

Leveraging Artificial Intelligence for Enhanced Risk Management in Saudi Banking Sector: A Quantitative Study

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HOW TO CITE: ABSTRACT:

Aisha Badawi, Nagwa Abubaker, Zahraa Mohamed, Ola Alghasham, Mohammed Mustafa5 (2026). Leveraging Artificial Intelligence for Enhanced Risk Management in Saudi Banking Sector: A Quantitative Study

International Journal of Special Education, 41(21s),1297-1309

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In recent years, the banking sector in Saudi Arabia has undergone a significant digital transformation driven by the rapid adoption of artificial intelligence (AI). The Kingdom's Vision 2030 emphasizes innovation and technology as strategic pillars for achieving economic diversification and financial sustainability. This study aimed to determine the impact of AI on risk management activities in the financial banking sector of Saudi Arabia, AI adoption, its effectiveness in reducing operational and economic risks, and the challenges associated with its implementation. The study used a quantitative method to collect primary data through a structured questionnaire. A sample of 350 employees from local commercial banks in Saudi Arabia was selected; however, only 300 valid responses were received and analyzed using SPSS. Saudi Arabian banks have gradually adopted AI technologies in their risk management processes, particularly in credit risk management, fraud detection, and operational surveillance. Results showed that AI can enhance predictive precision and reduce human errors, enabling quicker and evidence-based decision-making. The correlation analysis shows a strong positive relation of the adoption of AI technologies with the effectiveness of risk management practices, ($r = 0.72$, $p < 0.01$). This study highlights the need for increased investment in AI infrastructure, employee training, and a robust regulatory compliance system. This study has contributed to the digitalization of the Saudi banking industry, focusing on innovation as key to boosting economic stability and financial resilience.

Keywords: Artificial Intelligence, Risk Management, Digital Transformation, Operational Risk, Decision-Making Processes.

1. Introduction

The use of AI has brought about significant change in the banking industry in recent years. According to a report on financial services in Saudi Arabia, 55% of Saudi financial institutions

have upgraded or implemented AI solutions in the past 12 months (Finastra, 2023). Over the past five years, the Saudi Arabian market for AI-based banking customer insights has grown, with an estimated value of USD 1.2 (Joy & Khan, 2025). The described growth can be significantly

explained by the growing use of AI technologies that should help to optimize the work process and strengthen the customer experience (Mamadiyarov, 2024). Emirates NBD in the UAE and Riyadh Bank in Saudi Arabia have embraced AI-powered client conduct and dealings investigation to handle credit and business risk. Such applications demonstrate that banks have ceased to consider AI as an additional instrument but as one of the fundamental provisions of a proactive risk culture (Alhammadi, 2024). Banks are depending more on advanced data analytics to give them actionable information on customer behavior as a result of the rise of digital banking and the growing need to cater to the needs of individual customers.

According to the study conducted by Shukla (2020), JPMorgan Chase applies AI to analyze trading operations and determine unusual actions in the market that might be signs of future risks or fraud (Shukla, 2020). The major cities, which include Riyadh, Jeddah and Dammam, control the market since they are the centers of financial institutions, fintech firms, as well as technology-driven people (Alnaser et al., 2023). Additionally, the high penetration rates of AI solutions in these areas have been facilitated by government initiatives promoting digital transformation in the banking industry (Mohammed & Rahman, 2024).

In 2023, the Saudi Arabian Monetary Authority (SAMA) unveiled regulations to enable the use of AI in the banking sector, requiring all banks to have AI-driven customer service solutions in place by 2025 (Joy & Khan, 2025). These initiatives seek to improve customer interaction and the banking processes mainly impacted on risk management process (Al-Baity, 2023). There are several other banking functions where AI is now being applied to enhance customer experience, generate revenue, and create a more competitive environment, as well as address basic chatbots. Nonetheless, the full adoption is limited by several factors related to employee adoption and knowledge of technology implementation and AI tools, as well as the cost burden of technological infrastructure and regulatory compliance (Ezmigna et al., 2024). Significant issues arose from a lack of risk management, leading to a lack of transparency regarding algorithms, concerns about data security, and the ethical use of customer information. All these issues are the priorities of regulatory supervision and consumer confidence (Alotaibi, 2024).

