

# ASSESSING THE IMPACT OF A PAPERLESS HEALTHCARE ENVIRONMENT ON PATIENT SATISFACTION AND LOYALTY

Syed Muhammad Fauzan Ali<sup>\*1</sup>, Fahad Ahmed Khan<sup>2</sup>, Tariq Shah<sup>3</sup>, Muhammad Aslam<sup>4</sup>, Agha Wasif Ali<sup>5</sup>, Inayyat Ullah<sup>6</sup>, Arfan Ul Haq<sup>7</sup>

<sup>\*1,2,3,4,5,6,7</sup>Baqai Institute of Health Management Sciences, Baqai Medical University

#### Corresponding Author: \*

DOI: <u>https://doi.org</u>	/10.5281/zenodo.14981	<u>597</u>	
Received	Revised	Accepted	Published
13 January, 2025	13 February, 2025	28 February, 2025	06 March, 2025

# ABSTRACT

The proposed research investigates factors that influence the satisfaction and loyalty of patients in a paperless healthcare context and is based on the theoretical framework of the Unified Theory of Acceptance and Use of Technology (UTAUT). It is planned to focus on performance expectancy, effort expectancy, service quality, and doctor performance as constructs that influence patient satisfaction, which affects patient loyalty. To collect data of multiple aspects concerning the acceptance of digital healthcare, it is encouraged to focus on healthcare professionals such as doctors, managers, executives, and officers. To analyze the correlation within constructs, it is planned to make use of SEM (structural equation modeling) with bootstrapping. Overall, the research findings state that doctor performance, effort expectancy, and service quality have an influence on patient satisfaction, while performance expectancy does not. It is also determined that patient satisfaction positively affects patient loyalty. The research underlines the importance of simple and easy-to-use digital healthcare systems, high service quality, and successful performance of doctors in the interaction with patients. The research has managerial implications for health care providers, suggesting additional education for medical professionals, making systems more user-friendly, and improving tools that make it easier for patients to interact with digital healthcare technologies. It is suggested to consider other determinants in further research regarding the adoption of digital healthcare technologies, such as trust, data security, and patient demographics. Overall, the proposed research project contributes to understanding the principle of the effectiveness and adoption of paperless healthcare technologies.

*Keywords:* Paperless Healthcare, Patient Satisfaction, Patient Loyalty, Digital Healthcare Adoption, Unified Theory of Acceptance and Use of Technology (UTAUT)

#### INTRODUCTION

For hospitals in the healthcare industry patient satisfaction together with loyalty functions as essential measures to determine institutional success and patient trust. Hospitals worldwide have adopted paperless systems as а transformation solution because of the growing digitalization movement. Paperless technologies transform traditional paper documents into electronic systems to generate better operational while decreasing efficiency errors and strengthening patient care quality (Ahmed et al., 2024). Healthcare facilities struggle to implement paperless systems because these systems encounter difficulties when introduced into healthcare environments dominated by traditional infrastructure. Assessing hospital patients' satisfaction levels and loyalty will examine hospital technology implementations throughout Sindh Pakistan's healthcare facilities.

#### **Research Background**

Research has proven that information technology (IT) produces beneficial healthcare results by advancing operational efficiency together with

care quality delivery. The process of converting medical case files into digital files in outpatient departments led to improved doctor-patient bonds and enhanced communication according to Gandhi et al. (2022). Medical applications of healthcare 4.0 technology increase healthcare service quality according to Sony et al. (2023) while also producing a more efficient patientcentered healthcare environment. Research investigations point out specific challenges that prevent organizations from adopting completely paperless administration systems. The healthcare industry combines paper-based approaches with digital processes since hospitals maintain both electronic and manual work streams in their operations. Developing nations face specific challenges in deploying digital healthcare because their inadequate infrastructure stands as an obstacle to complete digital system implementation. Healthcare facilities struggle with more than technological transitions to paperless systems because they must successfully address both cultural and organizational obstacles that healthcare providers and patients need to adopt. Multiple medical research papers demonstrate that paperless technological systems can boost patient contentment. EMRs demonstrate the ability to offer rapid patient data access thus enhancing healthcare provider decision-making and communication processes. The use of machine learning techniques for paperless hospital systems according to Ahmed et al. (2024) supports both sustainable practices and improved resource allocation systems which result in better patient services. Patients who encounter effective and unbroken business procedures tend to develop stronger bond loyalty to their healthcare provider. Multiple research reports show that these systems fail to achieve their maximum benefits because healthcare organizations experience resistance to change and insufficient IT infrastructure while lacking adequate training. Outpatient health records sharing through QR code-based systems plays a vital role according to Pandeeswari et al. (2022) since they create paperless environments while increasing patient convenience. The researchers from Yeng et al. (2022) established that human elements remain fundamental for healthcare personnel to follow cybersecurity standards since these standards protect the integrity of digital systems. The successful application of digital technologies

heavily relies on staff training accompanied by awareness education. This sentence contains both direct and flowing language while also maintaining a proper verbalization flow.

