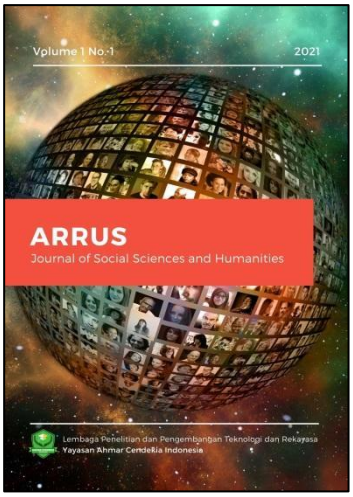
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RESEARCH ARTICLE

Model for Improving Hospital Service Quality in the Era of Digital Transformation: Systematic Literature Review and Bibliometric Analysis Using PRISMA 2020 and VOSviewer

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Abstract: This study examines how digital transformation influences hospital service quality by identifying the digital technologies, theoretical and methodological approaches, enablers, barriers, mediators, moderators, and outcome measures reported in the literature. This study employs a systematic literature review based on the PRISMA 2020 guidelines and bibliometric analysis using VOSviewer. Relevant studies were identified, screened, and selected according to predefined inclusion and exclusion criteria to examine research patterns and the relationships between digital transformation and hospital service quality. The results reveal that electronic medical records, hospital information systems, artificial intelligence, telemedicine, the Internet of Things, and big data analytics are prominent technologies in hospital digital transformation research. Improvements in service quality are associated with digital integration, workflow efficiency, information accessibility, patient safety, and patient-centered care. Key enablers include organizational readiness, digital competence, infrastructure, interoperability, leadership, governance, and stakeholder engagement. Conversely, inadequate infrastructure, cybersecurity threats, data privacy risks, limited digital skills, technological complexity, and resistance to change are identified as major barriers. The findings also indicate that digital integration, workflow efficiency, organizational performance, and patient experience represent important mechanisms linking digital transformation to service quality outcomes, while organizational and contextual conditions may influence these relationships. Overall, this study identifies an integrated pathway through which digital capabilities and organizational readiness support the integration of clinical and non-clinical workflows, thereby shaping hospital service quality, patient experience, satisfaction, and loyalty. This integrated model provides a comprehensive understanding of the multidimensional relationships between digital transformation and hospital service quality.

Keywords: Digital Transformation; Hospital Service Quality; Digital Health; Patient Experience; Systematic Literature Review

1. Introduction

Digital transformation has become a strategic priority in healthcare management, particularly in hospitals where service quality depends on the coordination of clinical activities,

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administrative processes, information systems, and managerial decision-making. Digital transformation extends beyond the adoption of information technology to include changes in organizational practices, service delivery, and operational processes (Altman Ferreira, 2025). Although digital technologies offer opportunities to improve operational efficiency, patient safety, information accessibility, and service quality, their benefits depend on organizational readiness and the ability to maintain service continuity during implementation. In Indonesia, the implementation of electronic medical records is influenced not only by technological readiness but also by the documentation practices and organizational culture of healthcare professionals (Hossain et al., 2025). Furthermore, hospital performance and patient loyalty are associated with service unit performance and patients' perceptions of digital administrative services, fairness, value, and satisfaction (Ambarwati et al., 2026; Anwar & Abdullah, 2026). These developments highlight the importance of understanding how digital transformation contributes to measurable improvements in hospital service quality rather than merely increasing technology adoption.

Previous studies have investigated hospital digital transformation through technological, organizational, and service-oriented perspectives. From a technological perspective, Alves et al. (2024) examined the application of artificial intelligence to support hospital management decision-making, while Jovy-Klein et al. (2024) explored the future development of smart hospitals through a real-time Delphi study. Askari et al. (2026) reviewed the strengths, enabling factors, challenges, and development directions associated with electronic health records in patient care. These studies provide insights into the technological developments shaping contemporary hospital management. However, examining individual technologies separately may not fully explain how different digital solutions interact with organizational processes and contribute to broader service quality outcomes.

