The Kashmir Journal of Academic Research and Development
Journal homepage: https://rjsaonline.org/index.php/KJARD

Impact of Digital Transformation on Service Quality in Pakistan's Healthcare Sector

Dr. Muhammad Rizwan

Lecturer, Department of Sociology, Islamia University Bahawalpur

Email: rizwan.sandila@iub.edu.pk

ARTICLE INFO

Received:
March 14, 2025
Revised:
March 28, 2025
Accepted:
April 12, 2025
Available Online:
April 28, 2025

Keywords:
Digital transformation, Quality of Services, Healthcare Sector, Electronic health Records, Telemedicine, Patient Satisfaction

Corresponding Author:
rizwan.sandila@iub.edu.pk

ABSTRACT

The healthcare sector is facing various challenges working in Pakistan i.e. lack of accessibility, resources and inconsistency in service quality. For the last couple of years, digital transformation has significantly contributed to the improvement of healthcare delivery and patients outcomes. This research aims to investigate the impact of digital revolution on quality of service in healthcare sector of Pakistan with a focus on study of the integration of technological options such as electronic health record (EHR), telemedicine, mobile health applications and hospital information systems etc. Through literary research and empirical research conducted within healthcare institutions, this paper presents an evidence to what extent the digital tools are helping with efficiency, accuracy and satisfaction as well as general quality of service. The results show that digital transformation brings about remarkable changes in strengthening healthcare services, however, there are challenges involved in infrastructure, training and digital literacy. This study provide some indicator to the policy makers and healthcare administrators to optimize use of digital strategies for more effective and patient centred healthcare system in Pakistan.

Introduction

In the past couple of years, there has been an overtake of the use of digital technology on many different industries around the globe, and one of the industries that has been highly affected by the use of digital technology is the healthcare industry. The integration of digital tools in healthcare - commonly referred to as digital transformation - have brought along a series of innovative ways in service delivery, operational and patient engagement. In Pakistan, the current state of healthcare industry has always been faced with a lot of challenges, including poor infrastructure, variable levels of service and accessibility to people living in rural areas (Ahmed & Khan, 2021). Digital transformation offers an opportunity to deal with these redundances by the improvement of operational efficiency, minimal human error and patient-centered care (Rizvi et al., 2022).

Service quality in healthcare is derived derived the Quality definition as follows: The degree to which health services are capable of meeting or even exceeding expectations of the patient. High quality healthcare services are said to be the benefits of the capacity of providing services in a wide range of service time and reliability, empathy, and effectiveness of healthcare (Parasuraman, Zeithaml, & Berry, 1988). In the context of Pakistan; the quality of services are usually suppressed due to resource constraint, inability to get the quality of trained personnel and the obsolete administrative processes which are implemented (Hassan et al., 2020). Digital transformation can have direct impacts on these dimensions through optimization of clinical workflows, automation of routine administrative tasks and real-time data access by the healthcare providers. (Khan, & Ali 2022) For example, with the implementation of electronic health records (EHRs) which there is the potential to

properly manage patient information, no duplication of testing and by being able to make better clinical decisions (Shah et al., 2021).

Telemedicine has become another important element in the transformation of the development of digitality in Pakistan especially in regions which are remote or poor. Telehealth platforms are the virtual healthcare consultation with the additional advantage that the patient has no need to travel to virtually meet a healthcare professional for its medical service. Studies have concluded the incorporation of telemedicine helps to address the patients satisfaction, faster waiting time and continuity of care (Malik & Qureshi 2020). Additionally, mobile health application can allow patients to track their health and manage their schedule by way of appointment schedules and reminders about medications, which can help to boost self-care and engagement in healthcare treatment processes (Rana and Saeed, 2021). These combinations of technologies make up changes the quality of healthcare services to better by overcoming the barriers of accessibility, efficiency and engagement of patients.

