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## A.I in the Banking Sector: A Critical Review of Research and Developments in the Middle East

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### **Abstract**

*Artificial intelligence (AI) represents a transformative force in various sectors, including banking, healthcare, and scientific research. Initially conceptualized in 1956 by John McCarthy, AI has evolved from rule-based systems to advanced machine learning models. Machine learning, particularly deep learning, has been instrumental in enhancing AI's capabilities, enabling systems to learn from data and make predictions without explicit programming. AI's impact on society is profound, offering benefits such as increased efficiency, productivity, and innovation across domains. However, it also poses ethical considerations, including biases in AI systems and implications for employment. In scientific research, AI accelerates discoveries by analyzing large datasets and generating hypotheses. Despite its potential, challenges like data privacy and interpretability persist, requiring ongoing research and dialogue. In banking, AI enhances fraud detection, risk management, and customer service, leading to improved operational efficiency and customer satisfaction. The Middle East, particularly GCC countries, has shown significant interest in AI, driven by its potential economic impact. AI adoption in the banking sector of Bahrain is still emerging but holds promise for enhancing operational efficiency, customer experience, and risk management, contributing to a competitive banking landscape. As AI continues to evolve, addressing ethical and practical concerns is paramount to ensure its responsible use and maximize its benefits for society.*

### **Artificial Intelligence**

Artificial intelligence (AI) is a multifaceted field of computer science that aims to create systems capable of performing tasks that typically require human intelligence. AI encompasses a range of techniques and methodologies, including machine learning, natural language processing, robotics, and computer vision. The concept of AI has evolved significantly since its inception, and its applications have permeated various sectors, including banking, healthcare, transportation, and more.

The term AI was first coined by John McCarthy in 1956 at a conference at Dartmouth College, marking the birth of AI as a scientific discipline (Xu et al., 2021). AI research initially focused on rule-based or symbolic approaches, which involved encoding expert knowledge into a system to enable it to perform specific tasks. These early AI systems, known as expert systems, were designed to mimic the decision-making abilities of human experts. AI systems are often categorized into two types: narrow or weak AI and general or strong AI. Narrow AI refers to systems designed to perform a specific task or set of tasks, such as language translation or image recognition. In contrast, strong AI refers to systems that possess the ability to

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understand, learn, and apply knowledge in a way that is indistinguishable from human intelligence (Tai, 2020). According to Xu et al. (2021), one of the core components of modern AI is machine learning, which allows systems to learn from data and improve their performance over time without being explicitly programmed. This is achieved through algorithms that can recognize patterns and make predictions or decisions based on new data

Machine learning has been instrumental in advancing AI, particularly through deep learning, a subset that involves neural networks with multiple layers that can learn complex representations of data. AI's impact on society is profound, as it has the potential to enhance efficiency, accuracy, and productivity across various domains. However, it also raises important ethical considerations, such as the potential for AI to reflect and amplify human biases, the implications for employment as automation increases, and the need for governance to ensure the responsible use of AI technologies (Tai, 2020). In the realm of scientific research, AI is increasingly used to analyze large datasets, identify trends, and generate hypotheses. It has the potential to accelerate discoveries in fields such as medicine, physics, and environmental science

In the views of Sheikh, Prins and Schrijvers. (2023), AI's ability to process and analyze vast amounts of information far exceeds human capabilities, making it an invaluable tool for researchers. Despite its widespread adoption and potential, AI is still a developing field with many challenges to overcome. Issues such as data privacy, security, and the need for robust and interpretable models are ongoing areas of research and debate. As AI continues to evolve, it will be crucial to address these challenges to harness its full potential while mitigating risks. Thus, AI represents a powerful paradigm shift in technology and society. Its evolution from rule-based systems to advanced machine learning models has opened up new possibilities for innovation and problem-solving. As AI becomes increasingly integrated into our daily lives, it is essential to continue research and dialogue on its ethical, social, and economic implications to ensure it benefits humanity as a whole

