The Impact of Digital Transformation on Operational Performance of Commercial Banks in Jordan

Faisal Aburub [1], May Jaber [2], Saad Zighan[3] and Buthaina Awais[4]

[1] Department of Business Intelligence and Data Analytics, University of Petra
fabutub@uop.edu.jo
[2] Department of Business Administration, University of Petra
[3] College of Business and Economics, Qatar University
[4] Department of education, Ajloun national university

Abstract

Digital transformation has become a cornerstone of organizational competitiveness and operational efficiency worldwide, fundamentally reshaping business models and customer interactions. In the financial sector, particularly banking, technological innovations such as digital readiness, trust mechanisms, interactivity, and the Internet of Things (IoT) have redefined how institutions deliver services and optimize performance. This study examines the impact of digital transformation on the operational performance of commercial banks in Jordan, a developing economy at the forefront of digital adoption in the Middle East. Using a quantitative approach, data were collected from 136 functional managers across Jordanian commercial banks through structured questionnaires. The findings reveal a strong positive relationship between digital transformation dimensions and operational performance indicators, including efficiency, cost reduction, service responsiveness, and customer satisfaction. Comparative insights from global fintech experiences underscore both the opportunities and challenges facing Jordanian banks, including regulatory alignment, cybersecurity, and digital inclusion. The study contributes theoretically by extending digital transformation research into the Jordanian context and practically by offering recommendations for policymakers and bank managers. Strengthening digital readiness, fostering trust, enhancing interactivity, and integrating IoT are highlighted as strategic imperatives to sustain competitiveness and ensure operational resilience in a rapidly digitizing financial ecosystem.

1   Introduction

The rapid diffusion of digital technologies has transformed the operational landscape of industries worldwide, with banking emerging as one of the most significantly affected sectors. Digital transformation is broadly defined as the strategic integration of advanced digital technologies—such as big data, artificial intelligence, blockchain, and the Internet of Things (IoT)—into organizational processes and structures to enhance competitiveness

and performance [1]. For the banking industry, this transformation represents not merely the adoption of new tools, but a paradigm shift in the way financial services are designed, delivered, and consumed.

Globally, banks have pursued digital transformation to achieve efficiency gains, improve service quality, and remain competitive against fintech entrants. Financial technology firms have introduced innovations such as mobile wallets, blockchain-based settlement systems, and algorithm-driven credit scoring models, compelling traditional banks to rethink their business models. Collaboration between banks and fintech has increasingly become a strategic necessity, enabling banks to harness technological innovation while preserving trust and regulatory compliance. The integration of digital transformation into banking operations has been shown to enhance operational performance through reduced transaction times, improved security, cost efficiency, and greater customer satisfaction [2].

The rise of fintech has also amplified the role of digital readiness and interactivity in shaping customer experiences. Mobile-first platforms, advanced authentication systems, and data-driven personalization have redefined expectations of convenience and responsiveness. Trust remains a critical determinant of customer adoption of digital banking services, particularly in contexts where cybersecurity and data privacy risks are salient. Recent empirical evidence underscores that trust in digital platforms directly influences both operational performance and customer loyalty in the financial sector [3].

Within the Middle East, digital transformation has accelerated in response to regional strategies emphasizing digital economies and financial inclusion. Jordan, in particular, has made tangible progress through regulatory reforms, fintech sandboxes, and investment in national payment infrastructures overseen by the Central Bank of Jordan. Commercial banks, numbering approximately twenty and operating through more than 850 branches, have invested in online platforms, mobile banking applications, and contactless payment systems [19]. Yet, despite these advancements, the banking sector continues to face structural and contextual challenges. These include macroeconomic instability, regional geopolitical pressures, gaps in digital literacy, and customer concerns over the security of electronic transactions.

Against this backdrop, the operational performance of Jordanian commercial banks hinges on their capacity to embed digital transformation across four interrelated dimensions: digital readiness, trust, interactivity, and IoT adoption. Digital readiness reflects the preparedness of institutions and employees to leverage emerging technologies effectively. Trust encompasses customer confidence in digital banking platforms, shaped by perceptions of security, privacy, and transparency. Interactivity refers to the degree of engagement facilitated by user-friendly interfaces and responsive communication channels, while IoT technologies enable new forms of operational efficiency and service innovation through smart devices and data integration.

Although the global literature has examined these dimensions extensively, empirical investigations within Jordan remain limited. Previous studies in developing economies highlight both the potential and challenges of digital transformation but often lack context-specific insights into operational outcomes ([4]; [5]). This study addresses this gap by empirically testing the relationship between digital transformation and operational performance within Jordanian commercial banks. In doing so, it contributes to both theory and practice. Theoretically, it contextualizes digital transformation research within a Middle Eastern financial system. Practically, it provides evidence-based recommendations for policymakers and bank managers regarding regulatory design, digital capacity building, and technological investment.

The purpose of this study is to empirically investigate the extent to which digital transformation—through digital readiness, trust, interactivity, and IoT adoption—contributes to the operational performance of commercial banks in Jordan. Specifically, the research aims to provide an evidence-based understanding of how these dimensions influence efficiency, service quality, and competitiveness in the Jordanian banking sector. By doing so, the study seeks to bridge existing gaps in the literature, contextualize global digital transformation frameworks within a Middle Eastern financial system, and offer practical recommendations for policymakers and bank managers to strengthen digital strategies and foster sustainable growth.