#### **Problem Statement**

Although many studies have already been conducted on adopting paperless technologies in healthcare, there remains a gap in understanding the impact of these technologies on patient satisfaction and loyalty in particular settings, for example, in Sindh, Pakistan. This region is a critical gap in the literature as no research has been conducted to examine the relationship between paperless systems and patient loyalty. Studies on the technological aspects of paperless systems are numerous. Still, they do not look into how these systems influence patient perceptions, especially service quality, doctor-to-patient and communication, overall satisfaction. According to Ketterman et al. (2024), the use of electronic questionnaires in well-child checkups can improve the quality of patient interaction, which implies that paperless systems can stimulate patient engagement.

In addition, the idea that patient accessibility is a key factor in influencing patient loyalty has not been conclusively proven to mediate the relationship between patient satisfaction and loyalty. For example, studies have demonstrated that patients may still seek service even though the hospital is far from a patient's home because they put their trust in the hospital's services and doctor's performance (Linghu et al., 2024). The question is whether it is the accessibility alone or also factors like service quality and doctor performance that matter more for patient satisfaction. Not much has been done so far to address such nuances in the literature, more so in the context of paperless healthcare systems.

Moreover, Customer Relationship Management (CRM) systems, which are an integral part of paperless healthcare in most hospitals, are not integrated optimally. Some hospitals have already changed the use of electronic medical records, but admissibilization admission forms and examination schedules are still paper-based (Saifudin et al., 2021). The inconsistency in the adoption of CRM technologies has the potential to hinder the realization of the full potential of paperless systems; thereby, its ability to enhance



patient satisfaction and loyalty would be hampered.

In terms of the literature on US healthcare, another gap is related to the low use of complete models like the Unified Theory of Acceptance and Use of Technology (UTAUT) to study the acceptance and use of paperless technologies in US healthcare. This study has not used the UTAUT model to explain how individual, social, and organizational factors will influence the acceptance of paperless systems in hospitals. A major limitation is that this approach does not consider the whole picture of studying paperless technologies in healthcare, which is especially problematic in developing countries such as Pakistan, as healthcare systems already struggle in many ways. Machap et al. (2022) and Thethi et al. (2023) have demonstrated in their studies that understanding these variables is essential for paperless healthcare system smooth, implementation and long-term success.

# **Research Aim and Objectives**

To investigate the relationship between factors associated with a paperless healthcare environment and their effect on patient satisfaction and loyalty in Sindh, Pakistan.

# Objectives

- 1. To evaluate the influence of performance expectancy on patient satisfaction.
- 2. To examine the impact of effort expectancy on patient satisfaction.
- 3. To assess the role of service quality in determining patient satisfaction.
- 4. To analyze the effect of doctor performance on patient satisfaction.
- 5. To establish the relationship between patient satisfaction and patient loyalty.

#### The following research questions are formulated:

- 1. How does performance expectancy influence patient satisfaction in a paperless healthcare environment?
- 2. What is the impact of effort expectancy on patient satisfaction in digital healthcare services?
- 3. To what extent does service quality contribute to patient satisfaction in a paperless healthcare setting?

- 4. How does doctor performance affect patient satisfaction in technology-driven healthcare systems?
- 5. What is the relationship between patient satisfaction and patient loyalty in a paperless healthcare framework?

#### Literature Review

Our study is based on the Unified Theory of Acceptance and Use of Technology (UTAUT), which constitutes an extensive framework through which the factors affecting the adoption of paperless healthcare technologies in Sindh, Pakistan, can be explored. We study in our work how different performance expectancy, effort expectancy, service quality, and doctor performance affect patient satisfaction and loyalty the paperless healthcare environment. in UTAUT's constructs of performance expectancy, effort expectancy, and social influence provide important insights into the factors that influence the acceptance and use of such digital technologies healthcare in settings. As demonstrated by studies (Tu et al., 2022), the belief that adopting technology improves the healthcare experience performance expectancy greatly influences the adoption of technology. In addition, the implementation of paperless systems in healthcare depends on effort expectancy or perceived ease of using new technologies (Reychav et al., 2021).

This study also addresses the effect of social influence and facilitating conditions on patients' perceptions and willingness to adopt paperless healthcare systems through the lens of UTAUT. Previous research has shown that patients' perceptions of hospital technology and social factors are important for technology adoption (Tatlı et al., 2024). In addition, studies about smart hospital services point out that the attitude and usability of patients are essential to understanding how new technologies are accepted (Tu et al., 2022). Our research also extends the existing body of knowledge in the adoption of paperless technologies in universities and healthcare and the acceptance of digital technologies in healthcare through the application of UTAUT.

# Theoretical Development of Hypotheses

The expectation that paperless technologies will enhance healthcare outcomes, known as



performance expectancy, has been positively linked to patient satisfaction in digital healthcare settings. Studies suggest that when patients perceive electronic health systems as improving service efficiency and care quality, they express greater satisfaction (Gandhi et al., 2022). However, some researchers highlight that transitioning to electronic health records (EHRs) may initially cause stress due to usability challenges, which could negatively impact satisfaction levels (Baniulyte et al., 2023). Despite these concerns, as patients become more accustomed to digital systems, their confidence in the technology's effectiveness increases, reinforcing the positive connection between performance expectancy and satisfaction. This forms the basis for the following hypothesis.

