

## Article

# The Effects of Digital Transformation on Firm Performance: The Role of Customer Experience and IT Innovation

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**Abstract:** Digital transformation (DT) has attracted the attention of management and organizational scholars in the past decade. In addition, firms are increasingly interested in using DT to obtain a competitive advantage. Nevertheless, studies on DT outcomes remain scarce. Therefore, this study empirically investigated the effect of digital transformation on firm performance by classifying the capabilities required to realize digital transformation, customer experience, and IT innovation. A structured questionnaire was used to collect data from 164 representatives of service sector firms in Saudi Arabia, namely chief information officers, chief transformation officers, and IT managers. Based on the findings of this study, it is evident that digital transformation, customer experience, and IT innovation positively impact a firm's performance, with customer experience exhibiting the strongest effect.

**Keywords:** digital transformation; customer experience; IT innovation; firm performance



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## 1. Introduction

Recently, the importance of the service sector has increased, and the sector now produces a substantial part of the global economy's gross domestic product (GDP). Based on current evidence, the service sector will continue to grow significantly in the coming years [1]. Additionally, firms in the service sector face the continuous challenge of operating in unstable environments. Therefore, digital transformation (DT) and innovation are essential for firms to develop an effective competitive strategy [2].

In 2016, Saudi Vision 2030 was launched to shape the future for the Kingdom of Saudi Arabia (KSA) and its citizens. The plan aims to shift the KSA from an oil-dependent economy to a knowledge-based economy. To achieve the goals of Saudi Vision 2030, the National Transformation Program 2020 was introduced to establish the needed capacities and capabilities, and DT is an integral part of this program, which is meant to be implemented throughout the Kingdom across all sectors, including non-profit, public, and private organizations. In addition, digital infrastructure development is also among the program's commitments. However, Saudi Arabia is only in the initial stages of DT and Saudi organizations still have work to do to achieve DT, and thereby contribute to Saudi Vision 2030 [3,4].

Digital technology is gradually becoming important for achieving business goals. It is a way of obtaining differentiation and competitive advantage; consequently, managers' interests in DT are increasing [5]. However, the focus in DT literature has been mostly on DT as a concept and the adoption process, with some studies conducted on DT effects on firm performance [6]. In another stream of research, groups such as Ukko et al. [7] have examined DT through two main dimensions, namely managerial capability and operational capability. These dimensions were built based on existing research in this field [8–10]. The researchers found that managerial capabilities significantly impact performance when mediated by a sustainability strategy.

Nevertheless, Martín-Peña et al. [11] found that digitalization has a direct strong positive relationship with the sales performance of industrial firms, in addition to its mediating role in the relationship between servitization and performance. In contrast, Kharlamov and Parry [12] concluded that digitization has no direct impact on the performance of British publishing firms in financial terms; however, it does have an effect when combined with servitization. Therefore, previous research has shown mixed results regarding the relationship between DT and performance measures.

To our knowledge, academic work in the area of DT and firm performance has not yet been extensively explored in Saudi Arabia, a context that shows high growth and digital transformation rates in relation to other developing countries, particularly in the service sector. In addition, previous research has called for investigating how DT influences firm performance in different contexts and sectors [13,14]. Moreover, understanding which channels can explain how DT influences firm performance is worth understanding. Some proposed channels through which DT can influence firm performance are IT innovation and customer experience. Those factors are particularly important within in-service sectors, where service delivery methods and customer experiences play a vital role in the success of any organization. Previous literature has examined these relationships in different contexts. For example, Stureson and Groth [15] studied the effect of DT on patient care in the medical sector in Sweden, and Hess et al. [16] examined the options for articulating DT strategies in German companies across different sectors. However, DT literature is generally limited in developing countries such as Saudi Arabia, and it is important to study this concept within such a context. Al-Ruithe et al. [3], for instance, inspected cloud computing as an enabler of DT in the Saudi public sector, but, as far as we know, studies have yet to examine the paths through which DT influences a firm's performance.

Customer experience (CX) is an essential service sector factor influencing a firm's performance. The literature broadly agrees that a consistent customer experience yields a firm's positive outcomes [17,18]. Furthermore, in recent research, customer experience has been specified as a new source of competitive advantage predictive of customer loyalty [19], and eventually influencing firm performance [17]. However, the literature on customer experience, for the most part, has focused on studying specific aspects of customer experience, such as customer consumption experience and reactions, in terms of thinking, feeling, sensing, and acting, customers' relationships with brands, customer satisfaction, and service quality [20]. Consequently, improving customer experience can be considered a strategic method to improve a firm's performance [21].

