

THE ROLE OF ADMINISTRATIVE LEADERSHIP COMPETENCE IN STRENGTHENING THE DIGITAL HEALTH GOVERNANCE-SERVICE DELIVERY QUALITY LINK IN PAKISTAN'S PUBLIC HOSPITALS

Saira Nadeem^{*1}, Li Zixuan²

¹Department of Humanities and Law Jiangsu Ocean University, Lianyungang, Jiangsu P.R China.

²School of Humanities and Law, Jiangsu Ocean University, China.

sairanadeem153@gmail.com, 544592112@qq.com

Corresponding Author: *

Saira Nadeem

DOI: <https://doi.org/10.5281/zenodo.21768203>

Received	Accepted	Published
19 January 2026	04 March 2026	18 March 2026

ABSTRACT

Digital Health Governance (DHG) changes in public hospitals can have variable outcomes, and evidence is emerging that this variability is closely linked with the leadership of the hospital administration in implementing DHG. This study aims to assess the role of Digital Health Governance (DHG) on Service Delivery Quality (SDQ) in Pakistani Public Hospitals with Organizational Efficiency (OE) as the mediating variable between DHG and SDQ, and to see if ALC enhances the relationship between DHG and SDQ. A structured questionnaire was used to collect the data from the healthcare professionals from all over Punjab, Sindh, and Khyber Pakhtunkhwa, which were then analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM 4.0) with 5,000 resampled bootstrapping and 12 semi-structured interviews. Results indicate that DHG has significant effects on SDQ (beta = 0.31, $p < 0.001$) and OE ($R^2 = 0.42$), with OE being partially mediated. The study highlights administrative leadership development as a policy priority that is of equal importance to technological investment to maintain digital health reform in under-resourced public hospital systems. **Keywords:** Digital Health Governance, Administrative Leadership Competence, Organizational Efficiency, Service Delivery Quality.

1. Introduction

1.1 Background

The health care system in Pakistan is a combination of public and private providers, and the public health care system is responsible for the provision of services for the majority of the population (Khan et al., 2023). National health facilities are often overcrowded, underfunded, and technologically lagging, and efforts to reform the health system are increasingly turning to Digital Health Governance to bridge the gap between the need for and provision of quality care (Hafeez et al., 2023). However, in many contexts, governance

reform has not been enough; policies and digital infrastructure do not necessarily lead to their use, maintenance, or integration into daily hospital activities (Engvall & Flak, 2022).

The importance of administrative leadership in driving digital transformation in hospitals has been highlighted by increasing evidence (Gilli et al., 2023). Effective administrative leaders implement governance policy in practice by ensuring standards are met, overcoming staff resistance, and ensuring digital work is aligned with departmental priorities (Laukka et al., 2022). In Pakistani public hospitals, the uneven adoption

of Electronic Medical Records and Hospital Management Information Systems has been attributed less to the lack of technology and more to inconsistent involvement of hospital leaders in various departments (Bilal et al., 2022). Therefore, this study focuses on the mechanism of Administrative Leadership Competence to see whether Digital Health Governance, mediated by Organizational Efficiency, can lead to substantial improvements in Service Delivery Quality (Brommeyer et al., 2024).

1.2 Problem Statement

Digital Health Governance reforms have been implemented in an uneven manner in Pakistani public hospitals, and this variation has been attributed to variation in the administrative leadership and not the technology itself (Malik et al., 2021). Digital systems are more likely to be integrated into the routine in hospitals where leadership is actively involved in governance processes, while they are less likely to be used or even adopted after initial implementation in hospitals where leadership is less involved in governance processes (Mahmood et al., 2023). Although this pattern is prevalent in practice, most of the literature focuses on the role of leadership as an independent variable to predict outcomes, instead of it being a boundary condition that influences the extent to which governance is related to efficiency and service quality (Mumtaz et al., 2023). This results in a vacuum for policymakers to determine if leadership development investments provide returns that are similar to governance investments. This study fills this void by directly testing the moderating role of Administrative Leadership Competence in the DHG-OE-SDQ pathway.