Organizational capabilities and stakeholder perspectives constitute another important dimension of digital transformation. Binsar et al. (2025) investigated the relationship between digital adoption capabilities and hospital performance in Indonesia, considering environmental dynamism as a moderating variable. Giangreco et al. (2025) highlighted differences in stakeholder perspectives regarding hospital digitalization in France, suggesting that the perceived benefits of digital technologies may vary among stakeholder groups. Jimmy and Phi Shi (2026) examined decision criteria in hospital information system procurement and their relationship with stakeholder satisfaction. Meanwhile, Ambarwati et al. (2026) applied the Malcolm Baldrige framework to evaluate inpatient unit performance. Collectively, these studies indicate that the outcomes of digital transformation are associated with organizational capabilities, environmental conditions, stakeholder expectations, technology procurement, and performance management. Nevertheless, their specific contexts and analytical focuses limit the extent to which their findings can independently explain the broader relationship between digital transformation and hospital service quality.

Despite these contributions, several research gaps remain. First, existing research addresses different components of hospital digital transformation, including artificial intelligence, smart hospitals, electronic medical records, organizational capabilities, governance, patient satisfaction, and loyalty. However, these components are not always examined within an integrated analytical framework that connects digital capabilities and organizational readiness with workflow integration, service quality, and patient-related outcomes. Second, existing reviews, including technology-focused reviews such as Askari et al. (2026), provide valuable evidence about particular digital applications but do not necessarily establish a comprehensive bibliometric perspective on the intellectual structure, thematic relationships, and development of research concerning digital transformation and hospital service quality. Integrating systematic literature review and bibliometric analysis may therefore provide a broader understanding of established research themes, emerging topics, and relationships among relevant concepts. Third, empirical studies conducted in Indonesia and other national contexts have examined different aspects of digital transformation, but their findings require systematic synthesis to identify patterns that extend beyond individual organizational settings.

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This synthesis is particularly relevant for understanding how technological capabilities, organizational conditions, and service-related outcomes interact in different hospital environments.

To address these gaps, this study investigates the relationship between digital transformation and hospital service quality through a systematic literature review and bibliometric analysis. The study addresses three research questions: (1) What are the publication characteristics and research trends concerning digital transformation and hospital service quality? (2) What thematic structures and conceptual relationships emerge from bibliometric co-occurrence analysis? (3) How can the existing literature be synthesized into an integrated model explaining hospital service quality improvement in the era of digital transformation? To answer these questions, the study applies the PRISMA 2020 guidelines to the systematic identification, screening, and selection of relevant publications and uses VOSviewer to map research themes and conceptual relationships. The findings are synthesized to examine the connections among digital technologies, organizational readiness, enabling factors, implementation barriers, and hospital service quality outcomes. By integrating these dimensions, this study develops a literature-based conceptual model that explains how digital transformation may contribute to service quality through organizational and operational mechanisms. The study thereby provides an integrated perspective on digital transformation in hospital management while identifying the principal themes and relationships that characterize the existing body of research.

2. Literature Review

2.1. *Digital Transformation as Strategic and Organizational Change*

Recent work frames digital transformation as a strategic reconfiguration of healthcare organizations rather than a technology installation. Yahia Marzouk (2025) offers a strategic perspective on digital transformation in the healthcare sector, and Altman Ferreira (2025) shows that transformation must be managed alongside operational resilience so that services continue during implementation. Programme-level and department-level evidence points in the same direction: the evaluation of the English Global Digital Exemplar programme (Krasuska et al., 2021) examined what drives digital transformation across hospitals, and Hügle and Grek (2023) applied the balanced scorecard to plan the digital transformation of an academic hospital department. Putra et al. (2024) reviewed the challenges and opportunities of reaching digital maturity.

The weakness of this stream is its reliance on conceptual arguments, single-case designs, and formative evaluations. Few studies link strategic transformation approaches to measurable service quality outcomes, which limits generalization.

2.2. *Digital Maturity, Readiness, and Dynamic Capabilities*

A second stream explains why hospitals with similar technologies perform differently. Binsar et al. (2025) examine the role of digital adoption capability in hospital performance in Indonesia, moderated by environmental dynamism. Tenggono et al. (2024) position digital readiness as an intermediary that enables strategic renewal in healthcare, and Tenggono et al. (2025) show how dynamic managerial capabilities and strategic agility help healthcare organizations respond to institutional pressure. These studies shift attention from what technology is adopted to how well the organization can absorb and use it.

However, their dependent variables are mostly strategic renewal or organizational performance. The pathway from capability to service quality in the clinical and patient-facing sense is rarely traced, and the evidence base is dominated by survey-based, cross-sectional designs.