## **Perks of Artificial Intelligence**

Artificial Intelligence (AI) has emerged as a powerful tool with numerous benefits across various sectors, including scientific research, industrial manufacturing, and social governance. The goal of AI is to develop machines that can mimic human behaviors, including learning, reasoning, and predicting (Chubb et al., 2022). One of the significant benefits of AI is its ability to handle large volumes of data efficiently. AI can process and analyze vast amounts of information far beyond human capabilities, making it an invaluable tool for researchers. This ability to manage big data allows AI to uncover patterns and trends that might be missed by human analysis, leading to new insights and discoveries. AI also has the potential to increase productivity and efficiency in the research process. It can automate mundane tasks, freeing up researchers to focus on more complex aspects of their work. This not only saves time but also boosts the speed and efficiency of the research process. For instance, AI can streamline the research process by taking care of tedious aspects such as managing references (Broby, 2021).

In addition to improving efficiency, AI can also enhance the quality of research. Papers that mention AI-related terms in their titles are more likely to be highly cited both within and outside their disciplines, suggesting that the use of AI can lead to higher impact research. This impact is seen across various disciplines, with some subfields seeing substantial benefits from AI. AI's benefits extend beyond research and into practical applications. For example, in the

banking sector, AI is used for tasks such as fraud detection, risk management, and customer service, leading to improved operational efficiency and customer satisfaction (Zhu & Wang, 2022).

However, while the benefits of AI are substantial, it's important to note that the use of AI also raises important ethical and practical considerations. These include issues related to data privacy, security, and the need for robust and interpretable models (Xu et al., 2021). As AI continues to evolve, ongoing research and dialogue are needed to address these challenges and ensure the responsible use of AI technologies. In conclusion, AI offers significant benefits, including the ability to handle large volumes of data, increase efficiency and productivity, and enhance the quality of research. Its applications are widespread and growing, impacting various sectors from scientific research to banking. However, the responsible use of AI requires careful consideration of ethical and practical issues (Chubb et al., 2022).

## **Technology in Banking**

The utilization of technology in the banking sector has undergone significant transformation, with digital innovations playing a pivotal role in reshaping the industry. Research articles have highlighted the various ways in which technology, particularly artificial intelligence (AI) and digital platforms, has been leveraged to enhance banking services and operations. A systematic literature review on the utilization of AI in the banking sector emphasized the importance of AI in mobile and internet banking research, as well as its implications for adoption and acceptance in these domains (Mocetti, Pagnini & Settle, 2017).

The review also identified three key areas of research: Strategy, Process, and Customer, underscoring the multifaceted impact of AI on different facets of banking operations and customer interactions. Furthermore, a bibliometric review and emerging trend analysis underscored the global impact of digitization on banking, emphasizing the widespread influence of digital technologies, including AI, blockchain, data platforms, and cybersecurity, on the banking landscape (Osei et al., 2023).

This comprehensive review highlighted the increasing significance of digital transformation in banking services and the need for continued research in this domain to address emerging trends and challenges. Moreover, a study on the future of banking and financial technology emphasized the accelerating trends in financial technology and their profound impact on banking services, particularly in the context of digital distribution via mobile technology and the changing nature of banking operations. The study underscored the pivotal role of digital technology in making banking services more accessible and efficient, reflecting the ongoing evolution of the industry (Osei et al., 2023).

Additionally, an article analyzing the effect of mobile technology on banking services highlighted the benefits of mobile banking, including fast service access, ease of use, reliability, and increased customer interaction. This analysis demonstrated the tangible advantages of integrating mobile technology into banking services, further underscoring the positive impact of technological advancements on customer experience and accessibility (Pierri & Timmer, 2022).

## **Artificial Intelligence in the Middle East**

The Middle East is rapidly embracing artificial intelligence (AI), with a focus on its potential economic impact and strategic positioning in the global AI landscape. The region, particularly

the Gulf Cooperation Council (GCC) countries, has demonstrated a strong commitment to the development and implementation of AI technologies, with the UAE, Saudi Arabia, and Qatar leading the way in investment and adoption (Sarkin & Sotoudehfar, 2024).