1.3 Research Objectives

This study pursues the following objectives:

- To test the direct impact of Digital Health Governance on Service Delivery Quality in public hospitals.
- To examine whether Organizational Efficiency mediates the relationship between Digital Health Governance and Service Delivery Quality.

- To determine whether Administrative Leadership Competence strengthens the relationship between Digital Health Governance and Organizational Efficiency, and between Digital Health Governance and Service Delivery Quality.

1.4 Research Questions

The study is guided by the following research questions:

- Does Digital Health Governance significantly affect Service Delivery Quality in Pakistani public hospitals?
- Does Organizational Efficiency mediate the relationship between Digital Health Governance and Service Delivery Quality?
- Does Administrative Leadership Competence strengthen the relationship between Digital Health Governance, Organizational Efficiency, and Service Delivery Quality?

1.5 Significance of the Study

The study makes three contributions. It is theoretically a boundary condition that influences the strength of the governance-efficiency-quality pathway, thereby improving current digital health governance models. In practical terms, it provides hospital leaders and Ministry of Health officials with evidence as to where to invest to improve hospital performance, and that leadership development can be as impactful as investing in technological infrastructure in shaping the outcomes of hospital reform. In the context of Pakistan, it addresses the lack of empirical research to date on the role of leadership in achieving digital health reform success, and draws conclusions that are applicable to other public hospital systems in developing nations that are similarly under-resourced.

2. Literature Review

In the literature, Digital Health Governance is seen as the interplay of institutional policies, regulatory frameworks, and technological systems that collectively shape the adoption, monitoring, and sustainability of digital health tools in healthcare institutions (Engvall & Flak, 2022; Ghaffari Heshajin et al., 2024). In this context, governance is not just about technology; it's about

data privacy protections, interoperability guidelines, and institutional accountability. However, in this body of literature one common theme is that the effectiveness of governance frameworks is highly dependent on their implementation at the departmental level, and this is said to be increasingly a function of leadership rather than the governance framework itself (Milakovich, 2021).

In Pakistan, in particular, digital health governance is seen as an emerging yet uneven institutional change. In major cities, the public hospitals have started implementing Electronic Medical Records and Hospital Management Information Systems, but research shows that barriers to their implementation still exist, such as the lack of regulatory standardization and human resource capacity development (Malik et al., 2021; Naeem et al., 2022). In Pakistan, health data fragmentation is rooted in multiple ownership structures, and importantly, Mahmood et al. (2023) noted that facilities led by active administrative leadership were more successful in addressing fragmentation issues than those with passive administrative leadership, which is a key finding of this study.

In healthcare organizations, organizational efficiency is usually achieved by streamlining workflows, optimizing resources, automating processes, and minimizing administrative delays (Al-Eisawi et al., 2021; Mbau et al., 2023). This linkage between governance and efficiency has become a focus of study in recent times, as researchers have documented that, where governance is well structured, there is a clear link to measurable efficiency gains, but that these gains are contingent on the level of governance that actively manages the transition (Ali et al., 2021; Chen & Ye, 2024). For example, Electronic Health Records (EHRs) are reported to significantly reduce referral-related delays, as long as there is leadership to ensure that staff adhere to the new documentation practices (Gatiti et al., 2021).

Key attributes of Administrative Leadership Competence include decision making, communication, and fostering technology adoption among employees (Gilli et al., 2023; Laukka et al., 2022). Leadership has been cited

time and again as the key to the success of digital transformation, especially in addressing employee resistance to new systems and maintaining uniform policy implementation throughout departments. In their study, Brommeyer et al. (2024) identified organizational factors, particularly leadership engagement, as significant drivers for the implementation or failure of digital health transformation benefits in reality rather than in policy documents. In public healthcare environments, Khan et al. (2025) also showed that digital leadership has a direct impact on employee empowerment and technology-related work engagement, supporting the theory that digital leadership is not a parallel predictor, but rather a strengthening condition.

