“Factors driving digital transformation: Technological, organizational, and environmental perspectives from Jordanian banks”

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FACTORS DRIVING DIGITAL TRANSFORMATION: TECHNOLOGICAL, ORGANIZATIONAL, AND ENVIRONMENTAL PERSPECTIVES FROM JORDANIAN BANKS

Abstract

In recent years, the digital transformation of financial institutions has gained the attention of researchers and practitioners all over the world. This study investigates the impact of organizational, environmental, and technological factors on the digital transformation process of Jordanian banks. The approach used in this study is quantitative, and an online questionnaire was forwarded to employees in 15 Jordanian banks. The convenience sampling method was utilized to collect data from 286 participants with a response rate of 35%. Partial least squares structural equation modeling was used for analysis. The results show a significant positive relationship between organizational, environmental, and technological factors and digital transformation, which confirmed the imperative role of organizational, technological, and environmental factors in the digital transition process in Jordanian banks. The results highlight the need for Jordanian banks to develop explicit strategies that involve the integration of new technologies, regulatory frameworks that encourage modern technology adoption, and dealing with different environmental factors. The study thus proposes recommendations for Jordanian banks to achieve maximum benefit from digital transformation and manage the difficulties arising from this transformation in the changing banking sector.

Keywords digital transformation, technological factors, organizational factors, environmental factors, banking sector

JEL Classification M15, O33, G21

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INTRODUCTION

The rapid growth of the digital economy has forced many countries worldwide to shift their economic drivers (Ji & Li, 2022). Thus, there has been a significant global shift towards Digital Transformation (DT) in the financial sector. DT is a strategy change to use technology's potential across all company components to increase competitiveness and create long-term value (Babiker & Elfaki, 2023). It incorporates digital technology like artificial intelligence, the Internet of Things, and big data analytics into every aspect of organizations, altering how businesses function and provide value to clients (Al-Okaily, 2023). However, DT boosts productivity, promotes creativity, and helps businesses develop new products and services that meet the changing needs of their clients (Babiker & Elfaki, 2023; Maletic et al., 2023). In contrast, companies may face cybersecurity risks, as newly developed digital systems can become targets of cyberattacks if not adequately protected (Härting et al., 2023). Furthermore, management and staff may oppose reforms owing to ignorance or apprehension about future consequences (Šimberová et al., 2022).

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The banking sector in Jordan has experienced a significant change due to DT, which has improved customer experience, accessibility, and efficiency. Electronic wallets, online payment systems, and mobile banking applications are digital tools and technologies Jordanian banks have adopted to provide more efficient and accessible services (Qasrawi et al., 2024). However, DT has been examined in several studies across various industries and geographical regions (Hussain & Papastathopoulos, 2022; Maletic et al., 2023; Stanković et al., 2022; Thipwiwatpotjana, 2021; Yousef, 2023); nevertheless, there is limited literature regarding the financial sector in Jordan. The previous studies lack adequate empirical evidence regarding the factors influencing DT in the Jordanian banking sector (Mohammed et al., 2024; Qatawneh, 2024). Therefore, this study aims to examine how technological, organizational, and environmental factors affect DT in Jordanian banks.

1. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

There are divergent opinions among academics on the phrase DT. However, Verhoef et al. (2021) identified three stages of the digital transition process: digitization, digitalization, and DT. DT is the most prevalent phase, characterized by an organization-wide transformation that creates new business models that may be novel to the focus business or the industry. As a result, DT affects the entire company and its business practices by going further beyond digitization, which entails changing fundamental organizational roles and processes (Ji & Li, 2022). It reorganizes the procedures to change an organization's business value-generating process (Papathomas & Konteos, 2024). Therefore, DT may be defined as using digital technology in a company's operations to create new value chains, improve performance, and elevate customer experience while adapting to the changing competitive landscape.

The determinants of DT in small and medium-sized enterprises in (27) European countries and (12) non-European countries were studied by Omrani et al. (2022). They found that the information technology infrastructure and innovation level are the main drivers of DT. The technological factors impacting DT encompass all current technologies, both those used internally by the company and external cutting-edge technologies that are on the market but have not yet been adopted by the company (Gupta & Bose, 2022). However, the current study focuses on two technological factors: technology infrastructure and the relative advantage of information systems.