Banks in Saudi Arabia have taken steps towards risk management through integrating AI for real-time fraud detection, predictive credit risk and monitoring (Joy & Khan, 2025). For example, Al Rajhi and Riyadh Bank established AI hubs for centralize analytics to manage operational and financial risks (Finastra, 2023). The investment also includes on technology infrastructure to ensure transparency and compliance. This is because that risk management is one of the most significant challenges that the banking sector in the Kingdom of Saudi Arabia faces, as it necessitates a high ability to predict and manage a wide range of risks, such as operational and financial risks (Aziz & Andriansyah, 2023). In this context, AI is one of the modern technological tools that many banks are considering for various aspects of their operations, particularly in risk management (Dewasiri et al., 2024). This involves the use of AI techniques to promote operational efficiency, facilitate early risk identification, including credit and market risks, as well as improving cybersecurity to detect fraudulent activities (Mamadiyarov, 2024). Gap still exists to understand how AI affects financial and operational bank performance, its ability for improvement in risk management strategies, alongside challenges that employees may face while dealing with these technologies. The problem involves understanding, from the perspective of Saudi bank employees, the impact of AI on risk management within Saudi banks.

1.1 Research Questions

1. To what extent do banks rely on AI in risk management?
2. What are the most important benefits of using AI in banking risk management?
3. What are the most prominent challenges banks face when applying AI technologies?
4. How does AI influence decisions to reduce operational and financial risks from the viewpoint of Saudi bank employees?

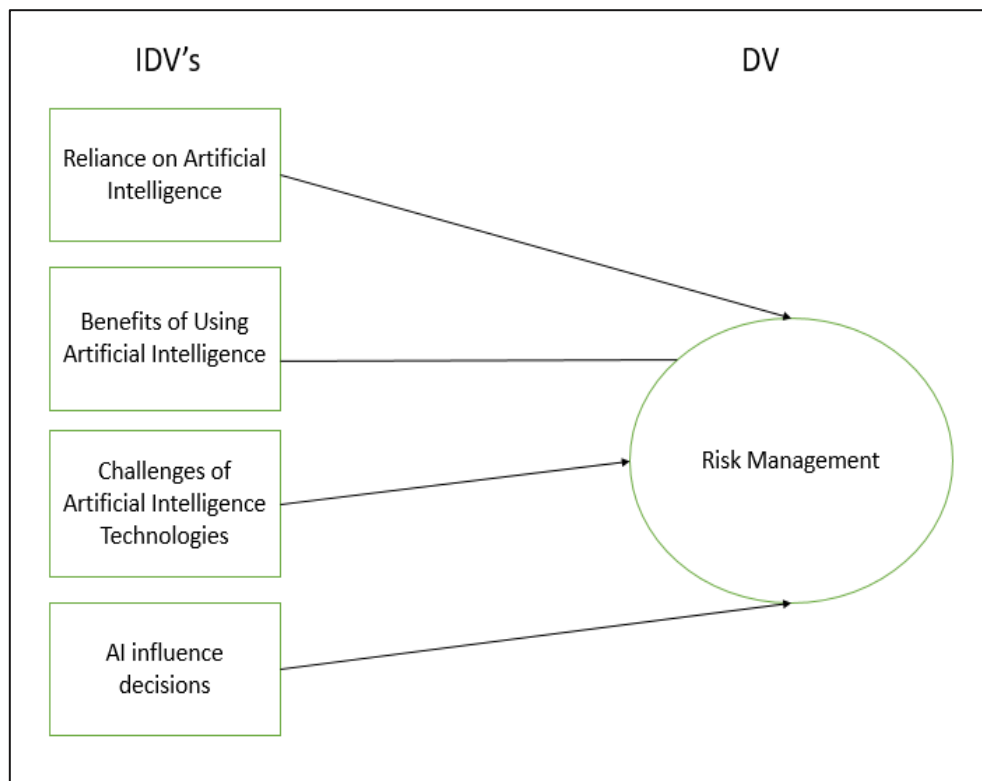
This study is important because it provides contribution for the risk management in financial sector of Saudi Arabia through defining the reliance, challenges, benefits and influence of AI on decision-making for risk management activities. It provides actionable insights for the management of banking sector to adopt AI for managing operational and financial risks. It highlighted barriers and provided guidelines to

improve risk management on banks to improve economic stability and financial stability.