2.3. *Core Digital Technologies: EMR/EHR, AI, and Smart Hospitals*

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Research on technology-specific applications is the most extensive. Askari et al. (2026) synthesize the strengths, facilitators, challenges, and future directions of EHRs in patient care. In Indonesia, Hossain et al. (2025) find that EMR implementation is shaped by recordkeeping culture, and Lestari et al. (2024) study how EMR use relates to doctor–patient communication in outpatient clinics. Yuniarto et al. (2026) map the EHR/EMR literature on patient access and user experience bibliometrically. For AI, Alves et al. (2024) review its use in supporting hospital management decisions, and Lanang Triana et al. (2024) discuss its role in developing hospital information management systems. Looking ahead, Jovy-Klein et al. (2024) forecast the future of smart hospitals through a real-time Delphi study, while Richards et al. (2026) scope state-of-the-art technologies for digital healthcare transformation.

The strength of this stream is its breadth. Its limitation is fragmentation: each study addresses one technology in isolation, forward-looking work such as Delphi studies reflects expert expectation rather than realized outcomes, and bibliometric work so far is limited to a single technology (EHR/EMR). Evidence for AI in particular is stronger on decision-support potential than on demonstrated quality improvement.

2.4. *Stakeholders, Sourcing, and Economic Evaluation*

Digital transformation also redistributes benefits and burdens across actors. Giangreco et al. (2025) question whether IT is "good for all" by contrasting stakeholder perspectives in French hospitals. Jimmy and Phi Shi (2026) examine decision criteria in hospital information system sourcing and their impact on stakeholder satisfaction. On the economic side, Nguyen et al. (2024) propose a cost-benefit framework for digital hospitals.

These studies reveal that outcomes are unevenly experienced and that sustainability depends on investment logic. Yet they are weakly connected to quality models: sourcing and economic studies seldom measure service quality, and stakeholder studies rarely include patients alongside staff and managers.

2.5. *Service Quality, Operational Performance, and Patient Outcomes*

The last stream examines quality as the result. Anwar and Abdullah (2026) show that the quality of digital hospital administration relates to patient loyalty through the mediating roles of perceived fairness, value, and satisfaction. Ambarwati et al. (2026) assess inpatient unit performance using the Malcolm Baldrige framework, and Ruliyandari et al. (2026) analyze service logistics and workflow optimization in a CT-scan unit. Lestari et al. (2024) connect EMR use with communication quality in outpatient care.

This stream demonstrates concrete quality outcomes but is context-specific, concentrated in single hospitals or units, and often detached from the digital capability and strategy streams described above.

3. Research Method and Materials

This study uses a systematic literature review (SLR) and bibliometric analysis. The protocol stages used as a basis and guide are those of PRISMA 2020, which consist of identification, screening, eligibility, and inclusion (Page et al., 2021). The bibliometric analysis procedure begins with determining the research objectives, formulating research questions, and developing a search strategy to collect the dataset. This study combines the SLR and bibliometric analysis stages because they have similar procedures, starting from determining the research objectives, formulating research questions, developing search strategies for data collection, and conducting analysis. This combination allows the content of the included studies and the structure of the research field to be examined together.

The entire series of activities in this review was carried out systematically, including the dataset search stage. The flow of actions specified in the design (planning section) was followed to guide the implementation of the research. A dataset covering 2019 to 2026 was considered sufficient to track research developments in this field, as it captures the

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acceleration of hospital digitalization after the COVID-19 pandemic. The dataset collection stage began chronologically by (1) opening the Scopus and Web of Science (WoS) Core Collection databases, which provide metadata that can be exported for bibliometric mapping; (2) entering the search keywords listed in Table 1 into the title, abstract, and keyword search fields; (3) setting the document type (articles and reviews); (4) setting the publication year (between 2019 and 2026) and the language (English); and (5) exporting the records for screening and SLR extraction. The keywords used were: ("digital transformation" OR "digital health" OR "digital hospital*" OR "smart hospital*" OR "hospital information system*" OR "electronic medical record*" OR "electronic health record*" OR "artificial intelligence" OR "digital maturity" OR "digital readiness") AND (hospital*) AND ("service quality" OR "quality improvement" OR "quality of care" OR "quality of service*" OR "healthcare quality" OR "hospital performance" OR "patient satisfaction" OR "patient safety"). The SLR protocol was formulated to answer three main questions:

RQ1: How can research trends on digital transformation and hospital service quality be mapped through bibliometric analysis using VOSviewer?

RQ2: What digital technologies, theoretical and methodological approaches, enablers and barriers, mediators and moderators, and outcome measures are used in the literature to explain how digital transformation influences hospital service quality?