Mohammad et al. (2022) studied the influence of technological factors in using business intelligence and analytics at Jordan Arab Bank. The findings revealed that the technological infrastructure capabilities positively influenced business intelligence and analytics. A similar finding was presented by Mohammed et al. (2024), who studied the adoption of business intelligence and analytics in the Jordanian banking sector. The authors mentioned that the use of such technologies increased the effectiveness of decision-making and operational activities. They found that emerging technologies can make banking services more personalized with fraud detection systems and financial advice.

The relative advantage of information systems refers to the degree to which the implementation of a particular information system is thought to be better than its predecessor or alternative techniques (Acheampong & Moyaid, 2016). Qatawneh (2024) investigated how business intelligence technologies were implemented and affected decision-making in the Jordanian banking sector. The author found that adequate knowledge of data amplifies risk management processes, enhances decision-making, and improves customer experience and requirements. Thus, banks acknowledge various benefits of employing information systems, enabling them to utilize data for valuable insights that support informed decision-making and strategic planning (Awan et al., 2021).

Stanković et al. (2022) used data from (16) insurance companies to analyze the impact of technological, organizational, and environmental factors on the digitalization of the insurance industry in the Republic of Serbia. The findings demonstrated that environmental and organizational variables

significantly influence the insurance industry's digitalization. However, organizational factors influencing the adoption and execution of business DT initiatives incorporate organizational resources, capabilities, strategy, structure, and managerial characteristics (Ji & Li, 2022). However, the current study focuses on two organizational factors: top management support and organizational readiness.

Lutfi et al. (2022) investigated the factors impacting Jordan's small and medium-sized hotel sector's usage of big data analytics. The authors stated that senior management support enhances technology learning and diffusion inside the organization, which is crucial during the technology adoption phases. Moreover, Qatawneh (2024) argued that top management support enhances DT by coordinating change activities, securing vital resources, and facilitating communication among specialized divisions. This support is essential to shaping business culture and fostering employee DT as a fundamental aspect of their roles.

Organizational readiness refers to the availability of technical and financial sources within an enterprise necessary to adopt new technologies (Hussain & Papastathopoulos, 2022). Abed (2020) examined the implementation of digital social commerce in small and medium-sized firms in Saudi Arabia. Their findings emphasize a significant effect of organizational readiness on digital social commerce in small and medium-sized firms. In Thailand, Boonsiritomachai et al. (2016) examined the maturity level of business intelligence implementations in small and medium-sized firms. The authors found a positive relationship between organizational resources and business intelligence usage.

In Portuguese banks, Porfírio et al. (2024) studied the effect of attributes of bank employees, internal bank resources, and external factors on DT. They found that external factors, such as regulation, budgeting issues, and customers' digital experience, influence DT. In contrast, and against their expectations, Omrani et al. (2022) found that environmental factors had a minor impact on DT in small and medium enterprises. However, the current study focuses on two environmental factors: regulation compliance and industry competition.

Al-Okaily (2023), who studied the usage of accounting information systems in small and medium enterprises in Jordan, found that regulations impose high data security and privacy standards, requiring banks to improve their digital infrastructure, which assists consumers in establishing confidence in digital financial services. Furthermore, Liu (2021) argued that the rules of banks create a safe and dependable banking system that asks banks to innovate and adapt ceaselessly to meet the growing standards. Thus, a positively established observation of the regulatory framework becomes crucial in diffusing transformation (Qatawneh, 2024).

The industrial competition supports DT and causes the banks within the competition to innovate and implement appropriate technological solutions (Lutfi et al., 2022). Jin and Pan (2023) evaluated how government attention and industrial competition affected DT among enterprises in China. According to their results, government participation is critical in providing necessary infrastructure, policy support, and incentives, while market competition promotes DT by encouraging businesses to innovate. In the same country, Lu et al. (2024) examined the relationship between DT initiatives, competitive plans, and innovation results in Chinese publicly traded enterprises. They concluded that businesses need to enhance their digital capabilities in a highly competitive market to improve customer experience processes and reduce expenses.

