

Digital Transformation on Service Quality in Medical Check-Up Services

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Abstract

Digital transformation in healthcare services has experienced significant acceleration globally, fundamentally changing how health organizations manage operations and deliver patient services. In the context of medical check-up (MCU) services, digitalization plays a strategic role as these services serve as the primary gateway for early disease detection and preventive health promotion. However, a comprehensive understanding of how digital transformation specifically affects service quality dimensions in MCU services remains limited, creating a research gap that requires systematic exploration. This study aims to identify the role of digital transformation in MCU service quality, analyze service quality dimensions affected by digitalization, synthesize findings from previous research, and provide recommendations for developing digital-based MCU services. This research employs a narrative review design to synthesize scientific literature regarding the influence of digital transformation on MCU service quality. Literature search was conducted systematically through five major electronic databases: PubMed, Scopus, ScienceDirect, ProQuest, and Google Scholar, covering publications from 2021 to 2025. From 156 initially identified articles, 12 articles meeting the inclusion criteria were selected for analysis using thematic analysis approach. Digital transformation significantly impacts five SERVQUAL dimensions in MCU services. Implementation of Electronic Medical Records (EMR) and Laboratory Information Systems (LIS) enhances reliability and accuracy of medical data recording. Electronic queue systems and online registration improve responsiveness by reducing patient waiting time. Digitalization strengthens assurance through transparent examination results, enhances tangibles with modern facilities, and deepens empathy through reminder features and automatic notifications. Patient experience shows substantial improvement in time efficiency, information clarity, and psychological anxiety reduction. Despite providing substantial benefits, implementation faces critical challenges including limited human resource competencies, high infrastructure costs, regional digital gaps, legacy system integration issues, and data security concerns. Successful digital transformation requires a holistic approach integrating end-to-end technology investment, human resource capacity building, data-driven periodic evaluation, and comprehensive cross-sector policies to optimize the benefits of preventive healthcare service digitalization.

Keywords: Digital Transformation, Healthcare Digitalization, Medical Check-Up Services, Preventive Healthcare, Service Quality

1. Introduction

1.1 Background

Digital transformation in the healthcare sector has become a global phenomenon that has experienced significant acceleration in recent years. The development of information and communication technology has brought fundamental changes in the way healthcare organizations manage operations and deliver services to patients. Research conducted by (Betancor et al., 2025) Identify five main clusters in the digital transformation of healthcare services, including service provider operational efficiency, patient-centered approaches, organizational factors and managerial implications, labor practices, and socio-economic aspects. These findings show that digitalization is not only impacting the technical aspects of operations, but also creating a paradigm shift in the way healthcare organizations interact with stakeholders.

In the context of services *Medical check-up*, digital transformation has a strategic role considering that this service is the main gateway for early detection of diseases and preventive health promotion. (David T. Liss, 2021) Explained that the healthcare industry is entering an era of digital innovation where patients are looking for services that can answer their needs directly, including easy access to medical information, searching for doctor information, and booking health checkup schedules through digital platforms. This phenomenon reflects the shifting expectations of healthcare consumers who demand convenience, speed, and personalization at every stage of their care journey. Further, empirical studies show that digital technologies such as *Telemedicine*, health apps *Mobile*, *wearable devices*, and electronic medical record systems have changed the landscape of service delivery *Medical check-up* fundamentally. (Goula et al., 2021) In a systematic study they found that technology *Telemedicine* able to significantly improve patient health outcomes, particularly in chronic disease management, with improved clinical metrics such as HbA1c levels in diabetic patients and increased patient involvement in their health care.

