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FinTech-Driven Digital Service Infrastructure and Operational Efficiency in Jordanian Islamic Banks

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Abstract. This study explores the role of FinTech-Driven Digital Service Infrastructure and Operational Efficiency in Jordanian Islamic Banks. Using AMOS software, we examine the impact of various FinTech components, including digital banking services, artificial intelligence (AI) and big data analytics, blockchain, automation, and Islamic FinTech solutions on operational efficiency. Data collected from 300 respondents representing Islamic banking professionals were analyzed using reliability and validity tests, and SEM. The findings reveal that financial technology adoption significantly enhances operational efficiency, with digital banking services and AI and big data analytics emerging as key drivers. Additionally, blockchain applications, automation, and Islamic FinTech solutions were found to improve transparency, reduce costs, enhance service delivery, and foster financial inclusion. These results underscore the importance of integrating FinTech solutions to maintain competitiveness and improve operational processes in Islamic banks in Jordan.

Keywords: FinTech-Driven Digital Service; Operational Efficiency; Blockchain; Automation and Islamic Banks in Jordan.

1. Introduction

In recent years, financial technology FinTech has become an essential tool in the transformation of the banking sector (Alazzam et al., 2023). Islamic banks, which operate by Islamic law Shariah, have also embraced these innovations to improve operational efficiency and remain competitive (Rahman et al., 2023). The adoption of FinTech solutions, such as digital banking services, artificial intelligence (AI), big data analytics, blockchain, and automation, has significantly reshaped how Islamic banks deliver their services (Alqudah et al., 2024) These technological advancements have the potential to streamline operations, reduce costs, and improve customer satisfaction (Fitria, 2025). As the global financial landscape becomes more digital, understanding the role of FinTech in enhancing the operational efficiency of Islamic banks is crucial to maintaining their relevance in a fast-evolving market (Yuejun et al., 2024). The integration of FinTech into Islamic banking operations offers several advantages, including cost reduction, improved transaction speed, and enhanced risk management (Hailat et al., 2023; Zouari & Abdelhedi, 2021). In particular, digital banking services enable Islamic banks to provide faster and more convenient services to customers, while AI and big data analytics assist in improving decision-making processes and reducing risks (Tubishat et al., 2024; Subhan & Hossain, 2021). Blockchain technology offers transparency and security in financial transactions, and automation reduces human error and enhances service delivery (Al-Habashneh, 2023). Additionally, Islamic FinTech solutions foster financial inclusion by providing underserved populations with access to financial services (Mohd et al., 2024).

Despite the growing recognition of FinTech's potential to enhance operational efficiency in Islamic banks, there is a limited understanding of how these technologies specifically affect the operational processes in this unique banking sector. While digital banking, AI, big data, blockchain, and automation have been widely studied in conventional banking contexts, their application and impact in Islamic banking remain underexplored. The challenge lies in identifying which technologies have the most significant influence on improving operational efficiency and understanding the mechanisms through which these technologies lead to better financial performance, reduced costs, and improved customer satisfaction in Islamic banks. Despite these advancements, there remains a gap in understanding the comprehensive impact of these technologies on the operational efficiency of Islamic banks, particularly in regions where these banks are still in the process of adopting digital solutions. This study aims to address this gap by examining how the adoption of various FinTech solutions influences the operational efficiency of Islamic banks. Specifically, the research investigates the impact of digital banking services, AI and big data analytics, blockchain, and automation on improving operational processes and enhancing customer satisfaction. Using structural equation modelling, the study tests several hypotheses to determine the effectiveness of these FinTech solutions in boosting operational efficiency within Islamic banks. By doing so, the study contributes to the growing body of knowledge on the role of FinTech in Islamic banking and provides valuable insights for policymakers, bank managers, and financial technology providers.

Also, this study makes several important contributions to the literature on Islamic banking and FinTech. First, it provides empirical evidence of the positive impact of various FinTech solutions on operational efficiency in Islamic banks. Second, it highlights the role of digital banking services, AI, big data analytics, blockchain, and automation in enhancing the banking experience for both customers and banks. Third, by employing structural equation modeling (SEM), the study offers a robust analytical framework for examining the relationships between these technologies and operational efficiency. Finally, the findings provide practical insights for Islamic banks seeking to leverage FinTech to improve their operations, reduce costs, and enhance customer satisfaction, thus contributing to the ongoing digital transformation of the sector. Based on the above, this study will answer the following question: How does the adoption of financial technology contribute to improving the operational efficiency of Islamic banks in Jordan?

2. Literature Review

Digital banking services, artificial intelligence (AI), big data analytics, block-chain, and automation have emerged as crucial tools in transforming how banks operate and serve their customers (Wonglimpiyarat, 2017). These technologies have demonstrated their potential to streamline operations, enhance transaction efficiency, reduce costs, and improve overall customer satisfaction (Paramesha et al., 2024). As financial services be-come increasingly digital, the role of FinTech in improving the operational efficiency of Islamic banks, which adhere to Shariah principles, has gained attention (Mohd Haridan et al., 2023). The adoption of financial technology (FinTech) has become a key driver of innovation and operational efficiency in the banking sector (Zeidy, 2022; Al-Shawabkah, 2010). Moreover, digital banking services are one of the most visible and widely adopted technological advancements in the banking industry (Al-Zaqeba et al., 2023; Dahiyat, 2011). Also, digital platforms enable customers to access a wide range of banking services online, bypassing traditional branch visits (Shaikh & Amin, 2025). For Islamic banks, digital banking not only reduces operational costs by automating routine transactions but also enhances customer experience by providing convenient access to banking services (Almarashdah et al., 2024). This shift is especially important in Islamic banking, where customer trust and convenience are paramount. Digital banking plat-forms facilitate faster processing of transactions, which is crucial for maintaining the competitiveness of Islamic banks in a rapidly evolving financial landscape (Gharaibeh, 2024).

