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The Role of Artificial Intelligence in Improving Banking Service Quality: An Analytical Study

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ARTICLE INFO	ABSTRACT
	This research aims to determine the impact of the dimensions of artificial intelligence (AI) in improving the service quality (SQ) provided in a sample of Iraqi banks in the public and private sectors and to indicate which sectors are more influential in improving the quality of their services provided to their customers for a random sample of employees and customers, as the banking sector faces major challenges in light of the technical changes in the business environment today, represented by the increased demand for services provided and their rapid development for different age groups of customers, and the security necessity of adopting modern technologies to hack bank accounts, by adopting the descriptive analytical approach to a questionnaire distributed to 87 individuals from the employees of the banks surveyed. One of the most important results of the research was that artificial intelligence contributes to improving banking service quality. **Keywords**: *Artificial Intelligence; Banking Service Quality; public and private banks.*

1. INTRODUCTION

The world is witnessing a major digital transformation driven by the rapid progress in artificial intelligence. This transformation extends to various sectors, especially banking, as artificial intelligence has become essential in improving operations and efficiency. AI is utilized to improve the reliability of government datasets, thus benefiting policymaking and public services (Binns, 2018). Therefore, it represents a scientific and practical revolution in all sectors, as it is used to develop systems that simulate the human mind in thinking, learning, making decisions, and solving problems. It relies on data analysis and machine learning to provide effective solutions. AI enhances data analysis, uncovers trends, and rectifies real-time inaccuracies (Gartner, 2020).

On the other hand, SQ is a crucial factor in the success of organizations as it leads to achieving customer satisfaction and depends on the following dimensions (empathy, reliability, responsiveness, security, tangibility). Redman stated that AI demonstrates significant potential to enhance data across numerous sectors, such as healthcare, business, and finance, by allowing AI systems and applications to effectively process and analyze large volumes of unstructured data by extracting valuable insights and rectifying data quality issues (2018). Rajkomar et al. commented that AI algorithms could detect discrepancies in patient records, like details or erroneous diagnoses, and suggest enhancements (2019). However, deep learning algorithms, for example, offer minimal interpretability, making it difficult for users to grasp the reasons behind labeled as high or low quality (Lipton, 2018). This issue is exacerbated by biases present in AI models. If these models are trained on biased datasets, AI systems may perpetuate these biases, resulting in flawed conclusions. It is essential to train AI models on varied and representative datasets to mitigate these risks (Mehrabi et al., 2019). AI technologies contribute significantly to improving the quality of services provided in terms of using machine learning to analyze customer behavior and meet their needs, implement routine tasks such as responding to customers, analyze data to provide insights into service performance, predict problems by adopting predictive algorithms to detect potential problems before they occur and enhance interaction with customers through specific system. AI systems, especially those using deep learning, can independently evaluate quality of information in service delivery can be evaluated by examining

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elements like noise, relevance, and consistency (Wang et al., 2018). This approach facilities improved communication with customers. Additionally, AI improves data integration by merging information from various sources, which improves completeness and reliability (Jiang et al., 2020).

2. LITERATURE REVIEW

Numerous studies have examined the relationship between artificial intelligence and SQ. Some studies have shown that artificial intelligence has become an urgent necessity for some organizations to confront and keep pace with rapid developments essential to any organization's survival and continuity. Moreover, Liu and Zhang highlight AI's role in 5G networks, where it dynamically allocates bandwidth for optimal congestion management (2021). Kumar and Rajan (2021) note challenges with AI, including data privacy, the need for extensive datasets for training, and the risk of over-dependence that can undermine human judgment in healthcare. Adam et al. (2020) found that anthropomorphism and consistency significantly boost user engagement of users following a chatbot's request for service feedback. Additionally, the findings reveal that social presence mediates the relationship between anthropomorphic design cues and user compliance. Furthermore, AI-driven chatbots and virtual assistants, including Amazon's Alexa and Apple's Siri, deliver timely support and efficiently address customer concerns, greatly increasing user satisfaction (Bakkouri, 2022). Misischia (2022) concluded that the customer-oriented functions of the examined chatbots include interaction, entertainment, problem-solving, trendiness, and personalization. He added that a detailed discussion of chatbot categories is provided. The text highlights their beneficial impact on SQ, which is the primary objective of chatbots, along with their potential to enhance customer service. Raji and Buolamwini (2019) point out that AI systems frequently function as "black boxes," which complicates our understanding of their decision-making processes and may diminish trust in AI-enhanced services. Scholars like O'Neil (2016) and Eubanks (2018) caution that AI systems could worsen existing inequalities without careful design and oversight, leading to inferior service for underrepresented communities. Svobada (2023) commented that AI relies entirely on machine learning programming, and its main objective in the banking industry is to assume roles previously held by humans to safeguard business operations against potential risks. He added that investing in stocks and finance relies heavily on technical skills and s small quantity of luck. In the future, with the help of sentiment analysis, crowd-sourced information, and advanced computing, we will manage our finances in an entirely new way. Moreover, AI can analyze vast amount of data, spotting trends often overlooked, with numerous financial service providers employing AI and machine learning systems to detect fraud in real time (Kaushik & Sharma, 2023). A study by (Narang et al., 2024) concluded that AI in banking and finance provides major advantages, including enhanced productivity, better decision-making, reduced costs, and greater client satisfaction. Sawant et al. confirmed that AI in banking sector seeks to deliver tailored, high-quality services swiftly and efficiently. Thus, by leveraging AI, banks have cut costs on repetitive tasks through automation. Additionally, AI has aided banks in minimizing fraud and analyzing credit risk, through challenges for AI remain significant (2023). Research by Asiri et al. found that using AI has a positive and significant impact on customer satisfaction and has implications for improving audit quality. Auditor efficiency has a positive effect on customer satisfaction (2023).

