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THE IMPACT OF DIGITALIZATION ON ENHANCING THE EFFICIENCY OF HEALTHCARE ORGANIZATION MANAGEMENT

Purpose. This paper explores the role that digitalization plays in improving the efficiency of managing healthcare organizations. The focus is on the contributions of ICT support, employee digital competence, organizational innovation, and service quality in driving organizational performance.

Design/methodology/approach. Using a structured questionnaire, empirical data were obtained from a sample of 243 healthcare organization employees transitioning to a more digitalized state. The study used the PLS-SEM methodology (SmartPLS program) for mathematical and statistical processing of empirical data.

Findings. The empirical findings reveal that ICT support and employee digital competence play significant roles in facilitating organizational innovation, which ultimately contributes to service quality and overall organizational performance. The results of this study validate the proposed research model and clarify the interrelationship of technological, organizational, and human factors on managerial effectiveness in the healthcare context.

Originality. The current study brings novelty to the field through the inclusion of the relationship between ICT support, service quality, digital competence of employees, and organizational performance in a single framework for health organizations. Whereas earlier studies mostly focused on the investigation of each of these concepts separately or in contexts different from that of healthcare organizations, the current study shows how the digital competence of employees acts as a mediator of digitalization initiatives and contributes to greater management efficiency. In addition, this study adds to the scarce body of literature based on health organizations in Kazakhstan.

Key words: ICT Support, Service Quality, Digital Competence of Employees, Organizational Performance.

Introduction

The rapid evolution of digital tools today determines how all sorts of organisations evolve. Health services have been no strangers to this phenomenon. Care groups face escalating needs and pressed finances while trying to meet high demands for improved service and access. It is in this landscape where technology is not just about the acquisition of new gadgets, but a vehicle for improving leadership, enhancing collaboration and creating smoother systems. In health care, the application of digital tools has the potential to facilitate smoother operations by streamlining paperwork, aiding staff to make smarter decisions, and also supporting stronger connections between various departmental teams.

However, how digitalization is implemented strongly relates to where technology fits in every day work and a company's support. Here, one important

component is leaders' use of tools. Having technology is simply part of it – the real focus must be on actively demonstrating how to use technology tools effectively, in ways that align with employees' comfort and performance improvement is promoted (Zhang, van Eerde, Liu, & Chen, 2025). This is true for health care settings where more pressure and complicated tasks lie on staff, hence, guidance of digital platforms facilitates smoother access to the tools and reduces resistance against implementing new systems. In the absence of ICT support, digital tools often remain underutilized. They do not necessarily facilitate but create more tension and added workloads for employees to cope with.

Notwithstanding what managers can provide, employees' digital competence with digital tools influence how effective tech projects are in facilitating organisational performance. When working with technology – and it is far more than quick typ-

ing – employees must be able to tackle problems, share ideas, cooperate, inquire about outcomes. (Zervas & Triantari, 2025). This perspective aligns with earlier definitions, such as a 2006 guide provided by the European Parliament (2006/962/EC), which understood the use of digital tools as being calm, thoughtful, and many a time shared collaboratively in work, conversation, and in private life. (Kupczyk, 2021). In health care groups, well-versed employees with digital tools seem to adapt much more easily to updated technology systems. They also utilize online sources with a higher level of discretion during routine operations and are crucial for successful initiation of digital initiatives.

What occurs in the digital world can subtly redirect how groups cooperated. New technology tools may change how tasks spread, are completed, or resolved. In lieu of previous mechanisms, digital steps create new ways to spread information across departments. Particularly in health care, when updates travel faster among staff, benefits can emerge. Similarly, the process of recreating important procedures, like feedback loops or decision paths, is facilitated by connected systems. Structures that once appeared very rigid may now offer looser arrangements, without necessarily losing authority. Change does not just halt simply since systems look stable at the outset. Thus, intra-organization change serves as a connection, aligning technological progress with enhanced practices of organizing work.