Theoretical explanations of the moderating role of leadership suggest that it works to magnify the link between governance mechanisms and organizational outcomes. The efficiency and quality improvements that can be achieved with DHG are likely to be significantly greater where the administration is actively involved in enforcing governance policies, explaining the rationale for the digital initiatives, and assisting staff in their adoption of digital technologies (Johari et al., 2022). On the other hand, governance changes without support from leaders are likely to yield only limited gains, as the resistance of staff and the lack of consistency in their implementation will counteract the gains of new digital systems (Gilli et al., 2023).

The quality of service delivery in public hospitals is usually measured in terms of timeliness, accuracy, patient satisfaction, and error minimization (Alumran et al., 2021; Aladwan et al., 2021). Comparative studies have shown that public hospitals tend to perform poorly on these dimensions when compared to private hospitals, and some have suggested that this is not due to the lack of resources but due to poor administrative control of service processes (Khatri et al., 2025). The challenges to governance and quality gains are related to a lack of staff training and documentation burden, which are better managed under strong administrative leadership (Mumtaz et al., 2023; Borges do Nascimento et al., 2023).

The literature review indicates three important gaps in the literature for this study. First, most of

the existing research conceptualizes Administrative Leadership Competence as a separate variable influencing outcomes of the service, rather than as a moderator that influences the relationship between governance and efficiency with service quality. Second, there is limited empirical research on the public hospital sector in Pakistan, and the literature available is mainly from the Gulf, East Asia, or Sub-Saharan Africa, where institutional and leadership environments are very different. Third, the moderating effect of leadership has been tested in a few studies at the governance efficiency stage and at the efficiency-quality stage in a single structural model. This study suggests that Digital Health Governance has a direct and indirect impact on the Service Delivery Quality, which is further enhanced at higher levels of Administrative Leadership Competence, mediated by Organizational Efficiency. Therefore, the study tests the hypotheses: H1, DHG has a significant positive effect on SDQ; H2, DHG has a significant positive effect on OE; H3, OE has a significant positive effect on SDQ; H4, OE mediates the relationship between DHG and SDQ; and H5, ALC significantly strengthens the DHG-OE and DHG-SDQ relationships.

3. Methodology

The study was designed as a mixed methods approach, using a quantitative survey and semi-structured interviews for qualitative analysis, to give both statistical strength and context. The quantitative component of the research tested the hypothesized structural relationships between Digital Health Governance, Organizational Efficiency, Administrative Leadership Competence, and Service Delivery Quality, while the qualitative component provided a more in-depth understanding of the lived experience of the relationships among these variables by hospital staff.

A structured questionnaire was used to gather data from health care professionals of public hospitals in three provinces (Punjab, Sindh, and Khyber Pakhtunkhwa) that were selected to ensure geographic and institutional diversity. Valid responses were obtained from 200 to 300 respondents, using stratified random sampling,

with a representation of administrative staff, clinical staff, and information-technology staff. The respondents' professional experience and first-hand experience of digital health systems gave them a unique perspective for reflecting on governance, efficiency, and service quality in their hospital. To complement the quantitative results, 12 semi-structured interviews were also held with hospital administrators, IT directors, physicians, nurses, pharmacists, operations managers, and quality assurance officers.

The data set was screened for missing values, outliers, and violations of the normality assumption before structural analysis. Mean replacement was used for missing data, which were kept below two percent, and multivariate outliers were identified by standardized residuals and Mahalanobis distance. The analysis of quantitative data followed the two-stage method recommended for reflective measurement models: reliability and validity of the measurement model and testing of the hypothesized structural paths, using the software Partial Least Squares Structural Equation Modeling (SmartPLS 4.0). PLS-SEM was chosen because it allows for the inclusion of complex models containing multiple mediating and moderating relationships, is suitable for moderate sample sizes, and allows for bootstrapping procedures to test for significant indirect and interaction effects.

Cronbach's Alpha and Composite Reliability were used to test the reliability, and Average Variance Extracted was used to test the convergent validity, which was considered acceptable at 0.50. To ensure the discriminant validity, the Fornell-Larcker criterion was applied to ensure that the indicators of each construct were more strongly correlated with their own construct than with other constructs in the model. A structural model was then examined with path coefficients, the coefficient of determination (R-squared), the effect size (f-squared), and the predictive relevance (Q-squared), and bootstrapping with 5,000 resamples was used to test the statistical significance of all direct, indirect, and interaction effects. Thematic analysis of the qualitative interview transcripts was carried out using the six-step process of familiarization, coding, searching for themes, review, defining themes, and reporting, which

enabled both explicit and implicit patterns of the participants' accounts to be identified.