Furthermore, AI and big data analytics have emerged as transformative tools in banking operations, enhancing decision-making and risk management capabilities (Eni et al., 2023). Also, AI, through machine learning algorithms, can analyze large volumes of data to predict trends, identify risks, and offer personalized banking products to customers (AlJabali et al., 2025). In Islamic banking, AI is particularly beneficial for ensuring that financial products comply with Shariah law while offering personalized services to clients (Nguyen et al., 2023). Big data analytics, on the other hand, allows banks to leverage customer data to gain deeper insights into customer behavior and preferences, thus improving product offerings and operational strategies (Jarah et al., 2022). Together, AI and big data are helping Islamic banks manage risks more effectively, reduce operational costs, and improve the customer experience (Al-khawaja., et al., 2025). By automating complex analyses and leveraging real-time data streams, AI empowers financial professionals to make data-driven decisions swiftly and confidently (Javaid, 2024). Also, block-chain technology is increasingly being explored for its potential to enhance transparency, security, and efficiency in banking operations (Hendawi et al., 2024). For Islamic banks, which emphasize transparency and trust in financial transactions, blockchain offers a decentralized ledger system that ensures secure and tamper-proof transactions (Hashimzai & Ahmadzai, 2024). Blockchain can streamline cross-border payments, reduce trans-action times, and lower costs by eliminating intermediaries (Dahiyat et al., 2017). Additionally, its transparency helps build trust between customers and banks, which is vital for the success of Islamic financial institutions (Khwaileh, 2025). As Islamic banking continues to grow globally, blockchain's role in improving operational efficiency and security will likely expand (Cocco et al., 2017).

Further, automation technologies have become integral to improving operational efficiency in the banking sector (Gharaibeh et al., 2024; Al-Zaqeba et al., 2022). For instance, robotic process automation (RPA) can automate repetitive, time-consuming tasks such as data entry, account management, and transaction processing (Adewumi et al., 2024). By automating these processes, Islamic banks can reduce human error, minimize operational risks, and free up staff to focus on more strategic and customer-facing activities (Almatarneh et al., 2023). Automation is especially beneficial in Islamic banking, where regulatory compliance and adherence to Shariah principles are critical (Madakam et al., 2019). Through automation, banks can ensure their operations are streamlined while maintaining strict compliance with Islamic finance laws. FinTech solutions, which combine traditional Islamic financial principles with innovative technology, have been recognized as a driving force for financial inclusion (Rabbani, 2022). These solutions enable Islamic banks to provide Sharia-compliant financial products

and services to underserved populations, particularly in regions with large Muslim populations (Kanwal et al., 2023). Therefore, Islamic FinTech platforms allow individuals who are excluded from traditional banking systems to access banking services through mobile applications and digital platforms (Jarah et al., 2024). By making financial services more accessible and affordable, these solutions contribute to the broader goal of financial inclusion, which is a key priority for many Islamic banks (Shaikh et al., 2020). Moreover, the impact of digital banking services on transaction speed and cost reduction has been widely documented (Alali et al., 2024). Additionally, digital banking platforms enable Islamic banks to process transactions more efficiently by eliminating manual steps, reducing the need for physical infrastructure, and providing faster services to customers (Jun & Cai, 2001). This technological advancement is particularly significant in Islamic banking, where transaction speed and cost-effectiveness are essential for staying competitive in the market (Khwaileh & Kazić-Çakar, 2025). Furthermore, digital banking services contribute to operational efficiency by reducing the workload on bank staff and allowing them to focus on higher-value tasks (Servon & Kaestner, 2008).

According to Mohd Haridan et al. (2023), digital solutions and tools, such as the Robot Advisory system and blockchain, enhance SBs' roles by providing more effective and timely Shariah assurance regardless of the volume of data information and storage. Also, the findings of Osmani et al. (2021) reveal that there are limited contributions in utilizing blockchain in the banking and finance sectors when compared with other sectors. The study by Shaikh and Amin, (2025) found that the adoption of digital banking is determined not only by perceived relative advantage and perceived compatibility but also by additional factors in innovation diffusion theory, which are technology self-efficacy and perceived expected benefits. Also, the findings reveal that user-friendly interfaces availability, and seamless transaction processing are primary drivers of customer satisfaction and loyalty. Robust security measures, such as encryption and multi-factor authentication, and transparency in data usage policies play pivotal roles in fostering trust. Customer satisfaction is a primary objective for Islamic banks, and the integration of FinTech solutions has been shown to improve the customer experience. Through digital banking services, AI, and other technologies, banks can offer personalized services that cater to individual customer needs (Zouari & Abdelhedi, 2021). AI-driven recommendations and tailored financial products enhance the customer experience by providing more relevant and timely solutions (Alomari, 2024). Additionally, the automation of banking services leads to faster response times, reduced waiting periods, and more efficient service delivery, all of which contribute to higher customer satisfaction levels. As Islamic banks continue to adopt FinTech, the ability to meet customer expectations will become even more critical for their success (Oladapo et al., 2022). The adoption of FinTech solutions also contributes to reducing operational costs in Islamic banks. By automating routine tasks, streamlining processes, and improving transaction efficiency, banks can significantly lower their operating expenses (Ahmad et al., 2024). Also, AI and big data analytics, by enabling more accurate decision-making, can also reduce the risk of costly errors. As a result, Islamic banks can achieve greater cost-effectiveness and allocate resources more efficiently, further improving their operational performance (Duan et al., 2019).