When provider leaders contemplate how care is provided to customers, the quality of the service taken seriously represents a cornerstone of the service-centered mindset. This ethos often manifests through perceptions of comparative service quality, which has been first described by Zeithaml and his crew in 1985. It essentially revolves around whether individuals think they receive what they need, which was suggested by Santos (2003). For health-related care, what customers perceive often applies to something like reliability, rapid responses, trustworthiness, comprehension, and visible items, and when care comes and feels, plus how appropriately problems are solved (Singh, Sharma, & Jayapriya, 2023). Digital assistance aids in rendering information accessible swiftly, streamlining operations among cross-functioning teams, while enhancing communication with recipients in care processes. However, the advantages of digital-enabled transformations emerge only if the technology is de-

signed to complement organizational leadership decision-making and everyday operational tasks.

Upon successful implementation of these digital interventions, their benefits become apparent in organizational performance. An organization is seen as a synergistic assembly of individuals, resources, and finances – human energy bound to shared objectives (Alchian & Demsetz, 1972; Barney, 2001; Jensen & Meckling, 1976; Simon, 1976). Achieving goals and enhancing organization performance is not merely a measure of hitting benchmarks; it's governed by how actual outcomes matchups to what was envisaged by the group, taking into account expectations, resources, and possibilities (Cho & Dansereau, 2010). Measuring actual efforts against the organization's outlined aspirations, rather than just falling inside or outside the bounds of arbitrary markings, is what's important (Tomal & Jones, 2015). In health care contexts, the efficacy of all these operations seldom hinges solely on immediate adjustments by management, but furthermore, touches upon the everyday decisions made by leaders, care quality standards, etc. Nonetheless, it can also boil down to whether teams are agility to adapt as technology and external demands evolve.

While the academic focus on digital transformation has matured over the years, across most disciplines, there are few studies that explicitly evaluate how technology-enabled change can correlate with worker competence, organizational transformations, care standards, and end results – particularly in health care. A majority of research narrowly focuses on digitalization uptake, without considering various social and structural drivers that determine the success of such efforts. This omission cues to a larger focus on how digitalized transformation of operations can affect organizational leadership outcomes within the medical context. In this context, the present examination considers how digital-enabled interventions can affect how effectively a health care organization operates. Rather than general estimations, it narrows down to five specific parameters – ICT assistants, staff digital competence, novel organizational operational protocols, care quality standards, and end results. Enabled by actual data, which helps link these variables, a clearer perspective emerges regarding what may drive improved leadership outcomes and performance outcomes within medical contexts. Results could lead to a shift in thought on how health care leadership can be impacted by technology-enabled transformation. Meanwhile, this can also yield progress for leaders and planners as it equips them

with better understanding for the smarter ways forward with digital-assisted strategies.

Literature review

The impact of ICT support on Organizational Performance through Digital Competence of Employees

ICT support—defined as the behaviors supervisors exhibit to enhance employees' well-being through guidance and support in ICT use (Juncheng Zhang, Wendelien van Eerde, Fang Liu & Weiqi Chen, 2025).

Owing to the diversity of terms, frameworks, and research domains associated with digital competence, the literature lacks a unified definition of this concept. In organisational studies, the definition most frequently adopted is: «Digital competence is an individual capacity to use and combine one's knowledge (i.e., know-what), skills (i.e. know-how), and attitude (i.e. know-why) associated with three related competence areas, technological, cognitive, and social, to use new or existing ICT to analyse, select and critically evaluate information to investigate and solve work-related problems and develop a collaborative knowledge base...» (J. Norveel, R. Gonzalez, W. Presthus, 2022)

In general, the concept of organizational performance is based upon the idea that an organization is the voluntary association of productive assets, including human, physical, and capital resources, for the purpose of achieving a shared purpose (Alchian & Demsetz, 1972; Barney, 2001; Jensen & Meckling, 1976; Simon, 1976).

