

The Impact of Digital Transformation Strategies on the Quality of Health Services - field study

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ABSTRACT

This study examines the impact of digital transformation strategies on healthcare service quality in primary health centers in Sabha City. Using a descriptive approach, data were collected from 384 clients, 121 service providers, and 6 managers through a questionnaire based on the SERVQUAL model. The results indicate a significant positive effect of digital transformation on service quality, with the strategic direction dimension ranking highest, supported by clear visions, implementation plans, and measurable goals. The technological dimension enhanced operational efficiency, customer experience, and decision-making, while human resource development improved technical skills and administrative performance. The legal and security dimension also played a key role in ensuring privacy, strengthening trust, and protecting institutional reputation.

INTRODUCTION

Digital transformation has become a crucial strategic direction for organizations to achieve qualitative leaps. The digital transformation process relies on the application of various digital technologies to improve business processes and promote business model innovation, thereby contributing to greater value creation. Digital transformation has changed the processes and structure of organizations, created new management methods, and produced many new practices (2025, Zhou et al). . Here, Westerman et al. (2011) see digital transformation as the use of technology to radically improve the performance or reach of organizations, while Hinings et al. (2018) see (2018, Hinings et al) view digital transformation as the combined effects of numerous digital innovations that create new actors, structures, practices, values, and beliefs that change, threaten, replace, or complement the current rules of the game within organizations, ecosystems, industries, or domains. Digital transformation can only succeed with strong strategy and leadership. Implementing digital transformation requires transformational changes, which are linked to strategy and leadership. Business practice research has shown that companies with successful digital management have a clear strategy, a commitment to change from senior management, motivated employee participation in the process, and a focus on changes in customer needs and interests (Schwertner, 2017).

Digital strategy has been defined as a business strategy, inspired by powerful and accessible technologies, that aims to provide unique and integrated business capabilities in ways that respond to constantly changing market conditions (Ross et al., 2016). In another context, quality is something that is determined by the customer, i.e., quality is based on the actual experience of customers toward the product or service, which is measured based on requirements. Service quality and patient loyalty are among the factors that influence patient loyalty toward health service facilities (Yunike et al., 2023). Therefore, good service quality is the provision of services efficiently and effectively in accordance with professional standards and service standards that are implemented comprehensively according to patient needs, using appropriate technology in health services (Tonis & Wiranata, 2020). Therefore, it can be said that the quality of health services is the degree of mastery of health services in accordance with professional standards and service standards through the use of available resources in hospitals in a reasonable, efficient, and effective manner, provided safely and satisfactorily, and based on ethics, law, and social culture by paying attention to the limitations and capabilities of the government, society, and the patient as a consumer (Rinovanchapo et al., 2025). Multidisciplinary healthcare is also defined as the collaborative provision of care by specialists from diverse backgrounds. By integrating care across multiple disciplines , the quality of healthcare services is improved, patient outcomes and satisfaction are enhanced, and operational costs and staff turnover can be reduced.(Vincent et al., 2011). Healthcare facilities in Libya consist of several types, including hospitals, health complexes, primary healthcare units, specialty clinics, private clinics. Government agencies such as the General Authority for Health Accreditation and Control, the Ministry of Health, and the Primary Health Care Foundation

work to regulate and provide health services in the country. Healthcare units in Libya face multiple problems, most notably a lack of investment in infrastructure, a shortage of medicines and equipment, a shortage of qualified medical personnel, poor coordination between departments, worsening funding problems, and the impact of armed conflict, which has damaged health infrastructure and made it difficult to access health services in some areas. In addition to administrative and organizational problems, such as irregular clinic schedules, the lack of effective coordination mechanisms between different health agencies, and the deliberate marginalization of the public sector in favor of private interests. Here, we highlight the impact of digital transformation strategies on improving the quality of health services in healthcare centers.