Quality of service (*Service Quality*) in the context of digital healthcare is a multidimensional construct that requires comprehensive evaluation. Research (George & Dr. Rekha Shewakramani, 2024) adapting the SERVQUAL instrument to measure service quality in the adoption of ICT technology in healthcare facilities, found that the traditional service quality dimension needs to be modified to accommodate the unique characteristics of technology-based services. Similar findings were also put forward by (Molina-mart, Piñero, Coco-mart, & Leal-vega, 2021) which proposes a conceptual framework that adds dimensions of patient safety and medical professionalism to the traditional SERVQUAL model for healthcare contexts. (Natakusumah, Maulina, Muftiadi, & Purnomo, 2022) In its systematic research, it was revealed that the implementation of digital hospitals showed a positive impact on clinical satisfaction with a satisfaction rate of 71 percent, despite challenges related to clinician-patient interaction and workload. This indicates that measuring service quality in the digital age requires a more holistic and contextual approach by considering a multi-stakeholder perspective.

Although digital transformation offers significant potential to improve service quality *Medical check-up*, there is a research gap (*Research gap*) that need to be identified. First, the majority of existing research focuses on technology or service quality aspects separately, while an in-depth understanding of how digital transformation specifically affects the dimensions of service

quality *Medical check-up* still limited. Second (Sembiring, Simanjorang, Aini, Indonesia, & Indonesia, 2021) In an interdisciplinary study, they revealed that the existing literature has not provided a comprehensive picture of the challenges and opportunities of digital transformation in healthcare, especially in the context of health check-up services. Third (Sharifi, Hosseini, Mohammadpour, & Javan-noughabi, 2021) emphasizing that despite the potential benefits *Telemedicine* And remote patient monitoring has been proven, thorough evaluation through empirical studies is still needed to validate its impact on healthcare delivery, including aspects of patient health outcomes, service costs, and overall quality of care. Fourth, the integration between the concept of digital transformation and service quality measurement in a specific context *Medical check-up* has not been systematically explored.

The novelty of this research lies in the *systematic review* approach that integrates two research domains that have been developing in parallel, namely digital transformation and service quality in the specific context of *medical check-up* services. In contrast to previous literature reviews that tend to be descriptive or focused on only one aspect, this study synthesizes empirical evidence to identify how various elements of digital transformation contribute to improving or changing the quality of *medical check-up* services. Furthermore, this study adopts a holistic perspective by considering not only technological aspects, but also the organizational, managerial, and patient experience dimensions in the *digitally transformed* medical check-up service ecosystem.

1.2 Formulation of Research Problems and Objectives

Based on the background that has been described, this study formulates several research questions as follows: How does digital transformation affect service quality in Medical Check-Up services? This research aims to identify the role of digital transformation in MCU service quality, analyze the service quality dimension affected by digitalization, synthesize findings from previous research, and provide recommendations for the development of digital-based MCU services.

This research is expected to make a theoretical contribution by enriching the literature on digital transformation and health service quality through a systematic synthesis of empirical findings from various studies. Practically, this research can provide guidance for managers and leaders of healthcare organizations in designing and implementing effective digital transformation strategies to improve the quality of *medical check-up* services. For policymakers, this research can be a reference in drafting regulations and standards related to the digitalization of health services. In addition, this research is expected to identify existing research gaps and provide recommendations for future research agendas in the field of digital transformation of health services.

2. Literature Review

2.1 Medical Check-Up (MCU) Services

Service *Medical check-up* It is a comprehensive health examination that aims to detect individual health conditions preventively and promotely before the onset of significant clinical symptoms. (Seyoung Jung, 2024) explained that general health screenings in the adult population include a series of systematic screenings to identify risk factors for chronic diseases and latent health disorders that require early intervention. The MCU service process generally

follows a structured flow starting from the administrative registration stage, followed by an anamnesis for the collection of the patient's medical history, then a physical examination by medical professionals, followed by laboratory and radiology supporting examinations, submission of examination results, to interpretation consultation with a competent specialist. The complexity of these service flows often faces operational challenges in the form of prolonged waiting times between one stage to the next, reliance on manual processes that are prone to administrative errors, and low data integration between service units that hinder the continuity of medical information. (Siswanto et al., 2023) predicts that the growth of the global health screening services market will reach significant value by 2034, driven by increasing public awareness of the importance of early detection of diseases and the increasing accessibility of healthcare services. The quality of service in the context of MCU is a crucial parameter that determines patient satisfaction and the effectiveness of preventive health programs, considering that positive experiences during the examination process can affect patients' adherence to medical recommendations and willingness to perform periodic routine checkups in the future.