According to Surat Edaran Mensesneg No. 1/2020 states that the head of the organizational unit determines employees who can carry out remote service duties and rotating service duties by considering, among other things, the type of work and employee competence in the use of ICT (S Triyani, E Sutirno, A Widjayanti, 2025). This provision emphasizes the competence of employees in the use of information and communication technologies for effective organization of work and provision of services.

Empirical evidence further supports the link between ICT-related competence and organizational outcomes. For instance, Wasike, Ogollah and Mburu, on the other hand, examined the role of competence in information systems on the agility of supply chain in the service industry. IT service competence was found to have a direct impact on supply chain agility as well as on service management skills. Further-

more, implementation results demonstrated that restructuring of the supply chain by using information technologies has positive effects on business performance criteria like supply, production and distribution (MPK Kang'ethe, Garap Bor, B Tarus, 2021).

In addition, lack of effective training yields unqualified staff that mess the system or maintain outdated system which do not serve the current needs of the employees. This often leads to lack of the correct information favourable for management functions and hence ineffectiveness in management (JC Mui-kamba, D Nzuki, 2012). This study is grounded in the Resource-Based View (RBV), according to which the implementation of quality E-HR systems relies on proper allocation of resources to steer the process, which will subsequently affect the improvement of the organization's performance.

Employees' knowledge and ability to use information technology will increase individual confidence and creativity; through information technology, information delivery and coordination will be more readily accepted by other individuals or work teams. Individuals can move swiftly in various fields by maximizing digital competency capabilities and efficiently impacting company performance (AP Putra, F Nuraisah, MW Kuswantoro, 2024).

Conversely, the lack of adequate ICT support and effective training negatively affects the competence of employees. In turn, the low competence of employees leads to management inefficiency and a decrease in the Performance of the organization. In general, the existing literature indicates that ICT support plays a crucial role in developing the competence of employees in the field of information systems and digital technologies. Improving the competence of employees allows organizations to use ICT more effectively and achieve higher organizational performance. The following hypotheses are proposed in light of the research mentioned above:

H1: ICT support has a positive effect on Organizational Performance through Digital Competence of Employees

The impact of Service Quality on Organizational Performance through Digital Competence of Employees

By relying on the definition provided in Kritikos and Plexousakis [2009], which mainly applies to software services, service quality is defined as a set of nonfunctional attributes of those contextual entities that are considered relevant to the service-client interaction, including the service and the client, that

bear on the service ability to satisfy stated or implied needs (Kritikos, K., Pernici, B., Plebani, P., Capiello, C., Comuzzi, M., Benrernou, S., Brandic, I., Kertész, A., Parkin, M., & Carro, M. (2013)).

Previous research highlights competent employees always show smart thinking, work reliably, experienced, skilled and professional in producing optimal work, both in terms of the amount of work produced in quantity, the value of quality work, efficient use of working time, utilization of effective budget use and loyal to the organization (I Ibrahim, S Syarifuddin, H Haeruddin, I AR, 2023). The study is based on the service quality theory from Oldham (2019: 24) that every individual must be able to provide quality services to achieve work targets. This theoretical lens suggests that quality of public services observed in this study is determined by the application of a variety of skills, task identity, task significance, service autonomy and feedback.

Barrolly's theory of synergy (2018:62) states that synergy is a combination of competence, service quality and performance. From this perspective, developing an implementation of the main tasks and functions within an organization is inseparable from the synergy of organizational members who have competent and professional human resources in providing quality services to achieve optimal work results (I Ibrahim, S Syarifuddin, H Haeruddin, I AR, 2023).

Empirical evidence provided by Zebua et al. (2025) demonstrates that employee mastery of skills, knowledge, and professional attitudes plays a crucial role in driving the quality and effectiveness. These results reinforce the theory that quality service can increase customer satisfaction and support the effectiveness of organizational policies.

Research in the hospitality industry demonstrates that employees' perception of training benefits, training support, training accessibility and service quality in the hospitality industry. Thus, this study implies that organizations can use training to improve customer service quality by supporting training interventions that enhance individual skills, service quality and overall organizational performance (M Waqanimaravu, CN Arasanmi, 2020).