This paper is structured as follows. Section 2 reviews the relevant literature on digital transformation and operational performance in banking, with particular attention to recent studies published. Section 3 outlines the methodology employed, including research design, sampling, and data analysis procedures. Section 4 presents the results, followed by Section 5, which discusses the findings in light of global evidence and policy implications. Finally, Section 6 concludes the paper with recommendations for future research and strategic action in Jordan's banking sector.

2   Related Work

The concept of digital transformation has attracted extensive scholarly attention over the last decade, particularly within the financial services industry. It is broadly understood as the integration of advanced digital technologies into organizational processes, models, and strategies, leading to fundamental changes in how institutions operate and deliver value [1]. Recent studies have emphasized that digital transformation is not merely a technological upgrade but a holistic reconfiguration of business models to meet evolving customer demands and competitive pressures. Within the banking sector, digital transformation has become a crucial determinant of operational performance, enabling organizations to achieve cost efficiency, service innovation, and resilience in a rapidly changing financial ecosystem [2].

From 2022 onward, scholarly discourse has increasingly focused on the specific dimensions of digital transformation that directly influence operational performance. Among these, digital readiness, trust, interactivity, and the Internet of Things (IoT) have emerged as central constructs. Digital readiness is defined as the extent to which organizations and employees are prepared to adopt and utilize digital technologies effectively. A recent study by Michelotto & Joia [6] highlighted that readiness involves not only infrastructure and technological investments but also workforce capabilities, standardized data practices, and interoperability of systems. For banks, digital readiness translates into the ability to deploy secure online platforms, provide continuous training for employees, and maintain adaptable infrastructures that can accommodate new innovations. Without adequate readiness, investments in digital tools often fail to translate into operational improvements ([7], [8]).

Trust has been widely recognized as another cornerstone of successful digital transformation. In financial services, customer trust is shaped by perceptions of data privacy, cybersecurity, and institutional transparency ([9], [10]). Al-Smadi [3] demonstrated that trust in digital platforms directly predicts both customer adoption and operational efficiency in Middle Eastern banks. Similarly, Waliullah et al. [11] found that robust cybersecurity frameworks significantly enhance customer loyalty, thereby supporting banks' long-term performance. For Jordanian banks, where concerns about data

security and fraud remain prominent, strengthening trust is critical for ensuring customer engagement with digital channels. Moreover, trust extends internally to employee confidence in digital systems, influencing their willingness to adopt new tools and processes.

Interactivity has also gained prominence in recent research as a determinant of customer satisfaction and service efficiency. Interactivity refers to the degree of engagement and responsiveness facilitated by digital platforms, such as mobile applications and online banking portals. Yuan [12] introduced the concept of outcome interactivity, which emphasizes not only the availability of interactive features but also their perceived value by users. In the banking context, interactivity enhances customer experience by allowing real-time transactions, personalized services, and seamless communication with financial institutions. Studies have shown that high levels of interactivity increase customer retention and reduce operational costs by shifting routine transactions away from physical branches toward digital platforms [13]. For Jordan, where mobile penetration is high and younger populations are digitally active, enhancing interactivity offers significant potential to improve both service quality and operational efficiency.

The Internet of Things (IoT) represents a further dimension of digital transformation that has been increasingly applied in banking operations. IoT refers to the network of connected devices that communicate and exchange data autonomously. In practice, IoT has enabled the development of smart ATMs, biometric authentication systems, and advanced fraud detection mechanisms [14]. Recent evidence by Kariuki [15] suggests that IoT adoption not only improves security but also streamlines operations by automating back-office processes. While adoption remains uneven across regions, banks that integrate IoT technologies report improvements in efficiency, reduced transaction errors, and enhanced customer experiences [16]. For developing economies such as Jordan, IoT represents both an opportunity and a challenge: while it can enhance efficiency, it requires significant investment in infrastructure and regulatory frameworks to ensure security and interoperability.

Empirical evidence linking digital transformation to operational performance has grown substantially since 2022. Do et al. [2] showed in their study of Vietnamese commercial banks that digital transformation had a significant positive impact on efficiency, particularly for larger banks with greater resource capacity. Al-Dmour et al. [5] found that the use of big data analytics in Jordanian banks directly improved decision-making and customer service responsiveness, underscoring the operational value of technological innovation. Similarly, Al-Okaily et al. [4] emphasized the role of digital accounting transformation in improving business performance, highlighting the integration of fintech tools as a critical factor. Collectively, these findings provide robust evidence that digital transformation enhances operational performance across diverse contexts, while also revealing important variations based on scale, regulatory environment, and institutional readiness.

Within Jordan, the banking sector has made notable progress in digital transformation, supported by regulatory initiatives from the Central Bank of Jordan and increasing competition from fintech firms. However, the literature indicates that gaps remain. Al-Sarhan [24] reported that while Jordanian banks have begun to adopt artificial intelligence and blockchain technologies, awareness and strategic integration remain limited compared to global counterparts. Similarly, Liu & Qi [17] stressed the importance of digital transformation for sustainable financial development but noted that operational outcomes in developing economies are constrained by limited digital infrastructure and customer

trust issues. These findings suggest that while Jordanian banks have advanced in adopting digital platforms, more research is required to understand how these efforts translate into measurable improvements in operational performance.