H1: Performance expectancy has a positive impact on patient satisfaction.

Effort expectancy is another crucial factor influencing patient satisfaction in a paperless healthcare environment. When patients perceive digital healthcare systems as easy to use and navigate, their satisfaction levels tend to increase (Kitesa et al., 2021). Conversely, if the technology appears complicated or difficult to operate, it can lead to frustration, ultimately reducing satisfaction (Adomah-Afari et al., 2023). Therefore, ensuring that digital healthcare platforms are designed to be intuitive and seamless is essential for enhancing patient experience (Alotaibi et al., 2024). This relationship forms the basis of the second hypothesis:

H2: Effort expectancy positively influences patient satisfaction.

The link between service quality and patient satisfaction in a digital healthcare environment is complex. On the one hand, digital systems can enhance service quality by providing faster and more accurate healthcare services, ultimately improving patient satisfaction (Sony et al., 2023). However, the initial shift to electronic systems may cause temporary disruptions in service delivery, leading to dissatisfaction (Baniulyte et al., 2023). While some research suggests that wellimplemented digital solutions enhance overall healthcare efficiency (Tu et al., 2022), others point to challenges such as staff adaptation difficulties and usability concerns (Addo & Agyepong, 2024). These differing viewpoints lead to the following hypothesis:

H3: Service quality has a positive impact on patient satisfaction in a paperless healthcare environment.

Doctor performance is a key factor influencing satisfaction. Attributes such patient as professionalism, clear communication, and wellinformed decision-making contribute significantly to positive patient experiences (Bhojak et al., 2023). In а digital healthcare setting, technological tools can enhance doctor performance by providing seamless access to patient records, leading to improved diagnostic accuracy and treatment efficiency (Tu et al., 2022). However, difficulties in adapting to digital systems may present challenges, potentially affecting doctor performance and, in turn, patient satisfaction (Baniulyte et al., 2023). While some research highlights the role of technology in strengthening doctor-patient interactions, others suggest that the transition to digital platforms may temporarily lower satisfaction levels (Unluturk & Semih, 2021). Based on these insights, the following hypothesis is proposed:

H4: Doctor Performance has a positive impact on patient satisfaction.

Patient satisfaction plays a vital role in fostering patient loyalty within healthcare settings. When patients have positive experiences, such as seamless access to medical information and timely care, their satisfaction increases, strengthening their commitment to a healthcare provider (Uwamungu et al., 2024). Digital tools, including patient portals, further enhance satisfaction by facilitating communication and minimizing wait times, ultimately promoting patient retention (Evans, 2024). However, challenges in implementing digital technologies can impact satisfaction levels and, consequently, patient loyalty (Bogonko et al., 2024). Despite these obstacles, research indicates that satisfied patients are more likely to continue seeking care from the same provider (Aravind et al., 2022). Based on these findings, the following hypothesis is proposed:

H5: Patient satisfaction positively influences patient loyalty.





# Methodology

The current research bases its methodology on positivist principles, which promote investigating data that can be scientifically measured and observed within the social sciences. According to positivism, statistical testing methods become possible because this perspective supports the direct measurement of objective realities (Harikumar & Saleeshya, 2020). The study utilizes measurable data to validate specific hypotheses related to the connection between healthcare factors during paperless treatment and patient satisfaction results. The positivist approach is suitable for this research because it provides an objective method to analyze data through scientific testing of observable facts.

The investigation uses a deductive quantitative analysis with a cross-sectional research design. The existing theories and hypotheses about paperless healthcare systems receive testing through a deductive approach. The research design helps researchers convert broad theoretical principles into detailed observations that validate or disprove theoretical relations. A single-time data collection through the cross-sectional methodology suits the purpose of assessing present patient satisfaction levels in paperless healthcare systems (George et al., 2024). Statistical analysis will be possible through the use of structured questionnaires to gather data from chosen patients in an efficient manner.

Patients at facilities in Karachi and Hyderabad Sindh represent the target demographic for this study since they have received healthcare from facilities that implement a paperless system. Patients who come into contact with digital healthcare technologies including electronic medical records (EMRs) and digital appointment systems belong to this group. Patients who use digital healthcare facilities offer ideal perspectives concerning their digital healthcare satisfaction levels. The study focuses on people who work with digital systems to assess their effect on healthcare encounters based on Kedwan's (2024) argument about accurately reflecting system impacts on healthcare delivery.

# This study includes five stages of criteria selection.

1. Patients must reach at least 18 years of age to establish informed consent since they will participate in the study.

2. Healthcare users who have interacted with paperless systems by receiving care within hospitals equipped with full or semi-digital management platforms should meet the requirements of the study.



3. Even though participation in this study demands voluntary consent participants must show their willingness to become part of the research.

The research criteria identify participants who currently utilize paperless systems so the generated data can be highly relevant to the study.