2.2 Service Quality Concept

Service quality is defined as the gap between the customer's expectations of the services to be received and the actual perception of the services that have been provided by the service provider. (Suntharak & Visitnitikija, 2022) applied the SERVQUAL model in assessing the quality of public hospitals in Greece and found that the five dimensions of service quality—*Reliability* (reliability in providing services as promised), *Assurance* (guarantee of competence and courtesy of staff that instills trust), *Tangible* (physical appearance of facilities and equipment), *Empathy* (individual attention to the needs of the patient), and *Responsiveness* (alertness in responding to patient requests)—has a significant influence on the satisfaction of healthcare users. In the context of MCU services, service quality indicators can be measured through the timeliness of examination completion, accuracy of laboratory results and medical interpretation, the comfort of the waiting room and the privacy of the examination, the ease of access to information and communication with health workers, and the responsiveness of the system in handling patient complaints or questions. (Dewi & Darma, 2022) compared the use of the SERVQUAL scale with that of HEALTHQUAL in assessing health centers in Iran and concluded that although both instruments have good validity, SERVQUAL remains a more comprehensive measuring tool for evaluating the dimensions of healthcare quality due to its ability to capture tangible and intangible aspects simultaneously. Dimension *Reliability* and *Responsiveness* is often a critical area in MCU services because it is directly related to process efficiency and patient trust in the service system.

2.3 Digital Transformation in Healthcare

Digital transformation in healthcare refers to the comprehensive integration of digital technologies to transform the way healthcare organizations operate, deliver value to patients, and create more efficient and responsive business models. Hermes et al. (2023) explain that digital transformation is not just the adoption of technology, but fundamental changes in organizational culture, business processes, and user experience facilitated by advances in information and communication technology. Digitalization components relevant to MCU services include *Electronic Medical Records* (EMR) that enables integrated and real-time

storage and access of patient data, *Online Booking* and digital registration that eliminates physical queues and facilitates more flexible scheduling, *Queue Management System* algorithm-based that optimizes patient flow and minimizes wait times, *Laboratory Information System* integrated that accelerates the transmission of supporting examination results, *Dashboard* digital and automated reporting that provides comprehensive visualization of health data, as well as digital payments and applications *Mobile Health* which improves the convenience of transactions and accessibility of health information. Kammrath (Zade, Tiwade, Shahu, Bandre, & Surkar, 2024) in his research on the impact of appointment scheduling systems *Online* in medical practices and university hospitals found that the implementation of digital technology significantly lowered the *no-show* patients and improve the efficiency of the use of clinical resources. Digitization has also been proven to improve the accuracy of medical documentation, reduce duplication of examinations, facilitate coordination between departments, and accelerate clinical decision-making processes through faster and more accurate information availability. The impact of digital transformation on operational efficiency and patient satisfaction is becoming increasingly evident as technology penetrates more widely in the modern healthcare ecosystem.