These countries have been supported by their governments as early consumers of AI technology, driving significant growth and innovation in the sector. The potential economic impact of AI in the Middle East is substantial, with annual growth expected to range between 20-34% across the region, and the UAE and Saudi Arabia projected to experience the fastest growth (PWC, 2023). This growth is driven by the transformative possibilities of AI as it moves from research labs into mainstream applications, offering significant opportunities for economic development and innovation (AlZgool et al., 2020). The UAE, in particular, is poised to become a leading AI hub in the Middle East by 2030, with a recent PwC report predicting that AI will be worth \$320 billion in the region by that time

This underscores the strategic importance of AI in driving economic growth and technological advancement in the Middle East. The impact of AI in the Middle East extends beyond economic considerations, as the region grapples with the ethical and social implications of AI adoption. The rapid development of AI technology has raised concerns about its potential to reflect and amplify human prejudices, leading to the need for new principles of AI bioethics to guide its responsible use (Sheikh et al., 2023).

### **Artificial intelligence in the Banking Sector**

Artificial intelligence (AI) is significantly transforming the banking sector, offering various benefits and opportunities. Some key applications of AI in banking and finance include such as Fraud Detection which where AI is used to detect and prevent fraudulent activities in real time, leading to improved security and reduced financial losses (Königstorfer & Thalmann, 2020).

Customer Service: Chatbots powered by AI enhance customer experience by providing efficient and personalized services, leading to increased customer satisfaction. Risk Management: AI enables banks to better assess and manage risks by analyzing large volumes of data and identifying potential risks in a more accurate and timely manner (Al-Omari et al., 2022). Operational Efficiency which as per Deloitte report is when AI automates tasks, such as data analysis and process automation, leading to reduced operational costs and improved productivity (Deloitte, 2022). The strategic application of AI technologies in banking is expected to lead to significant improvements in decision-making, risk management, customer service, and operational efficiency, ultimately reshaping the industry

### **Artificial Intelligence in the Middle East`s Banking Sector**

According to Rahman et al. (2023), the Middle East banking sector has been at the forefront of embracing artificial intelligence (AI) technologies, leading to a wide array of benefits across various domains. Research articles have shed light on the specific advantages of AI adoption in the region's banking industry, emphasizing its impact on operational efficiency, customer experience, fraud detection, and financial inclusion.

#### **Operational Efficiency**

AI technologies have significantly enhanced operational efficiency in Middle Eastern banks. By leveraging AI-driven automation, routine manual tasks such as document verification, data

entry, and compliance checks have been streamlined, leading to reduced processing time and enhanced overall efficiency (Rana et al., 2022). This has not only improved the speed and accuracy of operations but has also allowed banking professionals to focus on more complex and strategic aspects of their roles.

### **Customer Experience Enhancement**

Study by Hoyer et al. (2020) suggests that the adoption of AI in Middle Eastern banking has led to a substantial enhancement of customer experience. Banks in the region have utilized AI technologies to offer personalized services, including AI-driven chatbots that provide efficient and tailored customer support. This has resulted in improved customer engagement and accessibility, ultimately leading to higher levels of customer satisfaction.

### **Fraud Detection and Prevention**

AI has played a pivotal role in bolstering fraud detection and prevention capabilities in Middle Eastern banks. By harnessing AI technologies, banks have been able to deploy advanced fraud detection systems that can analyze large volumes of data in real time, leading to improved security and reduced financial losses (Bao, Hilary & Ke, 2022).

### **Financial Inclusion**

AI technologies have also contributed to advancing financial inclusion in the Middle East. By automating various banking processes and offering AI-driven credit assessment, banks have been able to make financial services more accessible to a broader segment of the population. This has facilitated greater participation in financial transactions and supported economic growth, particularly among individuals in remote areas or those with limited access to traditional banking services (Capco, 2022).

## **Artificial Intelligence in the Banking Sector of Bahrain**

According to Ali et al. (2024), Artificial Intelligence (AI) is poised to revolutionize the banking sector in Bahrain, presenting immense opportunities to enhance operational efficiency, elevate customer experiences, and fortify risk management practices. Although AI adoption in Bahrain's banking industry remains in its infancy, there is a growing acknowledgment of its significance, especially among regulatory bodies and financial institutions.

The Central Bank of Bahrain has taken proactive steps towards digital transformation, cultivating an environment conducive to the assimilation of AI technologies within the banking sector. This supportive regulatory landscape encourages banks to explore innovative AI-powered solutions to tackle various challenges and capitalize on emerging opportunities (Press Release CBB, 2020).