Based on the previous literature, the research hypotheses can be formulated into two main hypotheses as follows:

- The first main hypothesis: There is a significant correlation between artificial intelligence and SQ. The following sub-hypotheses branch out from it:

1) There is a significant correlation between expert systems and SQ.

2) There is a significant correlation between genetic algorithms and SQ.

3) There is a significant correlation between intelligence agents and SQ.

- The second main hypothesis: There is a significant influence relationship of artificial intelligence on SQ. The following sub-hypotheses branch out from it:

1) There is a significant influence relationship of expert systems on SQ.

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2) There is a significant relationship of influence between genetic algorithms and SQ.

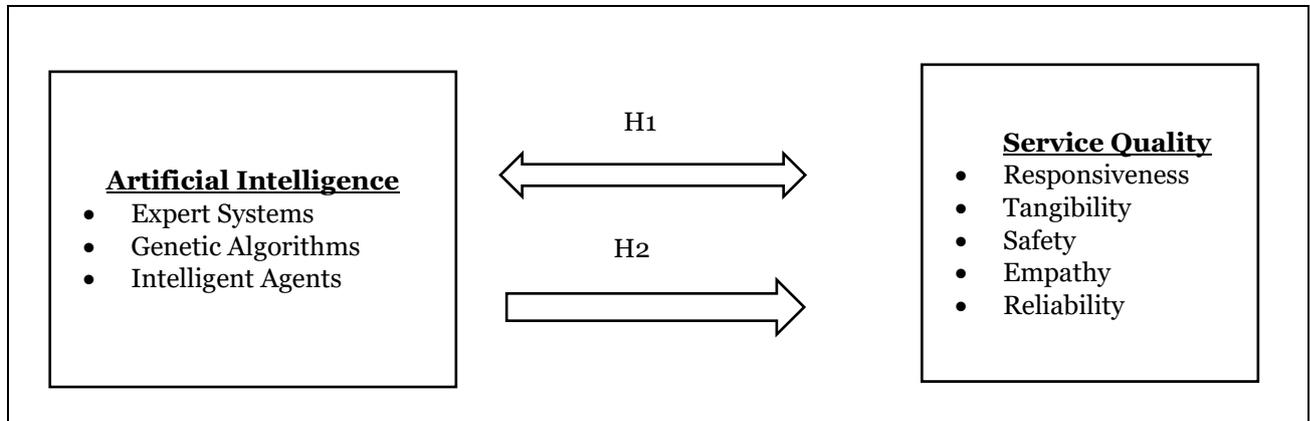3) There is a significant influence relationship of intelligent agents on SQ.

