TRANSFORMATION IN ENHANCING FINANCIAL INCLUSION AND THE MEDIATING ROLE OF PERFORMANCE EFFICIENCY: AN APPLIED STUDY ON COMMERCIAL BANKS' STRATEGY

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Abstract

This study aimed to explore the impact of digital transformation on enhancing financial inclusion in Jordanian commercial banks, focusing on the role of performance efficiency as a mediator in this relationship. The study employed a descriptive-analytical approach, distributing a questionnaire to 200 employees from 13 banks, and analyzing the data using SPSS v. 26 and SmartPLS software. The results showed a positive relationship between the dimensions of digital transformation (digital strategy, digital technologies, and digital skills) and both financial inclusion and performance efficiency. This can be attributed to digital transformation enhancing performance efficiency by reducing human errors, speeding up processing and auditing, improving collaboration, and enhancing communication between employees and clients, thereby contributing to increased financial inclusion. Additionally, the results indicated that performance efficiency plays a partial mediating role in the relationship between digital transformation and financial inclusion, as digital transformation enhances performance efficiency by minimizing human errors and accelerating procedures, which contributes to greater financial inclusion. In light of these findings, the study recommends that commercial banks in Jordan focus on developing digital transformation strategies, updating technological infrastructure, and providing appropriate training for employees to foster a culture of innovation.

Keywords: Digital Transformation, Digital Technologies, Digital Transformation Skills, Digital Strategy, Financial Inclusion, Performance Efficiency, Commercial Banks

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1. INTRODUCTION

The world has been experiencing a massive digital revolution over recent decades, in light of the rapid technological advancements in artificial intelligence, cloud computing, and machine learning. This has transformed the concept of banking from traditional practices to digital operations, which offer customers easy and convenient access to their bank accounts from anywhere, at any time, and at minimal cost (Morsi & Moussaoui, 2023).

Digital transformation provides innovative financial services such as online purchases and transfers, online banking, and automated teller machine (ATM) services. In this context, Agboola et al. (2019) indicate that the adoption of digital transformation by banks is accompanied by several negative aspects, most notably financial fraud, and cybercrime. Conversely, Kassem and Rashwan (2020) indicate that the adoption of digital transformation by banks can contribute to enhancing financial inclusion by providing several benefits to banks. These benefits include improving the quality of procedures for accessing banking services and products, fostering creative and entrepreneurial opportunities in these services, and achieving high customer satisfaction with flexibility and harmony. It is a comprehensive program that affects all financial and banking institutions, both internally and externally, to provide financial services in a more accessible, faster, and cost-effective manner. This aligns with Do et al. (2022) who point out that the adoption of digital transformation strategies by financial institutions can achieve high levels of performance efficiency through the optimal use of available resources (physical, financial, and human) over the medium and long term. This, in turn, can contribute to providing numerous banking services in a manner that enhances financial inclusion.

To keep pace with the era of digital transformation and the rapid advancements in financial technology and associated financial innovations, it has become imperative for the banking sector to adopt these developments. They are crucial elements affecting the sector's performance, reducing operational costs, and improving the quality of banking services provided to customers. This helps retain current customers, increase their satisfaction and loyalty, and attract more customers in the future (Durguti et al., 2023). Generally, organizational performance is measured by the level of customer satisfaction with the services provided to them (Khadka & Maharjan, 2017).

In light of the above and considering the importance of digital transformation in the banking sector and its impact on financial inclusion and performance efficiency, this study aims to explore the role that digital transformation can play in enhancing financial inclusion in Jordan particularly through the mediating role of performance efficiency in Jordanian in Jordan commercial banks.

Despite the significant progress made by the Jordanian banking sector in adopting digital technology over the past few years, the level of financial inclusion in Jordan remains below the expected standard. The National Financial Inclusion Strategy (2023–2025) issued by the Central Bank of Jordan (CBJ, 2023) indicates that the percentage of Jordanians using basic financial services does not exceed 43%.

Therefore, in the absence of studies analyzing the impact of digital transformation on enhancing financial inclusion in Jordan, the research problem revolves around assessing the impact of digital transformation with its dimensions (digital technologies, digital skills, and digital strategy) on enhancing financial inclusion, while considering the mediating role of performance efficiency in Jordanian commercial banks.

Consequently, and given the absence of studies analyzing the impact of digital transformation on enhancing financial inclusion in Jordan, the research problem revolves around testing the impact of digital transformation, with its dimensions (digital technologies, digital transformation skills, and digital strategy), on enhancing financial inclusion, considering the mediating role of performance efficiency in Jordanian commercial banks.

In light of this, the following research questions can be posed:

RQ1: What is the relative importance of digital transformation with its dimensions (digital technologies, digital transformation skills, and digital strategy), financial inclusion, and performance efficiency?

RQ2: Is there an impact of digital transformation with its dimensions (digital technologies, digital transformation skills, and digital strategy) on enhancing financial inclusion in Jordanian commercial banks?