1.2 Theoretical Model

The proposed theoretical model for this study lies in defining the implementation of AI in Saudi banking sector. For example, the use of AI for predictive analysis for risk management, fraud detection mechanism and managing both; financial and operation risks. The relationship

was shown by factors such as, reliance of banking sector on AI, benefits if using AI in banking sector of Saudi Arabia, challenges faced by banks in risk management and the influence of AI on decision-making. All these factors reflecting the relationship with dependent variable “risk management”. Through integrating this theoretical mode, thus study provided a comprehensive framework for risk management in the context of Saudi banking sector.



Conceptual Framework

Figure 1: Conceptual Model

The conceptual model of this study indicates that risk management, as a dependent variable, relies on different operations performed by AI. This includes reliance on AI by the Saudi banking sector, the benefits of using AI, challenges faced due to AI and its influence on decision-making practice regarding risk management. This suggests that if AI is integrated and managed effectively, it can become a primary driver of the banking sector's success by mitigating financial and operational risks.

2. Literature Review

2.2 Reliance of Banking Sector on Artificial Intelligence for Risk Management

AI has emerged as a transformational device in the management of risks in the banking sector

where financial institutions can utilize large amounts of both structured and unstructured data in real-time (Chitimira, 2020). The use of AI algorithms in predictive risk analytics, fraud detection, credit scoring, and operational monitoring is becoming more common in the modern banking setting. Most banks around the world have begun incorporating AI-driven systems into their primary risk management systems to ensure they anticipate risks before they become a reality (Rao et al., 2022). The use of AI is not limited to usability in conventional data analytics, but it also has support in deep learning models capable of forecasting credit defaults, detecting suspicious financial flows, and estimating the probability of fraud (Abdul-Al, 2024; Al-Baity, 2023).

In addition, AI technologies are also able to improve the speed of decision-making because the high-risk processes do not require any manual input. With the rise of volatility and complexity in financial markets, the reliance on AI in reducing risks has increased tremendously (Alnaser et al., 2023). The introduction of AI into the digital transformation approach of Vision 2030 in Saudi Arabia has brought about rapid uptake of intelligent risk management solutions, and it is an indication of a national commitment to a high level of financial analytics stability and resiliency in the banking industry (Alqublan, 2021). H1: Banks significantly rely on AI for risk management

2.3 Benefits of Using Artificial Intelligence in Banking Risk Management

The study by Naim. (2022), discussed the role of AI in business risk management. According to the study conducted by Naim. (2022), the implementation of AI in banking has also introduced several tangible advantages, making the risk management process more accurate and efficient. The most prominent benefits include; it is possible to single out the capability of AI to identify fraudulent and suspicious transactions in real-time, thereby enhancing the overall security of financial transactions (Naim, 2022). As an example, HSBC and Standard Chartered have been able to use machine learning tools to remotely monitor the activities of millions of daily transactions to help in identifying possible money laundering and unauthorized access to accounts (Ray, 2021). AI is enhancing the accuracy of credit risk evaluation by processing customer data more comprehensively than conventional models, which primarily rely on past repayment history. This is an enhanced ability that enables the banks to minimize the default rates and enhance the quality of the portfolios (Turksen et al., 2024). AI also supports financial forecasting based on predictive modelling and allows managers to predict the liquidity risk and market changes.