LITERATURE REVIEW

The health of individuals in society is one of the most important factors for development, and there has been increased interest in health centers and improving the quality of the health services they provide in recent times. A study (Leninkumer, 2017) confirmed the direct impact of service quality and improved customer satisfaction, while a study (Goswami & Dsilva, 2019) indicated that customer care and satisfaction are key to organizational success. Dsilva study indicated that customer care and satisfaction are among the keys to organizational success, while a study (Mosadeghrad, 2014) study confirmed that the quality of health services can be improved through supportive leadership, vision, sound planning, resource availability, and effective management of resources and employees. Several studies indicate a decline in the level of health services provided, with a study (Johnson, 2012) pointed to a decline in the level of health performance in government hospitals in Colombia as a result of a decline in financial and human resources. A study (Gang et al, 2013) also pointed to a decline in the level of health services in some government hospitals in Vietnam, and a study (Harris et al ,2014) found a decline in health performance and a lack of availability for all citizens. This calls for attention to be paid to studying the quality of health services in health centers, given their significant impact on achieving high levels of customer satisfaction. On the other hand, organizations are becoming increasingly aware of the importance of digital transformation and its impact on business day after day. Here, the impact of digital transformation on organizational efficiency becomes apparent, as customer expectations are higher than ever before. Digital transformation allows organizations to create personalized and seamless customer experiences, leading to increased satisfaction and loyalty. In an age of unbridled desire for instant gratification, customers demand fast, personalized experiences tailored to their preferences. Digital transformation enables organizations to leverage data and technology to create these experiences and enhance customer satisfaction and loyalty.

Defining a digital transformation strategy is a critical step to achieving success in the digital transformation process. Organizations must identify the processes they need to transform, develop a vision for their ultimate goal, and identify the technologies that will support that goal. They must then rapidly

develop digital capabilities, keep them up to date with the latest developments, and make adjustments based on user feedback. A good digital transformation strategy is one that provides added value within a comprehensive, step-by-step framework, giving stakeholders the opportunity to understand the change and appreciate its value. Therefore, a good digital transformation strategy must be compatible and consistent with the objectives to be achieved and contribute to specific results such as improving the efficiency of business processes, increasing growth, or reducing operating costs. In this context, we find many studies conducted on the importance of having a digital transformation strategy in organizations. For example, a study (Diana & Taya1, 2025) found that using the internet to discuss healthcare providers has a positive impact on the perceived quality of care, highlighting the vital role of primary care centers. Meanwhile, a study (Vidal ,2022) concluded that the success of digital transformation efforts depends largely on human capital and the presence of flexible administrative leadership. A study (Hossam & Mustafa, 2023) found that digital transformation strategies have a positive impact on institutional excellence in Egyptian airlines, while the results of a study (Michele et al, 2020) indicated that digital transformation contributes to reducing production costs and supports the decision-making process, The results show (Emran & elhony , 2023) a significant impact of digital transformation on human resources management strategies, highlighting the need for organizations to adapt and introduce technology in their systems to achieve sustainable development goals.

The results show (Emran & elhony, 2024) The findings reveal a significant positive impact of the transformational leadership style on achieving the digital transformation strategy, The results of the study (Emran & elhony, 2025) It also indicated that the existence of regulations and laws governing digital transformation, as well as comprehensive strategic plans, would contribute to enhancing this process and achieving significant successes. A study (Nyamenya ,2020) concluded that the use of digital tools in Kenyan airline operations has a significant impact on revenue generation. Therefore, we can say that the importance of digital transformation lies in its ability to enhance the efficiency of institutions by increasing productivity, reducing operating costs, and improving the customer and employee experience. It also contributes to informed data-driven decision-making, encourages innovation, provides a competitive edge, and promotes environmental sustainability.

METHODOLOGY

The study sample consisted of 384 clients of primary health care centers in the city of Sabha, 121 service providers, and 6 managers. A descriptive approach was used, and the questionnaire was the data collection tool, which consisted of two parts: The first part consisted of 20 items to measure the digital transformation strategy, and the second part consisted of 20 items to measure the quality of health services, then relying on the SERVQUAL scale, which addresses five dimensions (Tangibles, Reliability, Responsiveness, Assurance, and Empathy), as this scale has proven to be highly successful in many previous studies measuring service quality.