RQ3: How do the results of this systematic review provide a model of hospital service quality improvement, together with managerial and policy implications for strategies in managing digital capability, clinical and non-clinical workflows, stakeholder engagement, and quality standards to strengthen service quality and patient satisfaction and loyalty in various contexts?

Meanwhile, the next process is document screening or extraction by applying the inclusion and exclusion criteria established in the previous identification stage. At this stage, all articles and reviews are extracted (screened) to determine the data suitable for SLR analysis. The selection criteria are based on table 1.

Table 1. Selection Criteria

No.	Inclusion Criteria	Exclusion Criteria
1	Articles written in English and Indonesian **(58 articles)**	Articles written in languages other than English and Indonesian **(78 articles)**
2	Articles related to hospital service quality, hospital management, digital transformation, digital health, and healthcare technology **(51 articles)**	Articles that were not in accordance with the criteria (no relevant keywords in the title, abstract, or keywords) **(78 articles)**
3	Articles selected for systematic literature review and bibliometric analysis **(44 articles)**	Duplicated articles **(7 articles)**

Data extraction using the exclusion criteria described above yielded 143 articles. The articles were then assessed for eligibility. The collected data will be evaluated using the following quality assessment criteria:

(a). Was the article published in a journal listed in Google Scholar, ScienceDirect, PubMed, or Wiley Online Library between 2020 and 2025?

(b). Does the article cover the concept of Model for Improving Hospital Service Quality in the Era of Digital Transformation?

If the questions asked are correct, then the article passes the quality assessment for eligibility.

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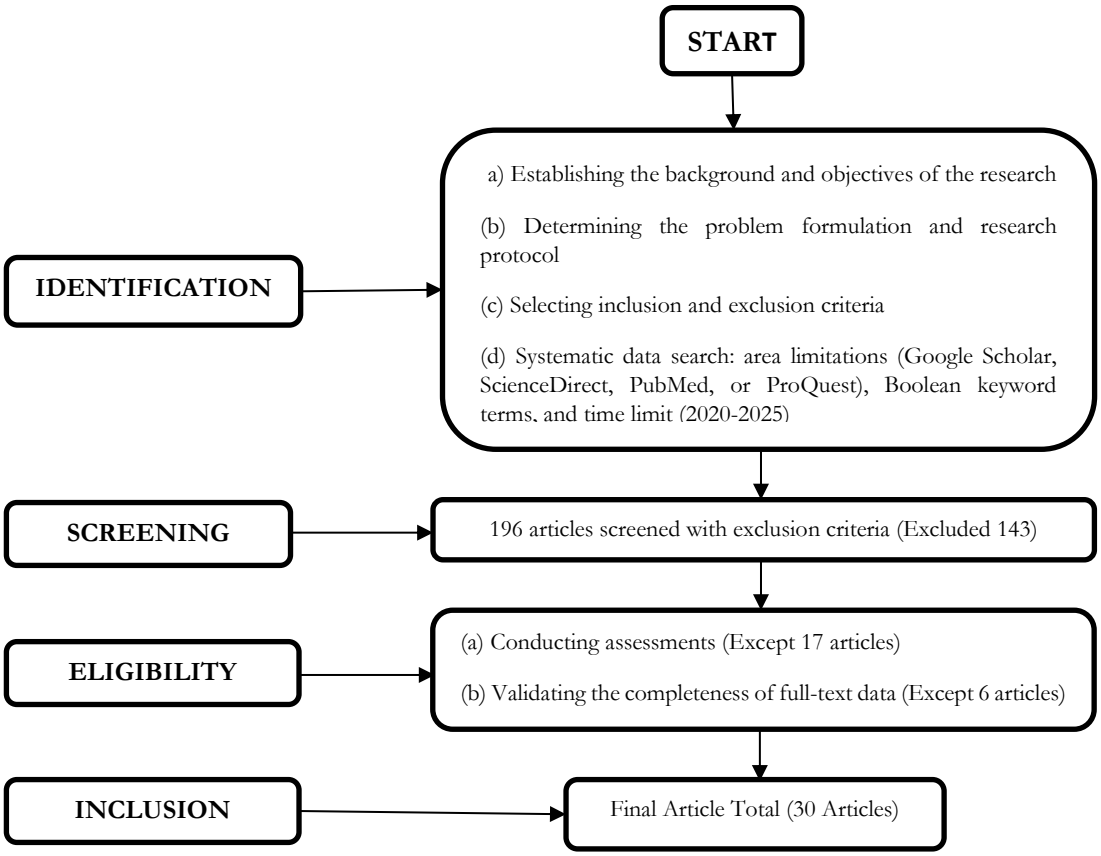