CitiBank has introduced AI-based risk engines to enhance the accuracy of forecasting and change the exposure to interest rates (Christensen, 2021). A second major advantage is that human errors are minimized with the automated systems being highly consistent in repetitive analytical work. It results in a higher adherence to regulatory requirements and became more efficient in terms of internal audit (Mucsková, 2024). Nevertheless, AI helps in making decisions faster and more

reliable, yet other banks continue to experience difficulty in enjoying its operational efficiency potential to the fullest because of the lack of infrastructure to support it. Altogether, AI has already become one of the key facilitators to the creation of more efficient, transparent, and responsive risk management frameworks that will support the stability of the banking industry in the conditions of unforeseeable market and credit circumstances (Truby et al., 2020; Uren & Edwards, 2023). H2: AI provides significant benefits in banking risk management

2.4 Challenges Banks Face When Applying Artificial Intelligence Technologies

Ghandour. (2021), defined challenges faced by banking sectors due to integration of AI, in spite of the apparent benefits. Banks still cannot fully implement it because of a number of challenges. The cost of the advanced AI technologies and the data infrastructure is one of the most serious obstacles as it is rather expensive to purchase and maintain (Ghandour, 2021). Similarly, a qualitative study by that AL-Dosari et al. (2024), on AI implementation and challenges showed that creating and training AI models are expensive in terms of computational power, data storage space and cybersecurity, and medium-sized banks may not be able to afford expensive systems (Al-Dosari et al., 2024). The other obstacle is that there are few professional experts who can construct, control, and audit AI models. Most financial institutions in emerging and developing economies, such as the ones in the Gulf region, have stated that they face challenges in attracting qualified data scientists and AI engineers who possess adequate financial modelling skills. Indicatively, a number of banks in Saudi Arabia have embarked on collaborating with technology companies like IBM and SAS to eliminate these human resource gaps (Ghandour, 2021; Lazo & Ebardo, 2023).

Moreover, the issue of privacy and the security of the information is also a serious concern since AI systems will need to access confidential personal and financial information. Any violation or misuse of this information can have a devastating impact on the image and regulatory presence of a bank (Biswas et al., 2020; Larina & Shkrebtanova, 2023). Also, the implementation of AI and the use of it with the existing legacy systems have operational challenges; most banks continue to use old IT systems which cannot be integrated with new machine learning systems (Larina & Shkrebtanova, 2023). The fear of AI acquiring

jobs formerly held by human beings is the other issue that is usually raised and posed as a threat to other employees of the organization and this fear creates a form of internal resistance against AI implementation (Khan et al., 2022). These issues indicate the necessity of a moderate response, namely, the integration of technological investment with the development of human potential and ethical data processing, which will provide a sustainable and safe AI use in the financial sector. H3: Banks significantly face challenges while applying AI technologies in risk management.

2.5 Influence of Artificial Intelligence in Banking Sector on Decisions-making for Risk Management

AI has started to change the very nature of the way banks make decisions in operational and financial risk mitigation (Khan et al., 2022; Larina & Shkrebtanova, 2023). AI can assist decision-makers in detecting possible threats and opportunities more quickly and accurately by automating the process of information analysis and simulating scenarios. As an example, the Erica platform by Bank of America and the COIN system by JPMorgan shows how AI can simplify the decision-making process by analyzing thousands of contracts or financial documents in seconds and reducing operational risks due to human factors (Ok et al., 2024). Saudi Arabian big banks like Al Rajhi Bank and Saudi National Bank have also introduced AI to their risk analytics units to improve their decision-making during credit and market risk appraisal assessments. With these systems, continuous analysis of customer profiles, payment patterns, and market dynamics is done to make risk-adjusted lending and investment decisions. In addition, AI can be used to aid predictive analysis, enabling banks to run simulations on economic shocks such as changes in interest rates or currency volatility. This forecasting ability enables the management to have preventive actions such as rebalancing of the portfolios or liquidity alterations to minimize the financial risk (Cărbune, 2024). Operational-wise, automation using AI reduces the probability of human applications making mistakes in their processing and enhances the accuracy of the compliance reporting (Biswas et al., 2020; Mohammed & Rahman, 2024). In addition, AI supports in cybersecurity and anti-fraud services enhance operational resilience since the abnormalities are detected in real-time, which minimizes the losses related to fraud or cyberattacks. With the help of

these applications, banks are now moving away to risk management models that are more proactive, with AI serving as an ally to strategic decisions as well as being the main driver of such strategic decisions to enhance the financial stability and institutional performance in an ever-digitized banking setting (Truby et al., 2020; Uren & Edwards, 2023). H4: AI significantly influence on decisions to influence on risk management.