In summary, the literature establishes a clear theoretical and empirical link between digital transformation and operational performance, with digital readiness, trust, interactivity, and IoT identified as critical dimensions. Global evidence from 2022–2025 demonstrates the transformative potential of these dimensions, yet also highlights contextual challenges in developing economies. For Jordan, the existing research remains fragmented, underscoring the need for focused empirical studies that evaluate how digital transformation strategies influence operational outcomes in commercial banks. This study addresses this gap by systematically analyzing the impact of these dimensions on Jordanian banks, thereby extending the global literature and providing practical insights for policymakers and financial institutions.

3   Hypotheses Development

Building on the reviewed literature, this study develops a set of hypotheses to empirically test the relationship between digital transformation dimensions and operational performance in Jordanian commercial banks. The theoretical and empirical insights suggest that digital readiness, trust, interactivity, and IoT adoption play pivotal roles in enhancing efficiency, responsiveness, and customer satisfaction.

Digital readiness is the readiness of an institution to embrace, incorporate and take advantage of digital technologies in its organizational operations. Reviewed literature notes that organizations, which have a high degree of digital readiness, i.e., resilient infrastructure, proficient workforce, and systems that are interoperable, are in a better position to use digital tools to improve performance ([6]; [8]).

Preparedness in the banking industry helps to implement safe platforms, to provide effective workflow, and speed up the services. Empirical studies across developed and developing economies show that a greater preparedness of banks results in a high level of operational efficiency, better control over costs, and increased customer satisfaction ([2]; [5]). Accordingly, it is hypothesized that:

H1: Digital readiness has a positive and significant effect on the operational performance of commercial banks in Jordan.

Trust in digital platforms is central to customer adoption and long-term engagement. Empirical evidence demonstrates that customer trust enhances both efficiency and loyalty in digital banking contexts [3]. Thus, it is hypothesized that:

H2: Trust in digital banking platforms positively influences the operational performance of commercial banks in Jordan.

Interactivity refers to the level of digital platforms that provoke responsive, interactive and real time interaction. Interactive systems are applied to enhance the customer experience through smooth transactions, personalized customers, and responsive customer support ([13]; [12]). Previous studies show that increased interactivity will decrease the time in the transaction, increase customer satisfaction, and transform normal banking interaction on the physical branch to online distribution that will boost efficiency in operations and reduce costs incurred. To banks that deal with digitally active markets like Jordan, increased interactivity is a competitive edge in improving the quality of services. Therefore, the following hypothesis is proposed:

H3: Interactivity in digital platforms has a positive and significant impact on the operational performance of commercial banks in Jordan.

The Internet of Things (IoT) has offered new possibilities of operational efficiency in terms of automatizing processes and integrating data and increasing the level of security. Devices equipped with IoT, including biometrics, smart ATM, and automated monitoring systems, strengthen fraud detection, reduce human error, and improve the work of the back-office ([14]; [15]; [16]). Although the rates of adoptions differ across the regions, banks that implement IoT solutions cite higher accuracy of transactions, workflow automation, and customer experience that can be measured. The implementation of IoT in Jordan represents a strategic platform that can be used to support operational resilience despite the currently faced infrastructural difficulties. Based on this, the study posits the following hypothesis:

H4: IoT adoption has a positive and significant effect on the operational performance of commercial banks in Jordan.

Together, these hypotheses provide a framework for examining the multifaceted influence of digital transformation on operational performance, serving as the foundation for the empirical analysis presented in subsequent sections.

4   Methodology

This study employs a quantitative research design to investigate the impact of digital transformation on the operational performance of commercial banks in Jordan. The design was chosen because it enables the testing of hypothesized relationships among variables using empirical data, providing a robust basis for generalizing findings within the Jordanian banking sector. Quantitative approaches are particularly suitable for studies that aim to measure the effects of multiple constructs—such as digital readiness, trust, interactivity, and IoT adoption—on complex outcomes such as operational performance [18].

4.1   Research Design and Population

The population of this study comprises all commercial banks operating in Jordan under the supervision of the Central Bank of Jordan. These institutions represent the backbone of the national financial system, accounting for the majority of banking assets, customer transactions, and credit activities. According to the Central Bank of Jordan [19], there are 20 licensed commercial banks, operating more than 850 branches across the country. The study targets functional managers within these banks, as they are directly involved in implementing digital transformation strategies and monitoring operational performance.

4.2   Sampling and Data Collection

A purposive sampling technique was employed to ensure high precession and correctness of collected data. Data were collected from 136 managers representing diverse operational units, including IT, operations, customer service, and risk management. This sample size is considered sufficient for statistical analysis using regression techniques, as it meets the recommended threshold for studies employing multivariate analysis [20]. Data collection was conducted through structured self-administered questionnaires, distributed electronically via official bank communication channels. The use of electronic surveys facilitated timely responses and ensured broader geographic coverage.