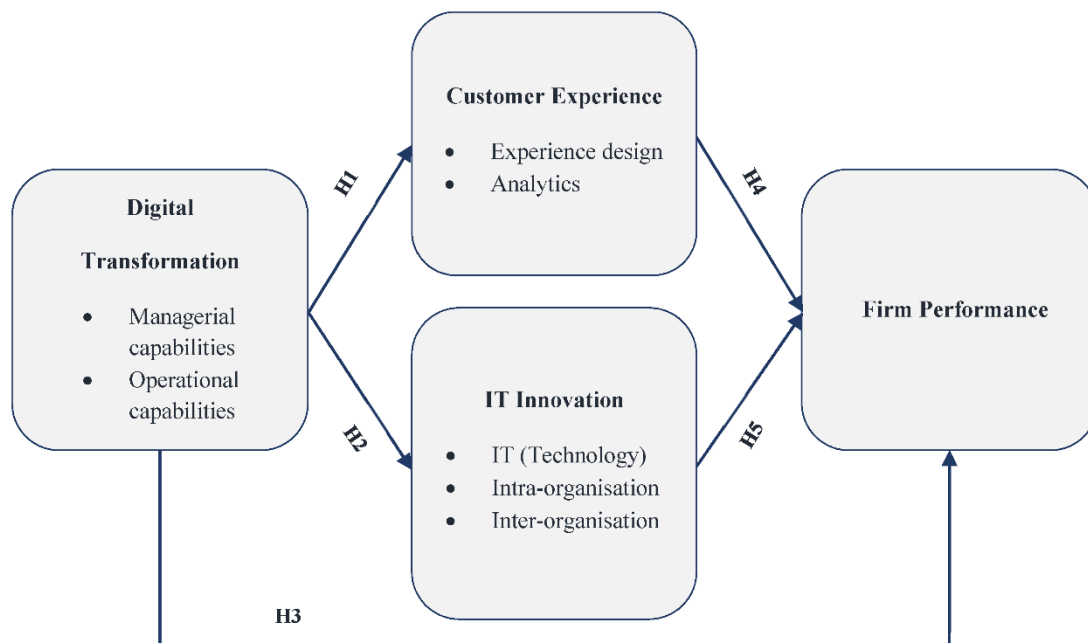
Equally, innovation is the main competency for firms to survive in dynamic and competitive environments, maintain competitive advantages, and improve performance [22]. Furthermore, within the factor of innovation, IT is becoming a fundamental element and the main driver of change in business processes. It enables innovation and innovation adoption, as well as process management. Thus, IT innovation is now an important research topic as well. However, efforts on this topic are only in the early stages [23,24]. Most of the innovation literature has focused on the innovation of products and processes [25], and employee innovation behavior [26]. Our knowledge of IT innovation still needs to be improved. Thus, more attention should be directed to the effects of IT innovation on firm performance and how digital transformation influences IT innovation. In addition, studies have highlighted the emphasis in innovation literature on the manufacturing sector, as well as the lack of focus on the service sector. Though some progress has been made to address this research gap, a bias in IT innovation research remains, suggesting a general interest in IT innovation in the manufacturing sector, but an interest in non-technological innovation in the service sector [27,28]. Thus, this study aims to examine the effect of digital transformation (DT) on both customer experience and IT innovation, influencing the performance of service sector firms. More specifically, we aim to examine the above relationship in a developing country, where the service sector plays a big role in its economy [29].

## 2. Theoretical Background and Hypothesis Development

Table 1 illustrates the definitions of the main variables and examines the literature that links the study variables to build hypotheses by reviewing studies, as shown in Figure 1.

**Table 1.** Construct definitions.

Construct	Definition
Digital Transformation	“Digital transformation is a holistic effort to revise core processes and services beyond the traditional digitization efforts. It evolves along a transition continuum from analog to digital to a full stack review of policies, current processes, and user needs and results in a complete revision of the existing and the creation of new digital services. The outcome of digital transformation efforts focuses, among others, on the satisfaction of user needs, new forms of service delivery, and expanding the user base”. [30]
Customer Experience	“Customer experience is the aggregate of feelings, perceptions, and attitudes formed during the entire process of decision making and consumption chain involving an integrated series of interactions with people, objects, processes, and environment, leading to cognitive, emotional, sensorial, and behavioral responses”. [21]
IT Innovation	“A product, process or business model that is perceived as new, requires significant changes on the part of adopters, and is embodied in or enabled by IT”. [31]
Firm Performance	“A measure of how well a firm is able to meet its goals and objectives compared with its primary competitors”. [32]



**Figure 1.** Conceptual model.

### 2.1. Digital Transformation and Customer Experience

Though the literature has recognized the impact of digital transformation on customer experience, empirical examinations have yet to become available. However, a customer-centric DT enables firms to embrace digital technologies, gain customer insights, and align

business processes to enhance customer experience [33]. Similarly, engaging customers in digitalized service development processes is critical for success [34].

Additionally, studies have found a positive impact of technology on customer experience. For example, Spiess et al. [35] found that integrating big data insights with process automation in different customer touchpoints improves customer experience. Moreover, Huseynov [36] discusses using big data to transform crucial business operations for better decision-making and improved customer experience. Additionally, studies have argued that using big data to analyze customers' online reviews and act in accordance with these reviews improves electronic word-of-mouth [37]. In other words, these enhancements will consequently lead to higher overall customer satisfaction and performance. Moreover, smart technologies in the retail industry improve customer experience by offering superior personalized services [38].