Despite all the possible benefits, however, there are challenges to the implementation of digital transformation in the healthcare sector in Pakistan. Limitation of the infrastructure including internet connection in rural areas restrain the appropriate implementation of digital solution (Ahmed & Khan, 2021). Moreover, there might be a need for specialized training for healthcare professionals to effectively utilize digital tools as well as there might be the resistance to change which can slow down the use of digital tools (Hassan et al., 2020). Besides, data privacy and cyber security and compliance with regulations are major issues that are paramount and need to be overcome for successful integration of digital systems (Shah et al.,2021).

Several studies are highlighting the positive impact of the digital transformation in terms of quality services, provided that the application of technology process is driven by effective leadership, the investment in the technology and capacity building initiatives (Khan & Ali, 2022; Rizvi et al, 2022. In the case of Pakistan, there are governmental initiatives like Health Management Information System (HMIS), pilot telemedicine projects which infers that there is a growing realisation that digital solutions are extremely important to the modernization of healthcare delivery (Malik and Qureshi, 2020). There is, however, still very little comprehensive empirical studies about the direct impact of digital transformation in service quality in the country. Understanding this relationship is important in order to formulate evidence-based policies and stratagems in order to improve performance of healthcare institutions.

In conclusion, digital transformation is an important channel of bringing a critical shift in the quality of healthcare services in Pakistan. By integrating the following technologies: Electronic Health Records (EHRs) Telemedicine and Mobile health applications Healthcare institutions can better their efficiency, accuracy and patient satisfaction. Nevertheless, infrastructure, training and regulatory compliance issues do have to be overcome if the best positive outcome of digital transformation is to be achieved. This study is aimed to give insights on how the digital initiatives can be taken advantage of in order to build a more efficient and accessible healthcare system and a patient centered one in Pakistan.

Literature Review

Digital transformation has become an integral force to increase with the quality of services in healthcare systems everywhere in the world. According to Agarwal and Selen (2020) digital transformation in healthcare is the use of advanced technologies like electronic health records (EHRs), telemedicine, mobile health applications, and hospital information systems in optimizing clinical, administrative and managerial processes in healthcare. These advances in technology have proved to increase operational efficiency, reduce the rate of errors and enhance patient satisfaction (Rizvi et al., 2022). In Pakistan healthcare institutions are stepping up and taking digital solutions to counter the persistent challenges concerning accessibility, quality, quality and delivery of services although the rate of adoptions ranges from one public or private hospital to another (Ahmed & Khan, 2021).

Service quality is considered as being multidimensional construction in the health care service industry that includes reliability, reliability, responsiveness, assurance, empathy and tangibility conceptualized by Parasuraman, Zeithaml and Berry (1988). In the context of digital transformation these dimensions are directly affected by the availability and effectiveness of the digital tools. For example reliability and responsiveness using automated appointment systems, online consultation platform and real time patient monitoring technologies (Shah et al. 2021). In the same way, assurance and empathy by the telemedicine services and patient-oriented mobile applications are reinforced to encourage the conversation between patients and healthcare providers to be regular (Malik & Qureshi, 2020). Several studies has raised that an introduction of an

improvement in these dimensions result in better patient satisfaction, loyalty and overall trust in healthcare institutions (Hassan et al., 2020; Rana & Saeed, 2021).

Electronic Health Records (EHRs) is one of the hottest and discussed tool in the literature area of the digital transformation. EHRs that promote the systematically recording of data on patients that will minimize the likelihood of a medical error as well as the duplication of the testing and delays in providing treatment (Shah et al., 2021). Studies in Pakistan shows that EHR implementation hospitals have significant improvement to make clinical and day to day decision (Khan & Ali, 2022). However, some of the major challenges are, inadequate information technology infrastructure, employees in healthcare are resistant to change and data privacy questions are some of the big barriers to the deployment of 100 percent (Ahmed & Khan, 2021). Moreover, EHR systems vary widely in their qualifications with the private hospitals usually owning better systems than the public institutions which leads to differentials in the quality of services (Hassan et al., 2020).