4.3 Instrument Development

The research instrument was a structured questionnaire developed based on validated scales from prior studies, with adaptations made for the Jordanian banking context. Five items measuring digital readiness were adapted from [8], focusing on infrastructure, workforce skills, and organizational preparedness. Four items were derived from Al-Smadi [3] to measure Trust, emphasizing perceptions of data security, transparency, and customer confidence in digital platforms. Interactivity was measured using five items developed by [13], reflecting the responsiveness and engagement of digital platforms. Four items were based on Al-Nahar [21] to measure IoT Adoption, focusing on automation, biometric authentication, and device integration. Finally, operational performance was assessed using indicators such as efficiency, cost reduction, service quality, and customer satisfaction, drawing on measures validated by Yu et al. [22]. Responses were captured using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

4.4 Validity and Reliability

To ensure content validity, the questionnaire was reviewed by three academic experts in information systems and banking management, as well as two practitioners from the Jordanian banking sector. Their feedback was incorporated to refine the clarity and contextual appropriateness of the items. Construct validity was assessed through exploratory factor analysis (EFA), which confirmed the distinctiveness of the five constructs. Reliability was evaluated using Cronbach's alpha, with all constructs exceeding the recommended threshold of 0.70, indicating satisfactory internal consistency [20].

4.5 Data Analysis Methods

Data were analyzed using the Statistical Package for Social Sciences (SPSS, version 26). Descriptive statistics were first computed to summarize demographic characteristics and provide an overview of the constructs. Correlation analysis was performed to examine the strength and direction of relationships among variables. Multiple regression analysis was then employed to test the hypothesized effects of digital readiness, trust, interactivity, and IoT adoption on operational performance. These methods were chosen because they allow for testing linear relationships and estimating the predictive power of independent variables on the dependent variable. Diagnostic tests for multicollinearity, normality, and heteroscedasticity were also conducted to ensure the robustness of results.

By employing this methodological approach, the study provides a systematic and rigorous framework for evaluating the impact of digital transformation on operational performance in Jordanian commercial banks. The combination of validated instruments, representative sampling, and robust statistical analysis strengthens the credibility and generalizability of the findings.

5 Methodology

This study proposes a conceptual research model that links the dimensions of digital transformation to operational performance in Jordanian commercial banks. Grounded in the reviewed literature and hypotheses, the model illustrates how four independent variables—digital readiness, trust, interactivity, and IoT adoption—are expected to exert direct positive effects on the dependent variable, operational performance. As shown in

Figure 1, each construct is hypothesized to contribute significantly to operational performance within the banking sector.
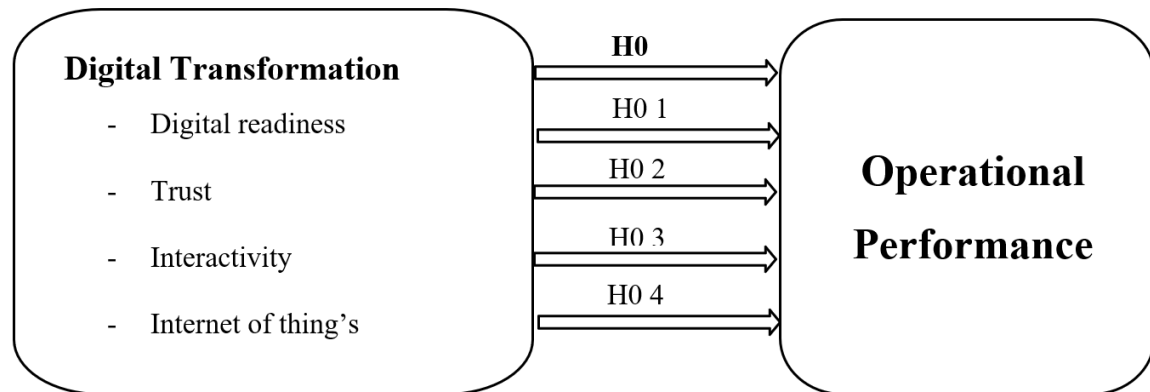

Fig.1. Conceptual research model linking digital transformation dimensions to operational performance.

6   Results

This section presents the findings of the empirical analysis, including descriptive statistics, correlation analysis, and regression results. The results provide insights into how digital transformation dimensions—digital readiness, trust, interactivity, and IoT adoption—affect the operational performance of Jordanian commercial banks.

6.1   Descriptive Statistics

Table 1 presents the descriptive statistics for the main study variables. The mean scores indicate that managers generally perceived a moderate to high presence of digital transformation practices within their banks. Operational performance received the highest mean score (M = 4.01), suggesting that participants believe their banks are performing relatively well in terms of efficiency, cost control, and service quality. By contrast, IoT adoption recorded the lowest mean score (M = 3.68), indicating that while technological adoption is progressing, it remains less developed compared to other dimensions. Standard deviations ranged from 0.62 to 0.73, reflecting a moderate level of variability in responses, which suggests differences in how banks perceive and implement digital transformation initiatives.