In contrast, to our knowledge, the effect of DT on customer experience has yet to be properly discussed in academic journals. For example, Sasmoko et al. [39] found that DT positively influences the customer experience. The researchers used hedonic parameters (such as memories and entertainment) and recognition (such as the feeling of importance and respect) as customer experience factors while observing DT through smart technologies' awareness, learning, understanding, and adaption. Considering this limitation in the academic literature, this study examines the effect of digital transformation on customer experience using the following hypothesis:

**H1.** *Digital transformation is positively related to customer experience.*

## *2.2. Digital Transformation and IT Innovation*

DT encourages new types of innovation that transcend traditional industry sectoral boundaries, combine digital and non-digital assets, and embrace ecosystems, communities, and networks. In addition, digital infrastructures and platforms provide new properties that support innovation beyond creating new opportunities, by providing broader value creation and value capture effects [40]. Moreover, ICT use promotes the gathering of information and big data from internal and external sources, enhancing innovation processes in terms of both intra-organizational (in-house) and inter-organizational (open innovation) innovations, and improving innovation performance [41]. Furthermore, Appio et al. [42] found that digital transformation affects industries and firms in a digitalized world in many ways, including competition and the organization for innovation, new product and service development, and managing people and teams involved in innovation.

On the other hand, big-data-based innovations are directly and strongly affected by social media and IT platforms, thereby intensifying the effect of a firm's social and relational capital on its IT innovations [43]. Additionally, DT adoption in digitalized processes increases the number of company innovations in process, product, and service innovation [6]. With only a few recent studies analyzing the effect of digital transformation on IT innovation, the following relationship is expected to hold:

**H2.** *Digital transformation is positively related to IT innovation.*

## *2.3. Digital Transformation and Firm Performance*

Digital transformation studies have concentrated on conceptualizing and formulating implementation strategies. Noticeably, few studies have addressed the effect of DT on firms' performances. However, Scott et al. [44] found a direct positive impact of technology adoption in the financial sector on firm performance, arguing that it may be observed more effectively in the long term, rather than in the short term, due to the complex nature of the technology adoption. At the same time, Guo and Xu [6] found that the operating performance is much more affected by digital transformation than financial performance. Digital transformation for improving operating performance requires more favorable conditions (i.e., policy and innovation environment).

Moreover, Chen et al. [45] used a resource-based view in textile SMEs and demonstrated the positive effect of DT on perceived organizational performance. Furthermore, Braojos et al. [46] empirically showed that IT capabilities, represented by e-commerce and social media, improve a firm's performance. Based on this reasoning, the following hypothesis is proposed:

**H3.** *Digital transformation is positively related to a firm's performance.*

#### *2.4. Customer Experience and Firm Performance*

In the domain of customer experience, studies have found that customer experience is positively linked to many customer aspects, such as satisfaction, loyalty, etc. For example, customer experience impacts satisfaction [47]. Moreover, academics have found that customer aspects, which are linked to customer experiences, such as customer satisfaction, positively affect a firm's performance [48]. In contrast, few published studies have linked customer experience to firms' performances [49], though there has been recent interest in this correlation. For example, it can be seen in the work of Mbama and Ezepue [50] that they found a positive relationship between customer experience and a firm's financial performance by surveying bank customers and using bank financial statements.

Meanwhile, Grønholdt et al. [51] identified customer experience management factors related to improving customer experience, and found that firms with superior customer experience enjoy considerable financial success. Similarly, Sharples [52] argues that adopting customer experience management in cruise firms, at the pre-consumption stage, will lead to a stronger relationship, improved customer experience, and enhanced firm performance. Consequently, this study examines the effect of customer experience on firm performance.

**H4.** *Customer experience is positively related to a firm's performance.*

#### *2.5. IT Innovation and Firm Performance*

The impact of innovation on a firm's performance has been extensively examined and found to be positive [53]. For example, Coad et al. [54] argue that innovation is vital in improving a firm's performance regardless of the age or size of the firm. Similarly, a study on Australian manufacturing firms found that a dynamic environment was a moderator that supported the impact of product innovation in improving a firm's performance. In contrast, a competitive environment moderates that effect, but strengthens process innovation [55]. Both product and process innovations positively impact business performance. Furthermore, the effect of environmental turbulence is limited to promoting product and process innovations, and does not moderate the relationship between innovation and business performance [56].

However, Tajvidi and Karami [57] studied the use of social media in UK hotels. They found that innovation plays a significant positive mediating role in the association between social media use and a firm's performance. Similarly, Gërguri-Rashiti et al. [58] used the dynamic approach and data collected from the business environment and a survey conducted by the World Bank to study the effect of ICT and other technologies on firms' innovativeness and performance. This study found that ICT adoption improves innovation and performance, regardless of the firm age and sector.

In short, innovativeness translates into the development of competitive advantage. Firms that focus on improving their capacity to innovate continuously improve, resulting in improved business performance [59]. Owing to the effects of IT innovation capability on performance, this study uses the capability-based approach to study IT innovation in the current study. Therefore, the following hypothesis is proposed:

**H5.** *IT innovation is positively related to a firm's performance.*



### 3. Research Methods

The current study uses a quantitative approach to answer the research questions and achieve the study's aim. Specifically, the study follows a survey research design.