Telemedicine has been notable digital remedy in Healthcare sector as it has revolutionized the rural and un-served communities in Pakistan. Telemedicine helps patients to attend to the healthcare providers from long distance, minimizing the requirements of visiting the health care providers and bridge the gaps of accessing health care provision; it helps in minimizing the geographical barriers to access to medical helps (Malik & Qureshi, 2020). Empirical evidence suggest that telemedicine help to enhance patient satisfaction, to shorten a patient's waiting time and to provide continuity of care (Rizvi et al. 2022). Apart from this, telemedicine platforms can also be utilized to facilitate a specialist consultation to complex cases which would not be accessible to patients who live in inaccessible areas (Rana & Saeed, 2021). Despite of these benefits, the use of telemedicine is limited due to outdated material infrastructure including unstable connectivity of internet connection and as a result of unfamiliarity of patients with digital tools creating the need for digital literacy programmes and investment to ICT infrastructure (Ahmed and Khan, 2022).

Mobile health applications (mHealth) is another important aspect of digital transformation. mHealth applications grant patients access to their health metrics to make an appointment, send reminded for medications, access educational information related to patients health and wellness (Rana & Saeed, 2021). Studies in Pakistan show that mHealth applications are having an impact on the engagement and compliance of the patients with consensus of the treatment protocol that has contributed to the improved quality of service provided (Shah et al., 2021). Moreover, mHealth platforms facilitate the provision of personalized care, as well as the patient being able to take a more active role in healthcare management for themselves, which is consistent with the global trend of moving towards patient-centered healthcare (Khan and Ali, 2022). However, there have been challenges such as the low smartphone penetration, socio-economic disparity and digital literacy are some of the constraints to the large-scale adoption of these technologies in certain parts of the world (Ahmed, & Khan, 2021).

The relationship between the digital transformation and the quality of service are affected by other organizational and managerial factors. Leadership commitment, staff training and change management strategies are key to the success of the digital initiatives in healthcare institutions (Rizvi et al., 2022). Hospitals investing in capacity building programmes, building of IT infrastructure and involving the staff in the digital adoption is more likely to see tangible improvement in quality of their service (Hassan et al. 2020). On the other hand under supporting leadership and under provision of training may lead to misutilization of digital tools contribution to minimal improvements to the quality of services despite huge investments of money and hence create very little impact on services (Khan and Ali, 2022).

In the situation of Pakistan, the government policies along with the national programs of health Pakistan have begun realizing the significance of digital transformation. Initiatives like Health Management Information System (HMIS) and pilot telemedicine initiatives are indications of the growing realisation on the potential of digital solutions towards improved access to and quality of healthcare (Malik & Qureshi, 2020). Nevertheless, the fragmentary nature of governance in the field of healthcare, as well as the insufficient allocation of funds for the success of the digital infrastructure in the public hospitals are the challenges associated with a nation-wide implementation (Ahmed & Khan, 2021). Scholars highlight on importance of integrated approach which involves mix of technology adoption, along with support policies, stakeholder engagement and building capacities for assuring sustainable improvement in quality of service (Rizvi et al, 2022).

Research has also reviewed importance of patient's perception in reviewing quality of services. Patient satisfaction has a close link to the perception of how the digital health services are working and efficient as well as being accessible to the patient (Rana & Saeed, 2021). Studies have been conducted in Pakistan where the patients are usually open for using the digital

healthcare services as long as they are user-friendly, reliable and accessible (Shah et al. 2021). However, there are socio-cultural aspects, such as trust in technology and literacy levels that affect patient acceptance and utilisation of digital tools, which means that digital transformation strategies should be specific to the local situations with a view to enabling pronounced change (Hassan et al., 2020).

Several empirical studies have been conducted all over the world for exhibiting the occurrences of a correlation between digital transformation and service quality in healthcare. For example, Agarwal and Selen's (2020) study demonstrates the fact that hospitals with advanced digital infrastructure have better patient satisfaction ratings, less operation inefficiencies and better clinical outcomes. Similarly, Rizvi et al. (2022), find that digital solutions are contributing to an improved communication between healthcare providers and patients, evidence based decision making and improved overall effectiveness of healthcare services. These results are further confirmed by studies in South Asia including Pakistan in which use of EHRs, telemedicine and mHealth platforms have been linked with improved service provision with the degree of impact varying and subject to organizational preparedness and quality of infrastructure (Khan & Ali, 2022; Malik & Qureshi, 2020).