Table 1. Descriptive Statistics of Study Variables

Variable	Mean	SD	Min	Max
Digital Readiness	3.89	0.64	2.3	4.9
Trust	3.75	0.71	2.1	5.0
Interactivity	3.92	0.68	2.5	5.0
IoT Adoption	3.68	0.73	2.0	5.0
Operational Performance	4.01	0.62	2.8	5.0

6.2   Correlation Analysis

Pearson correlation coefficients were calculated to examine the relationships among the study variables. As presented in Table 2, all four independent variables—digital readiness, trust, interactivity, and IoT adoption—were positively and significantly correlated with operational performance at the 0.01 level. The strongest correlation was observed between digital readiness and operational performance ($r = 0.61$), highlighting the importance of organizational preparedness in enhancing bank efficiency and service quality. Trust ($r = 0.59$), interactivity ($r = 0.57$), and IoT adoption ($r = 0.52$) were also moderately correlated with operational performance. These results provide preliminary support for the hypothesized relationships.

Table 2. Correlation Matrix

Variable	1	2	3	4	5
1. Digital Readiness	1				
2. Trust	0.54**	1			
3. Interactivity	0.48**	0.51**	1		
4. IoT Adoption	0.45**	0.47**	0.50**	1	
5. Operational Performance	0.61**	0.59**	0.57**	0.52**	1

Note. $**p < .01$ (two-tailed).

6.3   Multicollinearity

To ensure the reliability of the regression estimates, multicollinearity diagnostics were conducted using the Variance

Inflation Factor (VIF) and Tolerance values. As shown in Table 3, all predictor variables recorded VIF values well below the commonly accepted threshold of 10 and Tolerance values above 0.10, indicating the absence of harmful multicollinearity. Trust exhibited the highest VIF (3.07) with a corresponding Tolerance of 0.325, followed by interactivity (VIF = 2.56; Tolerance = 0.391). Digital readiness and IoT adoption recorded VIF values of 1.86 and 1.97, respectively, both suggesting low levels of shared variance with other predictors. These results confirm that the independent variables are sufficiently distinct and do not pose multicollinearity concerns, supporting the robustness and validity of the regression analysis.

Table 3. Multicollinearity test

Variable	Multicollinearity Statistics	
	Tolerance	VIF
DR	0.536	1.86
Trust	0.325	3.07
Interactivity	0.391	2.56
IoT	0.506	1.97

Table 4. Regression Results

Predictor	β	t	P
Digital Readiness	0.31	4.56	< 0.001
Trust	0.27	3.98	< 0.001
Interactivity	0.21	3.35	< 0.001
IoT Adoption	0.18	2.74	< 0.007
Model R²	**0.52**		

6.4   Regression Analysis

Multiple regression analysis was conducted to test the hypotheses. As summarized in Table 4, the overall regression model was significant ($F = 28.67$, $p < 0.001$), with an R^2 value of 0.52. This indicates that the four digital transformation dimensions collectively explained 52% of the variance in operational performance. Each of the four predictors had a statistically significant positive effect on operational performance. Digital readiness emerged as the strongest predictor ($\beta = 0.31$, $p < 0.001$), followed by trust ($\beta = 0.27$, $p < 0.001$), interactivity ($\beta = 0.21$, $p = 0.001$), and IoT adoption ($\beta = 0.18$, $p = 0.007$).

The results provide strong empirical support for the proposed model and confirm hypotheses H1 through H4. Digital readiness had the largest effect, underscoring the importance of infrastructure, human capital, and organizational preparedness in achieving high operational performance. Trust also emerged as a crucial factor, reflecting the necessity of cybersecurity, data privacy, and transparency to sustain customer confidence. Interactivity, while slightly weaker than digital readiness and trust, still demonstrated a significant contribution, indicating the value of responsive and engaging digital platforms. Finally, IoT adoption, though the weakest predictor, was still significant, highlighting the potential of IoT technologies to improve efficiency, automate processes, and strengthen security. Together, these findings emphasize that digital transformation is multifaceted and requires coordinated investment across multiple dimensions.

In summary, the empirical results provide strong evidence that digital transformation positively and significantly enhances the operational performance of Jordanian commercial banks. The findings not only validate the proposed research model but also provide practical implications for policymakers and managers aiming to strengthen the digital transformation agenda in the financial sector.

7   Discussion

The findings of this study confirm the significant role of digital transformation in enhancing the operational performance of commercial banks in Jordan. Consistent with previous research, all four dimensions—digital readiness, trust, interactivity, and IoT adoption—demonstrated positive effects, though with varying magnitudes. Digital readiness emerged as the most influential predictor, underscoring that the ability of banks to adapt their infrastructure, workforce skills, and organizational structures to digital technologies is fundamental to achieving efficiency, service quality, and competitiveness.

The results align closely with international evidence highlighting the primacy of digital readiness in driving performance outcomes. In developed economies such as the United

States and European Union, readiness has been found to be a key differentiator between banks that thrive in digital competition and those that lag behind [23]. Studies in Asian markets, particularly in South Korea and Singapore, also emphasize the role of readiness in enabling advanced banking innovations, such as AI-driven decision-making and blockchain-based settlement systems [25]. In contrast, evidence from developing economies mirrors Jordan's experience, where readiness remains uneven and constrained by financial and infrastructural limitations [2].