#### 3.1. Population and Sampling

The focus of this study is on the service sector in Saudi Arabia. The reason for focusing on this sector is the substantial importance of the service sector in the global economy and the economy of Saudi Arabia specifically. The service sector represents more than 50% of the global GDP, and that percentage is still growing [60]. Additionally, between 2010 and 2020, the service sector's contribution to Saudi Arabia's GDP increased from 39.2% to 53.9% [61]. Moreover, economies are transforming with the increasing effect of digital technologies. This is especially true in industries with intensive customer-facing activities, such as the service sector, where digital services enable closer customer relationships and provide value-creating customer interactions [62].

As noted, the IT department is a vital part of any digital initiative in a firm. Within that department, members at the managerial level are likely to be the most aware of the firm's present and past practices and performance. Furthermore, a firm's chief information officer and chief transformation officer are usually the main representatives accountable for DT. Hence, the questionnaire conducted in this study was addressed and distributed to IT department directors, managers, chief information and chief transformation officers in private service firms in the service sector industry. We have included the study objectives and targeted participants in the survey, which is crucial for ensuring that the data collected are free of bias. By clearly outlining the study's objectives and the participants who are being targeted, respondents are more likely to understand the purpose of the survey and respond in a manner that is relevant to the study. This helps ensure that the data collected is accurate and reflects the intended population. We used the nonprobability snowballing distribution method, which is widely employed for difficult-to-access populations [63]. This method was used in the present study to increase the sample size and guarantee that the sample would include only experts. Individuals who would be suitable initial candidates were contacted via email and social media platforms, mainly LinkedIn and WhatsApp. In addition, the participants provided great help by sharing the questionnaire with their colleagues, whom the researcher would have otherwise struggled to reach. More than 500 questionnaires were sent in February 2020 to executives and managers. Within four weeks, 220 replies were collected, representing an 84% completion rate. After removing the incomplete questionnaires and any outliers, a sample of 164 completed questionnaires was kept for analysis.

#### 3.2. Construct Measurements

The scales were measured on a 5-point Likert scale based on the mean values, and were used to assess the participant's responses to the items included in the questionnaire. In the questionnaire, "1" is "strongly agree," and "5" is "strongly disagree".

To answer the research questions, the present study applied the capability approach. The selected constructs have been tested in previous studies that found the constructs to be relevant and important to the related factors. All the constructs, i.e., variables, were operationalized as multi-item constructs, except for the firm's performance. The first construct, digital transformation, was measured using a 6-item scale by Ukko et al. [7]. Management capability factors concern the managers' skills in employing digitality in strategies, the workplace itself, and the employees' skills and minds [64]. In contrast, operational capability factors affect a firm's ability to integrate digitality into its strategies and business processes [65]. The second construct, customer experience, was measured using an 8-item scale by Berghaus and Back [66]. The third construct, IT innovation, was measured using an 11-item scale by Nwankpa and Datta [67] and Wu and Chiu [68]. Lastly, a firm's performance was measured using a 4-item scale by Zhu and Nakata [69], Khin and Ho [70], and Raguseo and Vitari [71] (see Table 2).

**Table 2.** Construct measurements.

Construct	Factor	Source
Digital transformation	Managerial capabilities	[7]
	Operational capabilities	[7]
Customer experience	Experience design	[66]
	Analytics	[66]
IT innovation	IT (technology)	[67]
	Intra-organization	[68]
	Inter-organization	[68]
Firm performance		[69]
	Firm performance	[70]
		[71]

### 3.3. Research Instrument Validity

Pearson's correlation coefficient was used to measure the degree of association between each statement (item) included in the questionnaire, to check the research method's validity. The total scores of the dimension to which each statement is related are demonstrated in Table 3.

**Table 3.** Survey instrument validity.

Digital Transformation		IT Innovation			
Item No.	Correlation coefficient	Item No.	Correlation coefficient	Item No.	Correlation coefficient
1	0.777 **	7	0.747 **	13	0.811 **
2	0.762 **	8	0.688 **	14	0.810 **
3	0.759 **	9	0.699 **	15	0.807 **
4	0.773 **	10	0.734 **	16	0.758 **
5	0.751 **	11	0.818 **	17	0.756 **
6	0.672 **	12	0.799 **		
Customer Experience		Firm Performance			
Item No.	Correlation coefficient	Item No.	Correlation coefficient	Item No.	Correlation coefficient
18	0.796 **	22	0.648 **	26	0.851 **
19	0.555 **	23	0.764 **	27	0.867 **
20	0.755 **	24	0.781 **	28	0.859 **
21	0.715 **	25	0.803 **	29	0.839 **

\*\* Correlation is significant at the 0.01 level.

Table 3 reveals that each item included in the questionnaire is statistically correlated with the total scores of the dimension to which the item relates. In other words, all the items achieve the purpose of the measurement. Furthermore, the values of the correlations are in the range of 0.555–0.859, with significance at the 0.01 level. Therefore, the results support the validity of the questionnaire used for data collection [72].