Figure .1 the hypothetic research model

Source: Prepared by the authors

3. METHODOLOGY

Technological developments, including artificial intelligence tools, have become a feature of today's business world. Traditional organizations that do not keep pace with these changes and developments are on their way to disappearing sooner or later unless they keep pace with them and work according to modern technologies. Despite the rapid spread of these technologies, we still see many organizations that operate in traditional ways that are close to disappearing amid dynamic changes. They provide their services to many customers whose numbers are decreasing year after year and thus find themselves reaching a difficult stage. Through field visits to many banks, we noticed their reliance on traditional methods in several activities, and the delay in providing the service. This is reflected in customer satisfaction with the quality of services provided and the continuation of dealing with the bank. The researchers adopted the (Wahid & Mahmoud, 2024) scale to determine the dimensions of artificial intelligence represented by Expert Systems, Genetic Algorithms, and Intelligent Agents. The researchers also adopted the (Al-Shami et al., 2020) scale to choose the dimensions of SQ represented by: Responsiveness, Tangibility, Safety, Empathy, and Reliability. Therefore, the research problem can be identified in the delay in providing services to customers, and in light of this, the following research question is raised: - (Can the application of artificial intelligence tools lead to improving the quality of services provided to customers?) and the following questions are derived from it- :

1) To what extent are the dimensions of artificial intelligence applied?
2) What is the level of quality of services provided to customers?
3) Is there a relationship between the dimensions of artificial intelligence and the quality of the service provided?
4) What is the impact of artificial intelligence on the dimensions of SQ?

The importance of the research is evident through the following:

1) Assisting senior management in laying the foundations that ensure improving the quality of services provided to a wide segment of individuals in society through artificial intelligence tools.
2) Strengthening the banking sector's role in the country, promoting the national economy, and driving the wheel of national development by improving service quality.

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3) Increasing senior management's awareness of the role of modern technologies, including artificial intelligence, and adopting it in formulating strategies and policies to improve quality and achieve a competitive advantage.

4) Providing a comprehensive view of the banking sector on the importance of artificial intelligence in improving the quality of its services.

The research seeks to achieve the following-:

1) Revealing the necessary dimensions of artificial intelligence.

2) Identifying the level of quality of services provided.

3) Clarifying the relationship between artificial intelligence and dimensions of SQ.

4) Clarifying the impact of dimensions of artificial intelligence on SQ

4. RESULTS & DISCUSSION

4.1: Statistical analysis of variables

Table 1 presents a summary of the research variables. The analysis indicates that the arithmetic mean of Artificial Intelligence was 3.739, with a s.d of 0.574 and a coefficient of variation of 15.35%. Regarding the sub-dimensions, the highest arithmetic mean was observed in Genetic Algorithms, with a mean value of 4.074, a s.d of 0.858, and a coefficient of variation of 21.06%. Conversely, the lowest arithmetic mean was recorded in Expert Systems, with a value of 3.567 and a s.d of 0.747, resulting in a coefficient of variation of 20.94%.

Table 1 presents a summary of the research variables. The analysis indicates that the arithmetic mean of Quality of Banking Service remained unchanged at 3.758, with a s.d of 0.437 and a coefficient of variation of 11.62%, Regarding the sub-dimensions, the highest arithmetic mean was observed in Safety, with a mean value of 4.032, a standard deviation (s.d) of 0.847, and a coefficient of variation of 21.00%. Conversely, the lowest arithmetic mean was recorded in Reliability, with a mean value of 3.573, a s.d of 0.794, and a coefficient of variation of 22.22%. Furthermore, the Quality of Banking Service variable ranked first among the research variables, as the majority of respondents demonstrated a high level of agreement on this variable compared to others.

Table (1) Summary of dimensions Search variables

No	Search Variables	Arithmetic mean	Standard deviation	Coefficient of variation	Order of variables
1	Artificial Intelligence	3.739	0.574	0.1535	the second
	Expert Systems	3.567	0.747	0.2094	2
	Genetic Algorithms	4.074	0.858	0.2106	3
	Intelligent Agents	3.578	0.685	0.1914	1
2	Quality of Banking Service	3.758	0.437	0.1162	the first
	Responsiveness	3.854	0.574	0.1489	1
	Tangibility	3.747	0.748	0.1996	3
	Safety	4.032	0.847	0.2100	4
	Empathy	3.585	0.647	0.1804	2
	Reliability	3.573	0.794	0.2222	5

Source: SPSS V.25

4.2: Testing the Impact of Artificial Intelligence Dimensions on the banking service quality

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- ❖ Expert systems in banking SQ, the model of the impact of banking expert systems According to the computed (F) value (46.478**), which is greater than the tabular (F) value (6.63), SQ was significant at a level lower than (0.01). The coefficient of determination (R2) value was (0.31), indicating that expert systems account for 31.6% of banking SQ. The expert systems coefficient (B) was 0.38, meaning that a change of one expert systems unit results in a change of 38.5% in banking SQ. The correlation coefficient between expert systems and banking SQ reached (0.584). This result indicates the acceptance of the first sub-hypothesis of the first main hypothesis and the first sub-hypothesis of the second main hypothesis.