3. Methodology

3.1 Research Design

A quantitative research design was employed in this study measure the impact of AI on risk management in banking sector of Saudi Arabia. It allowed systematic measurement of AI in banking risk management. Previous studies such as, the integration of FinTech into Saudi Arabia's Financial Landscape, the adoption of AI in banking industry, future and current prospects have adopted quantitative approach to collect numerical data (Lazo & Ebarido, 2023). This approach confirms validity and reliability of results from viewpoints of participants and not only presented secondary information from secondary sources.

3.2 Data Collection

The data were collected from close ended questionnaire, designed to measure practice perspectives of participants regarding the reliance of AI, benefits, challenges and its impact on decision-making for risk management in Saudi banking sector. The questionnaire included items related to the adoption of AI, its challenges, influence and benefits for financial and operational risk mitigation in the context of Saudi Arabia's financial sector.

3.3 Population and Sampling

The study population is represented by a group of local commercial banks (13) local banks licensed by the Central Bank (SAMA). The sample was chosen by simple random method and consists of a sample of (350) employees working in local banks. (350) forms were distributed to employees of the banks under study, and the number of valid questionnaires reached (300) questionnaires, with 50 forms excluded as invalid for statistical analysis.

3.4 Data Analysis

Data was analyzed using Statistical Package of the Social Sciences (SPSS). Frequencies and percentages have been used as descriptive

statistics to explain the demographic nature of the research sample. Cronbach's Alpha coefficient was used to determine the reliability of the study instrument on each dimension. The arithmetic means were computed to identify the general tendency of responses of the participants in the primary variables to rank the dimensions by the highest value of means.

Standard deviations have been used to evaluate the extent of variation of responses to each statement and dimension in comparison to the means. One-Way Analysis of Variance (ANOVA) was conducted to identify variations between the subgroups in the samples with

respect to the main dimensions of the questionnaire.

4. Results and Discussion

4.1 Characteristics of the Study Sample

4.1.1 Distribution of the Research Sample by Gender

The data in Table 1 shows that the research sample distributed by gender and age, with 61.7% for females and 38.3% for males, which means that the number of females in the study sample is much higher than the number of males. This is due to the fact that the response to applying the study was higher in the women's sections in the banks.

Table 1: Distribution of the Research Sample by Gender and Age

Variable	Category	Frequency (n)	Percentage (%)
Gender	Female	185	61.7
	Male	115	38.3
	Total	300	100.0
Age	25 or less	41	13.67
	26–34	133	44.37
	35–44	94	31.35
	45 or more	32	10.67
	Total	300	100.0

Table 1 reveals that the age group of 25 or less constituted 13.67% of the study sample, the age group of 1297-1309 years came at 44.37% of the study sample, while 31.35% were aged between 35 to 44 years, and finally, 10.67% of the study sample were aged 45 years and more. This reflects the diversity in age categories among workers in Saudi banks, as the banking sector in Jeddah city

witnesses a noticeable increase in qualified cadres, reflecting the Kingdom of Saudi Arabia's interest in human development programs emanating from Vision 2030 (Alqublan, 2021). In addition to the job opportunities available in the labor market, especially for young people of both genders, and benefiting from their ambitions and energies.

Table 2: Distribution of the Research Sample by Educational Level and Years of Experience of Respondents

Variable	Category	Frequency (n)	Percentage (%)
Educational Level	Bachelor's	79	26.3
	Master's	200	66.7
	PhD	21	7.0
	Total	300	100.0
Years of Experience	Less than 5 years	17	5.67

	5–10 years	34	11.33
	6–10 years	216	72.0
	More than 10 years	33	11.0
	Total	300	100.0

Table 2 shows that the majority of participants hold high academic qualifications, with 66% holding a Master's degree, 26% holding a Bachelor's degree, and 7% holding a doctorate. The results indicate that the majority of participants have a high level of education, which enhances their ability to understand and evaluate the impact of AI on risk management in banks. It also indicates the banking sector's trend towards employing competencies with advanced academic backgrounds, especially in the fields of financial analysis and risk management. These results are consistent with studies that confirm the importance of educational qualification in understanding and applying modern technologies, such as AI, in specialized work environments.