### 3.4. Research Instrument Reliability

To assess the questionnaire's reliability, the coefficient of Cronbach's alpha was used to find the internal consistency of all items and for each dimension. The Cronbach's alpha

values for digital transformation, IT innovation, customer experience, and firm performance were 0.84, 0.93, 0.88, and 0.88, respectively, above the cut-off of 0.70 [72].

### 3.5. Statistical Techniques for Data Analysis

The data collected by the questionnaire from the current study participants were entered into the Statistical Package for Social Science (SPSS) to produce the statistical results. Both descriptive and inferential statistical methods were used for data analysis. The descriptive statistical methods used frequency and percentages to describe the participants according to their demographic characteristics. In addition, the means and standard deviations were used to assess the participants' perceptions based on their responses to the items included in the questionnaire and answer the research questions. The inferential statistical methods used to test the research hypotheses include multiple regression analysis, *t*-tests, and correlation coefficients.

## 4. Analysis of Biographical Information

The firms and participants of the current study are described according to four variables: industry type, firm age, participants' education level, and work experience. The sample results illustrate the distribution of participating firms according to industry type. Aviation firms comprised the largest share, with 27.3% accounting for the firms surveyed. The banking sector share was 9.7%, and the health sector represented 9.1% of the total sample. The technology industry comprised 7.3%, and the financial sector share was 6.7%. Other industries accounted for 2.4% to 4.8%, comprising 23.6% of the responses.

The results show the illustrated firms' ages, and it is clear that the majority (75.8%) had been in business for more than 20 years: 13.9% of the firms were aged between 11 and 20 years, 6.1% were less than five years old, and 4.2% were between 5 and 10 years old.

The sample shows that 46.1% of the participants held a higher degree (Master's or a PhD), 48.4% held a bachelor's degree, and 5.5% were educated at a high secondary or diploma level. Therefore, most of the participants in the current study were well-educated.

The sample shows that most study participants (46.7%) had between 10 and 20 years of experience, 24.8% had 20–30 years of experience, 17.6% had less than ten years of experience, and 10.9% had over 30 years of experience. Therefore, most of the participants had an experience that enabled them to assess the impact of digital transformation.

### 4.1. Descriptive Statistics

The descriptive statistics in this section aim to assess participants' attitudes toward the main variables of the study. The means and standard deviations of participants' attitudes are illustrated in Table 4.

**Table 4.** Means and standard deviation values of participants' perceptions of digital transformation variables.

No.	Digital Transformation	Mean	Standard Deviation	Ranking
1	Our organization's management is familiar with digital transformation tools.	4.10	0.87	5
2	Our organization's management has a clear vision for utilizing digital transformation in the future.	3.99	0.93	6
3	Our organization's management supports the utilization of digital transformation.	4.28	0.77	3
4	Digital transformation has become an important part of our business operation.	4.46	0.75	2
5	Digital transformation is a natural part of our business.	4.16	0.92	4
6	Digital transformation enhances our business.	4.61	0.71	1
Overall mean value (digital transformation)		4.27	0.62	



Table 4 shows participants’ perceptions of DT implementation in the service sector in Saudi Arabia. The overall mean value reaches 4.27, with a standard deviation of 0.62. This mean value indicates that most private sector firms implement digital transformation in their business operations. Therefore, Saudi service sector firms have adequate managerial and operational capabilities. The mean values reach 4.41 and 4.13, indicating positive circumstances.

The results in Table 5 illustrate respondents’ perceptions of the customer experience within the service sector in Saudi Arabia. The overall mean value of customer experience is 3.65, with an SD of 0.72. This mean value indicates that most respondents agreed that customer experience is enhanced with the new technology advances. Therefore, DT changes the procedures of managing firms’ operations based on the new technology implemented to improve customer experience.

**Table 5.** Means and standard deviation values of the status of customer experience due to the use of digital transformation.

No.	Customer Experience	Mean	Standard Deviation	Ranking
1	Customer experience is consistent across all channels of our organization.	3.47	1.06	6
2	Customer interaction occurs via both the traditional and digital channels of our organization.	4.04	0.80	1
3	Digital content is designed according to individual user situations at our organization.	3.36	1.07	8
4	Digital customer communication is personalized to individual user status in our organization.	3.42	0.96	7
5	Customers’ needs and wants are included when designing a new product or service in our organization.	3.89	0.92	2
6	Customer and interaction data are collected across different channels of our organization.	3.85	0.97	3
7	Insights are derived from customer and interaction data in our organization.	3.62	0.98	4
8	Customer data are analyzed and acted on in real time in our organization.	3.50	1.08	5
Overall mean value (customer experience)		3.65	0.72	

The analytical results of participants’ responses to experience design and analysis indicate that service sector firms focus more on experience design and information analysis related to customer interactions that reflect their needs and wants.

Table 6 shows respondents’ perceptions of IT innovation use in Saudi Arabia’s service sector. The results reveal that the overall mean value is 4.12, with an SD of 0.66. This mean value indicates that service sector firms often use IT innovation in business operations.

**Table 6.** Means and standard deviation values of the status of IT innovation due to the use of digital transformation.