# The exclusion criteria are:

1. This study excludes patients who have not used paperless systems because their input does not match the research aims.

2. Patients unable to certify their understanding because of communication difficulties along with intellectual disabilities and other relevant factors will be excluded from participation so that the research maintains ethical boundaries and achieves reliable results.

Purposive sampling as a non-probabilistic technique will allow researchers to choose participants according to defined criteria important for the research. Direct experience with healthcare technologies defines the members of this sample because the research approach selects participants with relevant knowledge (Mustafa et al., 2024). The researcher selects appropriate participants through purposive sampling since random selection is not necessary to obtain suitable study respondents.

The sample size for this study will be a minimum of 200 respondents, based on the rule of thumb for Partial Least Squares Structural Equation Modeling (PLS-SEM). This rule requires at least 10 respondents per indicator of the most complex construct (H. A. M. N. I. C., 2022). A sample of this size is sufficient to ensure statistical power and reliability, allowing for the testing of multiple relationships and the robustness of the results.

The structured questionnaire will serve as a data collection tool that healthcare facility patients from Karachi and Hyderabad within Sindh province will answer. The questionnaire development uses previous research while a pilot study serves to validate it (Hanif and Anindita, 2023; Tatli et al., 2024). A pilot study with validate the measurement tool to confirm measurement quality so researchers can revise the survey ahead of implementing it in the principal data-gathering phase. The assessment instrument examining different focuses on paperless healthcare system aspects starting from patient satisfaction assessments to digital tool perception evaluation and assessment of healthcare delivery experience.

The research data will undergo Partial Least Squares Structural Equation Modeling (PLS-SEM) analysis to test direct and mediating relationships between variables. PLS-SEM serves as a strong statistical method that fits this study because it can analyze complex multi-construct and indicator models (Kedwan 2024). The current study selects PLS-SEM as a research method for implementing analysis because it efficiently examines multifaceted research models comprised of numerous constructs and indicators (Kedwan 2024). The software application used for hypothesis assessment and relationship evaluation performance expectancy, between effort expectancy, service quality, doctor performance, patient satisfaction, and patient loyalty will be SmartPLS or its equivalent.

Data Analysis and Results Table 1 Respondent Profile

Table 1 Respondent 1 Tome				
Category	Percentage			
Gender				
Male	68%			
Female	32%			
Education				
Master's	76%			
Degree				
Bachelor's	24%			
Degree				
Professional				
Roles				
Managers	42%			
Executives	35%			
Officers	13%			
Doctors	10%			

Table 1 presents the demographic breakdown of respondents, highlighting a male-dominated sample (68%) with most participants holding a master's degree (76%). Managers (42%) and executives (35%) constitute the majority, reflecting leadership perspectives on paperless healthcare adoption. The presence of doctors (10%) ensures insights from medical professionals on patient satisfaction and loyalty. Doctors were also included to provide medical professionals' insights, as their role directly influences patient satisfaction and healthcare delivery.



Table	2 Outer Loadings					
Item	Doctor's	Effort	Patient	Patient	Performance	Service
	Performance	Expectancy	Loyalty	Satisfaction	Expectancy	Quality
DP1	0.764					
DP2	0.849					
DP3	0.877					
DP4	0.761					
EE1		0.781				
EE2		0.774				
EE3		0.862				
EE4		0.863				
PL1			0.910			
PL2			0.934			
PL3			0.910			
PS1				0.855		
PS2				0.911		
PS3				0.876		
PE1					0.772	
PE2					0.817	
PE3					0.892	
SQ1						0.809
SQ2						0.837
SQ3						0.861
SQ4						0.841
Table	2 presents	the outer	loadings,	assessing doctor	performance, effo	rt expectancy,
demo	nstrating the stren	orth of each ind	licator in	natient lovalt	v satisfaction	performance

demonstrating the strength of each indicator in measuring its respective construct. All values exceed the acceptable threshold ( $\geq 0.70$ ), confirming strong reliability. These results validate the effectiveness of the selected indicators in assessing doctor performance, effort expectancy, patient loyalty, satisfaction, performance expectancy, and service quality within a paperless healthcare system.

#### Table 3 Construct Reliability and Validity

Construct	Cronbach's	Composite	Average	Variance	Extracted
	Alpha	Reliability	(AVE)		
Doctor's Performance	0.830	0.834	0.664		
Effort Expectancy	0.840	0.865	0.674		
Patient Loyalty	0.907	0.911	0.843		
Patient Satisfaction	0.855	0.857	0.776		
Performance	0.778	0.851	0.687		
Expectancy					
Service Quality	0.859	0.869	0.701		

Table 3 evaluates construct reliability and validity using Cronbach's Alpha, Composite Reliability, and AVE. All Cronbach's Alpha values exceed 0.7, confirming internal consistency. Composite Reliability scores further validate the constructs' reliability. AVE values above 0.5 indicate strong convergent validity, ensuring that the constructs effectively measure patient satisfaction and loyalty in paperless healthcare settings.