Thus, a review of previous literature shows a lack of studies examining the factors affecting DT within the banking industry in Jordan. The present study expands the literature and examines how technological, organizational, and environmental factors affect Jordanian banks' DT. Accordingly, the following hypotheses were developed:

H1: Technology infrastructure positively affects the digital transformation in Jordanian banks.

H2: Relative advantage positively affects the digital transformation in Jordanian banks.

H3: Top management support positively affects the digital transformation in Jordanian banks.

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H4: Organizational readiness positively affects the digital transformation in Jordanian banks.

H5: Regulation compliance positively affects the digital transformation in Jordanian banks.

H6: Industry competition positively affects the digital transformation in Jordanian banks.

2. RESEARCH METHODOLOGY

This study uses a quantitative approach to examine the hypotheses of the study. A cross-sectional survey design was employed to gather data from bank employees. The difficulties in reaching and including all targeted workers from the research population of 15 Jordanian banks led to the employment of a convenience sampling method. This method allowed for obtaining the required data while ensuring its accurate representation of the total population (Sekaran, 2016). An online questionnaire was designed utilizing Google Forms for data collection. The respondents were provided with the link to this questionnaire after obtaining the required approval. Those banks are Arab Bank, Arab Banking Corporation, Bank of Jordan, Cairo Amman Bank, Capital Bank of Jordan, Jordan Commercial Bank, Jordan Kuwait Bank, Jordan Ahli Bank, The Housing Bank for Trade & Finance, Arab Jordan Investment Bank, Investbank, Bank al Etihad, Islamic International Arab Bank, Jordan Islamic Bank, and Safwa Islamic Bank. The questionnaire retrieved 286 valid responses. However, according to Krejcie and Morgan (1970), a sample size of 250 to 380 is enough for populations beyond 5000.

A questionnaire with five primary sections and 26 questions was designed to gather the requisite data to test the study's hypotheses. The questionnaire begins with five general questions about the respondents. Then, 21 questions were included; the independent variables comprised 18 questions relating to the technological, organizational, and environmental aspects employed in the study, and three questions were included to measure DT. A five-point Likert scale was used to gather essential data relating to the study variables. A total of 25 participants pretested the questionnaire to assess its language correctness and clarity. A pilot test was conducted with 35 participants to identify the possible issues in the survey design before distributing the questionnaire. The questionnaire was improved based on the pretest and pilot test feedback.

The Partial Least Squares Structural Equation Modelling (PLS-SEM) was used to analyze the collected data. PLS-SEM was selected due to its ability to enhance the accuracy of predictions by examining the relationships between dependent and independent variables. Additionally, PLS-SEM is appropriate for this study since it is less affected by small sample sizes and non-normal data distributions (Hair Junior et al., 2014). Hypothesis testing was performed utilizing SmartPLS version 4.0.7.8 software.

Table 1 demonstrates the demographic characteristics of the respondents. 60.8% of participants were males, while 39.2% were females. The predominant age group was from 30 to 40 years, comprising 35.3%, while 12.9% were aged over 50 years. Concerning academic qualifications, 2.4% had a diploma degree, 64.7% had a bachelor's degree, 30.8% had a master's degree, and 2.1% had a Ph.D. degree. Furthermore, 41.3% of participants had 5 to 9 years of experience, while 11.4% had more than 15 years of experience. Regarding the current position, 32.9% were employees, 51% were supervisors, and 16.1% were managers.

Table 1. Demographic characteristics of the sample

Variable	Category	Frequencies	Percentages
Gender	Male	174	60.8%
	Female	112	39.2%
Age	Less than 30 years	59	20.6%
	From 30 to 40 years	101	35.3%
	From 41 to 50 years	89	31.1%
	Over 50 years	37	12.9%
Academic Qualification	Diploma	7	2.4%
	Bachelor's	185	64.7%
	Master's	88	30.8%
	Ph.D.	6	2.1%
Work Experience	Less than 5 years	62	21.7%
	From 5 to 9 years	118	41.3%
	From 10 to 14 years	72	25.2%
	From 15 years and over	34	11.9%
Current Position	Employee	94	32.9%
	Supervisor	146	51.0%
	Manager	46	16.1%