RQ3: Is there an impact of digital transformation with its dimensions (digital technologies, digital transformation skills, and digital strategy) on performance efficiency in Jordanian commercial banks?

RQ4: Is there an impact of performance efficiency on enhancing financial inclusion in Jordanian commercial banks?

RQ5: Is there an impact of digital transformation with its dimensions (digital technologies, digital transformation skills, and digital strategy) on enhancing financial inclusion in the context of performance efficiency in Jordanian commercial banks?

Regarding the significance of the study, it holds exceptional theoretical and practical importance due to its focus on a contemporary and crucial topic: the impact of digital transformation on financial inclusion in the Jordanian banking sector, considering the mediating role of performance efficiency. From a theoretical standpoint, the study enriches knowledge in this field by analyzing the relationship between these three variables for the first time, and it also contributes to filling a gap in Arab research. Furthermore, it paves the way for further studies and enriches the Arab and Jordanian literature. From a practical perspective, the study provides valuable findings and recommendations for decision-makers in the Jordanian banking sector, which can help them improve their strategies and make informed decisions to enhance performance efficiency and expand the scope of banking services, thereby contributing to achieving financial inclusion and improving the lives of all segments of Jordanian society.

A review of global databases reveals a significant lack of research exploring the triadic relationship between digital transformation, financial inclusion, and performance efficiency in commercial banks at both national and international levels. In this context, this study is considered pioneering in its aim to bridge this research gap by focusing on the impact of digital transformation on financial inclusion while highlighting the mediating

role of performance efficiency in Jordanian commercial banks. Given the limited number of studies addressing this relationship, this research represents an important step towards enriching academic knowledge, as it emphasizes the vital role of digital transformation in enhancing financial inclusion. By providing innovative financial services and products that are easily accessible at any time and from anywhere, digital transformation can reduce costs and improve efficiency in the banking sector.

The structure of this paper is as follows. Section 2 reviews the relevant literature. Section 3 analyses the methodology that has been used to conduct empirical research on transformation in enhancing financial inclusion and the mediating role of performance efficiency. Section 4 reports on results and discussion. Section 5 captures the conclusion.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

2.1. Theoretical framework

Digital transformation is a complex process that necessitates the commitment of an organization's entire resource base — human, material, organizational, and technological to the implementation of available digital technologies across the organization, particularly within operational processes (Kutnjak et al., 2019). According to Stark (2020), digital transformation signifies a profound shift in business models, competencies, organizational structures, processes, and commercial practices through the utilization of digital technologies, ultimately aimed at fulfilling customer needs and achieving satisfaction.

Digital technologies are a rapidly evolving field within the financial industry, characterized by the application of technology to enhance financial performance and develop innovations in financial services.

Digital transformation skills encompass the abilities that equip employees to adapt to technological advancements and effectively interact with digital platforms and tools that support the bank's journey towards digital transformation (Shehadeh, 2022).

Digital strategy refers to the business strategy formulated and executed by leveraging digital resources to create a competitive advantage (Korachi & Bounabat, 2020).

Financial inclusion refers to a process consisting of a set of plans, policies, decisions, and strategies that enable formal financial institutions to reach all segments of society, attract them to access their services, and use these services at a low cost and with high quality and speed, thus integrating them into the formal system on the one hand and improving their living conditions and meeting their needs on the other (Hussein & Lefta, 2019).

Performance efficiency refers to the result of optimal utilization of the resources available in the bank, in addition to the effects of the surrounding environment, including social, economic, cultural, and technological.

Regarding the relationship that analyzes the triple link between digital transformation, performance efficiency, and financial inclusion, there is a strong relationship between these variables in the banking sector, as digital transformation represents a huge revolution in the financial sector, and constitutes a major gateway to enhancing financial inclusion and banking performance efficiency, as it allows easy access to financial services through the Internet and smart applications, which removes geographical barriers and reduces reliance on traditional bank branches. In addition, digital transformation can make financial services available to a wide range of society, as it contributes to reducing the cost of providing services, which enables banks to provide affordable services that suit the needs of low-income individuals. The impact of digital transformation is not limited to financial inclusion only, but extends to enhancing the efficiency of banking performance by reducing human errors, accelerating processing and auditing operations, analyzing big data and better understanding customer behavior, improving communication within banking institutions, and enhancing cooperation and information exchange between employees.

Hence, digital transformation is an important element in achieving integration between financial inclusion and banking performance efficiency. By adopting modern technology and digital systems, banks can provide affordable and accessible financial services that meet the needs of all segments of society, contributing to sustainable economic development.

2.2. Previous studies

The researchers conducted a review of the literature related to the study topic, presented chronologically from the most recent to the oldest as follows further.

Telukdarie and Mungar (2023) explored the impact of digital financial technology on accelerating financial inclusion in several developing economies. The researchers used quantitative and qualitative methods to analyze these variables' relationships. The results indicated that digital financial technologies could significantly expand financial inclusion by attracting a larger population who previously did not have bank accounts to engage with banking institutions. The results also pointed out that access to financial services in remote areas is limited due to a lack of infrastructure.