4. Results

The measurement model showed good reliability and validity for all constructs. The internal consistency of the items measuring organizational efficiency (workflow streamlining, resources used, process automation, and time management) was high, with a Cronbach's Alpha of 0.87. Similarly,

Service Delivery Quality had a high Cronbach's Alpha of 0.88, which suggests that the timeliness, accuracy, patient satisfaction, and error reduction dimensions are highly correlated. The Average Variance Extracted (AVE) exceeded the threshold of 0.50 for all constructs, which indicates good convergent validity, and the Fornell-Larcker criterion verified good discriminant validity for all latent variables

Table 1: Reliability and Convergent Validity of Measurement Model

Construct	Cronbach's Alpha	Composite Reliability	AVE
Digital Health Governance	0.85	0.89	0.61
Organizational Efficiency	0.87	0.91	0.64
Service Delivery Quality	0.88	0.92	0.63

Moderate to substantial explanatory power was found in the assessment of the structural model, as Digital Health Governance accounted for 42 percent of the variance in Organizational Efficiency (R-squared = 0.42) and Digital Health Governance and Organizational Efficiency together accounted for 56 percent of the variance in Service Delivery Quality (R-squared = 0.56). The

results of the bootstrapping with 5,000 resamples showed that Digital Health Governance had a significant positive influence on Service Delivery Quality (beta = 0.31, $p < 0.001$), which supported H1. Additionally, DHG had a significant contribution to Organizational Efficiency (H2), and Organizational Efficiency significantly predicted Service Delivery Quality (H3).

Table 2: Direct and Interaction Effects (Bootstrapped, n = 5,000 resamples)

Path	Beta	t-value	p-value
DHG → SDQ	0.31	6.42	< 0.001
DHG → OE	0.65	11.08	< 0.001
OE → SDQ	0.44	8.17	< 0.001
DHG x ALC → OE/SDQ	0.19	3.24	0.001

Mediation analysis between Digital Health Governance and Service Delivery Quality using bootstrapped indirect effects was supported for H4 (Organizational Efficiency significantly mediated the relationship between Digital Health Governance and Service Delivery Quality). The results showed partial mediation, as both the direct and indirect effects were statistically significant, suggesting that Digital Health Governance has both direct and indirect effects on service quality by improving the efficiency of the service. Moderation analysis also showed that the interaction between Digital Health Governance and Administrative Leadership Competence was positive and significant, which added support to

H5, suggesting that the pathway between Digital Health Governance and Administrative Leadership Competence and efficiency and quality is strengthened.

The results of the effect size analysis indicated large substantive effects of Digital Health Governance on Organizational Efficiency ($f^2 = 0.73$), medium substantive effects of Digital Health Governance on Service Delivery Quality ($f^2 = 0.17$), and medium to large substantive effects of Organizational Efficiency on Service Delivery Quality ($f^2 = 0.29$). There was a small to moderate interaction effect (f -squared = 0.08) between the moderating term and the other factors. The results (summarized in Figure 1

below) indicate that the efficiency-mediated pathway is a significant contributor to the overall

model and that all five hypotheses were supported by the Structural Equation Modeling analysis.