Vol	lume	3,	Issue	3,	2025
		-,		-,	

Table 4 Discriminant Validity - Correlations Among Constructs								
Construct	Doctor's	Effort	Patient	Patient	Performance	Service		
	Performance	Expectancy	Loyalty	Satisfaction	Expectancy	Quality		
Doctor's								
Performance								
Effort	0.753							
Expectancy								
Patient Loyalty	0.424	0.578						
Patient	0.857	0.714	0.582					
Satisfaction								
Performance	0.708	0.847	0.474	0.581				
Expectancy								
Service	0.814	0.781	0.671	0.877	0.863			
Quality								

Table 4 assesses discriminant validity by examining correlations among constructs. Each construct correlates more strongly with its indicators than with others, confirming distinctiveness. High correlations, such as between patient satisfaction and service quality (0.877), highlight key relationships. These results validate the study's framework, ensuring reliable measurement of patient satisfaction and loyalty.

Table 5	Bootstrappi	ng - Path	Coefficients
---------	-------------	-----------	--------------

Hypotheses	Sample Mean	T Statistics	P Value	Remarks
Doctor's Performance → Patient Satisfaction	0.361	2.086	0.037	Significant
Effort Expectancy -> Patient Satisfaction	0.510	3.493	0.001	Significant
Patient Satisfaction -> Patient Loyalty	0.517	3.437	0.001	Significant
Performance Expectancy -> Patient Satisfaction	0.121 <sup>titute</sup> for Excellence in E	<sup>du</sup> 1.166 <sup>Research</sup>	0.244	Insignificant
Service Quality -> Patient Satisfaction	0.459	2.594	0.010	Significant

In the last step, we applied bootstrapping, a nonparametric technique, to test the statistical significance of path coefficients. Bootstrapping involves resampling with replacement from the original dataset to generate multiple subsamples, allowing for robust standard error estimation and confidence interval construction. This approach ensures the stability of results, particularly in Structural Equation Least Squares Partial Modeling (PLS-SEM), where traditional parametric assumptions may not hold (Ringle et al., 2019).

The results indicate that Doctor's Performance significantly influences Patient Satisfaction ( $\beta$  = 0.361, p = 0.037), confirming that higher doctor performance enhances patient experiences. Effort Expectancy also has a significant positive effect on Patient Satisfaction ( $\beta$  = 0.510, p = 0.001), suggesting that when patients perceive hospital

technology as easy to use, their satisfaction increases. Similarly, Service Quality positively affects Patient Satisfaction ( $\beta$  = 0.459, p = 0.010), reinforcing the importance of well-managed healthcare services.

Furthermore, Patient Satisfaction strongly predicts Patient Loyalty ( $\beta = 0.517$ , p = 0.001), demonstrating that satisfied patients are more likely to return and recommend the hospital to others. However, Performance Expectancy does not significantly impact Patient Satisfaction ( $\beta =$ 0.121, p = 0.244), indicating that patients may prioritize actual service delivery over expectations of system performance.

These findings align with the study's objectives by identifying key factors influencing Patient Satisfaction and Loyalty in a paperless healthcare environment. The insights suggest that hospitals should focus on improving doctor performance,



service quality, and ease of technology use to enhance patient outcomes.

# Discussion

Our results provide empirical validation for some of the proposed hypotheses while challenging others, offering significant insights into the factors affecting patient satisfaction and loyalty in a paperless healthcare environment. Among the hypotheses tested, the study found significant support for the positive effects of doctor performance, effort expectancy, and service quality on patient satisfaction, as well as the relationship between patient satisfaction and patient loyalty. However, the effect of performance expectancy on patient satisfaction was found to be insignificant.

The results confirm that doctor performance significantly influences patient satisfaction, aligning with prior research emphasizing the role of professional competence, clear communication, and effective decision-making in shaping positive patient experiences (Bhojak et al., 2023). The adoption of digital healthcare technologies enhances diagnostic accuracy and treatment efficiency, ultimately improving patient outcomes (Tu et al., 2022). However, it is also acknowledged that adapting to digital platforms can present challenges for healthcare providers, potentially creating barriers to patient satisfaction (Baniulyte et al., 2023). Despite these concerns, the findings reinforce that improved doctor performance, facilitated by digital tools, leads to higher satisfaction levels, supporting the acceptance of H4.

Similarly, effort expectancy emerged as a significant predictor of patient satisfaction, in line with previous studies that highlight the importance of perceived ease of use in technology adoption (Reychav et al., 2021). When patients find digital healthcare systems easy to navigate, their experience improves, leading to greater satisfaction (Kitesa et al., 2021). Conversely, when systems are complex and difficult to operate, frustration arises, reducing satisfaction levels (Adomah-Afari et al., 2023). These findings support the adoption of paperless healthcare solutions, provided that usability remains a priority in system design. As a result, H2 is supported.