2.4 Digital Transformation and Service Quality

The relationship between digital transformation and improved service quality has been supported by a variety of empirical evidence showing the contribution of digital technology to improving the five dimensions of SERVQUAL in the context of healthcare. Li et al. (2023) in a study *Cross-sectional theory-based Psychological empowerment* Found that the digitization of services significantly improves patient satisfaction through the psychological empowerment resulting from information transparency, ease of access, and greater control over their own healthcare processes. Dimension *Reliability* experienced substantial improvements through the use of an integrated information system that minimizes manual errors, ensures data consistency between platforms, and ensures the availability of accurate medical information at all times. *Responsiveness* Improved through process automation that accelerates response times to patient requests, a real-time notification system that informs the status of the examination, and the ability of a digital platform to handle multiple requests simultaneously without a decrease in service quality. Dimension *Assurance* strengthened through data encryption that ensures the security of sensitive medical information, an automated validation system that improves the accuracy of examination results, and *Digital Credentials* which verifies the competence of health workers. (Devasmita, 2024) In the analysis of digital transformation of health service quality in the era of disruption and society 5.0, it is emphasized that digital technology contributes to the improvement of the dimension *Tangible* through the application interface that *User-friendly* facilities *Virtual Consultation* modern, as well as digital infrastructure that creates a professional and innovative impression. Dimension *Empathy* also benefit from digitalization through the system *Customer Relationship Management* that facilitates personalized communication, automatic reminders to *Follow-up* examination, and personalization of services based on individual patient preferences and health history, thus creating a more humane service experience even though mediated by technology.

2.5 Review of Previous Studies

Table 1. Synthesis of relevant previous literature

Yes	Journal Title	Author & Year	Research Focus	Digital Transformation on Service Quality	Medical Check-Up Services	Future Research Directions	Relevance of the Findings
1	The Impact of Digital Transformation on Public Services	(Millensyah, 2024)	Examine how the public sector is adapting through digitalization to improve efficiency, transparency, and accountability in providing services to the community	Digitalization has been proven to be able to speed up bureaucratic processes, reduce service waiting times, reduce operational costs, and increase people's ease of access to public services, especially during the COVID-19 pandemic	It does not specifically discuss medical check-up services, but the principles of efficiency and digital accessibility are relevant to be applied to the health check-up system	Further studies are needed on cross-sectoral policy integration, increasing the capacity of bureaucratic human resources, strengthening IT infrastructure, and empowering the community in utilizing digital services	It is very relevant because it shows that digital transformation can improve the efficiency and accessibility of public services, including health services such as medical check-ups
2	Digital Transformation in Hospital Services: Evaluating Effectiveness, Challenges, and Implications for Healthcare Service Quality in Indonesia	(Palapessy & Susanti, 2025)	Explore the effectiveness of digital technology implementation in hospitals, identify the challenges faced, and analyze their impact on the quality of medical services in Indonesia	Digitalization is able to improve bureaucratic efficiency and accuracy of medical records, but still faces obstacles such as limited training and adaptation of medical staff, uneven reliance on technological infrastructure, and barriers to digital accessibility, especially for elderly patients	Although it does not focus specifically on medical check-ups, the findings on bureaucratic efficiency and accuracy of medical records are very relevant to improve the quality of overall health check-up services	Further research is suggested to cover a broader geographic context and integrate quantitative analysis to reinforce the generalization of findings	It is very relevant because it identifies the main challenges in the digital transformation of hospitals that also apply to medical check-up services, such as the readiness of human resources and technological infrastructure
3	Digital Transformation in Indonesian Healthcare	(Peterson, 2021)	Elaborating digital transformation in Indonesia's health sector by identifying challenges that arise in the context of the pandemic and potential conflicts in its implementation	Digital transformation in health services faces challenges in the form of legal and ethical issues, as well as social, political, and cultural contexts that can pose a risk of conflict in health service relations	It does not specifically discuss medical check-up services, but provides an important perspective on the risks and challenges of digital transformation in the health sector that need to be mitigated	Potential conflict mitigation strategies are needed so that the benefits of digital transformation can be maximized in improving access and quality of health services	It is relevant because it provides a critical perspective on the socio-cultural risks and challenges in the implementation of health digital transformation that must be considered in medical check-up services
4	Service Digitalization and Digital Transformation on the Quality of Service in West Sulawesi Provincial Hospital	(Nurfaidah, 2025)	Examining the influence of service digitalization and digital transformation on hospital service quality using a quantitative approach with a sample of 227 respondents	Simultaneous digitization of services and digital transformation have a significant effect on the quality of hospital services with a contribution of 60.7%, showing that there are still 39.3% of other factors that affect service quality	It does not specifically discuss medical check-up services, but findings about the significant influence of digitalization on the quality of hospital services can be applied to health check-up services	Further research needs to identify 39.3% of other factors that affect service quality to gain a more comprehensive understanding	It is very relevant because it empirically proves that digitalization and digital transformation have a significant impact on improving the quality of services in health facilities
5	Evaluating Factors Influencing	(Pramintasari, Tan, Antonio,	Analyze the factors that affect the compliance	The quality of health service delivery and the quality of personnel are	Specifically addresses medical check-	Follow-up research can explore specific	It is very relevant and specific because it