Despite this increase in the literature, still there are some gaps in the knowledge on the holistic effect of digital transformation on the quality of service in Pakistan. Most studies are focused on individual technology, such as EHRs or telemedicine without considering the integrated effect of the multiple digital technologies on patient satisfaction, operational efficiency and clinical outcomes (Shah et al., 2021). Furthermore, there are few researches directed to the moderating role of the organizational culture, leadership and digital literacy in the relationship between digital transformation and service quality (Ahmed and Khan 2021). Overcoming these gaps is important in the development of evidence-based strategies that could help healthcare institutions to maximise the benefits of using digital solutions that will enhance the quality of services.

In conclusion from the literature, it appears that there are great potentials of digital transformation to improve quality of services in healthcare sector Pakistan. Technologies such as EHR's, Telemedicine and mobile health applications are successful in enabling organization to be more efficient by making less errors and making the patients more satisfied. However, limitations of infrastructure, training requirement and socio-cultural factors of acceptance by the patients need to be addressed for successful implementation. Future research should focus on research based on integrated approaches; seeking how combination of digital tools, supportive policy and organizational practices could attained sustainable improvements in service quality in healthcare system in Pakistan.

Methodology

This research incorporates a quantitative research design which focuses to examine the impacts of digital transformation towards the quality of services in healthcare sector in Pakistan specifically in Lahore. The methodology is aimed to elicit information from healthcare professional and patients about the uptake of use of digital technology as and their impact on quality of service received.

Research Design

A quantitative research design was employed since it provides an opportunity for the systematic collection of data through the analyses of numerical data in order to test relationship between variables (Creswell & Creswell, 2018). The subject of this study involve the study of relationship between digital transformation which is assessed by the adoption of electronic health records (EHRs), telemedicine, mobile health apps and health information system and also the quality of services which is measured using dimension from the SERVQUAL methodology which include reliability, responsiveness, assurance, empathy, and tangibility (Parasuraman, Zeithaml, & Berry, 1988).

Population and Sampling

The target population is the healthcare professionals (doctors, nurses and administrative staffs) and patient's belonging of the hospitals of Lahore. A purposive sampling technique was employed in this study to obtain the participants who were directly involved and/or affected with respect to a digital healthcare practices (Taherdoost, 2016). The study was based on the six major hospitals in the capital of the province of Lahore like three public and three private hospitals to get a representative picture of the digital adoption in different organizational settings. A total of 300 questionnaires were issued and 270 used questionnaire was obtained with a rate of 90% which is equal to sufficient for carrying out statistical analysis (Hair et al., 2021).

Data Collection Instrument

Data was collected using structured questionnaire which was divided in to 2 sections. The first one was demographic data collecting of age, gender, level of education, experience of the professions / role in the healthcare institution. The second part was the measuring of the study variables. Items for digital transformation were based on the previous researches (Shah et al., 2021; Rizvi et al., 2022) and they included questions relating to use of EHR, telemedicine, mHealth and Hospital Information Systems. Items for the service quality were based on the SERVQUAL scale (Parasuraman et al., 1988). Responses were measured using the five point Likert Scale using a combination of 1 to 5 (strongly agree).

A pilot study was done with 25 respondents to find out the degree of question alreadyness, unreliability and consistency of the questionnaire. The Cronbach's alpha for digital transformation scale was calculated to be 0.88 and 0.91 to scale quality of service which indicated that the reliability is high (Nunnally & Bernstein, 1994).

Data Collection Procedure

Data collection was physically performed in all the hospitals of the city of Lahore. Respondents were informed about the aim of study and the informed consent was sought. Questionnaires were distributed as the course of work hours to healthcare professionals and outpatients and inpatients of the healthcare departments. The respondents were given sufficient time to answer the questionnaires and it was ensured at that point that confidentiality and anonymity would be maintained.