Hassan et al. (2023) investigated the effects of digital transformation on the implementation of financial inclusion policies at Egyptian Natural Gas Holding Company (EGAS), using a descriptive-analytical approach. The study found that digital transformation is crucial and that the digital transformation at EGAS is partial rather than complete, requiring significant effort to achieve full digital transformation. The study also revealed that the company is seeking to reorganize its management structure to keep pace with and adapt to digital transformation.

Sodokin et al. (2022) tested the impact of digital transformation on banking stability and financial inclusion across 36 sub-Saharan African countries. The study concluded that digital transformation positively affects both banking stability and financial inclusion in the region. Digital technologies improve the efficiency of banking operations, reduce financial risks, and increase transparency in the financial system.

El Haddad (2022) focused on the impact of digital transformation on internal auditing in Egyptian banks and its reflection on financial inclusion.

The researcher used an inductive approach along with conducting a field study to achieve the study's objective. The study. Showed that implementing digital transformation can enhance the effectiveness of internal auditing in Egyptian banking institutions. Additionally, digital transformation leads to the expansion of financial services usage and increases financial inclusion in these institutions.

Amudhan et al. (2022) attempted to analyze the impact of digital transformation on the Indian banking sector, with a particular focus on customers in rural and remote areas. The study highlighted the importance of both technological infrastructure and digital skills in achieving this transformation. The results showed that digital transformation improved the customer experience in accessing financial services and increased efficiency in banking operations. The findings also revealed several challenges facing the Indian banking sector, such as inadequate network facilities, poverty, economic backwardness, and the vast population.

Khams (2021) measured and analyzed the impact of digital transformation on the job performance of employees in Egyptian commercial banks. The results indicated a significant positive correlation between digital transformation and dimensions of job performance among employees in these banks. This suggests that banks that have successfully implemented digital transformation strategies have experienced improvements in employee performance and enhanced service delivery.

Boumoud et al. (2020) explored how financial technology contributes to the development of performance in Arab Islamic banks. The adoption of innovative digital technologies enhances efficiency and improves customer experience in these banks, positively affecting their competitiveness in the financial market. The study focused on the case of Emirates Islamic Bank and AL Baraka Bank Bahrain, considering the qualitative leap in the financial technology capabilities utilized by these banks.

Hadi and Hmood (2020) investigated the competitive landscape of the Iraqi banking sector, highlighting the role of digital transformation in intensifying competition among financial institutions. The study emphasized the importance of financial capabilities in implementing strong digital strategies, contributing to the growing competitive environment among financial institutions in providing their services.

Shahata (2020) examined the relationship between digital transformation and financial inclusion, identifying several key dimensions: expanding access to financial services. The study found that digital transformation has an impact on enhancing dimensions of financial inclusion by leveraging modern technologies to increase the use of financial services, diversify service offerings, and enhance e-governance.

Kassem and Rashwan (2020) highlighted the role of digital transformation in enhancing the competitiveness of banks, improving service quality, attracting investments, and increasing transaction efficiency. The study concluded that digital transformation elevates the level of banking services, accelerates transactions between individuals and investors, and ensures their accuracy and speed. Additionally, the technologies resulting from digital transformation help in monitoring the quality of electronic services.

Votintseva et al. (2019) assessed the capabilities of Russian local banks in the digital transformation process, as well as analysed the impact of digital transformation processes on customer satisfaction and competition among Russian local banks. The study focused on competition among banks in providing innovative services, investment in artificial intelligence technologies, and mitigating digital transformation risks. The study showed a positive relationship between digital transformation and customer satisfaction.

Musa et al. (2015) compared the Nigerian banking sector during two periods, before and after the adoption of online banking services, and the impact of this on the performance of the banking sector in Nigeria. The study results indicated that the expansion of digital banking services significantly contributed to the implementation of financial inclusion in Nigeria by improving customer access via the Internet and financial account management and providing effective communication channels between banks and customers.

A review of the previous literature reveals a significant focus on examining the impact of digital banking services on various performance metrics in the banking sector, as well as the associated risks. While this literature provides valuable insights, it also shows differences in methodology, geographical scope, and the indicators used to represent digital transformation, financial inclusion, and banking performance. Consequently, these variations create opportunities for academics to conduct further research to address knowledge gaps and deepen the understanding of the interaction between digital transformation, financial inclusion, and performance efficiency in the sector.

2.3. Research hypotheses

Based on the research problem and the conceptual framework presented in Figure 1, the researchers formulated the following hypotheses:

H1: There is a statistically significant impact at the significance level ($\alpha \leq 0.05$) of digital transformation with its dimensions (digital technologies, digital transformation skills, and digital strategy) on enhancing financial inclusion in Jordanian commercial banks.

H2: There is a statistically significant impact at the significance level ($\alpha \leq 0.05$) of digital transformation with its dimensions (digital technologies, digital transformation skills, and digital strategy) on the performance efficiency of Jordanian commercial banks.