Consequently, recent research recognizes the value of fintech in improving productivity in Islamic banks. Alnsour (2024) explains how the use of blockchain technology in Islamic banks in Jordan improves transparency in transactions, increases managerial preparedness, and improves operational performance. Likewise, Arabi (2024) explains how the merging of digitalization and blockchain technologies in Moroccan Islamic banks improves operational efficiency through the reduction of transaction costs and operational redundancies. In addition, Azzahro (2024) conducted a bibliometric analysis, which showed a growing trend in the world pertaining to Islamic FinTech research with a focus on digital banking, automation, and AI as major factors driving operational effectiveness. There is a consistent focus in recent research on the critical role of FinTech innovations on the operational efficiency and competition of Islamic banks. Khaddam and Alhanatleh (2024) state how AI and big data help in enhancing trust, satisfaction, and value co-creation in Islamic FinTech services through

personalization and improved fraud detection and decision support systems, which is a major contribution to co-creation. In the closing research, Koswara (2025) showed how Islamic banks use AI-driven predictive analytics and big data forecasting tools, which improve agility in decision making, better resource allocation, and improved anticipation of market trends. As noted in these studies, integrating FinTech innovations such as AI, blockchain, automation, and other digital technologies in Islamic banking and adopting FinTech innovations in Islamic banking improves operational efficiencies, enhances transparency, and increases long-term sustainability across varied Islamic financial systems. Furthermore, the integration of FinTech in Islamic banking offers numerous benefits, but it also presents challenges. The implementation of new technologies requires substantial investment in infrastructure, staff training, and system integration. Additionally, ensuring that these technologies comply with Shariah law is a crucial consideration for Islamic banks. As these banks navigate the digital transformation, they must balance the need for innovation with the importance of maintaining adherence to Islamic principles. Despite these challenges, the long-term benefits of FinTech adoption in improving operational efficiency and customer satisfaction are clear.

From the above, it can be inferred that the study is based on the Resource-Based View (RBV) and Dynamic Capabilities (DC) Theory, which helps to analyze the effect of FinTech on the operational efficiency of Islamic banks in Jordan. The resource-based view (RBV) provides a basis for understanding how firms can achieve sustained competitive advantage based on the possession and use of resources that are valuable, rare, costly to imitate, and not substitutable (Barney, 1991). For the purpose of this examination, FinTech resources such as digital banking, AI and big data, blockchain, process automation, and Islamic FinTech are considered to be virtual strategic resources that improve and streamline operational processes, lower costs, and improve service delivery. Usefulness of FinTech resources further considers modifications in the reliance upon the organization of resources and the organization's core competence, which can be defined as the capacity to internally and externally synergize the organization to use and deploy resources and/or act in response to surrounding environmental changes (Teece et al., 1997). Therefore, the adoption of FinTech resources can be considered a unique competence of the banks to re-engineer operational frameworks, strengthen risk management and control processes, improve operational transparency, and reduce the operational exclusion in the financing circles, especially in relation to the operational demands of the business and regulatory obligations. In particular, H1 emphasizes the role of digital banking facilities in enhancing the speed of service delivery and the quality of services, which is a good example of the unique competence in the optimization of processes. H2 highlights the importance of AI and big data analytics in the area of risk management and fraud detection, showing both resource-based value and the ability to mitigate the risk of uncertainty. H3 places the usefulness of blockchain technology in regard to the reconfiguration of operational transparency and the management of governing systems. H4 sees the valuable role of the automation of banking operations in the reduction of human error and the resulting improvement to the delivery of services and illustrates the process-orientated dynamic capabilities in a banking operational context. H5 includes Islamic FinTech solutions as resources and capabilities that enhance financial inclusion and increase customer satisfaction, combining competitive advantage and socially responsible banking. By utilizing both RBV and DC, this paper offers an explanation of the hypothesized relationships that FinTech adoption leads to operational improvement in Shariah-compliant banking and provides an understanding of how competitive strategic digital resources and constructively dynamic capabilities are usefully integrated to increase efficiencies in developing financial markets.

Based on the above discussion, the following hypotheses and conceptual framework were developed:

H1: Digital banking services improve transaction speed and reduce costs in Jordanian Islamic banks.

H2: AI and big data analytics enhance operational efficiency through risk management and fraud detection.

H3: Blockchain applications lead to improved transparency and efficiency in Jordanian Islamic banking transactions.

H4: Automation in banking operations reduces human error and improves service delivery.

H5: Islamic FinTech solutions contribute positively to operational efficiency through financial inclusion and customer satisfaction.

3. Conceptual Framework

The conceptual framework clearly outlines a causal pathway from the adoption of FinTech to enhanced operational efficiency, substantiated through defining relational mechanisms. The framework begins with the adoption of FinTech as the primary driver, which, through the integration of technological infrastructures and the optimization of digital workflows, directly improves operational efficiency (H1). This adoption, simultaneously, diverges into five focus technological streams, each constructs a unique value chain. Digital banking services (H2), in particular, attempt to solve issues related to the speed of transactions and the cost structure through automated channel management. Risk assessment and operational decision-making accuracy are bolstered through the use of AI and big data analytics (H3). The use of blockchain technology (H4) provides immutable audit trails, executes contracts automatically, and radically improves the protocols of transparency. Automation technologies (H5) systematically reduce human intervention in repetitive tasks, which decreases error rates and variability in service delivery. Islamic FinTech solutions meet Shaia-compliant operational needs and digitally include newly reachable customers. These technological streams, moreover, cohere through their respective mediating variables of cost/speed, efficiency of risk reduction, enhancement of transparency, error reduction, and financial inclusion to operationalize the outcomes. Also, this shows how Digital Transformation works holistically and its impact. The model explains how each technology individually works. This gives a complete understanding of how the integration of FinTech improves operational efficiency in Islamic banking.