3. RESEARCH RESULTS

To clarify and verify the model of the study, the researcher followed the model assessment stages outlined by Hair et al. (2019) as follows. The reliability of items and constructs was tested using Cronbach's alpha. All items demonstrated high reliability, with outer loadings exceeding the acceptable threshold of 0.7. This study evaluated the convergent and discriminant validity to determine the model items' validity. As shown in Table 2, all Average Variance Extracted (AVE) values were above the acceptable limit of 0.70, and the composite dependability value was higher than the 0.50 criterion. Prior findings indicate that the construct being studied exhibits convergent validity and shows adequate internal consistency of the resulting factor. The researcher used Heterotrait-Monotrait correlations to determine discriminant validity. The results of Heterotrait-Monotrait correlations presented in Table 3 showed that correlations were less than 0.9, which met the acceptable level.

The internal model's accuracy was evaluated using the Standardized Root Mean Square Residual (SRMR) and the Normed Fit Index (NFI). Table 4 indicates that the SRMR value was 0.07, below the acceptable threshold of 0.08, while the NFI value was 0.92, exceeding the adequate criterion of 0.9. The model's predictive power was assessed using the R-squared value. The model's R-square score for DT in the study was 0.66, which suggests significant explanatory power.

Table 4. Model fit indicators

Indicator	Saturated model	Estimated model
SRMR	0.034	0.037
NFI	0.925	0.923

In the second analysis phase, the study's hypotheses were tested. As shown in Table 5, the results indicate a notable positive impact of the technological factors: the technology infrastructure ($\beta = 0.311 \mid t = 6.100$) and the relative advantage ($\beta = 0.290 \mid t = 4.890$) on the DT of Jordanian banks, thereby accepting the study hypotheses *H1* and *H2*. Furthermore, the findings indicate a notable positive impact of the organizational factors: top management support ($\beta = 0.130 \mid t = 2.102$) and organizational readiness ($\beta = 0.285 \mid t = 6.095$) on the DT of Jordanian banks, thereby accepting the study hypotheses *H3* and *H4*. Furthermore, the environmental factors, regulatory compliance ($\beta = 0.324 \mid t = 7.112$), and industry competition ($\beta = 0.310 \mid t = 5.101$) positively impact Jordanian banks' DT, supporting the study hypotheses *H5* and *H6*.

Table 2. Convergent validity results

Construct Name	Cronbach's alpha	Composite Reliability	Average Variance Extracted
Digital Transformation	0.881	0.951	0.942
Technology Infrastructure	0.878	0.852	0.863
Relative Advantage	0.914	0.804	0.970
Top Management Support	0.940	0.927	0.898
Organizational Readiness	0.861	0.875	0.852
Regulation Compliance	0.923	0.921	0.964
Industry Competition	0.937	0.945	0.917

Table 3. Heterotrait-Monotrait correlation

Variables	1	2	3	4	5	6	7
Digital Transformation (1)	–	–	–	–	–	–	–
Technology Infrastructure (2)	0.482	–	–	–	–	–	–
Relative Advantage (3)	0.682	0.517	–	–	–	–	–
Top Management Support (4)	0.601	0.663	0.101	–	–	–	–
Organizational Readiness (5)	0.715	0.801	0.235	0.702	–	–	–
Regulation Compliance (6)	0.631	0.641	0.374	0.831	0.594	–	–
Industry Competition (7)	0.742	0.753	0.352	0.685	0.774	0.683	–

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Table 5. Results of hypotheses testing

Hypothesis	Coeff.	t-value	p-value	Decision
H1: Technology Infrastructure → DT	0.311	6.100	0.000	Accepted
H2: Relative Advantage → DT	0.290	4.890	0.000	Accepted
H3: Top Management Support → DT	0.130	2.102	0.000	Accepted
H4: Organizational Readiness → DT	0.285	6.095	0.000	Accepted
H5: Regulation Compliance → DT	0.324	7.112	0.000	Accepted
H6: Industry Competition → DT	0.310	5.091	0.000	Accepted

4. DISCUSSION

This study analyzes the factors influencing DT in Jordanian banks. From a technological viewpoint, it is proved that technology infrastructure reinforced DT in Jordanian banks. Advanced technological infrastructure allows banks to optimize operations, bolster data security, and elevate client experiences. They also give banks an opportunity to realize personalized services in real time by allowing for a proper response to changes in market situations. The result is consistent with findings that were approved by Jaradat et al. (2024). The study shows that information technology enables banks to offer tailored services that can cover their clients' needs and develop solutions that strengthen customers' loyalty. IT systems are essential for data protection and ensuring customers' privacy within the legal framework. Banks can use these technologies to devise innovative ideas and bring in new customers by providing innovative financial products and improving their digital services. This idea is supported by Lutfi et al. (2022) and Acheampong and Moyaid (2016).