Trust was also found to significantly enhance operational performance, consistent with research in Middle Eastern and North African (MENA) countries showing that perceptions of cybersecurity and institutional transparency are pivotal for digital adoption [3]. In comparison, studies in Europe report higher baseline trust in digital platforms due to stricter regulatory frameworks such as the General Data Protection Regulation (GDPR) [17]. The lower levels of trust observed in developing countries, including Jordan, highlight the importance of regulatory reform and customer education to build confidence in digital banking.

Interactivity's positive effect reflects global findings that customer engagement, real-time responsiveness, and personalization are essential for digital banking success [12]. In advanced economies, banks have invested heavily in user experience (UX) design and digital ecosystems, which have proven critical to customer retention. Jordanian banks, while making progress, still lag in creating highly interactive platforms, pointing to an opportunity for investment in customer-centric design.

Finally, IoT adoption showed the weakest but still significant impact. This is consistent with the global literature, which emphasizes that IoT in banking remains in its early stages, with more advanced adoption in markets such as China, where IoT-enabled payments and biometric systems are widespread [15]. For Jordan, limited infrastructure and high implementation costs have slowed IoT diffusion, yet its potential to enhance security and automate operations remains substantial.

7.1   Managerial Implications

For bank managers, the results highlight the importance of aligning digital transformation strategies with organizational goals. Investments should prioritize building internal readiness, including upgrading IT infrastructure, enhancing employee digital skills, and developing adaptive organizational cultures. Building customer trust requires transparent communication of security measures and consistent delivery of reliable digital services. Enhancing interactivity will involve redesigning customer interfaces, integrating AI-driven chatbots, and offering personalized financial solutions. Managers should also explore scalable IoT applications, such as biometric authentication, to strengthen both efficiency and customer experience.

7.2   Theoretical Contributions

This study makes several contributions to the academic literature. By empirically testing the influence of four dimensions of digital transformation on operational performance in Jordanian banks, it extends the global discourse into a Middle Eastern context that has been underexplored. The confirmation of all four hypotheses demonstrates the multidimensional nature of digital transformation and provides a framework that can be adapted to other developing economies. The strong role of digital readiness also supports the view that

transformation outcomes depend not merely on technology adoption but on organizational preparedness and adaptability.

7.3   Limitations and Directions for Future Research

Despite its contributions, the study has limitations. The use of self-reported data may introduce response bias, and the sample size, while sufficient for regression analysis, is limited to managers within Jordanian banks, restricting generalizability. Future research should expand the scope to include multiple stakeholder perspectives, such as customers and regulators. Longitudinal studies could also provide insights into the dynamic nature of digital transformation and its evolving effects on performance. Finally, qualitative approaches, such as interviews or case studies, could complement quantitative findings and enrich understanding of contextual challenges and strategies.

In summary, the results reaffirm that digital transformation is a critical driver of operational performance in Jordanian commercial banks. The findings highlight both universal patterns observed globally—such as the primacy of readiness and trust—and contextual challenges specific to developing economies. By addressing these challenges through strategic investments, regulatory reforms, and customer-centered innovations, Jordanian banks can strengthen their competitiveness in an increasingly digital financial landscape.

8   Conclusion

This study set out to examine the impact of digital transformation on the operational performance of commercial banks in Jordan, focusing on four key dimensions: digital readiness, trust, interactivity, and IoT adoption. Drawing on empirical evidence from 136 bank managers, the results demonstrate that all four dimensions exert significant and positive effects on operational performance. Among them, digital readiness emerged as the strongest predictor, underscoring the critical importance of organizational preparedness in driving efficiency, cost-effectiveness, and customer satisfaction. Trust was also confirmed as a vital factor, reflecting the necessity of robust cybersecurity, transparency, and data protection measures in fostering customer engagement with digital platforms. Interactivity and IoT adoption, while slightly weaker, were nonetheless significant contributors, highlighting the growing role of customer engagement tools and emerging technologies in strengthening operational outcomes.

From a theoretical perspective, the findings contribute to the literature by contextualizing digital transformation research within Jordan's banking sector, a setting that has received limited scholarly attention. By validating the multidimensional framework of digital transformation in a developing economy, the study adds depth to the global discourse and demonstrates the transferability of concepts across different contexts. The confirmation of all four hypotheses reinforces the argument that digital transformation is not a monolithic process but rather a multifaceted phenomenon requiring coordinated investments across multiple domains.

Practically, the study offers actionable recommendations for both policymakers and bank managers. For policymakers, the results highlight the need to strengthen regulatory frameworks that support digital readiness, particularly through incentives for technology adoption, workforce development, and infrastructure investment. Building public trust in digital banking requires stronger data privacy protections, public awareness campaigns, and collaboration with international regulatory bodies to align with global best practices. For bank managers, the results point to the importance of investing in both technology and people. Enhancing internal readiness, fostering organizational agility, and embedding a

culture of continuous learning are essential for sustaining digital transformation initiatives. Banks should also prioritize customer-centric strategies by improving platform interactivity, offering personalized services, and exploring scalable IoT applications to enhance efficiency and security. [26-29]

Looking ahead, the outlook for Jordanian banks is promising but also challenging. Digital transformation is accelerating globally, and banks in developing economies must keep pace to remain competitive. Emerging technologies such as artificial intelligence, blockchain, and advanced analytics will play an increasingly important role in shaping operational performance. However, their adoption will depend on the readiness of institutions, the trust of customers, and the ability of regulators to provide supportive environments. The findings of this study underscore that success in digital transformation requires a holistic approach that integrates infrastructure, security, interactivity, and innovation.