Research by I Ibrahim, S Syarifuddin, H Haeruddin, I AR (2023) shows that developing an imple-

mentation of the main tasks and functions within an organization is inseparable from the synergy of organizational members who have competent and professional human resources in providing quality services to achieve optimal work results. This suggests that employee competence serves as a critical mechanism through which service quality is translated into tangible organizational results.

Furthermore, Research by Aenkly Banamax (2018), Khairul Anuar (2016) and Any Isvandiari (2019) shows similarities, namely competence and service quality simultaneously affect performance. These findings imply that employee competencies play a critical role in converting service quality into improved organizational performance.

As a result, all these studies show that the Service Quality increases the competence of employees, especially in the use of digital products. In turn, this enhances the performance of the organization. Thus, Digital Competence of Employees plays a mediating role between Service Quality and Organizational Performance:

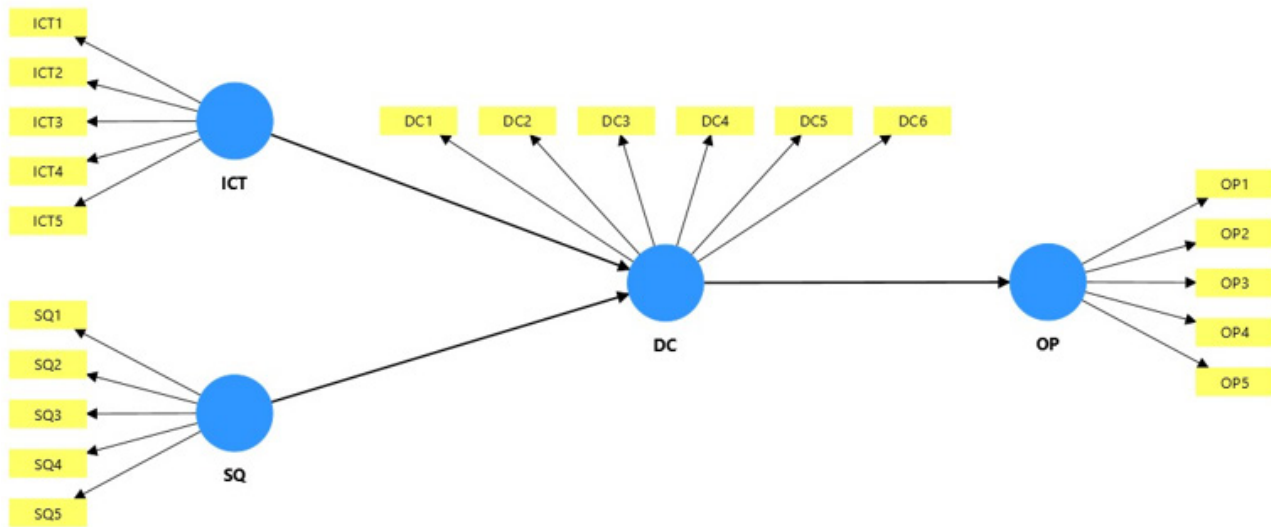
H2: Service quality has a positive effect on Organizational Performance through the Digital Competence of Employees.

Methodology

This study adopts a quantitative research approach to empirically examine the impact of digitalization on the efficiency of healthcare organization management. Data were collected using a structured questionnaire distributed to 350 employees of healthcare organizations located in the city of Almaty. Almaty was selected as the research setting due to its status as one of the major metropolitan areas in the country, hosting a large concentration of key healthcare institutions.

A total of 258 valid responses were obtained and included in the final sample. The demographic profile of the respondents indicates that 68.3% were female, while 31.7% were male. With regard to age distribution, 70 respondents were aged 18–25 years, 78 respondents were aged 26–35 years, 70 respondents were aged 36–45 years, and 25 respondents were aged 46 years and above. The majority of the participants were employed in private healthcare clinics.