Figure 1. The Flowchart

The flowchart in Figure 1 summarizes the details of the SLR and bibliometric analysis in the following steps: (1) Identification of articles based on keywords. Systematic data search from Google Scholar, journal articles from 2020 to 2025 (2) in screening, 196 articles were extracted using exclusion criteria. A total of 143 articles were excluded, and 53 articles proceeded to the next level; (3) in terms of eligibility, the articles had to be validated and completed, and (4) finally, 30 articles in full text that were eligible for Systematic Literature analysis were included, and their content was reviewed manually. Data synthesis was continued with the extraction of article data corresponding to the Research Questions (RQs) described in thematic form.

4. Results and Discussion

4.1. RQ1: Research Trends On Digital Transformation And Hospital Service Quality Be Mapped Through Bibliometric Analysis Using Vosviewer

Network Visualization in VOSviewer is used to map conceptual relationships among keywords based on their co-occurrence frequency in the literature. Each color represents a thematic cluster formed by the semantic relationships among keywords, while the size of each node indicates the frequency with which a particular keyword appears in the research literature. The proximity between nodes indicates the strength of their conceptual relationship. Therefore, the network visualization provides an important basis for answering RQ1, namely how research on hospital service quality improvement develops in the context

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of digital transformation and how digital technologies interact with managerial, operational, and patient-oriented quality dimensions.

Based on the thematic mapping of the literature, four major research clusters can be identified, representing the dominant orientations of research during the study period: (1) digital transformation and hospital information systems, (2) hospital management and operational efficiency, (3) healthcare service quality and patient outcomes, and (4) advanced digital technologies, patient safety, and organizational readiness. These clusters demonstrate that research on hospital service quality has gradually shifted from conventional quality measurement toward an integrated perspective that combines digital technology, organizational management, operational efficiency, patient experience, and continuous quality improvement.

Cluster 1 (red): Digital Transformation, Hospital Information Systems, and Electronic Medical Records

Cluster 1 represents the technological foundation of hospital service transformation. The dominant concepts in this cluster include digital transformation, hospital information systems, electronic medical records, health information systems, digital health, interoperability, and information management. This cluster indicates that digital infrastructure and information systems have become central components in discussions about improving hospital service quality.

The literature demonstrates that Electronic Medical Records (EMR) and Hospital Information Systems (HIS) are increasingly positioned not merely as administrative tools but as strategic instruments for improving hospital performance. Kosasih et al. (2026), through a systematic literature review combined with PRISMA and VOSviewer, analyzed 37 relevant articles published between 2020 and 2025 and found that EMR research increasingly emphasizes service efficiency, operational performance, digital integration, interoperability, and smart hospital development. Their findings indicate that digital information systems can support the reduction of operational costs, improve clinical decision-making, and optimize service processes.

Similar evidence is found in the systematic review of Pangestika et al. (2026), which analyzed 223 identified articles and included 16 studies after the screening process. The review found that 14 of the included studies reported positive associations between SIMRS implementation and service efficiency or quality. However, infrastructure limitations, low digital competence among human resources, and weak governance remained important barriers to implementation. These findings demonstrate that digital transformation does not automatically produce service quality improvements; its effects depend on technological infrastructure, human capabilities, and organizational support.

The importance of technological integration is also demonstrated by Al-Assaf et al. (2024), who reviewed 168 peer-reviewed publications on Healthcare 4.0 and healthcare service quality. Their review identified technologies such as artificial intelligence, Internet of Things, and big data analytics as important components of the transformation of healthcare delivery. The findings suggest that the development of service quality research is increasingly associated with the ability of hospitals to integrate digital technologies into service delivery and decision-making processes.

Thus, Cluster 1 illustrates a shift from conventional information management toward an integrated digital infrastructure in which EMR, SIMRS, interoperability, and digital health technologies function as important enablers of hospital service quality improvement.

Cluster 2 (green): Hospital Management, Operational Efficiency, and Organizational Performance

Cluster 2 focuses on the managerial and operational dimensions of hospital service quality. The major concepts associated with this cluster include hospital management, hospital performance, operational efficiency, organizational performance, management practices, governance, and service efficiency. The emergence of these concepts indicates that digital

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transformation is increasingly understood as an organizational transformation rather than simply the adoption of new technologies.