H3: There is a statistically significant impact at the significance level ($\alpha \leq 0.05$) of performance efficiency on enhancing financial inclusion in Jordanian commercial banks.

H4: There is a statistically significant impact at the significance level ($\alpha \leq 0.05$) of digital transformation with its dimensions (digital technologies, digital transformation skills, and digital strategy) on enhancing financial inclusion in the context of performance efficiency in Jordanian commercial banks.

3. RESEARCH METHODOLOGY

The study adopted the descriptive analytical approach to analyze and interpret the research phenomenon. Primary data were collected through

a questionnaire directed to the study community, while the study relied on various secondary sources including books, scientific journals, previous studies, and electronic references. The data were subjected to appropriate statistical analysis.

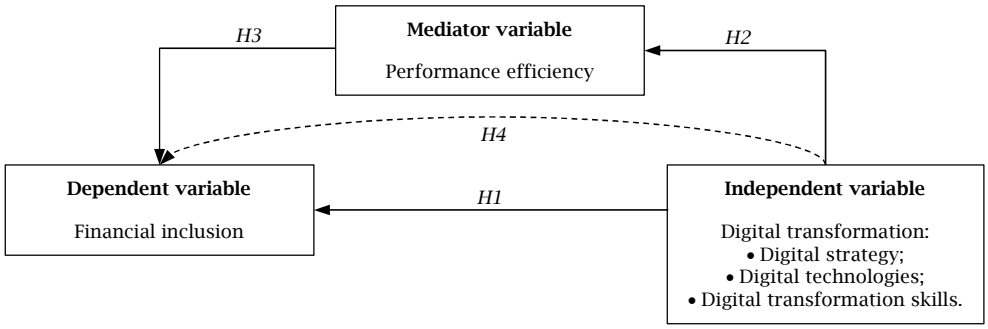
3.1. Study population and sample

The study targeted 200 employees from 13 commercial banks in Amman, Jordan, stratified between senior management positions and information technology (IT) staff. The survey was distributed electronically to ensure data quality.

3.2. Study model

The study model was developed based on the study's questions and objectives, illustrating the independent and dependent variables, along with their directional relationships as shown in Figure 1. Accordingly, a hypothetical model was designed for the current study, the model consists of three primary variables: *digital transformation*, serving as the independent variable with its three dimensions (digital technologies, digital transformation skills, and digital strategy); *performance efficiency*, acting as the mediating variable; and *financial inclusion*, as the dependent variable.

Figure 1. Study model



Source: Authors' elaboration based on the studies by Ditshego (2018), Hamad (2020), Qasi and Paulsnam (2022), Khams (2021), El Haddad (2022), Benkaidaa (2023), Sighi (2023), Makhareta et al. (2024), and Yousif (2024).

3.3. Statistical methods used

To obtain the results of the study, the following statistical methods were used:

- SPSS v. 26 to conduct a comprehensive statistical analysis.
- Descriptive statistics characterized the sample.
- Pearson correlation assessed survey validity.
- Multiple regression analysis tested the hypothesized relationships between variables in the research model.
- Tests for multicollinearity (variance inflation factor — VIF) and normality of distributions (skewness coefficient) were conducted.
- SmartPLS evaluated the mediating effects in the structural model.

4. RESULTS AND DISCUSSION

4.1. Study tool

A research questionnaire was developed based on a comprehensive review of the relevant literature. This questionnaire was designed to measure the study variables (*digital transformation, financial inclusion*, and *performance efficiency*) and their respective dimensions. The questionnaire consisted of 37 items distributed across these three variables.

The questionnaire was divided into two sections:

- Section 1: Collected demographic and professional information from the participants.
- Section 2: Measured the study variables using 37 items, as detailed in Table 1.

Table 1. Distribution of items across study variables and their dimension

Study variables and dimensions		*Paragraph sequence*
Independent variable (*Digital transformation*)	1–5: Measuring digital technologies; 6–11: Measuring digital transformation skills; 12–16: Measuring digital strategy.	1–16
Dependent variable (*Financial inclusion*)	17–26: Measuring financial inclusion	17–26
Mediator variable (*Performance efficiency*)	27–37: Measuring performance efficiency	27–37

A 5-point Likert scale was used to assess the questionnaire as follows: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree.

Data analysis was conducted by calculating the mean score for each item. The results were categorized into three levels: high (3.68 and above), medium (2.34–3.67), and low (1.00–2.33). A high mean score indicated strong agreement among participants with the item, while a low mean score suggested disagreement.

4.2. Validity and reliability of the study tool

The validity and reliability of the research instrument were examined using the following methods:

- *Face validity*: The instrument was presented to experts in finance and administration for evaluation. It was adopted after achieving an 80% consensus among the experts.
- *Content validity*: The instrument was piloted with a sample of 25 participants. Pearson correlation coefficients were computed to assess the relationship between each dimension and its corresponding total

score, as well as among the dimensions of *digital transformation* and their respective items. The results revealed strong positive correlations at a statistically significant level ($\alpha \leq 0.05$), as shown in Table 2, supporting the construct validity of the instrument.