The results in Table 2, also indicate the distribution of years of experience in the banking sector among participants. The highest percentage was for employees with experience between 1297-1309 years, reaching 72%. As for employees with more than 10 years of experience, they constituted 11%, indicating that most workers in the Saudi banking sector who participated in the study have medium expertise, which may suggest that Saudi banks rely heavily on employees with practical experience in risk management.

4.2 Results Related to the Study Questions

This study investigated the topic of AI and its impact on risk management in Saudi banks. It is a descriptive analytical study through which the study sought to answer the following questions:

- (1) **To what extent do banks rely on artificial intelligence in risk management?**

Table 3 reflects the extent to which Saudi banks rely on AI in risk management, as the overall arithmetic mean reached 4.152, indicating a significant level of agreement among participants that Saudi banks rely on AI in risk management. It is clear that the item "Managing operational risks" received the lowest arithmetic mean of 3.743, with the highest variance, indicating a divergence of views on the effectiveness of AI in this area. Item (1) "The bank relies on AI applications in risk management" received the highest arithmetic mean of 4.453, indicating the participants' perception of the importance of AI as a key tool in banking risk management. These results are consistent with the results of previous studies (PwC, 2021) which confirmed that AI has become an essential part of risk management strategies in the banking sector. And the study (Deloitte, 2020) which indicated that AI contributes to improving the assessment of future risks and reducing operational costs, which aligns with the high averages for the items related to risk assessment and fraud detection. On the other hand, the results related to "Early risk detection and fraud detection" require further study. The study found that the effectiveness of AI in early detection depends on the quality of available data and the level of automation in the bank (Celestin & Vanitha, 2021).

It shows that the Saudi banks rely significantly on AI in risk management, with a clear focus on assessing credit risks and fraud detection. However, there is still disparity in the effectiveness of AI in the early detection of risks, which requires further development and investment in these technologies, taking into account the necessity of developing the technological infrastructure and necessary applications for this field.

Table 3: Opinion of the Study Sample Individuals on the Extent of Banks' Reliance on AI in Risk Management

Rank	Statements	Arithmetic Mean	Standard Deviation
1	The bank relies on AI applications in risk management.	4.453	0.7937

2	The bank uses AI applications in assessing credit risks.	4.230	0.8905
5	I feel satisfied with the use of AI in risk management in the bank.	3.743	0.9970
3	The bank uses AI applications in managing operational risks.	4.197	0.8248
4	Data analysis and fraud detection are primarily done through AI applications.	4.140	0.8619

Note: Overall Mean 4.152

(2) What are the most important benefits of using artificial intelligence in banking risk management?

Table 4 shows results regarding the opinion of the sample individuals on the most important benefits of using AI in banking risk management, where the arithmetic means range between (3.743 - 4.230). This indicates significant agreement among participants on the positive benefits of AI in this field.

The arithmetic mean for this axis was 4.072, reflecting a strong consensus among participants on the benefits of AI in banking risk management.

The results show that the most important benefit of AI according to the sample is its ability to detect suspicious operations related to money laundering, as this item received the highest arithmetic mean (4.230), indicating the awareness of the bank employees in the study of the importance of AI in regulatory compliance and fraud detection. In contrast, the least perceived benefit was improving the speed of banking operations (3.743), which indicates that AI applications in this area have not yet achieved the maximum possible benefit.

Table 4: Opinion of the Study Sample Individuals on the Most Important Benefits of Using AI in Banking Risk Management

Rank	Statements	Arithmetic Mean	Standard Deviation
4	AI contributes to improving the accuracy of predicting financial risks.	4.060	0.9727
2	AI contributes to reducing human errors in risk analysis.	4.197	0.8248
5	AI has an impact on the speed of decisions related to risk management.	3.743	0.9970
3	AI helps in finding solutions to confront operational and financial risks.	4.130	0.9252
1	AI applications contribute to quickly detecting suspicious operations related to banking operations security.	4.230	0.8905

Note: Overall Mean 4.072

(3) What are the most prominent challenges banks face when applying artificial intelligence technologies?