Operational efficiency stands out as one of the primary domains where AI is making notable strides in Bahrain's banking sector. By harnessing AI-driven automation and sophisticated analytics, banks can streamline their operations, optimize resource allocation, and curtail operational expenses. Tasks that were once laborious and resource-intensive, such as document verification, data entry, and compliance checks, can now be executed with heightened speed and precision, empowering employees to focus on strategic initiatives (Abdulla et al., 2021).

Moreover, AI holds tremendous promise in revolutionizing the customer experience across Bahraini banks. Through the deployment of AI-driven chatbots and virtual assistants, banks can

deliver personalized and responsive services round the clock. These AI-enabled interfaces excel in handling customer queries, offering product recommendations, and facilitating transactions, thereby augmenting customer satisfaction and fostering loyalty (Seyadi et al., 2021).

Additionally, AI technologies play a pivotal role in fortifying fraud detection and prevention endeavors within Bahrain's banking landscape. By analyzing vast troves of transactional data in real-time, AI algorithms can discern aberrant patterns and flag potential fraudulent activities with heightened accuracy and efficiency. This proactive stance towards fraud mitigation not only bolsters security measures but also minimizes financial losses for both banks and customers alike. Furthermore, AI holds the potential to bolster risk management frameworks within Bahraini banks. Through the utilization of predictive analytics and machine learning algorithms, banks can enhance their ability to assess credit risk, market risk, and operational risk. This enables more informed decision-making and empowers banks to adopt proactive risk mitigation strategies (Al Shehab & Hamdan, 2021).

## Conclusion

In conclusion, while AI integration in Bahrain's banking sector is still at an early stage, the potential benefits are considerable. As banks continue to invest in AI-driven solutions and leverage advanced analytics capabilities, they stand to unlock novel avenues for growth, innovation, and competitiveness in Bahrain's dynamic financial services industry. The strategic integration of AI is poised to play a pivotal role in propelling the growth and evolution of Bahrain's banking landscape, contributing to a more customer-centric and agile industry ecosystem.

## References

- Abdulla, Y., Ebrahim, R., & Kumaraswamy, S. (2020, October). Artificial intelligence in banking sector: evidence from Bahrain. In *2020 International Conference on Data Analytics for Business and Industry: Way Towards a Sustainable Economy (ICDABI)* (pp. 1-6). IEEE.
- Al Shehab, N., & Hamdan, A. (2021). Artificial intelligence and women empowerment in Bahrain. *Applications of Artificial Intelligence in Business, Education and Healthcare*, 101-121.
- Ali, S. A., Al-Absy, M. S. M., Al Astal, A. Y. M., & Gharaibeh, A. M. O. (2024). Impact of Financial Technology on Future of Banking in Bahrain: Opportunities and Challenges. *Digital Technology and Changing Roles in Managerial and Financial Accounting: Theoretical Knowledge and Practical Application*, 36, 141-153.
- Al-Omari, M. A., AlZgool, M. R. H., Ahmed, U., Pahi, M. H., & AlMaamary, Q. (2022). Exploring the Nexus Between E-Business Processes and Organizational Performance: Can Technological Opportunism Play Any Role?. *Frontiers in Psychology*, 13, 896527.
- AlZgool, M. R. H., Ahmed, U., Shah, S. A., AlMaamary, Q., & AlMahmoud, N. (2020). Examining the Interplay of HR Initiatives, Knowledge Management, Technological Capabilities and Product Innovation. *Journal of Security & Sustainability Issues*, 10(2).
- Bao, Y., Hilary, G., & Ke, B. (2022). Artificial intelligence and fraud detection. *Innovative Technology at the Interface of Finance and Operations: Volume I*, 223-247.
- Broby, D. (2021). Financial technology and the future of banking. *Financial Innovation*, 7(1), 1-19.
- Capco. (2022). Top Banking Trends in the Middle East. Retrieved from: <https://www.capco.com/intelligence/capco-intelligence/middle-east-banking-trends>. [Accessed 25<sup>th</sup> November 2023].