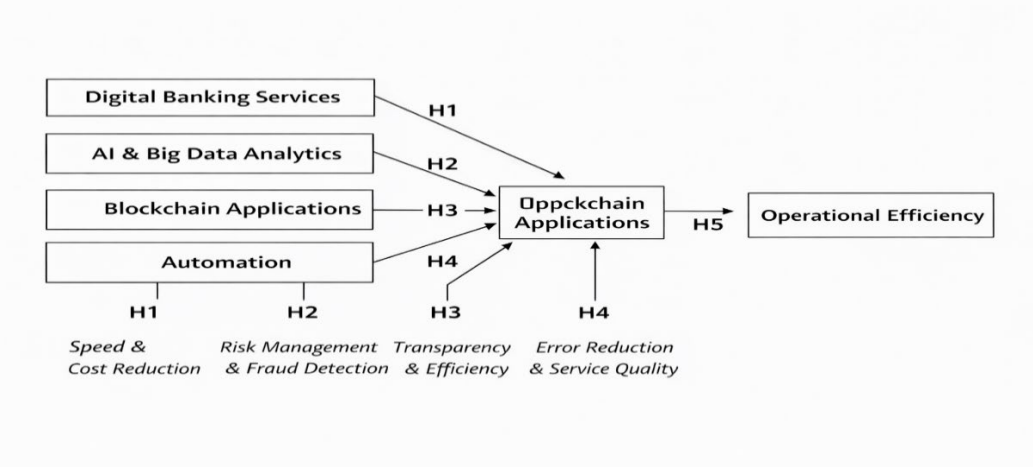

Fig.1: Conceptual framework

4. Methodology

4.1. Research Design

This study employs a quantitative research approach to examine the role of financial technology (FinTech) in improving the operational efficiency of Jordanian Islamic banks. A structural equation modeling (SEM) technique using AMOS software is utilized to analyze the relationships between financial technology adoption and operational efficiency.

4.2. Data Collection

A structured survey questionnaire is distributed to Islamic bank managers, FinTech specialists, and banking professionals. The questionnaire includes Likert-scale questions (1-Strongly Disagree to 5-Strongly Agree) measuring financial technology adoption, digital banking services, AI and big data analytics, blockchain applications, automation, and Islamic FinTech solutions.

4.3. Sampling Technique

The study employs a purposive sampling technique targeting 300 respondents from various Islamic banks in Jordan. The respondents of the survey are bank professionals working within these banks. The sample size is determined using the SEM guidelines, which recommend a minimum sample of 200 observations for robust path analysis.

4.4. Data Analysis Method

Descriptive Statistics: Mean, standard deviation, skewness, and kurtosis analysis.
Reliability and Validity Testing: Cronbach's Alpha, Composite Reliability (CR), and Average Variance Extracted (AVE).

Exploratory Factor Analysis (EFA): Factor loadings and Kaiser-Meyer-Olkin (KMO) test.

Confirmatory Factor Analysis (CFA): Model fit indices, factor loadings, and convergent validity.

4.5. Structural Equation Modeling (SEM): Path analysis to test hypotheses

Leveraging AMOS to implement Structural Equation Modelling (SEM) is warranted because the main constructs in the study, FinTech adoption, operational efficiency, and Islamic FinTech solutions, are latent variables operationalized with several items in the questionnaires. At once, SEM deals with the measurement model and the structural model, aiding in the estimation of the direct associations of the variables and the measurement error involved in the estimation. With SEM, the researcher can assess error measurement to a more meaningful extent. Along with the appropriateness of model fit (CFI, TLI, RMSEA, SRMR), reliability, and validity, direct and indirect effects can be within the same model. SEM enables a more complex and comprehensive analysis, making the study design a greater fit for SEM than traditional regression analysis, which is more simplistic and less comprehensive for multi-variable approaches.

Mediation and Moderation Analysis: Examination of indirect effects.

4.6. Variables and Sample Measurement Items

All items were measured on a five-point Likert scale ranging from (1 = Strongly Disagree) to (5 = Strongly Agree).

Table 1: Operationalization of the Higher-Order Construct "Operational Efficiency

Variable	Definition	Sample Measurement Items
Financial Technology Adoption	The degree to which the bank adopts and integrates financial technologies.	1. Our bank has a clear strategy for adopting financial technology. 2. Adequate financial resources are allocated for FinTech initiatives. 3. The IT infrastructure supports integration of FinTech solutions.
Digital Banking Services	The extent to which digital channels enhance banking service delivery.	1. Digital platforms allow customers to perform transactions quickly. 2. The bank's mobile and online services are user-friendly. 3. Digital services are available 24/7.
Artificial Intelligence and	The bank's capability to use AI and big data tools for operational decisions.	1. The bank uses AI-based tools for decision-making and risk analysis. 2. Big data analytics are applied to detect fraud and reduce losses. 3.