Table 2. Pearson correlation coefficients between each dimension of *digital transformation* and the total score for the dimension

Variable	*Number of items*	*Correlation coefficient with overall digital transformation dimensions*
Digital strategy	5	0.816**
Digital technologies	6	0.871**
Digital transformation skills	5	0.789**

*Note: ** Statistically significant at the level $\alpha \leq 0.05$.*

• *Internal consistency reliability:* Pearson correlation coefficients were calculated to assess the relationship between each item and the total score of its corresponding variable (*financial inclusion*, *performance efficiency*). The results revealed strong positive correlations, as presented in Tables 3 and 4, indicating the instrument's reliability and consistency in measuring the variables.

Table 3. Pearson correlation coefficients between each item of the dependent variable (*financial inclusion*) and the total score

Paragraph	*Correlation coefficient*	*Paragraph*	*Correlation coefficient*
17	0.519**	22	0.455**
18	0.329**	23	0.514**
19	0.468**	24	0.384**
20	0.308**	25	0.451**
21	0.463**	26	0.395**

*Note: ** Statistically significant at the level $\alpha \leq 0.05$.*

Table 4. Pearson correlation coefficients between each item of the mediating variable (*performance efficiency*) and the total score

Paragraph	*Correlation coefficient*	*Paragraph*	*Correlation coefficient*
27	0.370**	33	0.316**
28	0.715**	34	0.260**
29	0.666**	35	0.430**
30	0.824**	36	0.225**
31	0.442**	37	0.209**
32	0.260**		

*Note: ** Statistically significant at the level $\alpha \leq 0.05$.*

• Reliability: Cronbach's alpha coefficient was calculated to assess the internal consistency of the instrument. As shown in Table 5, the high alpha values obtained for all variables (*digital transformation, financial inclusion, performance efficiency*) and their dimensions indicate that the instrument is reliable and consistent.

Table 5. Cronbach's alpha coefficients for dimensions of the independent, dependent, and mediating variables

Variable	*Number of items*	*Cronbach's alpha*
Digital strategy	5	0.812
Digital technologies	6	0.920
Digital transformation skills	5	0.800
Overall digital transformation dimensions	16	0.908
Financial inclusion	10	0.917
Performance efficiency	11	0.924

As shown in Table 5, Cronbach's alpha coefficients are good and acceptable for research purposes.

4.3. Descriptive statistics of personal and professional characteristics of the study sample

The distribution of the study sample according to personal and professional characteristics, including gender, educational qualification, years of service, and job title, is presented in Table 6.

Table 6. Distribution of the study sample by demographic and professional characteristics

Category		*Frequency*	*Percentage*
Gender	Male	108	54%
	Female	92	46%
Educational qualification	Middle diploma	10	5%
	Bachelor's	128	64%
	Master's	48	24%
	Ph.D	14	7%
Years of service	1–5	40	20%
	6–10	78	39%
	More than 10	82	41%
Job title	Manager	29	14.5%
	Deputy manager	36	18%
	Assistant manager	52	26%
	IT staff	83	41.5%
Total		200	100%

The data shows that more than half (54.0%) of the sample are males. The majority of the sample (64.0%) hold a bachelor's degree. In terms of years of service, the largest group (41.0%) has been working for more than 10 years. Finally, the largest job title category is IT staff (41.5%).

4.4. Descriptive statistical analysis of the study variables

This section presents a descriptive statistical analysis of the data collected. Specifically, it provides the mean and standard deviation for all study variables and their respective items.

4.4.1. Independent variable: Digital transformation

Table 7 presents the descriptive statistics of respondents' answers regarding *digital transformation*. The overall mean score for the *digital transformation* dimension was high, with a value of 4.446 and a standard deviation of 0.219. The digital strategy dimension had the highest mean score (4.474), followed by digital skills (4.469), and then digital technologies (4.400).

Table 7. Descriptive statistics for the respondents' answers concerning *digital transformation*

Sequence of paragraphs	*Dimension*	*Mean*	*Standard deviation*	*Rank*	*Rating*
1–5	Digital strategy	4.474	0.287	1	High
6–11	Digital technologies	4.400	0.265	3	High
12–16	Digital transformation skills	4.469	0.240	2	High
1–16	Digital transformation dimensions	4.446	0.219	-	High

Table 8 presents descriptive statistics for each item within the digital strategy dimension. The results indicate a high level of agreement among respondents on all items. Item 5, stating that the bank can develop its digital strategies to keep pace with rapid developments, received the highest mean score (4.470) with a standard deviation of 0.575. Conversely, item 3, focusing on round-the-clock access to services, obtained the lowest mean score (4.310) with a standard deviation of 0.733.