No.	IT Innovation	Mean	Standard Deviation	Ranking
1	We constantly keep up with new information technology innovations.	4.05	0.85	3
2	We are capable of and continue to experiment with new IT as necessary.	4.10	0.87	4
3	We have a climate that is supportive of trying out new ways of using IT.	3.85	1.00	1
4	We constantly seek new ways to enhance the effectiveness of IT use.	4.22	0.84	8
5	IT innovation supports business process redesign across multiple units within our organization.	4.23	0.84	9
6	IT innovation supports knowledge sharing across multiple units within our organization.	4.12	0.81	5
7	IT innovation supports data integration across multiple units within our organization.	4.24	0.83	11
8	IT innovation continually supports the development and production of new products or services within our organization.	4.17	0.84	7
9	IT innovation supports strategic alliances between partners.	4.13	0.88	6
10	IT innovation supports integration with upstream and downstream suppliers across organizational boundaries.	4.01	0.90	2
11	IT innovation supports the development of long-term customer relationships on an external basis.	4.24	0.81	10
Overall mean value (IT Innovation)		4.12	0.66	

Furthermore, it shows that the three variables of IT innovation, IT technology, intra-organization, and inter-organization, achieve mean values that extend between 4.05 and 4.19, which indicates that service sector firms have shown continuous success in keeping up with the modern IT innovations and implementing these innovations to support their business operations. Therefore, participants agreed that their firms had a high level of IT innovation.

The results in Table 7 illustrate participants' perceptions of the firm's performance based on the effect of DT in the service sector in Saudi Arabia. The results reveal that the overall mean value of firm performance is 3.84, with an SD of 0.78. This mean value indicates that DT clearly affects a firm's performance. Service sector firms are taking real steps to adopt actual transformation in their policies, procedures, and functions to obtain the advantages of technology and innovation. Therefore, adopting DT in service sector firms has positively improved firms' performances.

**Table 7.** Means and standard deviation values of firms' performances due to the use of digital transformation.

No.	Financial Performance	Mean	Standard Deviation	Ranking
1	Our product or service is competitive compared with major competitors.	3.95	0.92	1
2	Our customer retention rate is competitive compared with major competitors.	3.91	0.91	2
3	Our profitability increase is competitive compared with major competitors.	3.64	0.93	4
4	Our market share is competitive compared with major competitors.	3.87	0.90	3
Overall mean value (Financial performance)		3.84	0.78	

#### 4.2. Results of Testing Research Hypotheses

##### 4.2.1. Results of Testing Hypothesis One

A simple regression analysis was run to test this hypothesis, and the results are shown in Table 8.

**Table 8.** Simple regression analysis to examine the effect of digital transformation on customer experience.

Factors	Coefficients	Beta	t-Test	p-Value (Sig.)	F	Sig.
Constant	1.218		8.864 **	0.00		
Digital Transformation	0.656	0.566	8.776 **	0.00	77.02 **	0.00
$R = 0.566$			$R^2 = 0.321$		$Adj.R^2 = 0.317$	

\*\* F-statistic and \*\* t-test statistics are significant at 0.01.

The results in Table 8 show that the F-statistic is 77.02 and statistically significant at 0.01, indicating that simple regression, including digital transformation as an independent variable, effectively estimates changes in customer experience if other factors remain unchanged. Furthermore, the coefficient determination ( $R^2$ ) is equal to 0.321, meaning that DT effectively predicts approximately 32% of changes in customer experience.

In addition, the results reveal that the regression coefficient of the independent variable digital transformation is 0.656, which is statistically significant, as the p-value is less than 0.01. These results show that DT has a significant positive effect on customer experience, thereby supporting the acceptance of H1, which proposes that digital transformation positively affects customer experience.

##### 4.2.2. Results of Testing Hypothesis Two

A simple regression analysis was conducted to determine if there is a positive relationship between DT and innovation, and the results are presented in Table 9.

The results in Table 9 show that the F-statistic is 118.92 and statistically significant at 0.01, indicating that simple regression of DT as an independent variable effectively explains the changes in IT innovation if other factors remain unchanged. Furthermore, the coefficient determination ( $R^2$ ) equals to 0.422, meaning that DT effectively predicts approximately 42% of IT innovation changes.

**Table 9.** Simple regression analysis to examine the relationship between digital transformation and IT innovation.

Factors	Coefficients	Beta	<i>t</i> -Test	<i>p</i> -Value (Sig.)	<i>F</i>	Sig.
Constant	0.684		5.886 **	0.00		
Digital Transformation	0.689	0.649	10.905 **	0.00	118.92 **	0.00
<i>R</i> = 0.649			<i>R</i> <sup>2</sup> = 0.422		Adj. <i>R</i> <sup>2</sup> = 0.418	

\*\* *F*-statistic and \*\* *t*-test statistics are significant at 0.01.

In addition, the results in Table 9 suggest that the regression coefficient of the independent variable digital transformation is 0.689, which is statistically significant, as the *p*-value is less than 0.01. This result suggests a significant and positive relationship between DT and IT innovation in the service sector in Saudi Arabian firms. In addition, the correlation coefficient value equals to 0.649, indicating a positive relationship between the two variables. Therefore, the results support the acceptance of H2, which predicts that DT positively affects IT innovation.