Figure 1
Conceptual Research Model



Note: Compiled by the author

Measures

The measurement instruments used in this study were adapted from previously validated scales. All the points of the questionnaire were formulated in such a way as to reflect the respondents' perception of digitalization and its consequences for the effectiveness of management in healthcare institutions.

ICT support was measured by assessing employees' perceptions of the availability and adequacy of information and communication technology. ICT support was measured by five items: two items of Saleem et al. (2017), two items of Majchrzak et al. (2005), and one item of Drent and Meelissen (2008). A sample item of ICT support was: "I can access the information system at any time from anywhere". Responses of all the measurement items were collected on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree) (Kaniz Marium Akter, Swee Mei Tang & Zurina Adnan, 2023). The Cronbach's alpha for this scale was 0.71.

Digital Competence of Employees was developed by adapting scale developed by King and Zeithaml (2001). The scales measured in a five-point Likert-scale format from "strongly disagree" (1) to "strongly agree" (5) (Thuy Thanh Thi DOAN, 2021). An example question is: "The company mission is clear and coherent". The Cronbach's alpha for this scale was 0.78.

The indicators for calculating **Service Quality** are **drawn from** previous studies. Each item is measured by a 5-point Likert scale type (1 = **strongly**

disagree to 5 = strongly agree). An example question is: "Medical staff are knowledgeable when answering my questions". The Cronbach's alpha for this scale was 0.80.

The questions for **Organizational Performance** were adapted from H Lee, B Choi (2003) and each item was based on a six-point Likert scale, from "very low" to "very high." Likert scales as generally used tend to underestimate the extreme positions. For example: "Our company is more successful". The Cronbach's alpha for this scale was 0.86.

Data were analyzed using SmartPLS 4.0 and the PLS-SEM technique, which was selected due to its wide application in structural equation modeling studies. Descriptive statistics, including mean values and standard deviations, were calculated for all measurement items. The reliability of the constructs was confirmed, as Cronbach's alpha coefficients for all variables exceeded the recommended threshold of 0.70, while the mean values were above 0.60.

Results

Fit of Measurement Model

The fit of the measurement model was assessed via SmartPLS 4.0, examining the reliability, convergent validity, and discriminant validity. Internal consistency reliability was examined using Cronbach's alpha and composite reliability (CR). According to results, Cronbach's alpha values for all constructs ranged from 0.712 to 0.858, suggesting the internal

consistency over all constructs was satisfactorily stable. The composite reliability quantities for each construct rose again the designated threshold of 0.70, 0.812 to 0.897 respectively, reinforcing reliability over measurement scales (see table 1).

Table 1
Reliability and convergent validity of the constructs

Construct	Cronbach's alpha	rho_A	Composite reliability (rho_C)	AVE
ICT	0.712	0.714	0.708	0.464
DC	0.786	0.815	0.812	0.476
SQ	0.804	0.823	0.897	0.557
OP	0.863	0.843	0.867	0.636

Note: Compiled by the author based on SmartPLS 4 output.

The convergent validity was evaluated via the average variance extracted (AVE) criterion. The AVE values for Organizational Performance (0.636) and Service Quality (0.557) surpassed the proposed threshold of 0.50, suggesting appropriate convergent validity of these constructs. The AVE figures for Digital Competence (0.476) and ICT support (0.464) fell marginally below the accepted threshold. Yet, as composite reliability figures for both constructs soared above 0.70, convergent validity can be taken to be satisfactory for the exploratory research and consistent with recommendations within the PLS-SEM literature.

Discriminant validity was evaluated by both the Fornell–Larcker criterion and the heterotrait–monotrait ratio (HTMT). The square root of the AVE for each construct exceeded the respective inter-construct correlations, providing evidence of discriminant validity. Further, all HTMT values were below the suggested threshold of 0.85, implying that the constructs are empirically distinct from each other. All levels of indicators' VIF revealed that the collinearity is not worrying for the purposes of this analytic approach.