Service quality was also found to have a significant effect on patient satisfaction, confirming the

assertion that well-implemented digital healthcare solutions improve service efficiency and care delivery (Sony et al., 2023). Digital systems enhance operational effectiveness by reducing wait times and facilitating seamless access to patient records, which directly contributes to patient satisfaction. However, the literature also highlights that transitioning to paperless systems can create temporary disruptions, potentially leading to dissatisfaction (Baniulyte et al., 2023). Despite such transitional challenges, the results affirm that patients recognize the long-term benefits of improved service quality, supporting H3.

The relationship between patient satisfaction and patient loyalty was strongly supported, reinforcing findings from past studies indicating that higher satisfaction levels encourage continued engagement with healthcare providers (Uwamungu et al., 2024). Digital tools, such as patient portals, further strengthen this relationship by streamlining communication and improving accessibility (Evans, 2024). Given that satisfied patients are more likely to return and recommend services to others, this result validates the core assumption of H5.

However, contrary to expectations, performance expectancy did not significantly influence patient satisfaction. This finding diverges from prior research suggesting that the perceived usefulness of technology directly enhances satisfaction (Gandhi et al., 2022). A possible explanation could be that while patients acknowledge the potential benefits of paperless healthcare, they prioritize actual service delivery over theoretical expectations. Additionally, transitioning to digital systems may introduce stress and uncertainty, particularly for patients unfamiliar with such technologies, which could diminish the impact of performance expectancy on satisfaction (Baniulyte et al., 2023). Consequently, H1 is rejected.

The findings align with the research objectives by identifying kev determinants of patient satisfaction and loyalty in a paperless healthcare environment. The study confirms that doctor performance, service quality, and effort expectancy are critical factors influencing patient satisfaction, with satisfaction acting as a strong predictor of loyalty. The insights provide recommendations for healthcare actionable institutions to improve service delivery, ensuring that digital healthcare technologies enhance, rather than hinder, patient experiences.



# Conclusion and Future Directions

This study sheds light on the factors influencing patient satisfaction and loyalty in a paperless healthcare environment, offering valuable insights for healthcare providers transitioning to digital systems. The findings confirm that doctor performance, effort expectancy, and service quality significantly enhance patient satisfaction, while patient satisfaction itself strongly predicts patient loyalty. These results highlight the importance of well-designed, user-friendly digital healthcare systems and the crucial role of doctors in ensuring a smooth transition to paperless healthcare. However, performance expectancy did not significantly impact patient satisfaction, suggesting that patients prioritize tangible service quality over perceived technological benefits.

These insights emphasize the need for seamless, accessible digital healthcare solutions that enhance both provider efficiency and patient experience. By addressing usability challenges and maintaining high service standards, healthcare institutions can improve patient trust and retention. Ultimately, the study provides a roadmap for optimizing digital healthcare systems, ensuring they positively impact patient care and long-term loyalty.

The findings of this study provide several managerial implications for healthcare administrators aiming to transition toward a paperless healthcare environment. First, service quality and doctor performance play a crucial role in patient satisfaction, emphasizing the need for hospitals to invest in staff training and technological support. Ensuring that healthcare professionals can efficiently use digital systems will enhance the overall patient experience and trust in paperless healthcare.

Second, while effort expectancy positively influences patient satisfaction, performance expectancy was found to be insignificant. This suggests that healthcare institutions should focus on simplifying digital systems rather than merely highlighting their benefits. User-friendly interfaces, adequate training for patients, and real-time support can ease adoption and minimize resistance.

To improve patient loyalty, hospitals must prioritize satisfaction by enhancing the usability and responsiveness of digital platforms. Additionally, integrating personalized digital interactions—such as AI-driven patient assistance and seamless appointment scheduling—can further strengthen patient engagement.

Future research should explore the long-term impact of paperless systems on healthcare efficiency, financial sustainability, and patient trust. Investigating potential moderating factors, such as age, digital literacy, or healthcare accessibility, could provide deeper insights into optimizing digital healthcare adoption. Expanding the study beyond Sindh to other regions would enhance generalizability and applicability.

# References

- Addo, K., & Agyepong, P. K. (2024). Evaluating the Health Information system implementation and utilization in healthcare delivery. *Health Informatics Journal*, 30(4), 14604582241304705.
- Adomah-Afari, A., Anakwa-Awuku, A., & Gadeka,
  D. D. (2023). Patients satisfaction with the quality of care upon implementation of electronic health records system at the 37 Military Hospital, Ghana. *Health Sciences Investigations Journal*, 4(2), 494-501.
- Aggrey, R., Nketiah, L., Nunoo, G., Cetin, E., & Adjei, B. A. Digital Transformation in Healthcare: A Case Study of the University of Ghana Medical Centre with
- Ahmed, I., Hasan Mim, S., Shabnam Chadni, J., Islam, S., & Hasan Plabun, M. (2024, January). А Sustainable, Paperless Environment Using Machine Learning in Hospitals and Medical Sectors. In International Conference on Emerging Applications of Information Technology (pp. 389-401). Singapore: Springer Nature Singapore.
- Alotaibi, N., Wilson, C. B., & Traynor, M. (2024). Enhancing Digital Readiness and Capability in Healthcare: A Systematic Review of Interventions, Barriers, and Facilitators.
- Aravind, G. P., Goel, K., Gupta, M., & Singh, A.(2022). Effect of digitization of medical case files on doctor patient relationship in an out patient department setting of Northern India: a comparative study.
- Baniulyte, G., Rogerson, N., & Bowden, J. (2023). Going paperless–Qualitative monitoring of staff morale during the transition from



paper to electronic health records. *Heliyon*, 9(10).