Table 8. Descriptive statistics for each item within the digital strategy dimension

Number	*Statement*	*Mean*	*Standard deviation*	*Rank*	*Rating*
1	The bank has a clear and coherent digital strategy.	4.690	0.525	2	High
2	The digital strategy supports the bank's competitiveness, increasing its market share.	4.460	0.538	3	High
3	The digital strategy enables round-the-clock access to services for all customers without the need for physical presence at the bank.	4.310	0.733	5	High
4	Digital strategies contribute to easier use of services by customers.	4.440	0.573	4	High
5	The bank could evolve its digital strategies to keep pace with rapid development.	4.470	0.575	1	High

Table 9 presents the descriptive statistics for the digital technologies dimension. The mean scores for all items within this dimension were high, ranging from 4.305 to 4.472. Item 10, indicating that the trend towards implementing *digital transformation* in banks leads to an increase in customers' use of banking applications instead of visiting bank branches, had the highest mean score (4.472). Conversely, item 9, regarding the growth of mobile and online payments, had the lowest mean score (4.305).

Table 9. Descriptive statistics for the digital technologies dimension

Number	*Statement*	*Mean*	*Standard deviation*	*Rank*	*Rating*
6	The bank utilizes user-friendly digital technologies and applications.	4.340	0.698	5	High
7	The bank employs digital technologies to reach a wider customer base.	4.430	0.589	3	High
8	The bank develops technological applications to suit its customer services.	4.385	0.546	4	High
9	There is a growing trend of mobile and online payments.	4.305	0.717	6	High
10	The trend towards digital transformation in banks is leading to increased customer usage of banking apps instead of visiting physical branches.	4.472	0.575	1	High
11	The bank views digital technologies as a means to promote financial inclusion.	4.470	0.557	2	High

Table 10 presents the descriptive statistics for the digital skills dimension. The results indicate a high level of agreement among respondents on all items. Item 15, "Employees have the ability to manage or work and adapt in a fast-paced and flexible environment", had the highest mean score (4.530), indicating a high level of agreement among respondents. In contrast, item 14, "Employees have the skill to provide new digital services to increase competitiveness", had the lowest mean score (4.395).

Table 10. Descriptive statistics for the digital skills dimension

Number	*Statement*	*Mean*	*Standard deviation*	*Rank*	*Rating*
12	Employees possess advanced digital skills in banking operations.	4.465	0.557	3	High
13	Employees have the skill to develop banking services to meet customer needs.	4.525	0.501	2	High
14	Employees have the skill to introduce new digital services to increase competitiveness.	4.395	0.530	5	High
15	Employees have the ability to manage or work and adapt in a fast-paced and flexible environment.	4.530	0.539	1	High
16	Digital skills contribute to significant changes and a leap in banking services provided to customers.	4.430	0.563	4	High

4.4.2. Dependent variable: Financial inclusion

Table 11 shows that the overall mean score for the *financial inclusion* dimension was high, with a mean of 4.484 and a standard deviation of 0.229. All items within the *financial inclusion* dimension also had high mean scores. Item 25, "The bank ensures the safe use of these banking services", had the highest mean score (4.573) with a standard deviation of 0.516. On the other hand, item 26, "The bank ensures the confidentiality of customer data and prevents data breaches", had the lowest mean score (4.450) with a standard deviation of 0.519.

Table 11. Descriptive statistical analysis of *financial inclusion* items

Number	*Statement*	*Mean*	*Standard deviation*	*Rank*	*Rating*
17	The bank has branches in all governorates of the kingdom.	4.455	0.556	8	High
18	The bank provides ATMs in all areas.	4.472	0.500	4	High
19	Easy access for customers to banking services online.	4.470	0.557	6	High
20	The bank's website covers all banking services that customers need.	4.515	0.501	3	High
21	The bank is developing its service delivery mechanisms to reach the widest possible customer base.	4.460	0.529	7	High
22	The bank provides financial services to customers in the least time and at the lowest cost.	4.455	0.547	9	High
23	All segments of society can easily use the services provided by the bank.	4.525	0.567	2	High
24	The bank provides a guide on its website to explain how to use the services.	4.471	0.520	5	High
25	The bank ensures the safe use of these banking services.	4.573	0.516	1	High
26	The bank guarantees the confidentiality of customer data and prevents its breach.	4.450	0.519	10	High

4.4.3. Mediator variable: Performance efficiency

Table 12 shows that the overall mean score for the *performance efficiency* dimension was high, with a mean of 4.343 and a standard deviation of 0.281. However, there was more variability in the responses for this dimension compared to *financial inclusion*. Item 30, "The bank takes improvement measures for its operations based on the feedback it receives", had the highest mean score (4.585) with a standard deviation of 0.494. On the other hand, item 28, "The bank develops its operations to keep pace with rapid banking developments", had the lowest mean score (3.545) with a standard deviation of 1.239. This was the only item that had a moderate mean score.

