of many banking AI systems is dependent on the accumulation and analysis of extensive customer-related data, encompassing demographics, spending patterns, physical interactions, credit card and debit card details, social media profiles, and more. Consequently, the privacy and safety of consumers are significant considerations when utilizing AI in banking processes (Caron, 2019; Ghandour, 2021; Königstorfer & Thalmann, 2020; Lui & Lamb, 2018; Patel, 2023). The current landscape lacks sufficient evidence on aligning AI with conventional banking processes seamlessly. This shortage of understanding challenges realizing the maximum value from AI implementation within the banking sector (Ghandour, 2021; Königstorfer & Thalmann, 2020; Patel, 2023).

DISCUSSION

In the 21st century digital innovation become crucial for financial institutions to maintain customer expectations and satisfaction and sustain in competitive markets (Eren, 2021; Rajaobelina & Ricard, 2021). AI emerged as a vital force that resulted in transformative intervention across banking channels (mobile banking, online banking, automated teller machines, etc.), solutions (credit scoring, investment advice, financial patterns, etc.), and services (chatbots, voice recognition, check imaging, etc.). AI helps to reduce unnecessary banking service demands, prevent tireless service lines, and enhance the banking practice smoothly and dynamically. Despite these charismatic benefits, AI has several limitations.

The extensive and diverse user demographic poses considerable challenges for individuals in grasping the intricacies of AI. As a consequence, a notable concern has emerged due to the insufficient understanding of various technical aspects, leading to unforeseen occurrences like digital theft, fraud, and money laundering in the digital realm.(Roberts-Lombard & Petzer, 2021) Subsequently, users have raised doubts about the trustworthiness of AI in banking services, prompting questions about its legitimacy as well (Mazzarolo et al., 2021). AI-based applications have developed based on programming language and banks might struggle to get programming experts. Technical knowledge of users also impacts the use of these applications. Digital literacy, language, and access to internet services and hardware might raise the concerns of banking applications. Advanced technology reduces the cost and time, but social interactions are crucial for human beings and can increase trust in service delivery.

However, high-level technical advancement limited the human touch in service delivery. Several countries and institutions are required to advance their laws to adopt AI technology which can take several years to pass and implement which may help to fertile digital crime and cybercrime. Additionally, bank managers, policymakers, banking personnel, and customers need a

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comprehensive understanding of the significance of AI in banking services. This understanding is crucial for regulating and guiding its strategic utilization within the banking sector.

Given that annual global economic damages due to cybercrimes are estimated at US $ 10.5 trillion (Cybercrime, 2024), it is particularly crucial to scrutinize the impact of AI disruption in cybersecurity within the banking industry (IMF, 2024). AI utilizes various techniques, including artificial immune systems, artificial neural networks, genetic algorithms, and fuzzy logic, to detect and combat cybercrime. Nevertheless, phishing remains a significant social engineering threat in the banking sector. AI-powered systems in tailored phishing attacks could exploit data from social networks, thereby enhancing the success rate of such attacks. Additionally, hackers may deploy AI to undermine the AI-powered security systems of banks, enabling large-scale web-based attacks and rendering them vulnerable to blackmail. Digital fraud is an urgent issue that cannot be overlooked and is likely to persist in the future. Ongoing investment in infrastructure is essential to address this formidable challenge and ensure the provision of reliable and trustworthy banking services.

CONCLUSION

In brief, the banking industry is experiencing a revolutionary period marked by ongoing technological advancements and a transition toward modern AI-based banking services. Consumer expectations have evolved, emphasizing features such as payment gateways, swift transactions, and resilient banking services. However, users encounter challenges involving security issues, privacy concerns, and the complexity of technology in AI-driven banking services. Financial institutions face a significant challenge in achieving responsive banking that allocates technology resources effectively. While AI holds a crucial role in the banking sector, successful implementation demands ample allocation and consistent, predictable utilization of AI practices.

Although there is extensive research on AI's opportunities and challenges in banking, much of it is descriptive and relies on secondary data. Hence further research should use rigorous empirical methods to provide solid evidence on AI’s role and impact in the banking sector. Further we need to explore the possibility of wider AI application in all spheres of banking services including its application on banking sector of developing economy.

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