- ❖ Genetic algorithms in banking SQ were significantly below the significance level (0.01) in terms of the calculated (F) value (57.674**), which is below the significance threshold (0.01) and more than the tabular (F) value (6.63). According to the coefficient of determination (R2) value of 0.298, genetic algorithms account for 29.8% of banking SQ. Changing one unit of genetic algorithms results in a change of 37.4% in banking SQ, according to the value of the genetic algorithms coefficient (B), which was.373. The correlation coefficient between expert systems and banking SQ was (0.634), and this result indicates the acceptance of the second sub-hypothesis of the first main hypothesis and the second sub-hypothesis of the second main hypothesis.

- ❖ Intelligent Agents on the banking service quality was less than the significance level (0.01) as indicated by the calculated (F) value (31.570**), which is higher than the tabular (F) value (6.63) and less than the significance level (0.01). The value of the coefficient of determination (R2) was (0.272), This indicates that 27.2% of the quality of financial services may be explained by intelligent agents. The Intelligent Agents (B) coefficient has a value of 0.627, meaning that a change of one Intelligent Agent unit results in a change of 62.7% in the quality of banking services. The correlation coefficient between expert systems and the banking service quality was (0.658), and this result indicates the acceptance of the third sub-hypothesis of the first main hypothesis and the third sub-hypothesis of the second main hypothesis.

- ❖ The findings demonstrate that the impact of Artificial Intelligence (AI) on Banking Service Quality was statistically significant at the 0.01 significance level ($p < 0.01$). The calculated F-value (71.585) exceeded the critical F-value (6.63), confirming the significance of the effect.

The coefficient of determination (R²) was 0.342, indicating that Artificial Intelligence accounts for 34.2% of the variance in Banking Service Quality. Furthermore, the regression coefficient (B) for Artificial Intelligence was 0.783, suggesting that a one-unit increase in Artificial Intelligence leads to a 78.3% change in Banking Service Quality. Additionally, the correlation coefficient (r) between Artificial Intelligence and Banking Service Quality was 0.658, supporting the acceptance of both the first and second main hypotheses.

$$\text{Quality of Banking Service} = .863 + 0.783 \,(\text{Artificial Intelligence})$$

Table (2) Results of Artificial Intelligence on Quality of Banking Service

Variables and dimensions		Quality of Banking Service					
		α	B	F calculated	sig	R2 Adjusted	r
Artificial Intelligence	Expert Systems	1.642	0.385	46.478 **	.000	31.6%	.584 (.000)
	Genetic Algorithms	1.582	0.373	57.674 **	.000	29.8%	.634 (.000)
	Intelligent Agents	0.953	0.627	31.570 **	.000	27.2%	.658 (.000)
Total Artificial Intelligence		0.863	0.783	71.585 **	.000	34.2%	.743 (.000)

5. CONCLUSIONS

1. The study results showed that artificial intelligence positively impacts the banking service quality , as its explanation percentage for the banking service quality reached (34.2%), indicating its pivotal role in improving the level of services.

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2. Genetic algorithms were the highest sub-dimension regarding arithmetic mean, reflecting their importance in improving banking operations compared to expert systems that received the lowest value.

3. It was found that security is the most influential factor in banking service quality, indicating that customers prioritize protection and reliability factors when evaluating the service.

4. Expert systems significantly impact the quality of banking services, as they account for 31.6% of them, which means that improving them can lead to a tangible increase in quality.

5. The impact of intelligent agents reached 27.2% on the banking service quality, indicating the need to develop these systems to enhance their efficiency and achieve a greater impact.

6. The correlation coefficient between artificial intelligence and banking service quality is high (0.658), confirming the importance of integrating artificial intelligence technologies to enhance banking performance.

6. RECOMMENDATIONS

1. Enhancing reliance on artificial intelligence in banking services by developing data analysis tools and making automatic decisions to improve customer experience.

2. Improving expert systems by increasing their accuracy and efficiency improves banking service quality.

3. Developing and using genetic algorithms to improve operational processes enhances banking services' efficiency.

4. Increasing interest in security factors in digital banking services, given their significant impact on customer satisfaction and confidence in the services provided.

5. Enhancing the use of smart agents in customer service and responding to their inquiries more accurately and quickly develops banking service quality.

6. More studies on the impact of artificial intelligence on various operational aspects in the banking sector will be conducted to explore new ways to enhance efficiency and innovation.

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