Data Analysis

Data were analyzed by using version 26 of Statistical Package and Procedures (SPSS) statistical program for the Descriptive and the Correlation analyses; and version 24 of Analysis of Moment Structures (AMOS) statistical program for the Structural Equation Modeling (SEM) analysis. Descriptive statistics was used to summarise demographic information and digital adoption and quality of service. Correlation analysis was adapted for establishing of the degree and direction of relationship between the digital transformation and quality of services (Field, 2018). In order to make sure the internal consistency of constructs, Cronbach's alpha was computed (Tavakol & Dennick, 2011). The hypotheses relationships were tested using SEM accounting for errors in measurement using Hair et al (2021). Model fit was tested by the two methods comparing Chi-square (kh2), Comparative Fitness Index (CFI), Tucker Lewis Index (TLI) and Root Mean Square Error of approximation (RMSEA) and CFI and TLI [0.90, 0.90] Root Mean Square Error of approximation (RMSEA) [0.08] were found to be acceptable (Hu & Bentler, 1999).

Ethical Considerations

The research was conducted according to ethical research. Participation was voluntary and informed consent to participation was obtained of all participants. Confidentiality and anonymity was maintained close and data securely stored. The research was in accordance with the ethical rules of the institution and best practices required in conducting survey-based research in the health care facilities (Israel & Hay, 2006).

Data Analysis and Findings

The data collected from 270 respondents, from city of Lahore was analyzed for determining effect of digital transformation on the quality of the services in the healthcare institutions. The first step, descriptive statistics, were first calculated in order to know the demographic characteristic of a sample and the digital adoption patterns. The demographic analysis proved that 54% of the respondents was a male, and 46% of the respondents were a female where most (62%) of the respondents were aged between 25 and 40 years old. Of those who responded to call, 45 percent were doctors, 30 per cent were nurses and 25 per cent were administrative staffs. With respect to experience, 38% less than 5 years in experience while 42% had an experience of 5 to 10 years and the rest of 20% of more than 10 years.

Table 1. Descriptive Statistics of Digital Transformation and Service Quality

Variable	N	Mean	SD	Min	Max
Electronic Health Records (EHRs)	270	4.12	0.68	2	5
Telemedicine Adoption	270	3.87	0.72	2	5
Mobile Health Applications	270	3.75	0.71	1	5

Hospital Information Systems	270	3.95	0.69	2	5
Service Quality Overall	270	4.03	0.66	2	5

The descriptive statistics shows that the use of electronic health records is the most commonly used and effective in PHC with mean value of score 4.12. Telemedicine and hospital information systems also scored quite high on adoption as nowadays mobile health applications were moderately utilized. Overall service quality was rated at 4.03, and would suggest that Mam would generally agree that the digital transformation is having a positive impact on service quality.

Correlation analysis was conducted as the method of analysis of the correlation between the elements of digital transformation and quality of services dimensions. The results as shown in Table 2 showed that there is positive and a significant correlation between all the variables of digital transformation and overall quality of service. Electronic health records were correlated most with quality of service ($r = 0.62$, $p < 0.01$) followed by hospital information systems ($r= 0.58$, $p<0.01$) and then telemedicine adoption ($r= 0.55$, $p<0.01$) followed by mobile health applications ($r= 0.51$, $p<0.01$). These findings indicated that the higher level of digital tools adoption of the healthcare workers is correlated with the level of improved service quality perception by the service users, which in this case is the healthcare professionals and patients.

Table 2. Correlation Analysis Between Digital Transformation and Service Quality

Variable	Service Quality
Electronic Health Records (EHRs)	0.62**
Telemedicine Adoption	0.55**
Mobile Health Applications	0.51**
Hospital Information Systems	0.58**

Note: **p < 0.01

Structural Equation Modeling (SEM) was applied to test for an hypothesized relationship between digital transformation and service quality. There was good fit of the model with kh2/df = 2.41, CFI = 0.92, TLI = 0.91, and RMSEA = 0.058, indicated this data was an adequate fit for the proposed model (Hu & Bentler, 1999). The results of the SEM analysis showed that the significant prediction of digital transformation on service quality ($b=0.65$, $p<0.001$) confirmed that the digital transformation using EHRs, telemedicine, mHealth applications, and hospital information computers has a significant positive impact on the quality of healthcare services in Lahore. Among the digital transformation variables, EHR adoption had the highest impact on the quality of service, followed by hospital information systems, telemedicine and mobile health applications.