From the managerial perspective, the study indicated that top managers within Jordan's banking sector have supported digital reforms. When top management is strongly supportive of digital projects, an inventive and adaptive culture is created across the organization. Senior managers carry out the majority of change management by articulating a clear strategic vision, forming group objectives with the workforce in mind, and allocating appropriate funds to digital projects. This finding is in agreement with the findings of Y.-M. Wang and Y.-C. Wang (2016) and Park and Kim (2021). For DT to be effective in banks, the readiness of the institution is a vital prerequisite. It reduces resistance to change and speeds up the pace of digital modernization through a competent workforce prepared with the skills and knowledge needed for creativity and a focused strategic vision. This finding aligns with the conclusions of Mohammed et al. (2024) and Maroufkhani et al. (2023).

The environmental factors, as indicated by the study, positively influence DT in the Jordanian banking industry. In addition, it helps build customer confidence in banks by protecting sensitive financial information in a safe digital space through regulatory compliance of the institutions. Moreover, it minimizes the risk of fraud, data breaches, and financial crimes, thus securing the online environment and assuring the dependability and integrity of digital banking services. The results of Sekli and De La Vega (2021) and Alsmadi et al. (2022) agree with this finding. However, banks are driven by competitive pressures to improve service delivery and operations and adopt new technologies. It also encourages the creation of customer-centric digital solutions, including cybersecurity, tailored financial services, and mobile banking applications. Competition will see banks automate and digitize their business to reduce costs and increase productivity. Thus, banks are constantly improving their business practices and maintaining their competitive advantage to meet the needs of changing market customers. The findings of Lu et al. (2024) and Jin and Pan (2023) support this finding.

CONCLUSIONS AND RECOMMENDATIONS

This study examines how technological, organizational, and environmental factors affect DT in the banking industry in Jordan. The study findings highlight the importance of technological factors, such as the role of modern technologies and the relative advantage of information systems, in promoting DT

in banks in Jordan. It also confirmed the role of organizational factors, including management support and organizational readiness, in supporting DT in banks in Jordan. This study emphasizes that the environmental variables, in particular, market competitiveness and regulatory compliance, play a significant role in the DT process.

The current study identifies a group of actions that help practitioners enhance DT in the banking sector in Jordan. The IT department of the banks needs to assess the existing technological infrastructure to find weaknesses and areas for development, making sure that it is in line with bank goals and using technological tools to enhance customer insights and enable customized solutions. Moreover, the banks' top management has to present a DT plan that supports the banks' goals, motivates employees at all levels, and includes stakeholders. Additionally, banks should implement training programs to enhance employee skills, ensuring they possess the requisite competencies to utilize new technologies proficiently. Finally, banks should formulate a DT strategy integrating regulatory compliance as a fundamental element and invest in technology like RegTech solutions to automate compliance operations, enhance reporting accuracy, and reduce human workloads.

This study offers an understanding of the factors influencing DT in the banking sector in Jordan. However, it has some limitations. The study focused on banks in Jordan, thereby limiting the applicability of the results to other sectors. Hence, to thoroughly understand DT, the upcoming research should encompass a broader range of sectors. Additionally, the study uses quantitative methodologies; therefore, it is recommended for future research to use qualitative analysis to enhance knowledge and provide further evidence concerning the variables affecting DT. Finally, further investigations can expand the study by incorporating other variables that might affect DT.

AUTHOR CONTRIBUTIONS

Conceptualization: Mohammad O. Al-Smadi.
Data curation: Mohammad O. Al-Smadi.
Formal analysis: Mohammad O. Al-Smadi.
Investigation: Mohammad O. Al-Smadi.
Methodology: Mohammad O. Al-Smadi.
Writing – original draft: Mohammad O. Al-Smadi.
Writing – reviewing & editing: Mohammad O. Al-Smadi.

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