Collinearity was measured in terms of the variance inflation factor (VIF) values. All indicators' VIF levels were below 2.0, which indicated multicollinearity is not a problem for our measurement model.

The structural model underwent analysis using PLS-SEM with bootstrapping to evaluate the statistical significance of the hypothesized paths. The findings show that all paths are positive and statistically significant (see table 2).

Table 2
Structural paths and hypothesis testing

Path	β	t	p	Decision
ICT $\rightarrow$ DC	0.369	5.713	<0.001	Supported
SQ $\rightarrow$ DC	0.435	7.059	<0.001	Supported
DC $\rightarrow$ OP	0.538	9.711	<0.001	Supported

Note: Compiled by the author based on SmartPLS 4 bootstrapping output (5,000 resamples).

ICT support displays a substantial and positive influence on employee's digital competence ($\beta = 0.369$, $t = 5.713$, $p < 0.001$). This outcome indicates that management behaviors that are conducive to ICT use play a significant role in nurturing employees' digital abilities and confidence in using digital tools in healthcare organizations.

Quality of Service also shows a significant positive influence on employee's digital competence ($\beta = 0.435$, $t = 7.059$, $p < 0.001$). This finding highlights that enhanced perception of service quality correlates with greater digital competence, indicating the intertwined nature of service offerings and the need for optimized employ of digital technologies in healthcare.

Additionally, employees' digital competence positively contributes to organizational performance ($\beta = 0.538$, $t = 9.711$, $p < 0.001$). This result identifies digital competency of employees as a central determinant in the translation of digitalization efforts into quantifiable improvements in organizational performance and management efficacy.

R^2 values further demonstrate the explanatory power of the model. ICT support and quality of Service combine to account for 50.7% of the variance in digital competence ($R^2 = 0.507$), demonstrating significant explanatory capacity. Digital Competence (29.0%) explains a significant percentage of variance in organizational performance ($R^2 = 0.290$), suggesting a meaningful role of digital competence in understanding organization performance in healthcare organizations.

Overall, these outcomes offer empirical validation for the proposed model and shed light on the noteworthy role of factors relating to digitalization, especially ICT support and employees' digital competence, in fostering improved management efficacy and organizational performance in healthcare organizations.

Discussion and Conclusion

These findings of this paper affirm the critical role of digitalization in improving organizational management efficiency, mainly in enriching employees' digital competency. Our results indicate that Ics support has a dramatic positive influence on organizational performance through the employees' digital competence. This concurs with existing research emphasizing the significance of management support regarding ICT (Zhang et al., 2025). In accordance with the RBV (Alchian & Demsetz, 1972; Barney, 2001; Jensen & Meckling, 1976), ICT support constitutes an important organizational asset when considering the role of employees' digital competence in strengthening management performance through the conversion of technological expenditure into measurable performance effects.

The mediating function of digital competence also reinforces the premise that ICT does not suffice in boosting organization performance unless employees possess the required knowledge, skills, and attitude for the effective utilization of digital tools. This aligns with Nordvel's (2022) conceptualization of digital competence as a blend of technological, cognitive, and social capacities. In the healthcare sector, which increasingly uses digital tools in managing administrative, coordination, and management tasks, the capability of employees to critically analyze information and collaborate via ICT evolves into a significant contributor to management effectiveness. The empirical evidence of this study thus strengthens the RBV view by revealing that human resources and digital competence serve as fundamental organizational assets that contribute to organizational performance.

Additionally, the research revealed that employees' digital competence mediates service quality on organizational performance. The results are in agreement with service quality theory (Oldham, 2019) that underscores the importance of individual skills, autonomy, task significance, and feedback in generating high-quality service outcomes. And it is in harmony with the synergy perspective (Barrolly, 2018) that explains performance as a result of the interaction between employee competence and service quality. Empirical evidence in related Previous studies (Ibrahim et al., 2023; Zebua et al., 2025; Waqanimaravu & Arasanmi, 2020) also supports that competent employees are more effective in turning service Quality efforts into organizational performance. Also, digital tools increasingly influence service processes in healthcare organizations and provide a significant

opportunity to utilize competent employees to use digital tools for better coordination, information accuracy and responsiveness to the needs of the organization.