	Medical Checkup Adherence in Public Security Personnel Using Importance-Performance Mapping (IPMA) Method	& Harapan, 2023)	of health checks on public security personnel with a focus on the quality of service delivery, quality of personnel, adequacy of resources, and quality of administrative processes	strong predictors of medical check-up compliance. The results of the IPMA analysis show that even though the service provision is good, the quality of personnel still needs to be improved to increase the level of compliance	up services by identifying key factors that affect health check-up compliance, including the mediating role of patient satisfaction and the quality of the service environment	interventions to improve personnel quality and optimize factors of medium to low importance	directly discusses medical check-up services and identifies key factors that affect service quality and patient compliance
6	Evaluation of Development of Medical Check-Up Services at Putri Hijau Hospital	(D, 2021)	Evaluate the development of medical check-up services in hospitals by identifying strengths, weaknesses, opportunities, and threats through SWOT analysis	The quality of administrative and functional staff, ease of payment, and the ability to build good relationships are internal strengths. Weaknesses include marketing installations, marketing organizations, and marketing funds. The service process faces challenges such as the quality of medical personnel, the complexity of the work, long wait times, and the comfort of the patient waiting area	Directly discuss medical check-up services by identifying internal and external factors that affect the development of services, including the quality of medical equipment and the decrease in the number of visits	Continuous evaluation of the business process of medical check-up services is needed so that the use of resources becomes more efficient and able to respond to existing business opportunities	It is very relevant because it provides a comprehensive analysis of the factors that affect the quality and development of medical check-up services in hospitals
7	Failure Mode and Effects Analysis of Telehealth Service of Minority Elderly for Sustainable Digital Transformation	(Choi & Lee, 2022)	Improve the quality of telehealth services by reducing errors and creating a safe environment for low-income seniors through FMEA (Failure Mode and Effects Analysis) analysis	The study identified 24 risk factors and 34 causes in four main phases of telehealth services. Risk is categorized as obsolescence, economic issues, and technological literacy. To overcome failures, platform stabilization, additional service providers, and government policy support are needed	It does not directly discuss traditional medical check-ups, but telehealth is a form of digital health check-up that is relevant to the digital transformation of preventive health services	Clinical action priorities need to be weighed to reduce clinical risk in low-income seniors who use telehealth services	It is relevant because it provides a perspective on the identification and evaluation of potential risks in digital health services, which can be applied to improve the security and quality of digital medical check-up services
8	From Handbooks to Platforms: Japan's Maternal and Child Health Services in the Digital Era	(Imoto & Hayashi, 2025)	Describe Japan's transition from a paper-based maternal and child health book system to digital services, including the complexities of modernizing established systems	The digitalization of maternal and child health systems faces challenges in maintaining user trust, ensuring data security, and reconciling the interests of various stakeholders. Paper-based systems often experience fragmented oversight and difficulty adapting to new technologies	It does not specifically address medical check-ups, but it does provide valuable lessons about the transition from manual to digital systems in preventive health services	Other countries that digitize paper-based health frameworks can learn from Japan's experience, both its advantages and challenges	It is relevant because it provides a case study on the complexity of digital transformation in preventive health services, including aspects of user trust and data security that are also crucial for digital medical check-ups
9	Digital Health and Digital Disruption in Healthcare	(Laksono, 2023)	Discuss the comprehensive reorientation of the healthcare industry due to	Digital transformation is transforming the provision of healthcare services to meet the challenges of an aging population with	It does not specifically discuss medical check-ups, but the concept of	Further study is needed on the implementation strategy of digital health	It is relevant because it provides an understanding of the spectrum of