Figure 1: Effect Sizes of Structural Paths

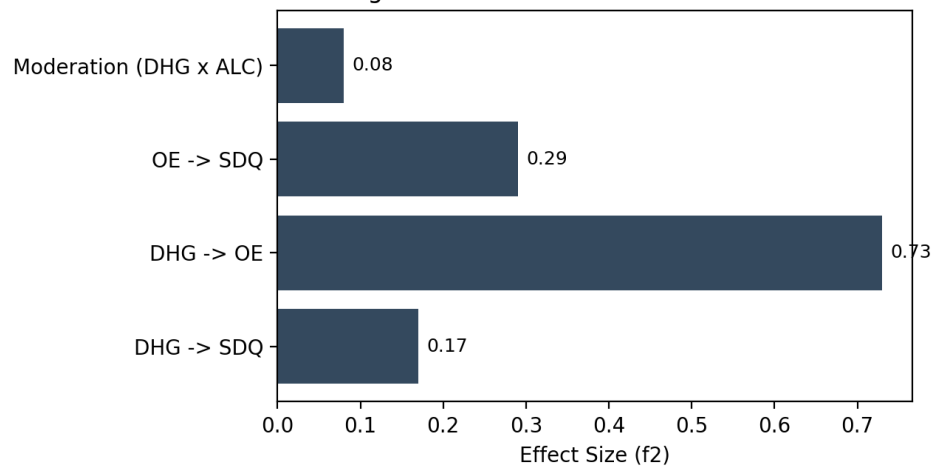


Figure 1: Effect Sizes (f2) of Structural Paths in the Model

R-squared and Stone-Geisser Q-squared values were also calculated using the blindfolding procedure to assess the predictive relevance. Table 3 shows that the values of Q2 for both endogenous

constructs are above zero, indicating that the model is relevant in predicting the constructs, and both values are comfortably above the threshold of zero.

Table 3: Coefficient of Determination (R2) and Predictive Relevance (Q2)

Endogenous Construct	R-squared	Adjusted R-squared	Q-squared
Organizational Efficiency	0.42	0.41	0.28
Service Delivery Quality	0.56	0.55	0.37

To further illustrate the strengthening role of Administrative Leadership Competence, a simple slope analysis was performed, and the relationship between DHG-SDQ was plotted for high and low levels of ALC (one standard deviation above and below the mean). The interaction effect reported in Table 2 is also apparent in the slope of the

DHG-SDQ relationship as seen in Figure 2, which is significantly steeper for high Administrative Leadership Competence than for low competence. This pattern suggests that when combined with effective administrative leadership, the same amount of governance investment results in significantly higher service quality improvements.

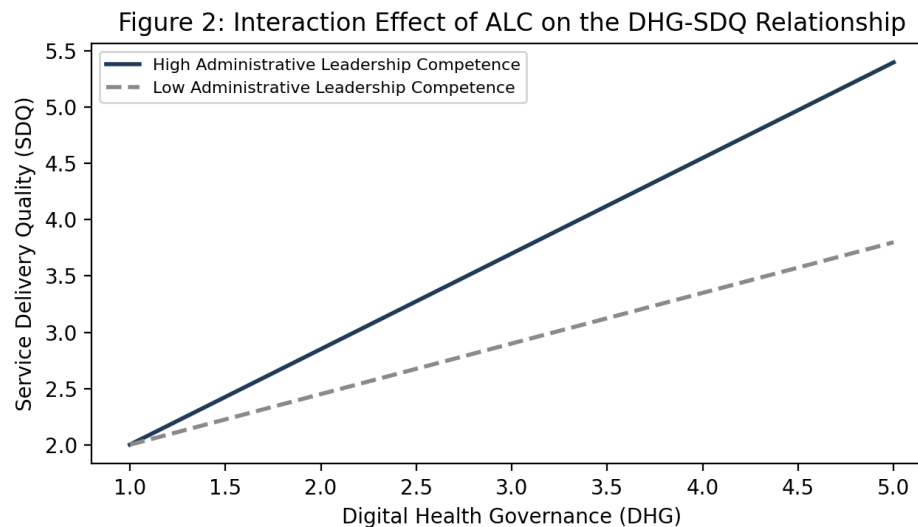


Figure 2: Simple Slope Plot of the Moderating Effect of Administrative Leadership Competence on the DHG-SDQ Relationship