Together, the findings confirm tested hypotheses and also prove that employees' digital competence is a vital mechanism for turning ICT support and service quality into improved organizational performance. The findings enrich current literature on this topic by bringing into consideration the Resource-Based View combined with service quality and competence-based approaches. They elucidate that managing efficiency of healthcare organizations in the digital era is not simply reliant on technological infrastructure, but also involves organizational support and development of employee competence.

Practical Implications

The findings from this study have several practical implications for healthcare managers and policy-makers. First, healthcare organizations should view ICT support as a managerial duty instead of a purely technical one. Supervisors and department heads play a pivotal role in facilitating employees' interaction with computational systems by providing orientation, technical support, and ongoing encouragement as Zhang et al. (2025) emphasized. Fortifying ICT support at the managerial level can minimize resistance to digitalization and promote a more positive digital culture in healthcare organizations.

Second, the findings emphasize the significance of systematic investments in employees' digital competence. Since digital competence serves as a mediator between ICT support, service quality, and organizational performance, healthcare organizations can implement continuous training and development programs targeting the enhancement of employees' digital knowledge, practical skills, and confidence in utilizing ICT to improve their performance. This would be especially crucial in large urban healthcare institutions like Almaty where digitized systems are heavily deployed within both private and public clinics.

Lastly, service quality enhancement strategies should be harmonized with employee digital capability. The successful delivery of high-quality care in healthcare heavily relies on effective utilization of digital systems for coordinating, documentation, and management activities. Specific training programs that unify service quality benchmarks with digital learning could increase employees' competencies in providing continuous and efficient services, thereby boosting organizational performance.

In conclusion, policymakers and healthcare administrators can leverage on the findings from this study to develop digital transformation strategies that transcend mere technological investment. Through an integrated approach of ICT infrastructure development, managerial support, and employee competence-building efforts, healthcare institutions can achieve sustainable enhancements in management efficiency and organizational performance.

Limitations and Future Research

This research entails several limitations that must be addressed to be acknowledged when interpreting the findings. According to the following points, it should be realized: The researchers collected their sample in healthcare organizations based in the city of Almaty. Hence, the results may not be generalizable in different areas or healthcare entities known to have a different level of digital maturity. Future research can extend the study to various cities or even different countries before testing whether the described connection between variables remains valid in certain institutions or cultures.

Third, this study concentrated on digital competence as an important mediator of organizational performance, with ICT support and service quality serving as key antecedents. Future research could expand the model by including other variables, including factors such as organizational culture, leadership style, technological readiness, or organizational innovation. Such an extension would offer a more entire portrait of the ways in which digital

transformation progresses within healthcare organizations. It would likewise be beneficial to use qualitative methods, such as interviews or case studies, to delve deeper into the drivers and effectors of digital competence as it pertains to healthcare management practice.

Additionally, future research may embrace longitudinal designs to examine the extent to which ICT support, digital competence, service quality, and organizational performance have changed with time as healthcare organizations move toward increased digitalization. Finally, comparative analyses between public and private healthcare organizations could help illuminate sector-specific factors that may influence the interplay between digitalization and organizational efficiencies.

Acknowledgements and Conflict of Interest

The authors declare that they have no conflicts of interest related to this study. No acknowledgements are applicable.

Author Contributions

Conceptualization, S.A.; Methodology, S.A.; Software, S.A.; Validation, S.A. and A.S.; Formal Analysis, S.A. and A.S.; Investigation, S.A.; Resources, S.A.; Data Curation, S.A.; Writing – Original Draft Preparation, S.A.; Writing – Review & Editing, A.S. and T.B.; Visualization, S.A.; Supervision, A.S.; Project Administration, A.S. and T.B.

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