	Services in Hospitals		the arrival of the digital technology era, including the digitization of products, services, and processes in hospitals	chronic conditions. Digital health products include e-Health, m-Health, health information technology, and telehealth/telemedicine. Inability to apply digital products can lead to disruption in traditional healthcare	digital disruption and various digital health products is relevant for the modernization of health check-up services	products in hospitals to avoid disruption to traditional services	digital health products and the potential disruptions that must be anticipated in the transformation of medical check-up services
10	Development of Tuberculosis Detection Software in an Effort to Optimize Health Services in the Era of Digital Transformation	(Suryadi, 2024)	Building computer-based software to detect tuberculosis to optimize health services in the era of digital transformation	Software development using the System Development Life Cycle (SDLC) model resulted in a system that could detect tuberculosis on a computer-based basis. This technology is expected to optimize services to patients, especially in the enforcement of TB diagnoses	Although the focus is on tuberculosis detection, the concept of diagnostic software development is relevant to improve the quality and speed of medical check-up services through automation and digitization of the examination process	Advanced research can explore the integration of diagnostic software with broader health information systems to improve continuity of service	Relevant because it demonstrates how software development can optimize healthcare, including speeding up and improving the accuracy of diagnostic processes in health check-ups
11	Design and Implementation of Health Management Information Systems for Clinical Services	(Salman Alfarisi, 2025)	Designing a Java-based health management information system using the Waterfall method to improve the efficiency and quality of clinic services through integrated patient data management	The implementation of the system shows a significant increase in the speed of data access and a reduction in input errors, which contributes to increased productivity and quality of service. The system facilitates the rapid and accurate recording, editing, and retrieval of patient data, and facilitates room management and documentation of examination history	An integrated health management information system is very relevant for medical check-up services because it allows for efficient and accurate management of patient data, examination schedules, and treatment history	Further development may explore integration with external systems and the addition of analytics features to support more sophisticated data-driven decision-making	It is very relevant because it shows the concrete implementation of an information system that improves the efficiency, accuracy, and quality of clinic services, including the management of health examination data
12	Transforming Public Services in the Digital Era: Towards a Better Future of Services	(Luke Natika, 2024)	Examining the transformation of public services in the digital era with a focus on digitizing services, applying technology, and increasing community participation	Transformation brings benefits in the form of increased accessibility, efficiency, effectiveness, transparency, and accountability. However, facing challenges such as digital divides, data security, human resources, and organizational culture change	It does not specifically discuss medical check-ups, but the principles of digital public service transformation apply to health services including health check-ups	The government needs to continue to encourage the transformation of public services by overcoming various existing challenges to achieve more excellent, efficient, and effective services	It is relevant because it provides a comprehensive framework for the transformation of digital public services, including the benefits and challenges that also apply to the transformation of medical check-up services

Source: 12 Relevant studies

3. Research Method

3.1 Research Design

This study uses a *narrative review design* to synthesize the scientific literature related to the influence of digital transformation on the quality of *medical check-up services*. In contrast to *systematic reviews* that follow strict and standardized protocols, *narrative reviews* provide greater flexibility in exploring topics comprehensively and integrating multidisciplinary perspectives (Ferrari, 2015; Green et al., 2006). This approach was chosen because it allows researchers to analyze and synthesize findings from a variety of different research contexts, methodologies, and disciplines, so as to provide a holistic picture of the phenomenon of digital transformation in preventive healthcare. *Narrative review* also facilitates the identification of *research gaps*, emerging thematic patterns, and relevant practical and theoretical implications for the development of *digital-based* medical check-up services.