RESEARCH RESULT AND DISCUSSION

This section deals with the verification of the study's hypotheses. Since the data are not normally distributed, linear regression analysis was used to determine the effect of digital transformation strategies on the quality of health services in health centers in the city of Sabha, as follows:

Multiple regression analysis

Multiple regression is used to determine which independent variables (digital transformation strategies) have the greatest impact on the dependent variable (quality of health services). When studying the impact of a set of independent variables on a dependent variable, a model can be constructed for all independent variables to explain the variance in the dependent variable. The hypothesis was therefore formulated as follows: The first main hypothesis: which was formulated as a positive hypothesis, states that: " *There is a statistically significant effect of the dimensions of the strategic orientation of digital transformation on the quality of health services in health care centers in the city of Sabha at a significance level ($0.05 \geq \alpha$).*" To verify the validity of the hypothesis, multiple linear regression analysis was used for all variables at a significance level of ($\alpha=0.05$). The results of the multiple linear regression analysis for all dimensions of the strategic orientation of digital transformation on the quality of health services in health centers are as follows:

Table 1. Linear regression analysis to determine the impact of the dimensions of the strategic orientation of digital transformation on the quality of health services

Independent variables	Non-standardized coefficient values (β)	Standard error	Standardized coefficient values (β)	Model coefficient significance test		Model significance test (ANOVA)	
				Test statistics T	Probability value P-value	Test statistic f	Probability value P-value
(Constant)	1.292	0136.	-	9.530	0000.	63.275	* 0.000
Strategic dimension	0175.	0029.	0301.	6.128	0000.		
Technological dimension	0108.	0031.	0169.	3.547	000.		
After human resources	0173.	0030.	0275.	5.820	000.		

Legal and secur ity dimen sion	0116.	0030.	0165.	3.826	000.		
R= 0.654 R ² = 0.428 Adjusted (R ²)= 0.421 Std. Error of Estimate= 0.62068							

AtLevel (0.05).

Table (1) for multiple linear regression analysis shows that the correlation coefficient (R) is equal to (0.654), which is a moderate positive correlation, and that the coefficient of determination (R²) and the adjusted coefficient of determination (R²) are equal to (0.428) and (0.421) respectively, which means that (42.8%) of the change in the quality of health services is explained by the change in the strategic direction of digital transformation, and that (57.2%) remaining 57.2% indicates that there are other factors affecting the level of health service quality, and that the dimensions of digital transformation strategies have an impact at a significance level of ($0.05 \geq \alpha$). It also indicates that the proposed model of the relationship between the independent variables and the dependent variable in this study is appropriate.

Based on this, it appears that the strategic orientation dimension has the greatest impact on the health service quality variable, based on the probability value (0.000), which is less than the significance level (0.05). followed by the technological dimension, then the human resource development dimension and the legal and security dimension, which have the same effect on the variable of health service quality, based on the probability value (0.000), which is less than the significance level (0.05). Furthermore, the results of the regression analysis indicated that the model significance test (ANOVA) is significant with a probability value (0.000), which confirms the interpretation of the model from a statistical point of view.

Simple Regression Analysis

The validity of the previous results can be verified in another way by performing a simple linear regression analysis of the dimensions of the strategic orientation of digital transformation on the quality of health services in healthcare centers, from which the following sub-hypotheses emerge from the main hypothesis:

The first sub-hypothesis states that "there is a statistically significant effect of the strategic orientation of digital transformation on the quality of health services in healthcare centers at a significance level ($0.05 \geq \alpha$)".

To verify the validity of the hypothesis, a simple linear regression equation was calculated to determine the effect of the strategic direction dimension on the quality of health services, and the results were as follows:

Table 2. Shows the impact of strategic orientation on the quality of health services

Indepen dent variable	Non- standard ized coefficie nt values (β)	Stand ard error	Standard ized coefficie nt values (β)	Model significance Test		Model significance test (ANOVA)	
				Test statist ics T	Probab ility value P- value	Test statist ic f	Probab ility value P- Value
(Consta nt)	2.211	0095.	-	23.26 2	0.000*	134.26 5	0.000*
After determi ning the strategic directio n	.3090	.027	0.532	11.58 7	0.000*		
R= 0.532 R ² = 0.283 Adjusted (R ²) =0.280 Std. Error of Estimate = 0.69219							

*Function value at a significance level of $0.05=\alpha$.