Further analysis of dimensions of service quality showed the most positive impact of digital transformation on reliability and responsiveness as automated systems and real-time information helped to reduce delays and errors in patient treatments. Assurance and empathy was also boosted especially through telemedicine and mHealth applications, which helped in facilitating constant communication and patient engagement. Tangibility, including the perception of modernized infrastructure and technology was positively affected by implementation of visible digital system. These results highlight that digital transformation not only improves operational efficiency but also improves patient centered aspects of quality of service.

In conclusion, the findings show a strong and significant positive relationship between digital transformation and service quality in the healthcare sector associated with Lahore. The research confirms the integration of electronic health records, telemedicine, mobile health applications, and hospital information systems make a difference to service quality by enhancing reliability, responsiveness, assurance, empathy, and tangibility. The results also highlight the importance of the holistic implementation of digital tools, supportive infrastructure, and staff training in order to maximize the benefits of digital transformation in healthcare delivery.

Discussion

The results and the findings from this study show that the effect of digital transformation is very positive on service quality in the healthcare sector of Lahore. The results are consistent with previous research suggesting that technologies such as electronic health records (EHRs), telemedicine, mobile health applications, and hospital information systems help largely to improve operational efficiency, reduce errors, and improve patient satisfaction (Shah et al., 2021; Rizvi et al., 2022). Of the digital products reviewed, EHRs were considered to have the greatest impact on service quality because of their role to ensure proper record-keeping, create an efficient workflow and facilitate evidence-based decisions. This supports the findings of

Khan and Ali (2022) that emphasized that the systematic management of patient data is central to improving the outcome of healthcare services.

The analysis also determined that the use of telemedicine and mobile health applications have positive effects on patient engagement, responsiveness and assurance. These tools eliminate geographical and time impediments for patients, virtual consultations, and facilitate the proactive management of health by reminders and real-time communication (Malik & Qureshi, 2020; Rana & Saeed, 2021). The study points out that in the densely populated city of Lahore, where hospitals are dealing with the burden of many patients and the traffic delays, digital solutions have a very important role to play in improving accessibility and efficiency of service delivery.

Furthermore, the outcomes of the study highlight the fact that hospital information systems play an important role in the overall quality of service by bringing together administrative, clinical, and operational functions. These systems help to enhance coordination between the departments and reduce task duplication and increase the availability of information for decision-making at the appropriate time. The findings highlight the impact of digital transformation in many dimensions of service quality, including reliability, responsiveness, assurance, empathy, and tangibility, to show that the benefits are not limited to operational efficiency, but also include patient-centred care.

However, the study also found challenges in adoption of digital tools infrastructure limitations, digital literacy gaps among patients and staff and occasional resistance to change among healthcare professionals (Ahmed & Khan, 2021). These barriers underscore the need that digital transformation is successful not only through the investment in technology, but also by the readiness of organizations and the training and support provided for their staff as well as the enabling/inhibiting policy frameworks. Overall, the findings support the notion that digital transformation has a strong empirically-grounded role to play in improving service quality but also highlight areas that need specific interventions in order to achieve maximum effect.

Conclusion

This study concludes that digital transformation is one of the major drivers of improved services quality in healthcare sectors of Lahore. The acceptance of EHRs, tele-medicine, mobile health applications, and hospital information systems has made a huge impact in improving the efficiency of operation, reducing errors, and improving patient satisfaction. The results confirm that digital tools affect positively all aspects of service quality such as reliability, responsiveness, assurance, empathy and tangibility.

The findings also indicate that EHRs play the most key role in improving healthcare delivery, followed by hospital information systems, telemedicine and mobile health applications. Moreover, the study suggests that although there may be much to be gained from digital transformations, also challenges regarding infrastructure, digital literacy, and staff readiness need to be addressed if there are to be optimal outcomes from digital transformation processes. Therefore, there is a need for hospitals and policymakers to have a holistic approach of integrating technology adoption with organizational capacity-building and patient engagement approaches.