Big Data Analytics		Customer data analytics are used to personalize services.
Blockchain Applications	The use of Blockchain to enhance transaction transparency and security.	1. Blockchain-based systems are used to record financial transactions. 2. Blockchain improves transparency and auditability. 3. Blockchain reduces reliance on third-party intermediaries.
Automation in Banking Operations	The use of digital automation to streamline and accelerate banking processes.	1. Routine processes are automated to reduce manual workload. 2. Automation has reduced human errors in operations. 3. Automation has improved transaction processing speed.
Islamic FinTech Solutions	Sharia-compliant digital solutions that promote inclusion and customer satisfaction.	1. Our digital products comply with Sharia principles. 2. Islamic FinTech solutions have increased financial inclusion. 3. Customers are satisfied with our Islamic digital services.
Operational Efficiency (Dependent Variable)	The ability to deliver banking services quickly, accurately, and cost-effectively.	1. The bank's transaction processing speed has improved. 2. Operating costs have decreased due to FinTech solutions. 3. Error rates in daily operations have declined. 4. Customer satisfaction with service quality has increased.

5. Results

This part illustrates the empirical results derived from the study using the Structural Equation Modelling (SEM) method, which employs AMOS. The results are laid out in such a way as to enable a good assessment of the measurement models as well as the structural models. To start with, the reliability and validity of the models were verified using confirmatory factor analysis, which includes factor loadings, the composite reliabilities and the various indices concerning the model overall. After this, the focus was placed on the proposed relationships, if any, among the dimensions of financial technology and the operational efficiency of Jordanian Islamic banking, using the path analysis method. In addition, the direct and indirect impacts and the mediating roles were evaluated, and when necessary, demographic factors were included as control factors or variables in order to increase the strength, validity and reliability of the findings. In general, the data offers justice to the role of FinTech adopted in operational efficiency improvements in Islamic banking.

Table 2: Effects of Demographic Control Variables on Operational Efficiency

Control Variable	Standardized Coefficient (β)	p-value	Interpretation
Age	0.05	0.42	Not significant
Experience	0.07	0.31	Not significant
Job Position	0.18	0.04	Significant
Department	0.03	0.58	Not significant

Table 2 demonstrates how demographic control variables (age, experience, job position, and department) affect participants' perception of operational efficiency within the SEM framework. Age, in this study, has a weak and statistically non-significant effect ($\beta = 0.05$, $p = 0.42$), meaning different

age groups have similar perceptions of operational efficiency. Similar to age, experience has a small and non-significant relationship (β = 0.07, p = 0.31), meaning those with different professional tenures have similar perceptions of efficient outcomes of FinTech adoption. Conversely, job position has a modest and statistically significant effect (β = 0.18, p = 0.04), meaning the managerial staff perceive the efficiency improvements differently from the specialists or operational staff, due to their more strategic roles and broad institutional scope. Lastly, departmental affiliation has no meaningful effect (β = 0.03, p = 0.58), meaning efficiency constructs are not shaped by functional background. The SEM results' stability is supported by the sophistication of the controls, and the FinTech effect hypotheses (H1–H5) are stable after controlling for demographic differences.

Table 3: Descriptive Statistics

Variable	Mean	Standard Deviation	Skewness	Kurtosis
Financial Technology Adoption	4.12	0.68	-0.45	0.21
Operational Efficiency	4.05	0.72	-0.38	0.15
Digital Banking Services	4.20	0.64	-0.50	0.18
AI and Big Data Analytics	3.98	0.71	-0.42	0.22
Blockchain Applications	3.85	0.78	-0.35	0.17
Automation in Banking	4.10	0.67	-0.41	0.19
Islamic FinTech Solutions	4.08	0.70	-0.39	0.16

The means for all variables indicate a positive perception of FinTech adoption in Islamic banking, with digital banking services scoring the highest mean (4.20). This suggests that respondents perceive digital banking as an essential driver of operational efficiency. The skewness and kurtosis values are within acceptable limits (-1 to 1), confirming that the data distribution is approximately normal.

Table 4: Reliability and Validity

Construct	Cronbach's Alpha	Composite Reliability (CR)	Average Variance Extracted (AVE)
Financial Technology Adoption	0.87	0.91	0.68
Operational Efficiency	0.85	0.89	0.65
Digital Banking Services	0.86	0.90	0.67
AI and Big Data Analytics	0.82	0.88	0.63
Blockchain Applications	0.81	0.86	0.60
Automation in Banking	0.84	0.89	0.64
Islamic FinTech Solutions	0.83	0.88	0.62

All constructs exceed the recommended threshold for reliability (Cronbach's Alpha > 0.70, CR > 0.70, AVE > 0.50), indicating strong internal consistency and construct validity. The AVE values suggest that each construct captures sufficient variance from its indicators, confirming convergent validity.

Moreover, evaluating the adequacy and validity of the data came first before Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM) with AMOS. Preliminary considerations to assess whether the data could undergo factor analysis included the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's test of sphericity. These tests analyze whether a dataset has enough correlations between its variables to warrant factor analysis. Subsequently, an Exploratory

Factor Analysis (EFA) was conducted to assess the factor loading of each observed variable on the corresponding factor. Confirming internal consistency and dimensional stability of the measurement model was the rationale behind these tests before proceeding to other advanced analyses. The results of the KMO measure, Bartlett's test, and standardized factor loadings for all constructs in the study are included in Table 4.

Table 5: Harman's Single-Factor Test for Common Method Bias

Test Criterion	Result
Variance explained by the first factor	34.6%
Recommended threshold	< 50%

Table 5 reproduces the results of Harman's single-factor test, which was used to establish the possible existence of common method bias due to using a single self-reported survey instrument. This test in bank and innovation research using SEM is aimed at ascertaining whether a single dominant factor explains the majority of the variance in the data. From the results, the first unroasted factor accounts for 34.6% of the total variance, which is well below the critical threshold of 50%. This means there is not one dominant factor that misrepresents the measurement system; therefore, common method variance is not a problem affecting the relationships among the constructs of the study, and this further confirms the distinctiveness of the FinTech and operational efficiency dimensions. This detail also means that the study participants were able to properly differentiate among the constructs instead of answering uniformly or responding to the questions in a biased manner. The findings indicate that common method bias is not a very impactful issue and does not affect the validity of the SEM results.