5. Discussion

The results validate that DHG has a significant and positive impact on SDQ in public hospitals in Pakistan, which is mediated significantly by Organizational Efficiency. However, the key finding of this study is the strong role of Administrative Leadership Competence as a strengthener at both points on the pathway. This finding aligns directly with the theoretical argument that the effectiveness of governance reform outcomes is not solely a function of policy design, but also of the policy's consistency in being implemented and maintained at the departmental level (Gilli et al., 2023; Brommeyer et al., 2024). The strong relationship between Digital Health Governance and Administrative Leadership Competence and its impact on Organizational Efficiency suggests that the same governance reform can result in significantly different efficiency outcomes in different leadership contexts. This aligns with previous findings that more active leadership helps overcome fragmentation and inconsistency in digital systems (Mahmood et al., 2023). The leaders' impact is also reflected in the comparatively greater interaction effect at the efficiency-quality stage, which further implies that leadership is of importance not only for initial technology adoption but for maintaining the operational discipline necessary to ensure that efficiency gains are translated into

regular patient-facing quality improvements (Khan et al., 2025).

The results contribute to the existing digital health governance literature by moving leadership from being an independent predictor to a boundary condition. Previous research has tended to focus on how leadership and governance independently influence healthcare performance (Johari et al., 2022), but this study shows empirically that the impact of leadership is multiplicative, meaning that it determines the proportion of the efficiency gain that is realized as service quality. This has a direct practical impact: if hospitals have good governance but poor administrative leadership, then they will only achieve a small proportion of the benefits of digital health spending.

Policy-wise, these findings suggest that leadership development initiatives for decision making, communication, and change management skills of hospital administrators should be considered as a co-equal policy priority with governance and infrastructure investments. In addition to the digital systems, structured leadership development, accountability for digital health enforcement, and incentives for consistent policy implementation could be as relevant to service quality outcomes as the digital systems themselves (Laukka et al., 2022). The ongoing monitoring of leadership engagement and governance performance is suggested to ensure ongoing

improvement in service quality in the public hospital sector in Pakistan.

This study has its limitations. The cross-sectional design does not allow for causal inference on whether leadership competence is a prerequisite or a result of governance maturity, and the geographically diverse sampling in the three provinces may not have fully represented the variation in rural and tertiary care facilities. Further research is needed to explore how leadership competence and governance maturity develop over time in a longitudinal design, and to determine if particular leadership behaviors are most likely to contribute to the pathway of governance quality, rather than a composite score of leadership competence.

REFERENCES

- Abbas, H. S. M., Qaisar, Z. H., Ali, G., Alturise, F., & Alkhalifah, T. (2022). Impact of cybersecurity measures on improving institutional governance and digitalization for sustainable healthcare. *PloS One*, 17(11), e0274550.
- Al-Eisawi, D., Serrano, A., & Koulouri, T. (2021). The effect of organisational absorptive capacity on business intelligence systems efficiency and organisational efficiency. *Industrial Management & Data Systems*, 121(2), 519-544.
- Al-Kahtani, N., Alrawiai, S., Al-Zahrani, B. M., Abumadini, R. A., Aljaffary, A., Hariri, B., ... & Alumran, A. (2022). Digital health transformation in Saudi Arabia: A cross-sectional analysis using Healthcare Information and Management Systems Society digital health indicators. *Digital Health*, 8.
- Ali, A., Iqbal, S., Haider, S. A., Tehseen, S., Anwar, B., Sohail, M., & Rehman, K. (2021). Does governance in information technology matter when it comes to organizational performance in Pakistani public sector organizations? Mediating effect of innovation. *SAGE Open*, 11(2).
- Alumran, A., Almutawa, H., Alzain, Z., Althumairi, A., & Khalid, N. (2021). Comparing public and private hospitals' service quality. *Journal of Public Health*, 29(4), 839-845.
- Bilal, W., Qamar, K., Siddiqui, A., Kumar, P., & Essar, M. Y. (2022). Digital health and telemedicine in Pakistan: Improving maternal healthcare. *Annals of Medicine and Surgery*, 81.
- Borges do Nascimento, I. J., Abdulazeem, H., Vasanthan, L. T., Martinez, E. Z., Zucoloto, M. L., Ostengaard, L., ... & Novillo-Ortiz, D. (2023). Barriers and facilitators to utilizing digital health technologies by healthcare professionals. *NPJ Digital Medicine*, 6(1), 161.
- Brommeyer, M., Whittaker, M., & Liang, Z. (2024). Organizational factors driving the realization of digital health transformation benefits from health service managers: A qualitative study. *Journal of Healthcare Leadership*, 455-472.
- Chen, Y., & Ye, Q. (2024). The impact of digital governance on the health of rural residents: The mediating role of governance efficiency and access to information. *Frontiers in Public Health*, 12, 1419629.
- Engvall, T., & Flak, L. S. (2022). Digital governance as a scientific concept. In *Scientific foundations of digital governance and transformation: Concepts, approaches and challenges* (pp. 25-50). Springer.
- Gatiti, P., Ndirangu, E., Mwangi, J., Mwanzi, A., & Ramadhani, T. (2021). Enhancing healthcare quality in hospitals through electronic health records: A systematic review. *Journal of Health Informatics in Developing Countries*, 15(2), 1.
- Ghaffari Heshajin, S., Sedghi, S., Panahi, S., & Takian, A. (2024). A framework for health information governance: A scoping review. *Health Research Policy and Systems*, 22(1), 109.