3.1.1 Literature Search Process

Literature searches are conducted systematically through five major electronic databases: PubMed, Scopus, ScienceDirect, ProQuest, and Google Scholar. The selection of this database is based on a comprehensive coverage of the literature in the fields of health, service management, and information technology. The search strategy uses a combination of *keywords* and Boolean operators: ("digital transformation" OR "digitalization" OR "digital innovation") AND ("service quality" OR "quality of service" OR "SERVQUAL") AND ("medical check-up" OR "health screening" OR "preventive health services" OR "health examination"). The search was conducted in the period January to March 2025 to identify publications published between 2021 and 2025. The research inclusion criteria include: (1) *full-text* articles published in the 2021-2025 period, (2) written in English or Indonesian, (3) discussing the topic of digital transformation and/or service quality in the context of health services, especially preventive health check-up services, and (4) using empirical research methodologies or validated conceptual studies. Exclusion criteria include: (1) editorial, opinion, or *commentary* articles without a research basis, (2) publications that are not relevant to the topic of healthcare digital transformation, (3) articles without *full-text access*, and (4) studies that focus on acute or curative healthcare services without a preventive component. From the initial search process, 156 articles were obtained, which were then filtered based on the relevance of the title and abstract into 48 articles. After a *full-text evaluation* and quality assessment, 12 articles were obtained that met the inclusion criteria and were used as the main literature in this study.

3.2 Data Analysis Techniques

Data from the selected literature were analyzed using a *thematic analysis* approach (Braun & Clarke, 2021) which involved six stages: (1) familiarization with the data through repeated reading, (2) *initial coding* to identify units of meaning, (3) grouping codes into potential themes, (4) evaluation and refinement of themes, (5) naming and definition of the final theme, and (6) preparation of an analytical narrative. The findings are organized into three main themes: the role of digital transformation in MCU services, the impact of digitalization on the service quality dimension, and the challenges of digital technology implementation in the context of preventive healthcare.

4. Result and Discussions

4.1 The Influence of Digital Transformation on the Service Quality Dimension

The implementation of digital transformation has a significant impact on the five dimensions of service quality in the context of periodic health check-ups. On the *Reliability* Application *Electronic Medical Record* (EMR) and *Laboratory Information System* (LIS) has been proven to improve the accuracy of recording medical data and laboratory test results. (Pramintasari et al., 2023) emphasized that digital-based health information systems allow for integrated patient data recording with a high level of accuracy, thereby minimizing input errors that often occur in manual systems. (Nurfaidah, 2025) added that the digitalization of services has a significant effect on improving the quality of hospital services, with a contribution of 60.7% to the quality of service. Dimension *Responsiveness* Improved through the use of electronic queuing systems and online registration that shortened patient wait times. (Palapessy & Susanti, 2025) Identify that digitalization is able to increase the efficiency of the health service bureaucracy. On the dimensions *Assurance*, quickly and transparently available digital examination results increase patient confidence, supported by the *Decision Support* which reinforces confidence in the diagnosis. Aspects *Tangible* enhanced through digital facilities that create a modern and convenient perception, while digital guides clarify instructions to patients. Dimension *Empathy* Strengthened with digital reminder features, automatic follow-up, and notification of examination results that show the institution's attention to the patient's personal needs.