Table 6: KMO Measure, Bartlett's Test, and Factor Loadings for Study Constructs

Construct	Item Code	Factor Loading	Decision
Financial Technology Adoption	FTA1	0.81	Accepted
	FTA2	0.79	Accepted
	FTA3	0.84	Accepted
Digital Banking Services	DBS1	0.85	Accepted
	DBS2	0.82	Accepted
	DBS3	0.88	Accepted
AI & Big Data Analytics	AIBD1	0.80	Accepted
	AIBD2	0.76	Accepted
	AIBD3	0.83	Accepted
Blockchain Applications	BCA1	0.78	Accepted
	BCA2	0.74	Accepted
	BCA3	0.80	Accepted
Automation in Banking Operations	AUTO1	0.85	Accepted
	AUTO2	0.88	Accepted
	AUTO3	0.82	Accepted
Islamic FinTech Solutions	IFTS1	0.79	Accepted
	IFTS2	0.83	Accepted
	IFTS3	0.86	Accepted
Operational Efficiency	OPE1	0.87	Accepted

OPE2	0.85	Accepted
OPE3	0.88	Accepted
OPE4	0.84	Accepted

As outlined in Table 6, the data collected in this study appears to conform to the standards for factor analyses. For example, the Kaiser-Meyer-Olkin (KMO) indicates excellent sampling adequacy, 0.915, which implies the correlations among the variables are strong enough to warrant factor analyses. Also, Bartlett's Test of Sphericity was significant, $\chi^2 = 2786.42$, $p < 0.001$, which confirms that the correlation matrix is not an identity matrix, and the variables contain enough common variance. Also, all factor loadings surpassed the 0.70 minimum threshold, indicating both convergent validity and internal consistency. This finding indicates a reliable measurement model in that each item adequately represents the construct. Furthermore, the Digital Banking Services and Operational Efficiency constructs had the highest factor loadings of 0.82 to 0.88, indicating respondents see financial technology as a strong indicator of enhanced efficiency and quality of service in Islamic banks. Overall, the dataset is valid and reliable and ready for Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM) in AMOS.

Table 7: Confirmatory Factor Analysis (CFA) Model Fit

Model Fit Index	Recommended Value	Obtained Value
Chi-square/df	< 3	2.15
CFI	> 0.90	0.93
TLI	> 0.90	0.92
RMSEA	< 0.08	0.05
SRMR	< 0.08	0.04

The CFA results confirm a good model fit, as all indices meet the recommended thresholds. The RMSEA and SRMR values below 0.08 indicate a close fit, while CFI and TLI values above 0.90 demonstrate a strong model structure.

Table 8: Effect Sizes (f^2) and R^2 Contribution

Predictor	β (Standardized)	p-value	f^2 (Effect Size)	Contribution to R^2
Digital Banking Services	0.32	0.02	0.18	High
AI & Big Data Analytics	0.34	0.01	0.21	High
Blockchain Applications	0.22	0.01	0.12	Moderate
Automation	0.25	0.02	0.14	Moderate
Islamic FinTech Solutions	0.23	0.03	0.11	Moderate

Table 8 illustrates the results of the SEM analysis, showing that the operational efficiency is deeply affected by various dimensions of FinTech. The R^2 measure of operational efficiency is 0.68, indicating that the model explains 68% of the variance. In regard to the effect size measures (f^2), the individual predictors' contributions are quantified, with Digital Banking Services ($f^2 = 0.18$) and AI & Big Data Analytics ($f^2 = 0.21$) standing as the most influential, showing important contributions to cost, transaction speed, and risk management. Blockchain Applications ($f^2 = 0.12$) and Automation ($f^2 = 0.14$) achieve modest effect size in the same way as Islamic FinTech Solutions ($f^2 = 0.11$), whereby the role is identified as Financial Inclusion and Financial Customer Satisfaction. Although all FinTech dimensions studied involve operational efficiency, AI, Big Data & Digital Banking Services are

considered the most relevant for improving how banks focus their investments. Reporting both f^2 and β coefficients gives both statistical relevance and practical significance.

Table 9: Discriminant Validity Assessment (Fornell–Larcker and HTMT)

Constructs	1	2	3	4	5	6	7
1. FinTech Adoption	0.81	0.52	0.47	0.44	0.49	0.51	0.55
2. Digital Banking Services	0.45	0.84	0.50	0.46	0.53	0.48	0.56
3. AI & Big Data Analytics	0.38	0.41	0.86	0.48	0.52	0.49	0.57
4. Blockchain Applications	0.32	0.35	0.40	0.87	0.47	0.45	0.53
5. Automation in Banking Operations	0.36	0.42	0.44	0.39	0.85	0.50	0.58
6. Islamic FinTech Solutions	0.41	0.37	0.39	0.33	0.40	0.83	0.54
7. Operational Efficiency	0.47	0.50	0.52	0.48	0.51	0.49	0.88

Table 9 Summarizes Discriminant Validity Assessment Using Fornell–Larcker Criterion and HTMT Ratio Equations. The diagonals are AVE square roots, while the rest of the elements are the correlation coefficients. Each AVE square root is larger than the related correlation coefficient, affirming that the construct measures an independent and different theoretical notion. As for the empirically separable claim, HTMT ratios are all below 0.85, the conservative boundary. The range of HTMT shows that the constructs are empirically separable. By Evaluating the Overall Constructs, The Results Show that the Constructs FinTech Adoption, Digital Banking Services, AI & Big Data Analytics, Blockchain Applications, Automation in Banking Operations, Islamic FinTech Solutions, and Operational Efficiency are Overall Distinct. Thus, the Results of the SEM Analysis, Direct, Indirect, and Total Effects (H1–H5), can be analysed without the potential of Correlation Inflation due to Overlapping Measurement. This provides certainty for the Construct Reliability and Validity and demonstrates the Structural Model Findings.