Table 12. Descriptive statistical analysis of *performance efficiency* items

Number	*Statement*	*Mean*	*Standard deviation*	*Rank*	*Rating*
27	The bank provides all the services that customers need at the lowest cost.	4.550	0.499	2	High
28	The bank develops its processes to keep pace with rapid banking development.	3.545	1.239	11	Average
29	The bank offers competitive and convenient facilities to its customers.	3.760	1.179	10	High
30	The bank takes corrective actions based on customer feedback to improve its operations.	4.585	0.494	1	High
31	Employees make sufficient efforts to achieve the bank's goals in the shortest time possible.	4.505	0.549	6	High
32	Employees strive to complete tasks with minimal cost.	4.520	0.539	4	High
33	Employees possess the necessary skills to handle any problem that may arise.	4.455	0.519	7	High
34	Employees can respond quickly to any changes in the banking services provided.	4.535	0.529	3	High
35	The bank implements plans to identify the training and development needs of its employees.	4.410	0.578	8	High
36	The bank is committed to training and developing its employees' skills through specialized training courses.	4.520	0.521	5	High
37	The bank provides a safe and healthy work environment for its employees.	4.395	0.617	9	High

4.5. Descriptive statistical analysis of hypotheses

4.5.1. Multicollinearity test

Before conducting the hypothesis tests, a multicollinearity test was performed on the independent variables by examining the VIF, tolerance, and skewness values. As shown in Table 13, the VIF values for all variables were less than 10, the tolerance values ranged between 0.664 and 0.874, and the skewness values ranged between 0.130 and 0.491, confirming the absence of high multicollinearity among the independent variables and indicating that the data followed a normal distribution.

4.5.2. Hypothesis testing

Based on these findings, hypothesis tests were conducted using multiple regression analysis and path analysis. All tests yielded statistically significant results supporting all four research hypotheses.

Table 13. Variance inflation factor, tolerance, and skewness

Variable	*VIF*	*Tolerance*	*Skewness*
Digital strategy	1.506	0.664	0.130
Digital technologies	1.735	0.576	0.317
Digital transformation skills	1.538	0.650	0.151
Digital transformation	1.145	0.874	0.491
Performance efficiency	1.145	0.874	0.234

Hypothesis 1

Table 14 summarizes the results of the multiple regression analysis testing the impact of the dimensions of *digital transformation* (digital strategy, digital technologies, digital skills) on enhancing *financial inclusion* in Jordanian commercial banks.

Table 14. Multiple regression analysis to test *H1* (Dependent variable: *Financial inclusion*)

Dimension	*Unstandardized Beta*	*Std. error*	*Standardized Beta*	*t*	*Sig.*
Constant	1.115	0.238	-	4.691	0.000
Digital strategy	0.119	0.049	0.150	2.441	0.016
Digital technologies	0.159	0.057	0.185	2.805	0.006
Digital transformation skills	0.478	0.059	0.501	8.081	0.000
Calculated F-value: 68.208 Analysis of variance (ANOVA) Sig.: 0.000 Correlation coefficient (R): 0.715 Coefficient of determination (R^2): 0.511					

The multiple regression analysis, as shown in Table 14, revealed a significant positive relationship between the dimensions of *digital transformation* and *financial inclusion* in Jordanian commercial banks. The calculated F-value was 68.208, which is significant at the 0.05 level. This indicates that the dimensions of *digital transformation* collectively have a significant impact on *financial inclusion*. The R^2 value of 0.511 suggests that the dimensions of *digital transformation* can explain 51.1% of the variance in *financial inclusion*.

Hypothesis 2

The results indicate that the overall model is statistically significant (F = 13.355, $\alpha \geq 0.05$), suggesting that the dimensions of *digital transformation* collectively have a significant impact on *performance efficiency*. However, when examining the individual dimensions, only digital technologies showed a significant positive relationship with performance efficiency (t = 4.019, $\alpha \geq 0.05$). Neither digital strategy nor digital skills had a statistically significant impact on *performance efficiency*.

The R^2 value of 0.17 indicates that the dimensions of *digital transformation* can explain approximately 17% of the variation in *performance efficiency*. This suggests that while *digital transformation* plays a role, other factors also contribute to performance.

Standardized beta coefficients show that digital technologies have the strongest positive impact on performance efficiency. Although digital strategy also had a positive coefficient, it was not statistically significant. This suggests that while digital strategy might contribute to *performance efficiency*, its impact is not as pronounced as that of digital technologies.

Table 15. Multiple regression analysis to test *H2* (Dependent variable: *Performance efficiency*)

Dimension	*Unstandardized Beta*	*Std. error*	*Standardized Beta*	*t*	*Sig.*
Constant	2.116	0.380	-	5.568	0.000
Digital strategy	-0.055	0.078	-0.057	-0.708	0.480
Digital technologies	0.177	0.091	0.167	1.943	0.053
Digital transformation skills	0.380	0.095	0.324	4.019	0.000
Calculated F-value: 13.355 Significance level for variance test (Sig.): 0.000 Correlation coefficient (R): 0.412 Coefficient of determination (R^2): 0.17					

Hypothesis 3

Table 16 shows a significant positive impact of *performance efficiency* on *financial inclusion*. The high F-value (74.640) at a significance level of alpha ($\alpha \geq 0.05$) indicates a statistically significant relationship. *Performance efficiency* explains 27.4% of the variance in *financial inclusion*, as shown by the R^2 value. This is further supported by the correlation coefficient (R) of 52.3%, which confirms the role and influence of *performance efficiency* in explaining *financial inclusion*.