Table (2) shows the simple linear regression analysis of the effect of the strategic orientation dimension on the quality of health services. The correlation coefficient between the strategic orientation dimension and the quality of health services reached (0.532). This value is moderate, indicating a moderate positive correlation between the strategic orientation dimension and the quality of health services. The coefficient of determination (explanation) reached (0.283), meaning that (28.3%) of the variation in the quality of health services is explained by the variation in the strategic orientation dimension, and that the remaining 71.7% indicates that there are other factors affecting the level of health service quality besides the strategic orientation dimension. The beta coefficient (β) reached 0.309, which means that a one-point increase in strategic orientation improvement leads to a 30.9% improvement in health service quality. This is confirmed by the significance of this effect, with an f value of 134.265, which is statistically significant (0000.) at the $0.05=\alpha$ level, confirming the statistical adequacy of the model. Therefore, we accept the alternative hypothesis, which states that there is a statistically significant effect of strategic orientation on the quality of health services at health care centers in the city of Sabha.

The second sub-hypothesis states that "*there is a statistically significant effect of the technological dimension on the quality of health services in health care centers in the city of Sabha at a significance level ($0.05\geq\alpha$)*".

To verify the validity of the hypothesis, a simple linear regression equation was calculated to determine the effect of the technological dimension on the quality of health services, and the results were as follows:

Table 3. shows the effect of the technological dimension on the quality of health services

Independent variable	Non-stand and coefficient values (β)	Stand and error	Standar dized coefficient values (β)	Model coefficient significance test		Model significance test (ANOVA)	
				Test statis tics T	Probab ility value P-value	Test stati stic f	Probabilit y value P- Value
(Constant)	2.235	.1140	-	19.559	0.000*	84,960	0.000*
Technologi cal dimension	.2860	.0310	0.447	9.217	0.000*		
R= 0.447 R ² = 0.199 Adjusted (R ²) =0.197 Std. Error of Estimate = 0.73116							

* Function value at a significance level of $0.05=\alpha$.

Table (3) shows the simple linear regression analysis of the impact of the technological dimension on the quality of health services, where the correlation coefficient between the technological dimension and the quality of health services reached (0.447), indicating a positive correlation between the technological dimension and the quality of health services, , and the coefficient of determination (explanation) reached (0.199), which means that (19.9%) of the change in the quality of health services is explained by the change in the technological dimension, and that the remaining (80.1%) indicates that there are other factors that affect the level of health service quality. The beta coefficient reached (0.286) β , which means that a one-degree increase in technological improvement leads to a (28.6%) improvement in the quality of health services. This is confirmed by the significance of this effect, with an (f) value of (84.960) and a statistical significance value of (0000.) which is statistically significant at the level of ($0.05=\alpha$), . Therefore, we accept the alternative hypothesis, which states that there is a statistically significant effect of technology on the quality of health services in health centers in the city of Sabha.

The third sub-hypothesis: , which states that "there is a statistically significant effect of the dimension human resource development on the quality of health services in health centers in the city of Sabha at a significance level ($0.05\geq\alpha$)".

To verify the validity of the hypothesis, a simple linear regression equation was calculated to determine the impact of human resource development on the quality of health services. The results were as follows:

Table 4. shows the effect of the human resource development dimension on the quality of health services

Indepe ndent varia ble	Non-standa rdized coeffic ient values (β)	Sta nd ar d err or	Standar dized coefficie nt values (β)	Model significance Test		Model significance test (ANOVA)	
				Tes t stat isti cs T	Probab ility value P- value	Te st sta tis tic f	Probab ility value P- value
Hu ma n Res our ce Develo pment	2.149	.1060	-	20.20 4	0.00 0*	116, 990	0.00 0*
	.3190	.0290	0.505	10.81 6	0.000*		
R= 0.505 R ² = 0.255 Adjusted (R ²) =0.253 Std. Error of Estimate = 0.70513							

*Function value at a significance level of $0.05=\alpha$.