#### 4.2.3. Results of Testing Hypothesis Three

A simple regression analysis was run to examine whether digital transformation positively affects firm performance, and the results are presented in Table 10.

**Table 10.** Simple regression analysis to examine the effect of digital transformation on firm performance.

Factor	Coefficients	Beta	<i>t</i> -Test	<i>p</i> -Value (Sig.)	<i>F</i>	Sig.
Constant	1.004		6.522 **	0.00		
Digital Transformation	0.666	0.529	7.958 **	0.00	63.33 **	0.00
<i>R</i> = 0.529			<i>R</i> <sup>2</sup> = 0.280		Adj. <i>R</i> <sup>2</sup> = 0.275	

\*\* *F*-statistic and \*\* *t*-test statistics are significant at 0.01.

The results in Table 10 show that the *F*-statistic is 63.33 and statistically significant at 0.01, which indicates that the simple regression of DT is efficient in predicting changes in a firm's performance if other factors are unchanged. In addition, the coefficient of determination (*R*<sup>2</sup>) is equal to 0.280, meaning that DT can predict 28% of changes in a firm's performance on average.

In addition, the results in Table 10 show that the regression coefficient of the independent variable digital transformation is 0.666, which is statistically significant, as the *p*-value is less than 0.01. This finding suggests that DT positively affects firm performance in the Saudi service sector. In addition, the correlation coefficient value between the two variables equals to 0.529, meaning that a positive relationship exists between DT and firm performance. Consequently, the above results support the acceptance of H3, which predicts that DT positively affects firm performance.

#### 4.2.4. Results of Testing Hypothesis Four

A simple regression analysis to test this hypothesis is illustrated in Table 11.

The results in Table 11 reveal that the *F*-statistic is 105.652 and statistically significant at 0.01, which indicates that the simple regression of customer experience is efficient in predicting changes in firm performance if all other factors are unchanged. In addition, the coefficient of determination (*R*<sup>2</sup>) equals to 0.393, indicating that customer experience can predict approximately 39% of variations in firm performance.

**Table 11.** Simple regression analysis to examine the effect of customer experience on firm performance.

Factor	Coefficients	Beta	<i>t</i> -Test	<i>p</i> -Value (Sig.)	<i>F</i>	Sig.
Constant	1.11		8.627 **	0.00		
Customer Experience	0.576	0.627	10.279 **	0.00	105.652 **	0.00
<i>R</i> = 0.627			<i>R</i> <sup>2</sup> = 0.393		Adj. <i>R</i> <sup>2</sup> = 0.390	

\*\* *F*-statistic and \*\* *t*-test statistics are significant at 0.01.

The illustrated results also show that the regression coefficient of the independent variable customer experience is 0.576, which is statistically significant, as the *p*-value is less than 0.01. This result suggests that customer experience has a significant impact on firm performance. In addition, the correlation between the dependent and the independent variables equals to 0.627, which supports the relationship between customer experience and firm performance. Therefore, customer experience is important as one of the determinants of firm performance. Furthermore, existing literature supports the acceptance of H4, which predicts that customer experience positively affects firm performance.

#### 4.2.5. Results of Testing Hypothesis Five

A simple regression analysis was performed to test this hypothesis, and the results are presented in Table 12.

**Table 12.** Simple regression analysis to examine the effect of IT innovation on firm performance.

Factor	Coefficients	Beta	<i>t</i> -Test	<i>p</i> -Value (Sig.)	<i>F</i>	Sig.
Constant	0.796		6.554 **	0.00		
IT Innovation	0.500	0.593	9.414 **	0.00	88.614 **	0.00
<i>R</i> = 0.593			<i>R</i> <sup>2</sup> = 0.352		Adj. <i>R</i> <sup>2</sup> = 0.348	

\*\* *F*-statistic and \*\* *t*-test statistics are significant at 0.01.

The results in Table 12 reveal that the *F*-statistic is 88.614 and statistically significant at 0.01, indicating that the simple regression of IT innovation is efficient in predicting changes in firm performance if all other factors are unchanged. In addition, the coefficient of determination (*R*<sup>2</sup>) equals to 0.352. Therefore, innovation can predict approximately 35% of variations in firm performance.

Furthermore, the results show that the regression coefficient of the independent variable IT innovation is 0.500, which is statistically significant, as the *p*-value is less than 0.01. This result suggests that IT innovation significantly positively affects firm performance. Moreover, the correlation between the dependent and the independent variables equals to 0.593, which supports the relationship between innovation and firm performance. Furthermore, this finding suggests that IT innovation can predict long-term firm performance. Therefore, the previous evidence supports the acceptance of H5, which predicts that IT innovation positively affects firm performance.

## 5. Discussion

The current study aimed to examine the effects of digital transformation (DT) on customer experience and IT innovation, and its direct influence on firm performance in the service sector. Five hypotheses were proposed to test the different framework factors.

The analysis shows a significant positive effect of digital transformation on customer experience, indicating that successful adoption of digital transformations will enhance the customer experience, supporting previous studies' results [33,34,39].