Findings also emphasize on the fact that digital dimensions of transformation are interrelated and that when one area is improved, the efficiency of others could be enhanced as well. More specifically, improved digital preparedness can reinforce the effects of a more intensive use of interactivity and IoT in place, with banks that have a better infrastructure and digitally competent staff being better able to implement responsive platforms and apply smart technology ([6]; [8]). Equally, investments in cybersecurity and clear communication practices help to not only make the trust levels higher but also implement more interactive features and services that use IoT-enabled systems ([3]; [11]). According to Liu and Qi [17], the digital capabilities do not only contribute to the enhancement of daily operational efficiency, but also create the stability of the long-term work by ensuring that the institutions can quickly adapt to disruptions, changes in customer behavior, or changes in regulations. The positive effects of readiness, interactivity, and the use of the IoT that were observed in this research indicate that the banks with stronger digital bases and more customer-focused digital platforms are in a better position to overcome competitive pressure originating in fintech, react to cybersecurity risks, and maintain service continuity during crises. These findings are consistent with recent results of the global banking systems that show that digital transformation makes operational flexibility and strategic resilience stronger ([2]; [25];[30]). These insights are significant to Jordanian banks to emphasize the strategic value of digital transformation, as it is very critical in not only improving the current performance but also ensuring future competitiveness.

Future research should build on these findings by adopting longitudinal and multi-method approaches to capture the dynamic and evolving nature of digital transformation. Comparative studies across countries in the Middle East and beyond would provide richer insights into how contextual factors shape outcomes. By expanding the scope of inquiry and integrating new technological dimensions, future research can provide further guidance for policymakers and practitioners navigating the complexities of digital transformation.

In conclusion, digital transformation represents both a necessity and an opportunity for Jordanian commercial banks. By investing in readiness, strengthening trust, enhancing interactivity, and leveraging IoT, banks can achieve higher levels of operational performance and secure their competitiveness in a rapidly digitizing financial landscape. The path forward requires coordinated action across institutional, managerial, and regulatory levels, ensuring that the promise of digital transformation translates into tangible outcomes for banks, customers, and the broader economy.

References

[1] Verhoef, P. C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Dong, J. Q., Fabian, N., & Haenlein, M. (2021). Digital Transformation: A Multidisciplinary Reflection and Research Agenda. *Journal of Business Research*, 122, 889–901. https://doi.org/10.1016/j.jbusres.2019.09.022

[2] Do, T. D., Pham, H. A. T., Thalassinos, E. I., & Le, H. A. (2022). The Impact of Digital Transformation on Performance: Evidence from Vietnamese Commercial Banks. Journal of Risk and Financial Management, 15(1), 21. https://doi.org/10.3390/jrfm15010021

[3] Al-Smadi, M. O. (2023). Examining the relationship between digital finance and financial inclusion: Evidence from MENA countries. *Emerging Markets Finance and Trade*.

[4] Al-Okaily, M., Alsmadi, A. A., Alrawashdeh, N., Al-Okaily, A., Oroud, Y., & Al-Gasaymeh, A. S. (2023). The role of digital accounting transformation in the banking industry sector: An integrated model. Journal of Financial Reporting and Accounting, 22(2), 308–326. https://doi.org/10.1108/JFRA-04-2023-0214

[5] Al-Dmour, H., Saad, N., Basheer Amin, E., Al-Dmour, R., & Al-Dmour, A. (2023). The influence of the practices of big data analytics applications on bank performance: filed study. *VINE Journal of Information and Knowledge Management Systems*, *53*(1), 119-141.

[6] Michelotto, F., & Joia, L. A. (2024). Organizational digital transformation readiness: An exploratory investigation. Electronic Commerce Research and Applications, 19(4), 159. https://doi.org/10.3390/jtaer190400159

[7] Händel, M., Stephan, M., Gläser-Zikuda, M., Kopp, B., Bedenlier, S., & Ziegler, A. (2020). Digital readiness and its effects on higher education students' socio-emotional perceptions in the context of the COVID-19 pandemic. *Journal of Study on Technology in Education*, *54*(2), 267-280.

[8] Avirutha, A. (2018). The impact of digital transformation to business performance in Thailand 4.0 Era. Veridian E-Journal, Silpakorn University (Humanities, Social Sciences and arts), 11(5), 295-307.

[9] Li, W. (2023). Management Control System in the Business Network: Control and Trust. In *Strategic Management Accounting in a Network Economy* (pp. 263-291). Singapore: Springer Nature Singapore

[10] Van der Cruijsen, C., de Haan, J., & Roerink, R. (2021). Financial knowledge and trust in financial institutions. *Journal of Consumer Affairs*, *55*(2), 680-714.

[11] Md. Waliullah, Md. Zahin Hossain George, Md. Tarek Hasan, et al. (2025). Assessing the influence of cybersecurity threats and risks on the adoption and growth of digital banking: A systematic literature review. *arXiv*, March 2025.

[12] Yuan, R. (2024). The role of interactivity in enhancing customer engagement on sharing economy platforms. *Journal of Business Research*, 178, 114658.