From the data in Table (7), we find that statement number (2) came in the first rank with the highest arithmetic mean of 4.617, which falls within the first category of the five-point scale (Very High), followed by statements (1, 4, 3, 5) with arithmetic means of 4.350, 4.277, 4.203, 3.993 respectively,

which are within the five-point scale category (High). From this data, it can be said that the challenges facing the application of AI in the banks under study are represented in the high costs of implementation and technological infrastructure, reliance on AI reduces the need for human resources, lack of specialized competencies, concerns about security and privacy, and banks face challenges in integrating

AI with systems. These results agree with the results of previous studies, which confirmed that the most prominent challenges are those related

to technical and informational constraints and the lack of specialists to deal with AI applications (Ghandour, 2021; Mucsková, 2024).

Table 5: Opinion of the Study Sample Individuals on the Most Prominent Challenges Banks Face When Applying AI Technologies

Rank	Statements	Arithmetic Mean	Standard Deviation
3	One of the most important challenges the bank faces when applying AI is the lack of specialized competencies.	4.277	0.8656
1	The high costs of AI applications represent a real challenge for banks.	4.617	0.6667
4	Concerns related to privacy and security limit the full reliance on AI.	4.203	0.9892
2	Increasing reliance on AI reduces the need for human resources in risk management, which raises employees' fears.	4.350	0.8019
5	Banks face challenges in integrating AI with systems.	3.993	0.8996

Note: Overall Mean 4.288

(4) How do artificial intelligence influence decisions to reduce operational and financial risks from the viewpoint of Saudi bank employees?

Table 6 results shows that most of the participants were agreed regarding the impact of AI on decisions to reduce operational and financial risks, where item (2) came in the first rank with an arithmetic mean of 4.467 (Very High, on the five-point Likert scale), followed by items (1, 4, 6, 5, 3) with arithmetic means (4.367, 4.277, 4.277, 4.273, 4.303) respectively, within the (Very High) category. Through the data in the previous table, we find that AI has a positive impact in enhancing decisions to reduce operational and financial risks in the banks under

study, as many previous studies (Al-Otaibi, 2024), (Al Rajhi Bank, 2024), (McKinsey, 2022) confirmed this and their results agreed with the current study's results. In addition to that, a McKinsey & Company (2022) report indicates that generative AI is expected to revolutionize risk management in financial institutions over the next five years, by automating processes and enhancing their efficiency, which contributes to reducing operational and financial risks.

After presenting the previous results, it is clear that the application of AI technologies in banks and financial institutions significantly contributes to improving the management of operational and financial risks, necessitating consideration of the challenges and the adoption of appropriate measures to mitigate them.

Table 6: Opinion of the Sample Individuals on the Impact of AI on Decisions to Reduce Operational and Financial Risks from the Viewpoint of Saudi Bank Employees

Rank	Statements	Arithmetic Mean	Standard Deviation
2	AI applications contribute to supporting strategic decisions related to operational risk management.	4.367	0.6980
1	AI techniques show a clear effectiveness in improving risk management processes.	4.467	0.6980
3	AI contributes to improving operational processes and reducing potential errors.	4.303	0.9159
4	AI contributes to reducing potential risks in financial lending decisions.	4.277	0.6980

5	The bank uses AI in analyzing financial reports and investment decisions.	4.273	0.7353
4	AI applications contribute to reducing market risks through predictive analysis.	4.277	0.6980
7	The bank relies on AI techniques to detect non-project financial operations.	4.220	0.7834

Note: Overall Mean 4.312

5. Discussion

The research findings indicated that Saudi banks have already started implementing AI technologies during risk management operations, with most banks being dependent on big data analysis models and machine learning to identify abnormalities in banking transactions, which assist in proactively identifying the possible risk. The given finding was supported by the previous research works including the ones that showed that the banks of the Gulf region are turning more and more to AI to improve the level of financial security and lower financial fraud rates (Khan et al., 2022; Mohammed & Rahman, 2024).