Table (4) shows the simple linear regression analysis of the impact of human resource development on the quality of health services, where the correlation coefficient between human resource development and the quality of health services reached (0.505)., which is an average value, indicating a moderate and positive correlation between human resource development and the quality of health services. The coefficient of determination (explanation) reached (0.255) This means that 25.5% of the change in the quality of health services is explained by the change in the human resource development dimension, and the remaining 74.5% indicates that there are other factors affecting the level of health service quality besides the human resource development dimension. The beta coefficient reached 0.319 β , which means that a one-point increase in human resource development leads to a 31.9% improvement in the quality of health services. This is confirmed by the significance of this effect, with a value of (f) of (116.990) , which is statistically significant (0000.) at the level ($0.05=\alpha$), confirming the statistical adequacy of the model. Therefore, the null hypothesis is rejected, and the alternative hypothesis is accepted, which states that there is a statistically significant effect of human resource development on the quality of health services in health centers in the city of Sabha.

The fourth sub-hypothesis states that "there is a statistically significant effect of the legal and security dimension on the quality of health services in health centers in the city of Sabha at a significance level ($0.05=\alpha$)."

To verify the validity of the hypothesis, a simple linear regression equation was calculated to determine the impact of the legal and security dimension on the quality of health services. The results were as follows:

Table 5. shows the impact of the legal and security dimensions on the quality of health services.

Indepen dent variable	Non-standa rd coeffic ient values (β)	Stand ard error	Standard ized coefficie nt values (β)	Model significance Test		Model significance test (ANOVA)	
				Test statist ics T	Probabi lity value P- value	Test statist ic f	Probab ility value P- value
(Constan t)	2.425	131.	-	18.474	0.000*	41,215	0.000*
Legal an d security dimensio n	.2320	036.	0.328	6.420	0.000*		
R= 0.328 R2 = 0.108 Adjusted (R2) =0.105 Std. Error of Estimate = 0.77187							

* Function value at a significance level of $0.05=\alpha$.

Table (5) shows the simple linear regression analysis of the impact of the legal and security dimension on the quality of health services, where the correlation coefficient between the legal and security dimension and the quality of health services reached (0.328), This indicates a positive correlation between the legal and security dimension and the quality of health services The coefficient of determination (explanation) reached (0.108), which means that (10.8%) of the change in the quality of health services is explained by the change in the legal and security dimension, and that (89.2%) remaining 89.2% indicates that there are other factors affecting the level of health service quality besides the legal and security dimensions. The beta coefficient (β) reached a value of 0.232, which means that a one-point increase in the legal and security dimensions leads to a 23.3% improvement in health service quality. This is confirmed by the significance of this effect, with an f value of 41.215, which is statistically significant (0000.) at a level of $0.05=\alpha$, confirming the statistical suitability of the model. Therefore, the null hypothesis is rejected, and the alternative hypothesis is accepted, which states that there is a statistically significant effect of the legal and security dimension on the quality of health services at the health centers in the city of Sabha. The analysis shows that digital transformation strategies have an impact on the quality of health services at the health centers under study.

CONCLUSIONS AND RECOMMENDATIONS

The quality of health services requires a set of integrated factors, such as the quality of facilities and equipment, the physical appearance of service providers, and the speed of response to patient requests and attention to them, in order to

ensure the best health outcomes for patients. Digital transformation also requires a clear strategic vision, a strong technological infrastructure, and human resource development through continuous training, in addition to a focus on protecting all electronic health records and patient-related documents. The results of the study indicate that digital transformation strategies have a positive impact on the quality of health services in government health centers in the city of Sabha. We therefore propose that significant efforts be made to apply modern technologies such as artificial intelligence and cloud computing, automating internal processes, improving the user experience, providing the necessary training for employees, enhancing integration between systems to ensure smooth service, and continuously measuring performance to improve the quality of health services in health centers.

ADVANCED RESEARCH

Future research could explore the long-term effects of digital transformation on healthcare quality by conducting longitudinal studies that track performance indicators over multiple years. It is also recommended to examine the role of specific emerging technologies—such as artificial intelligence, cloud-based health information systems, and Internet of Medical Things (IoMT)—in enhancing patient outcomes and operational efficiency. Comparative studies between public and private health centers, or between different cities or countries, may offer deeper insights into contextual factors influencing successful implementation. Additionally, qualitative research involving interviews or focus groups with patients and healthcare providers could provide a more comprehensive understanding of challenges and user experiences related to digital transformation. Finally, future studies may investigate the economic impact and cost-benefit analysis of adopting digital health technologies, as well as the influence of organizational culture, leadership, cybersecurity policies, and digital literacy on the success of digital transformation initiatives in healthcare institutions.

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