- Gilli, K., Nippa, M., & Knappstein, M. (2023). Leadership competencies for digital transformation: An exploratory content analysis of job advertisements. *German Journal of Human Resource Management*, 37(1), 50-75.
- Hafeez, A., Dangel, W. J., Ostroff, S. M., Kiani, A. G., Glenn, S. D., Abbas, J., ... & Mokdad, A. H. (2023). The state of health in Pakistan and its provinces and territories, 1990-2019: A systematic analysis for the Global Burden of Disease Study 2019. *The Lancet Global Health*, 11(2), e229-e243.
- Khan, A. N., Wang, Y., Khan, N. A., & Ahmad, A. (2025). Digital leadership enhances employee empowerment, techno-work engagement, and sustainability: SEM analysis in public healthcare. *INQUIRY*, 62.
- Khan, S. J., Asif, M., Aslam, S., Khan, W. J., & Hamza, S. A. (2023). Pakistan's healthcare system: A review of major challenges and the first comprehensive universal health coverage initiative. *Cureus*, 15(9).
- Khatri, R. B., Endalamaw, A., Erku, D., Wolka, E., Nigatu, F., Zewdie, A., & Assefa, Y. (2025). Contribution of health system governance in delivering primary health care services for universal health coverage: A scoping review. *PloS One*, 20(2), e0318244.
- Laukka, E., Polkki, T., & Kanste, O. (2022). Leadership in the context of digital health services: A concept analysis. *Journal of Nursing Management*, 30(7), 2763-2780.
- Mahmood, S., Noorali, A. A., Manji, A., Afzal, N., Abbas, S., Qamar, J. B., ... & Samad, Z. (2023). Health data ecosystem in Pakistan: A multisectoral qualitative assessment of needs and opportunities. *BMJ Open*, 13(9), e071616.
- Malik, M., Kazi, A. F., & Hussain, A. (2021). Adoption of health technologies for effective health information system: Need of the hour for Pakistan. *PloS One*, 16(10), e0258081.
- Mbau, R., Musiega, A., Nyawira, L., Tsofa, B., Mulwa, A., Molyneux, S., ... & Barasa, E. (2023). Analysing the efficiency of health systems: A systematic review of the literature. *Applied Health Economics and Health Policy*, 21(2), 205-224.
- Milakovich, M. E. (2021). Digital governance: Applying advanced technologies to improve public service. Routledge.
- Mohamed, A. M. B., & Nawaz, D. (2022). Effective governance for healthcare administration in Pakistan public hospitals. In *International Conference on Public Organization (ICONPO 2021)* (pp. 335-342). Atlantis Press.
- Mumtaz, H., Riaz, M. H., Wajid, H., Saqib, M., Zeeshan, M. H., Khan, S. E., ... & Vohra, L. I. (2023). Current challenges and potential solutions to the use of digital health technologies in evidence generation: A narrative review. *Frontiers in Digital Health*, 5, 1203945.
- Naeem, W., Nadeem, H. A., Javed, A., & Ahmed, W. (2022). Digital health and future of healthcare in Pakistan. *Annals of King Edward Medical University*, 28(2), 268-272.