- Baniulyte, G., Rogerson, N., & Bowden, J. (2023). Going paperless-Qualitative monitoring of staff morale during the transition from paper to electronic health records. *Heliyon*, 9(10).
- Baniulyte, G., Rogerson, N., & Bowden, J. (2023). Going paperless-Qualitative monitoring of staff morale during the transition from paper to electronic health records. *Heliyon*, 9(10).
- Bhojak, N. P., Modi, A., Patel, J. D., & Patel, M. (2023). Measuring patient satisfaction in emergency department: An empirical test using structural equation modeling. International Journal of Healthcare Management, 16(3), 412-426.
- Bogonko, N. M., Simiyu, A., & Omondi, M. M. (2024). Green Occupational Health, Safety and Performance of Devolved Healthcare Services in Kenya. African Journal of Empirical Research, 5(3), 758-772.
- Bogonko, N. M., Simiyu, A., & Omondi, M. M. (2024). Green Occupational Health, Safety and Performance of Devolved Healthcare Services in Kenya. African Journal of Empirical Research, 5(3), 758-772.
- Bogonko, N. M., Simiyu, A., & Omondi, M. M. (2024). Green Occupational Health, Safety and Performance of Devolved Healthcare Services in Kenya. African Journal of Empirical Research, 5(3), 758-772.
- Evans, K. Determining the Influence of Patient Portal Enrollment on Length of Stay and Patient Satisfaction in a Pediatric Urgent Care: A Quality Improvement Project (Doctoral dissertation, Creighton University).
- Evans, K. Determining the Influence of Patient Portal Enrollment on Length of Stay and Patient Satisfaction in a Pediatric Urgent Care: A Quality Improvement Project (Doctoral dissertation, Creighton University).
- Gandhi, A., Goel, K., Gupta, M., & Singh, A. (2022). Effect of digitization of medical case files on doctor patient relationship in an Out Patient Department setting of Northern India: A comparative study. *Indian Journal of Community Health*, 34(4), 477-482.
- Gandhi, A., Goel, K., Gupta, M., & Singh, A. (2022). Effect of digitization of medical

case files on doctor patient relationship in an Out Patient Department setting of Northern India: A comparative study. Indian Journal of Community Health, 34(4), 477-482.

- George, T. R., Shewakramani, R., & un Nisa, N. (2024). Evaluation of Smart Technologies Applications to Improve Service Quality and Customer Satisfaction: An Investigation of Smart Hospitals in Kerala state, India.
- George, T. R., Shewakramani, R., & un Nisa, N. (2024). Evaluation of Smart Technologies Applications to Improve Service Quality and Customer Satisfaction: An Investigation of Smart Hospitals in Kerala state, India.
- H. A. M. N. I. C. (2022). Analysis of the Application of Smart Technologies in the Healthcare Industry to Improve Service Quality and Customer Satisfaction: An Investigation of Smart Hospitals in Kerala state, India (Doctoral dissertation, Universidad Católica San Antonio de Murcia)
- Harikumar, P., & Saleeshya, P. G. (2020). A systems approach to mapping performance in Indian healthcare Education & Recorganizations. International Journal of Healthcare Management, 14(4), 1134– 1147. https://doi.org/10.1080/20479700.2020. 1752990
- Kedwan, D. F. (2024). A Qualitative and Quantitative Study on Patients Online Registration System. Journal of Clinical and Biomedical Advances.
- Ketterman, B. T., Carlson, K. L., Stoppelbein, M., Kaegi, D., Franklin, I., Kennedy, M., & Patterson, B. L. (2024). Going Paperless: Using Electronic Questionnaires to Improve the Quality of Well-Child Checkups. *Pediatrics*, 154(6).
- Kitesa, G., Mamo, E., Teshome, A., Binu, W., Abi, H., & Abdisa, F. (2021). Effect of Electronic Health Records on Patient Satisfaction and Waiting Time at Selected Hospitals, in Addis Ababa.
- Linghu, C., Zhang, W., & Yang, S. (2024). Application of Project Management Thinking in the Implementation of Paperless Online Physical Examination



Reports in Grassroots Health Management Centers. Journal of Service Science and Management, 17(4), 367-376.