The participants in the study were in agreement with the notion that AI has a wide range of benefits in risk management with the greatest being; enhancing the accuracy of predictions, minimizing human errors as well as accelerating the decision-making process. The findings also revealed that AI has the benefit of improving the efficiency of banks in terms of providing immediate analytics on credit and operational risks. These findings are in line with a recent research on control and Management in banking sector to mitigate risks which established that the use of AI in banks leads to the enhancement of the precision of the financial risk assessment and exposure to possible losses (Lion & Abakasanga, 2024).

The most evident issues which banks encounter in implementing AI technologies: Despite the numerous advantages, the study found that the most prominent ones are associated with the costs of digital infrastructure development, the necessity to reskill employees to work with new systems, as well as with the data standardization and compliance with local and international banking systems (Truby et al., 2020). According to Truby et al. (2020), banks that are dependent on AI have problems in adjusting systems in the changing regulatory environment, which corresponds to the outcomes of the present study. It was established that intelligent systems

can monitor the banking operations at any given moment and sound an alarm in real-time, which has enhanced the capability of the Saudi banks to identify fraudulent operations and minimize the operational risks through the application of AI in banking operations (Abikoye et al., 2024). It was also revealed that AI can enhance the liquidity management strategies through market changes forecasting and rendition of useful information to financial managers (Nwangene et al., 2021). These findings are consistent with those presented by Abikoye et al. (2024), which elucidated the fact that AI helps financial institutions to predict and analyze risks more effectively than traditional means. The outcome of this study indicated that there is a difference in the degree of acquiescence of employees towards the application of AI since a significant proportion of the employees indicated their support to the application of modern technologies because of its functionality in alleviating workload and enhancing performance effectiveness. Though, not all employees were eager to use AI too often, they were worried about the threat of losing multiple jobs or the reduction of the necessity to use standard skills in banking operations (Uren & Edwards, 2023). The study conducted by Uren and Edwards. (2023) affirmed that the technology readiness concerning organizational success relies much on how much the employees are ready to embrace the technologies and this coincides with the current study.

6. Conclusion

This study draws conclusions that AI does not only impact on risk management activities in Saudi banking sector but also supports proactive decision-making through advanced analytics and predictive algorithms of AI. Beyond operational improvements, AI also improve culture of innovation and strengthens regulatory compliance for managing risks. However, the study addressed that it depends on training and knowledge of employees regarding AI system integration, thus addressing challenges for successful implementation is necessary. This may

impact on cost reduction. Technological infrastructure information among organization's culture and a path towards vision 2030. Therefore, it will maximize the benefits for Saudi banking sector and its economy as well.

7. Recommendations

Increasing the investment of banks in AI technologies to involve more investments in AI development and modernization in Saudi banks aimed at the application of the methods of machine learning and big data analysis to identify the risks in the operations and financial performance of banks as early as possible. It is suggested to offer special training courses to the employees to empower them to work effectively with smart systems to reduce cost burden and to increase their abilities to analyze risk information and make decisions based on AI.

It is suggested to develop clear policies, under which AI can be used in risk management, and make sure that it adheres to local and international banking standards, and that its decisions are transparent enough and data protection is preserved. It is suggested that Saudi banks should strive to observe the constant evolution of regulation in the sphere of AI and risk management and take advantage of new trends in order to promote the formation of new

and more progressive strategies that can be compatible with the world standards.

8. Strengths and Limitations of the Study

The results of the current research can contribute to future research because they can assist Saudi banks in utilizing AI in risk management more effectively. They also guarantee a deeper understanding of the problem and an opportunity linked with the use of AI by the decision-maker to enable the creation of more efficient policies and strategies to mitigate various risky scenarios in banks. This study has a limitation since it only analyzed Saudi banks. This can limit the generalizability of the results to other financial systems that have different regulations or technological backgrounds.

9. Future Directions

Future research might extend the selected field of study, using comparative analyses among different banking systems in the Gulf or Middle East in learning the disparity in AI adoption in the region. Future research can focus on the effectiveness of specific AI applications, such as generative AI or block chain-based risk management applications to suggest policy frameworks that would encourage responsible innovation in the banking sector.

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11. Author Declaration

We declare that this work is original and not published before at any journal. And also, we cconfirming that there is no conflicts of interest.