- Chubb, J., Cowling, P., & Reed, D. (2022). Speeding up to keep up: exploring the use of AI in the research process. *AI & society*, 37(4), 1439-1457.
- Deloitte. (2022), how artificial intelligence is transforming the financial and services industry. Retrieved from: <https://www.deloitte.com/ng/en/services/risk-advisory/services/how-artificial-intelligence-is-transforming-the-financial-services-industry.html>. [Accessed 19<sup>th</sup> November 2023].
- Hoyer, W. D., Kroschke, M., Schmitt, B., Kraume, K., & Shankar, V. (2020). Transforming the customer experience through new technologies. *Journal of interactive marketing*, 51(1), 57-71.
- Königstorfer, F., & Thalmann, S. (2020). Applications of Artificial Intelligence in commercial banks—A research agenda for behavioral finance. *Journal of behavioral and experimental finance*, 27, 100352.
- Mocetti, S., Pagnini, M., & Sette, E. (2017). Information technology and banking organization. *Journal of Financial Services Research*, 51, 313-338.
- Osei, L. K., Cherkasova, Y., & Oware, K. M. (2023). Unlocking the full potential of digital transformation in banking: a bibliometric review and emerging trend. *Future Business Journal*, 9(1), 30.
- Pierri, N., & Timmer, Y. (2022). The importance of technology in banking during a crisis. *Journal of Monetary Economics*, 128, 88-104.
- Predictive Analytics: AI is used to predict market trends, customer behavior, and investment opportunities, enabling banks to make more informed decisions (Rabbani et al., 2023).
- Press Release CBB. (2020). CBB presents plan for digital transformation to financial institutions. Retrieved from: <https://www.cbb.gov.bh/media-center/cbb-presents-plan-for-digital-transformation-to-financial-institutions/>. [Accessed 21 October 2023].
- PWC. (2023), US\$320 Billion by 2030?. Retrieved from: <https://www.pwc.com/m1/en/publications/potential-impact-artificial-intelligence-middle-east.html>. [Accessed 16<sup>th</sup> December 2023].
- Rabbani, M. R., Lutfi, A., Ashraf, M. A., Nawaz, N., & Ahmad Watto, W. (2023). Role of artificial intelligence in moderating the innovative financial process of the banking sector: a research based on structural equation modeling. *Frontiers in Environmental Science*, 10, 2083.
- Rahman, M., Ming, T. H., Baigh, T. A., & Sarker, M. (2023). Adoption of artificial intelligence in banking services: an empirical analysis. *International Journal of Emerging Markets*, 18(10), 4270-4300.
- Rana, N. P., Chatterjee, S., Dwivedi, Y. K., & Akter, S. (2022). Understanding dark side of artificial intelligence (AI) integrated business analytics: assessing firm's operational inefficiency and competitiveness. *European Journal of Information Systems*, 31(3), 364-387.
- Sarkin, J. J., & Sotoudehfar, S. (2024). Artificial intelligence and arms races in the Middle East: the evolution of technology and its implications for regional and international security. *Defense & Security Analysis*, 1-23.
- Seyadi, A. E., Al-Zayani, F. J., Shehab, S., Hamdan, A., & Alhor, R. H. (2021). The Implementation of Artificial Intelligence in the Public Sector: Opportunities and Challenges. *Applications of Artificial Intelligence in Business, Education and Healthcare*, 271-284.
- Sheikh, H., Prins, C., & Schrijvers, E. (2023). Artificial Intelligence: Definition and Background. In *Mission AI: The New System Technology* (pp. 15-41). Cham: Springer International Publishing.
- Tai, M. C. T. (2020). The impact of artificial intelligence on human society and bioethics. *Tzu-Chi Medical Journal*, 32(4), 339.
- Xu, Y., Liu, X., Cao, X., Huang, C., Liu, E., Qian, S., ... & Zhang, J. (2021). Artificial intelligence: A powerful paradigm for scientific research. *The Innovation*, 2(4).
- Zhu, J., & Wang, M. (2022). Analyzing the Effect of People Utilizing Mobile Technology to Make Banking Services More Accessible. *Frontiers in Public Health*, 10, 879342.