- Machap, K., Prabhu, M. R., Rajalingam, A., Charulatha, G., Saranya, R., & Renukadevi, S. (2022, December). A Prescribed Paper Less Clinic to view the Patient's Documents. In 2022 International Conference on Computer, Power and Communications (ICCPC) (pp. 685-689). IEEE.
- Miah, S., Maw, J., Pang, K., Nair, V., Hori, S., Lamb, A., ... & Shah, N. (2022). The provision of prostate cancer patient information leaflets on an electronic tablet: A further step to paperless healthcare provision. *Urology Annals*, 14(2), 156-161.
- Midha, S., Swathi, P., Shukla, V. K., Verma, S., & Baskar, K. (2024). Digital Health Records in Paving the Way for Paperless and Green Practices. In Harnessing AI and Digital Twin Technologies in Businesses (pp. 83-98). IGI Global.
- Mustafa,N.K.,Ibrahim, R., Awang, Z., Aizuddin, A.N., & Junid, S. M. A. S. (2024). Validation of a qualitative instrument measuring critical success factors and acceptance of Casemix system implementation in the total hospital information system in Malaysia. BMJ open, 14(8), e082547.
- Pandeeswari, S. T., Padmavathi, S., & Srilakshmi, S. S. (2022). QR Based Paperless Out-Patient Health and Consultation Records Sharing System. In Machine Learning and Data Analytics (Proceedings Big of International Conference on Machine Big Data Learning and Analytics (ICMLBDA) 2021) (pp. 106-116). Springer International Publishing.
- Reychav, I., Arora, A., Sabherwal, R., Polyak, K., Sun, J., & Azuri, J. (2021). Reporting health data in waiting rooms with mobile technology: Patient expectation and confirmation. *International journal of medical informatics*, 148, 104376.
- Ringle, C. M., Silva, D. D., & Bido, D. (2014). Structural equation modeling with the SmartPLS. *REMark: Revista Brasileira de Marketing*, 13(2).

- Saifudin, A., Aima, M., Sutawidjaya, A., & Sugiyono, S. (2021). Hospital digitalization in the era of industry 4.0 based on GHRM and service quality. International Journal of Data and Network Science, 5(2), 107-114.
- Sermontyte-Baniule, R., Pundziene, A., Giménez, V., & Narbón-Perpiñá, I. (2022). Role of cultural dimensions and dynamic capabilities in the value-based performance of digital healthcare services. *Technological Forecasting and Social Change*, 176, 121490.
- Shaikh, M. I., & Sarkar, A. (2023). A comparison of patients' satisfaction treated at public and private healthcare institutions under the health scheme using the HEALTHQUAL model. *Journal of Integrative Medicine and Public Health*, 2(2), 75-81.
- Sony, M., Antony, J., & McDermott, O. (2023). The impact of healthcare 4.0 on the healthcare service quality: a systematic literature review. *Hospital topics*, 101(4), 288-304.
- Sony, M., Antony, J., & McDermott, O. (2023). The impact of healthcare 4.0 on the healthcare service quality: a systematic Education & Re literature review. *Hospital topics*, 101(4), 288-304.
- Surya, S. M., & Tamilmani, B. EFFECTS OF DIGITALIZATION OF COOPERATIVE HOSPITAL ON CLINICAL OUTCOMES AND PATIENT SATISFACTION.
- Tatlı, H. S., Bıyıkbeyi, T., Gençer Çelik, G., & Öngel, G. (2024). Paperless Technologies in Universities: Examination in Terms of Unified Theory of Acceptance and Use of Technology (UTAUT). Sustainability, 16(7), 2692.
- Thethi, N., Batra, U., & Mukherjee, S. Service Oriented Architecture: A driving force for paperless healthcare system.
- Tidderman, B. The Implication of Automation in Healthcare Operations to Improve Customer Happiness in SEHA Hospitals-Case Study in Tawam Hospital (Doctoral dissertation,Aberystwyth University).
- Tu, J. C., Luo, S. C., Lee, Y. L., Shih, M. F., & Chiu, S. P. (2022). Exploring usability and patient attitude towards a smart



hospital service with the technology acceptance model. International Journal of Environmental Research and Public Health, 19(10), 6059.

- Tu, J. C., Luo, S. C., Lee, Y. L., Shih, M. F., & Chiu, S. P. (2022). Exploring usability and patient attitude towards a smart hospital service with the technology acceptance model. International Journal of Environmental Research and Public Health, 19(10), 6059.
- Tu, J. C., Luo, S. C., Lee, Y. L., Shih, M. F., & Chiu, S. P. (2022). Exploring usability and patient attitude towards a smart hospital service with the technology acceptance model. *International Journal of Environmental Research and Public Health*, 19(10), 6059.
- Tu, J. C., Luo, S. C., Lee, Y. L., Shih, M. F., & Chiu, S. P. (2022). Exploring usability and patient attitude towards a smart hospital service with the technology acceptance model. International Journal of Environmental Research and Public Health, 19(10), 6059.
- Unluturk, M., & Semih, U. T. K. U. (2021). Hospital Paperless Communication Technologies.
- Uwamungu, E., Munyaneza, E., & Pinney, J. (2024). Electronic medical record system user satisfaction and its implications for individual work performance: The case of a university teaching hospital in Rwanda.
- Yeng, P. K., Fauzi, M. A., & Yang, B. (2022). A comprehensive assessment of human factors in relation to cyber security compliance of healthcare staff in a paperless hospital.