The results also indicate that digital transformation significantly positively affects IT innovation, which shows that effective digital transformations can enhance a firm's IT innovativeness. Since digital transformation involves the adoption of technology, and IT innovation is any innovation facilitated by technology [73], this result is in line with studies that have shown that IT infrastructure and technology adoption positively affect firm innovation [40,41,43].

In addition, examining the digital transformation effects on firm performance reflected a strong positive effect, i.e., successful digital transformation will result in improved firm performance. This result is consistent with most studies examining the effect of digital transformation, digitization, or technology adoption [44–46].

In contrast, Chae et al. [74] surprisingly found that IT capabilities do not affect a firm's financial performance, neither through profit nor cost. He justified this by the fact that IT capability lost importance due to reduced IT costs, outsourcing, and ready packages. However, this cannot be true in the case of digital transformation because, as discussed earlier, DT is a strategic process that is more than just implementing technology.

However, productive digital transformation enhances customer experience, customer satisfaction, and customer loyalty. Overall organizational innovativeness also increases productivity and reduces costs [5]; thus, it leads to competitive products and services, increased customer retention rate, market share, and healthier profitability, i.e., improved firm performance.

Furthermore, the analysis indicates that customer experience significantly positively affects firm performance. In other words, a better customer experience will be translated accordingly into better firm performance. This finding aligns with the literature [50–52]. Clearly, enhanced customer experience results in better word-of-mouth and increased purchase intentions, customer satisfaction and loyalty, leading to improved performance, i.e., market share, retention rate, and profitability [48].

Moreover, the results demonstrate a significant positive effect of IT innovation on firm performance. Therefore, enhanced IT innovation will improve the performance of firms, which supports earlier studies [53,54,56].

## 6. Research Contributions

### 6.1. Theoretical Contributions

The results of this study will serve as theoretical contributions to this field's literature. Existing studies have discussed DT and its effects on firms' performances across many sectors. However, they need to expand on its significance in the service sector, particularly in developing countries such as Saudi Arabia. The current study empirically supports that DT predicts customer experience, IT innovation, and its direct influence on firm performance. Second, customer experience and IT innovation positively influence firm performance. Third, the vital role that DT needs to play in the process of implementing service delivery innovation practices, especially in industries such as the service sector, is crucial. In addition, as a result of its management and organizational capabilities, it can contribute to a firm's performance as a whole. Thus, our theoretical contribution is to expand on the role of DT, customer experience, and IT innovation on firm performance. As technologies emerge in the service industry, competition becomes more and more challenging. The relationship between digital transformation, customer experience, and IT innovation has become increasingly close.

Finally, the findings of this study are of great value to researchers and academicians, since they provide more insight and information about the impact of DT on firm performance and two dependent variables (customer experience and IT innovation). Moreover, the results could be useful for other research demonstrating that firm innovation influences firm performance [75]. In particular, the study represents a starting point for further research aiming to extend and replicate its findings in other countries or sectors with different levels of management experience.



## 6.2. Practical Contributions

The study findings identify the capabilities firms can focus on to enhance DT and the competencies needed to improve customer experience and IT innovation, and gain a competitive advantage in the marketplace. Moreover, this study offers firms a holistic view of key capabilities for more effective and efficient performance.

In addition, DT plays a crucial role in implementing service delivery innovation practices, especially in the service industry. As a result of its managerial and organizational capacities, it contributes to the performance of the firm. For example, top management must consider the role of IT managers in innovation initiatives.

Lastly, the study findings apply to any service organization, public or private, and any service-manufacturing firm.

## 7. Limitations and Future Research

This empirical study considered only the service sector. Future research could consider different industry sectors and/or different countries to explore the impact of DT in other markets and economies. This would help build an in-depth understanding of the conformity, similarity, and contrast between sectors and countries. Additionally, regarding the measurement of firm performance, the study used only one factor, without distinguishing financial from non-financial performance, due to the time limitation. At the same time, the data used to measure firm performance are subjective due to each firm's control over what real performance information is shared and how that information is presented. Therefore, researchers may consider a multi-factor measure for firm performance that includes financial and non-financial measures, providing a broader view.

Furthermore, studies could examine the level of employees' digital literacy as a moderating role during the digital transformation period, as it has been shown to enhance positive outcomes [76]. Another area of research that could be explored is to examine the possible mediating roles between DT and firm performance, such as managers' competencies, where previous research has called for a digital training program to improve the knowledge of organizations' employees [77].

## 8. Conclusions

To conclude, the present study findings support previous studies' results and thus help confirm that digital transformation positively affects customer experience and IT innovation, and confirm its direct influence on firm performance.

DT is an emerging concept crucial for a firm's competitiveness and survival in this era of technology revolution, in which businesses are transforming along with economies. Customer experience and IT innovation are crucial for a firm's competitive advantage. Nevertheless, only a few published studies have covered the effect of DT on firm performance, none in Saudi Arabia. Therefore, these findings, which align with existing literature, suggest that firms must invest in building capabilities relating to DT to boost performance.

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