Table 16. Analysis of the impact of *performance efficiency* on promoting *financial inclusion*

Independent variable	*Dependent variable*	*Coefficient of determination (R^2)*	*Correlation coefficient (R)*	*Calculated F-value*	*Significance level*	*Value of the slope coefficient (b)*	*t*	*Decision*
Performance efficiency	*Financial inclusion*	0.274	0.523	74.64	0.000	0.523	8.639	Accept

Hypothesis 4

Table 17 presents a summary of the path coefficients, t-values, p-values, and 95% confidence intervals. A statistically significant path coefficient indicates that the relationship between the variables is meaningful. By comparing the t-values to the critical t-value of 1.96 at a 0.05 significance level, or by comparing the p-values to 0.05, we can determine if the relationship is statistically significant. Additionally, if the 95% confidence interval does not include zero, we can conclude that the path coefficient is statistically significant.

Table 17. Path analysis results for the impact of *digital transformation* on *financial inclusion* mediated by *performance efficiency*

Type of effect	*Relationships between variables*	*Path coefficient*	*t-value*	*p-value*	*Confidence intervals*
Direct effect	*Digital transformation → Financial inclusion*	0.565	10.964	0.000	0.666–0.464
	Digital transformation → Performance efficiency	0.356	4.621	0.000	0.506–0.205
	Performance efficiency → Financial inclusion	0.322	5.464	0.000	0.438–0.207
Indirect effect	*Digital transformation → Performance efficiency → Financial inclusion*	0.112	3.357	0.001	0.182–0.048

5. CONCLUSION

The problem of this study lies in the low level of financial inclusion in Jordan, where the percentage does not exceed 43% (CBJ, 2023). This is despite the notable progress that the Jordanian banking sector has made in adopting digital technology over the past few years. The study aimed to analyze the impact of digital transformation on enhancing financial inclusion, considering the mediating role of performance efficiency in Jordanian commercial banks.

Based on the results of the statistical data analysis and sample survey, we conclude that digital transformation, in its various dimensions, has a significant positive impact on enhancing financial inclusion in Jordanian commercial banks. This finding reflects the increasing interest of bank management in developing digital strategies, employing modern technologies, and enhancing employee skills to achieve and promote financial inclusion. This result is consistent with the findings of studies such as Telukdarie and Mungar (2023), Kassem and Rashwan (2020), and Musa et al. (2015).

Furthermore, the results indicate a positive effect of digital technologies on performance efficiency in banks, thereby enhancing their ability to provide improved financial services and increase customer interaction. This result aligns with the studies by Boumoud et al. (2020) and Khams (2021). However, the dimensions of digital strategy and digital transformation skills did not show an effect on performance efficiency, which necessitates the enhancement of digital transformation skills and the adoption of effective digital strategies to ensure the full benefits of digital transformation in banks.

Moreover, the results show that banking performance efficiency contributes to enhancing financial inclusion. This can be explained by the fact that improved performance efficiency leads to better quality of financial services and expands their reach to more customers.

Finally, the results indicate that performance efficiency has a partial mediating effect and a positive impact on the relationship between digital transformation and financial inclusion. This can be attributed to the fact that digital transformation enhances performance efficiency by reducing human errors, accelerating processing and auditing, improving collaboration and information exchange, and enhancing communication between employees and customers, thereby contributing to greater financial inclusion.

Based on the study results, the researchers recommend that commercial banks pay greater attention to implementing and developing the dimensions of digital transformation on an ongoing basis, enhancing Cooperation between these banks and financial technology companies, and developing new low-cost technologies to ensure data security and preventing hacking. In addition to updating the digital infrastructure, providing continuous training for employees, and promoting a culture of innovation among bank employees.

Given the importance of customers as the cornerstone of any banking business, banks are recommended to organize training programs to educate various segments of society, enabling them to use digital channels effectively and enhancing their engagement with banking services.

For future research, researchers recommend conducting further studies on the impact of digital transformation on financial inclusion with different dimensions. Studies should also be conducted in other economic sectors, such as the insurance sector and microfinance institutions. Additionally, studies should be conducted in other countries to gain a clearer picture of digital transformation, performance efficiency, and financial inclusion.

This study was not without limitations. Most notably, the study was limited to three variables: digital transformation (with its dimensions of digital strategy, digital technologies, and digital skills) as the independent variable, financial inclusion as the dependent variable, and performance efficiency as the mediating variable. This may not fully capture the picture and the impact of other factors. Additionally, the study population was limited to employees in the general management of Jordanian commercial banks in Amman, and therefore the results cannot be generalized to a wider scope including other sectors such as insurance and microfinance institutions. Furthermore, the study relied solely on electronic questionnaires for data collection, which may overlook important viewpoints or information.

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