In conclusion, digital transformation provides a sustainable solution for the improvement of the quality of healthcare services in the city of Lahore, as well as the potential improvement of patient-centered care, operational efficiency and entire health care system.

Recommendations

Based on the results of the study, a number of recommendations are made to enhance the impact of the digital transformation on the quality of healthcare services:

1. **Enhanced Infrastructure** Hospitals should develop robust IT infrastructure like up-to-date internet infrastructure, servers and secure data storage for seamless digital operations within.
2. **Staff Training and Capacity Building,** Regular training program should be conducted to improve digital literacy level among healthcare professionals so that they can make the most effective use of EHRs, telemedicine and mHealth apps.
3. **Patient Awareness Programs:** Hospitals should educate the patient on the benefits and use of various digital healthcare tools for attaining better acceptance and engage in healthcare, especially in the aspect of telemedicine and mobile usage.

4. **Integrated Digital Systems:** There is a need for the healthcare institutions to embrace integrated hospital information systems that will link the administrative, clinical and operational structures to improve the coordination and quality of service.
5. **Policy and Regulatory Support:** Government and healthcare authorities should set the policies and guidelines associated with data privacy, cybersecurity and standardization of the digital tools to ensure the safe and efficient delivery of healthcare.
6. **Monitoring and Evaluation:** Continuous monitoring and evaluation of the digital transformation initiatives need to be undertaken so as to identify the gaps and measure the impact, and guide improvements in the quality of service.

By implementing these recommendations, it can bring about a maximum benefit to Punjab's healthcare sector which by doing so can improve patient outcomes, enhance efficiency and strengthen the overall quality of healthcare services.

References

1. Ahmed, S., & Khan, R. (2021). Challenges and opportunities in Pakistan's healthcare sector: A digital perspective. *Journal of Health Informatics*, 15(3), 45–59.
2. Agarwal, R., & Selen, W. (2020). Digital transformation in healthcare: Opportunities and challenges. *International Journal of Health Management*, 9(2), 101–120.
3. Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). Sage Publications.
4. Field, A. (2018). *Discovering statistics using IBM SPSS statistics* (5th ed.). Sage Publications.
5. Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2021). *Multivariate data analysis* (8th ed.). Cengage Learning.
6. Hassan, F., Malik, T., & Ahmad, N. (2020). Service quality gaps in public hospitals of Pakistan: An empirical analysis. *Pakistan Journal of Medical Sciences*, 36(5), 1052–1058.
7. Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, 6(1), 1–55.
8. Israel, M., & Hay, I. (2006). *Research ethics for social scientists*. Sage Publications.
9. Khan, M., & Ali, S. (2022). Digital healthcare in Pakistan: Adoption, challenges, and prospects. *Journal of Medical Systems*, 46(2), 25–39.
10. Malik, A., & Qureshi, F. (2020). Telemedicine in Pakistan: Enhancing healthcare accessibility in rural areas. *Telemedicine and e-Health*, 26(7), 910–918.
11. Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3rd ed.). McGraw-Hill.
12. Parasuraman, A., Zeithaml, V., & Berry, L. (1988). SERVQUAL: A multiple-item scale for measuring consumer perceptions of service quality. *Journal of Retailing*, 64(1), 12–40.
13. Rana, H., & Saeed, M. (2021). Mobile health applications and patient engagement: Evidence from Pakistan. *Journal of Telecommunication and Information Technology*, 9(4), 67–75.
14. Rizvi, S., Hussain, A., & Ahmed, R. (2022). Digital transformation and its impact on healthcare service delivery: A case of South Asia. *International Journal of Healthcare Management*, 15(1), 101–115.
15. Shah, P., Khan, A., & Rehman, S. (2021). Electronic health records adoption in Pakistan: Opportunities and challenges. *Health Policy and Technology*, 10(3), 100574.
16. Taherdoost, H. (2016). Sampling methods in research methodology; How to choose a sampling technique for research. *International Journal of Academic Research in Management*, 5(2), 18–27.
17. Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education*, 2, 53–55.