[13] Shankar, A. (2021). Impact of mobile banking application interactivity on consumer engagement: An Experiment-based investigation. Journal of Global Information Management (JGIM), 30(5), 1-18.

[14] Anbazhagan, A., Guru, K., Masood, G., Mandaviya, M., Dhiman, V., & Naved, M. (2022, June). Critically Analyzing the Concept of Internet of Things (IOT) and How It Impacts Employee and Organizational Performance. In *Proceedings of Second International Conference in Mechanical and Energy Technology: ICMET 2021, India* (pp. 121-130). Singapore: Springer Nature Singapore.

[15] Kariuki, P. (2024). Internet of Things on Banking Processes in South Africa: A Systematic Literature Review. *Journal of African Business*, 25(3), 295–314.

[16] Lampropoulos, G., Siakas, K., & Anastasiadis, T. (2019). Internet of things in the context of industry 4.0: An overview. *International Journal of Entrepreneurial Knowledge*, 4-19.

[17] Liu, T. & Qi, J. (2024). The mechanism of enterprise digital transformation on resilience from the perspective of financial sustainability. Sustainability, 16(17), 7409. https://doi.org/10.3390/su16177409

[18] Creswell, J. W., & Creswell, J. D. (2023). Research design: Qualitative, quantitative, and mixed methods approaches (6th ed.). Sage Publications.

[19] Central Bank of Jordan. (n.d.). Retrieved August 6, 2025, from https://www.cbj.gov.jo/

[20] Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2022). Multivariate data analysis (9th ed.). Cengage Learning.

[21] Al-Nahar, F. & Masha'al, D. (2019). The Impact of Internet of Things (IoT) on Financial Services Quality: Field Study in Jordanian Commercial Banks.

[22] Yu, J., Wang, J., & Moon, T. (2022). Influence of Digital Transformation Capability on Operational Performance. *Sustainability*, 14(13), 7909.

[23] Vial, G. (2022). Understanding digital transformation: A review and research agenda. *MIS Quarterly Executive*, 21(1), 45–72.

[24] Al-Sarhan, A. S. (2025). Individual and technological factors affecting the adoption of blockchain technology in the Jordanian banking sector: The moderating role of trust in technology. In H. Alshurafat (Ed.), *Innovative Law and Business in the Digital Era* (pp. 73–82). Springer. https://doi.org/10.1007/978-981-96-5773-5_8

[25] Khattak, M. A., Ali, M., & Azmi, W. (2023). Digital transformation, diversification and stability: What do we know about banks? *Economic Analysis and Policy*, 78, 122–132. https://doi.org/10.1016/j.eap.2023.01.010

[26] Alshehadeh, A. R., Al-Zaqeba, M. A. A., Elrefae, G. A., Al-Khawaja, H. A., & Aljawarneh, N. M. (2024). The effect of digital zakat and accounting on corporate sustainability through financial transparency. Asian Economic and Financial Review, 14(3), 228-249.

[27] Alshehadeh, A. R., Elrefae, G. A., Al-Khawaja, H. A., Bagustari, B. A., Eletter, S. F., & Belarabi, A. (2022, November). The Role of Data Mining Tools in Commercial Banks' Cyber-Risk Management. In 2022 Ninth International Conference on Social Networks Analysis, Management and Security (SNAMS) (pp. 1-8). IEEE.

[28] Alshehadeh, A. R., Al-khawaja, H., Alia, M. A., Kourtel, F., Injadat, E., & Jebril, I. H. (2023). The Impact of Operational Characteristics on the Total Risk Management: Evidence From the Industrial Firms. In 2023 International Conference on Information Technology (ICIT) (pp. 47-50). IEEE.

[29] Al-Ani, M., Al-Shayea, Q., Alshehadeh, A. R., Bagustari, B. A., & Al-khawaja, H. A. (2024). Creating Visual Knowledge Representation Based on Data Mining in Educational Jordanian Databases. International Journal of Advances in Soft Computing & Its Applications, 16(1).

[30] Al Obaidy, A. L. A., Alshehadeh, A. R., Al-Khawaja, H. A., Basheti, I. A., & Al-Zaqeba, M. A. A. (2024). Development of a new concept and definition of inheritance risk management in family businesses toward sustainability. International Journal of Advanced and Applied Sciences, 11(6), 1-13.

Notes on contributors

Faisal Aburub is a professor of Information Systems within the Faculty of Administrative and Financial Sciences at University of Petra, Jordan. Faisal completed his PhD in the University of the West of England - Bristol-UK. He joined University of Petra in September 2001. His primary areas of research are business process modelling, business process reengineering, organizational agility and ERP systems. His research has been published extensively in academic journals and conferences. Professor Aburub's research has focused significantly on bridging the gap between system models and business process models. His research has focused on using practical methods for modelling complex organizational settings and the potential role of IT systems within them.

Senior lecturer at the University of Qatar, teaching Operations Management and Project Management for undergraduate and graduate students. Saad has over 15 years' experience working in project management of real estate development industry and his PhD centres around Servitization in project based businesses. During his working experience, Saad implemented several administrative and support functions and contributed in developing new ideas and solutions to organize work flow of several construction and industrial projects.