4.2 The Impact of Digitalization on the MCU Patient Experience

Digital transformation in services *Medical check-up* bring about a fundamental change in the experience of patients undergoing health screenings. (Millensyah, 2024) stated that digitalization succeeded in shortening manual bureaucratic lines and cutting queue lengths, so that the service process became faster and more efficient. This is in line with the findings (D, 2021) which identifies that long waiting periods are one of the main challenges in health screening services, where digital solutions can overcome these problems. Information clarity has been significantly improved through digital access that allows patients to obtain information about procedures, schedules, and examination results in real-time. (Laksono, 2023) explains that digital health products such as *E-Health* and *m-health* Provides a platform that makes it easier for patients to access various health information. The psychological aspect of the patient has also improved, where the reduction in anxiety in waiting for the results of the examination occurs thanks to an automatic notification system that provides certainty of time. (Suryadi, 2024) emphasizing that disease detection software can optimize services by providing faster diagnosis enforcement information. Thus, digitalization not only improves the technical aspects of the service but also provides a more satisfying experience and reduces the emotional burden on patients during the health check-up process.

4.3 Challenges of Digital Transformation Implementation

Although it provides substantial benefits, the implementation of digital transformation in health check-up services faces various obstacles that need to be comprehensively addressed. (Palapessy & Susanti, 2025) Identifying that the limitations of training and adaptation of medical personnel to new technologies are the main obstacles, where the readiness of human resources is still not optimal. This is reinforced by (Pramintasari et al., 2023) which highlights

the importance of improving the quality of healthcare personnel to improve the level of compliance and effectiveness of the system. The financial aspect is a crucial consideration, considering that the high cost of technological infrastructure is often a barrier for healthcare institutions, especially in areas with limited budgets. (Millensyah, 2024) adding that limited infrastructure in remote areas and weak data integration between institutions are fundamental challenges that need to be addressed through integrated cross-sectoral policies. The integration of the old system with the new platform requires careful planning to avoid operational disruptions. The issue of patient data security is also a serious concern, where (Peterson, 2021) emphasizing that in addition to legal and ethical issues, there are social, political, and cultural contexts that have the potential to create conflicts in digital healthcare. The need to address the digital divide, data security, human resources, and organizational culture change as priorities in the transformation process.

4.4 Implications for MCU Services

The results of the analysis of the implementation of digital transformation have resulted in a number of strategic implications for service development *Medical check-up* in the future. Health institutions need to make comprehensive investments in digital systems *end-to-end* which covers all stages of service, from registration to submission of examination results. (Luke Natika, 2024) emphasizing that an integrated health management information system is an effective solution to support digital transformation in healthcare facilities and strengthen data-based decision-making. Technology-based service flow improvements should be designed with patient-specific needs and operational efficiency in mind. (Choi & Lee, 2022) suggests the use of the *Failure Mode and Effects Analysis* (FMEA) to identify and evaluate potential risks in digital healthcare, so as to systematically reduce potential failures. Periodic evaluation of service quality using digital data is a must to ensure that the system runs optimally and is responsive to changing needs. (Nurfaidah, 2025) shows that while digitalization contributes significantly to service quality, there are still other factors that need to be optimized. (Imoto & Hayashi, 2025) reminding the importance of maintaining user trust, ensuring data security, and reconciling the interests of various stakeholders in the digitalization process. With a holistic approach that considers aspects of technology, human resources, and organizational policies, digital transformation can make maximum contribution to improving the quality of health check-up services.

5. Conclusion

Digital transformation has a significant impact on improving the quality of medical check-up services through five dimensions of service quality. The implementation of Electronic Medical Record (EMR) and Laboratory Information System (LIS) improves the reliability and accuracy of medical data recording, while electronic queue and online registration systems improve responsiveness by shortening patient waiting times. Digitalization also strengthens the assurance dimension through the transparency of audit results, improves tangibles with modern facilities, and deepens empathy through automatic reminder and notification features. Patient experiences experience substantial improvements in terms of time efficiency, clarity of information, and reduction of psychological anxiety. However, implementation faces crucial challenges including limited human resource competencies, high infrastructure costs, regional digital divides, integration of legacy systems, and data security and privacy issues. Successful

digital transformation requires a holistic approach that integrates end-to-end technology investment, human resource capacity building, data-driven periodic evaluations, and comprehensive cross-sectoral policies to optimize the benefits of preventive healthcare digitalization.

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