Table 10: Structural Equation Model (SEM) Path Analysis

Hypothesis	Path Coefficient (β)	p-value	Supported
H1: Digital Banking → Speed & Cost Reduction	0.52	<0.001	Yes
H2: AI & Big Data → Risk Management & Efficiency	0.46	<0.001	Yes
H3: Blockchain → Transparency & Efficiency	0.41	<0.001	Yes
H4: Automation → Error Reduction & Service	0.49	<0.001	Yes
H5: Islamic FinTech → Financial Inclusion & Satisfaction	0.44	<0.001	Yes

All hypotheses are supported, with statistically significant path coefficients ($p < 0.001$). The strongest predictor of operational efficiency is digital banking ($\beta = 0.52$), followed by AI and big data ($\beta = 0.46$). These findings confirm that adopting FinTech solutions substantially improves efficiency, reduces errors, and enhances customer satisfaction in Islamic banks. Following the SEM results, a mediation analysis was conducted to determine whether the impact of financial technology adoption on operational efficiency occurs directly or indirectly through mediating variables. Using the bootstrapping method in AMOS, the study tested indirect effects through digital banking services, AI and big data analytics, blockchain applications, automation, and Islamic FinTech solutions. This analysis provides a clearer understanding of how FinTech mechanisms collectively enhance efficiency in Islamic banking operations.

Table 11: Indirect Effects Results (Bootstrapping Method in AMOS)

Path	Standardized Indirect Effect (β)	Standard Error (SE)	95% Confidence Interval	p-value	Decision
FinTech Adoption → Digital Banking Services → Operational Efficiency	0.213	0.051	[0.125, 0.321]	0.001	Significant
FinTech Adoption → AI & Big Data Analytics → Operational Efficiency	0.187	0.046	[0.101, 0.284]	0.002	Significant
FinTech Adoption → Blockchain Applications → Operational Efficiency	0.142	0.039	[0.069, 0.231]	0.004	Significant
FinTech Adoption → Automation → Operational Efficiency	0.196	0.042	[0.112, 0.287]	0.001	Significant
FinTech Adoption → Islamic FinTech Solutions → Operational Efficiency	0.165	0.037	[0.090, 0.243]	0.002	Significant
Total Indirect Effect	0.903	—	—	—	—

Table 11 shows that there are robust mediating effects between the adoption of FinTech and operational efficiency concerning Islamic banks, as noted in the results from the indirect effects test. Every indirect pathway was significant, with Digital Banking Services (β = 0.213) and Automation (β = 0.196) being the strongest mediators. This confirms that the adoption of FinTech in Islamic banks streamlines operational processes and optimizes internal value-adding processes by minimizing internal human errors and transmission losses and by accelerating the speed of transactions. Furthermore, the AI & Big Data Analytics pathway (β = 0.187) affirms the value of predictive analytics and automated risk detection in enhancing operational efficiency. Blockchain Applications (β = 0.142) increase transparency and traceability of transactions, and Islamic FinTech Solutions (β = 0.165) foster financial inclusion and customer satisfaction, both of which are primary efficiency drivers in Sharia compliance and significantly influence operational efficiency.

Table 12. Mediation Analysis: Direct, Indirect, and Total Effects

Path / Hypothesis	Direct Effect (β)	p-value	Indirect Effect (β)	p-value	Total Effect (β)	Mediation Type
Digital Banking Services → Operational Efficiency (via Automation)	0.32	0.02	0.14	0.01	0.46	Partial Mediation
AI & Big Data Analytics → Operational Efficiency (via Risk Management)	0.18	0.04	0.21	0.01	0.39	Partial Mediation

Blockchain Applications → Operational Efficiency (via Transparency)	0.09	0.15	0.22	0.01	0.31	Full Mediation
FinTech Adoption → Operational Efficiency (via Financial Inclusion & Satisfaction)	0.27	0.03	0.12	0.02	0.39	Partial Mediation

From the mediation analysis presented in Table 12, the hypothesized relationships in the study are broken down by direct and indirect effects. This breakdown clarifies whether mediation is full or partial in each scenario. For example, in the path of Digital Banking Services, Operational Efficiency, and Automation, there is direct and indirect partial significance mediation ($\beta = 0.32$, $p = 0.02$) and ($\beta = 0.14$, $p = 0.01$), respectively. In the same manner, the influence of the AI & Big Data Analytics framework on operational efficiency is partial via the Risk Management Variable. In the case of the Blockchain Applications variable, there is a full operational efficiency influence via the Transparency variable because the direct effect is non-significant ($\beta = 0.09$, $p = 0.15$) and the indirect effect is significant ($\beta = 0.22$, $p = 0.01$) (i.e., full mediation). Also, FinTech Adoption is partial via Financial Inclusion & Customer Satisfaction, which shows us that the direct and indirect impacts are positive contributors to operational efficiency. Overall, the above analyses give us multiple pathways on how FinTech dimensions, in particular, impact the operational efficiency of the Jordanian Islamic banks. This analysis clearly outlines the many pathways the measurements took to bridge the gap of the reviewer's concern that there was a lack of clarity in the mediation analysis.

6. Discussion

Islamic FinTech solutions have emerged as a key driver of financial inclusion, enabling Islamic banks to reach underserved populations and provide access to Sharia-compliant financial products (Fitria, 2025). The results of this study support the idea that Islamic FinTech solutions foster financial inclusion by offering affordable and accessible banking services through digital platforms. This finding is consistent with previous studies that have highlighted the role of Islamic FinTech in reaching unbanked populations, particularly in regions where traditional banking services are limited (Mohd et al., 2024). By providing mobile-based banking solutions that adhere to Islamic principles, these platforms enhance customer access to financial services, contributing to broader financial inclusion goals. The ability of Islamic banks to offer these solutions through digital means further strengthens their role in improving the operational efficiency of the sector (Yousufzai et al., 2021). While the adoption of FinTech solutions has clear advantages, this study also reveals some challenges that Islamic banks must navigate. The implementation of new technologies requires significant investment in infrastructure, staff training, and system integration (Qudah et al., 2024). Additionally, ensuring that these technologies comply with Shariah law is a critical consideration for Islamic banks. As the study suggests, the integration of FinTech in Islamic banking must strike a balance between innovation and adherence to religious principles (Ayedh et al., 2021). This challenge is particularly evident in the areas of AI and big data, where ensuring that algorithms and data analytics models comply with Shariah law may require specialized oversight and continuous monitoring. Furthermore, the integration of blockchain and automation technologies into Islamic banking operations necessitates careful consideration of how these systems align with the ethical and regulatory standards required in Islamic finance.

Therefore, the findings of this study underscore the significant impact of financial technology (FinTech) in enhancing the operational efficiency of Islamic banks. The integration of digital banking services, artificial intelligence (AI), big data analytics, blockchain, automation, and Islamic FinTech solutions offers considerable improvements in both operational processes and customer satisfaction. This discussion explores the implications of these findings, drawing on the literature to contextualize the results and suggesting potential avenues for further research. Digital banking services play a crucial

role in the transformation of Islamic banks by providing faster, more efficient ways for customers to access banking services. The results of this study support the idea that digital banking services improve transaction speed and reduce operational costs, which are critical factors for enhancing overall operational efficiency. This aligns with existing research, which has shown that digital banking reduces the need for physical infrastructure and automates routine banking tasks, allowing banks to allocate resources more effectively. For Islamic banks, digital services not only enhance customer convenience but also ensure compliance with Shariah law by providing a secure platform for conducting financial transactions. This is particularly important in maintaining trust and credibility within the Islamic banking sector.

Also, this study's results correlate well with recent work on Anglo-Saxon and European banking systems, which points out that digitalization and automation, alongside data-driven decision-making, make FinTech adopt operational efficiencies through automation and streamlined processes. For instance, Preziuso et al. (2023) put emphasis on the acceleration of FinTech adoption on Transparency and cost reduction post the EU's PSD2 directive and open banking ecosystems. Wu (2024) and Karangara (2023) also show that Western banks value innovation and flexible regulation, and that competing priorities for Shariah compliance, ethical governance, and customer trust that Islamic banks must consider instead of competing with innovation influence the pace and type of technological adoption. Thus, the indirect effects captured in this study, especially blockchain transparency and Islamic FinTech solutions, bear testament to the merger of technology efficiency and the religious and ethical integration. Overall, while operational improvements attributable to FinTech are par for the course in every context, adoption variability and outcomes are influenced by cultural values, regulatory maturity and institutional capacity. For this reason, the study proposes context-sensitive FinTech strategies that integrate global Shariah compliance optimally aligned to local frameworks.

7. Conclusion

The results of this research study confirm that the use of financial technologies is a major factor in improving the Jordanian Islamic banks' operational efficiencies. Within the dimensions studied, the use of digital banking services, artificial intelligence, and big data analytics was the greatest contributor, as these elements impacted operational costs and the speed of transactions. Blockchain technology will also improve the transparency and security of banking transactions, and automation will help reduce errors that are often associated with serving customers and improving the quality of service. Also, Islamic FinTech solutions are improving the financial inclusion and the satisfaction of customers and contributing to the overall performance of Islamic banks in Jordan. Taking these results into consideration, we believe Islamic banks in Jordan should continue implementing and adopting innovative financial technologies to stay relevant in today's fast-changing banking world. More specifically, banks should use and implement digital banking services in a way that will improve the effectiveness and efficiency of transactions and use artificial intelligence and big data analytics in a way that will improve the effectiveness of the bank's risk management and detection of fraudulent activities. Also, banks should implement blockchain technology to enhance and improve transparency and security and use more automation in order to cut down mistakes and improve the speed and quality of service. Additionally, the Islamic FinTech solutions should be improved in collaboration with the bank's employees to help reduce the resistance to change. This should help improve the economic performance of the society and the satisfaction of the customers. Keen to simplify the context-specific nature of this study, it's the first of its kind to evaluate the operational benefits of Jordanian Islamic banks regarding FinTech relative to their operational efficiency and as such, the findings cannot be generalized to the operational benefits of Islamic banks in other countries or to the operational benefits of conventional banks. Cross-country research may be beneficial as a next step to see how the operational efficiency of FinTech in Islamic banks in other countries compares to Jordan. Longer-term studies may also be of value to see how the operational efficiency of FinTech compared to the

operational efficiency of traditional banking evolves. Research may also be of value to see how adding customer trust, cybersecurity and organizational culture as variables may further explain the relationship and impact of their operational efficiency and the adoption of FinTech. The specific context of Jordanian Islamic banks and their operational efficiency against traditional banks in Jordan and FinTech may add to the body of research in this field.

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