Zhang et al. (2026) demonstrate this relationship through a systematic and bibliometric review of 74 peer-reviewed articles on digital technologies in healthcare facility management. The study identifies Building Information Modeling (BIM), Internet of Things (IoT), Artificial Intelligence (AI), and Digital Twin as major technological areas that contribute to the transformation of healthcare facility management. The study also identifies interoperability, scalability, cybersecurity, data privacy, and organizational adoption as continuing challenges. These findings suggest that digital transformation requires simultaneous changes in technology, organizational processes, and management practices. The relationship between management and quality is also supported by the broader literature on hospital management practices. Research on hospital management increasingly connects managerial practices with quality of care, patient experience, operational performance, and organizational outcomes. Therefore, service quality improvement cannot be separated from the capacity of hospital managers to align digital resources, human resources, organizational processes, and performance measurement.

The findings of Pangestika et al. (2026) reinforce this argument. Although SIMRS was consistently associated with improved operational efficiency and service quality in the reviewed literature, the strength of the evidence varied considerably. The authors identify organizational support and governance as important determinants of successful implementation. This cluster therefore illustrates an important development in the literature: hospital digital transformation is increasingly examined through the lens of organizational capability and management performance. Technology becomes an enabling mechanism, whereas management determines how effectively technology is translated into operational improvements and sustainable quality outcomes.

Cluster 3 (blue): Service Quality, Patient Experience, Satisfaction, and Patient Safety

Cluster 3 represents the patient-oriented dimension of hospital service quality. The central concepts include service quality, patient satisfaction, patient experience, patient safety, quality of care, and healthcare delivery. This cluster demonstrates that the ultimate objective of digital transformation is not technological adoption itself but improvement in the quality and experience of healthcare services received by patients.

Al-Assaf et al. (2024) provide strong evidence for this relationship through their systematic review of Healthcare 4.0 and healthcare service quality. Their analysis shows that the literature increasingly links digital technologies with service quality dimensions and patient-oriented outcomes. The emergence of artificial intelligence, IoT, big data analytics, and other Healthcare 4.0 technologies has expanded the discussion from traditional service quality toward technology-enabled healthcare delivery.

The Indonesian literature provides a similar pattern. Pangestika et al. (2026) found that the implementation of SIMRS was generally associated with improvements in service efficiency and quality, although the evidence base was characterized by substantial variation in methodological quality. The review emphasizes that digital systems can improve administrative processes, data management, and service delivery, but these benefits depend on infrastructure and human resource readiness.

The relationship between digital transformation and patient-oriented quality can therefore be understood as a multidimensional process. Digital technologies may improve the speed and accuracy of information processing, reduce administrative inefficiencies, facilitate clinical decision-making, and support continuity of care. These improvements can subsequently influence patient experience and perceptions of service quality. However, technology should not be regarded as a substitute for human-centered care. Instead, digital systems function as supporting mechanisms that enable healthcare professionals and hospital organizations to provide safer, more responsive, and more efficient services.

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Accordingly, Cluster 3 indicates that contemporary research has moved beyond evaluating service quality solely through conventional dimensions toward a broader framework incorporating patient experience, patient safety, digital responsiveness, and quality of care.

Cluster 4 (yellow): Artificial Intelligence, Smart Healthcare, Organizational Readiness, and Digital Innovation

Cluster 4 reflects the emerging research frontier involving artificial intelligence, smart hospitals, digital innovation, organizational readiness, interoperability, cybersecurity, data privacy, and digital competencies. Compared with the more established themes of service quality and hospital information systems, this cluster represents the increasingly strategic role of advanced technologies in future hospital management.

Zhang et al. (2026) identified AI, IoT, BIM, and Digital Twin as four major technological domains in the development of digitally enabled healthcare facility management. Their findings emphasize that the future of digital healthcare management depends not only on technological development but also on interoperability, scalability, cybersecurity, privacy protection, and organizational adoption.

Similarly, the review by Pangestika et al. (2026) identifies low digital competence among human resources as one of the principal barriers to effective implementation of SIMRS. This finding is important because it demonstrates that organizational readiness is a critical link between technology adoption and service quality improvement. A hospital may possess sophisticated digital infrastructure, but without adequate employee competencies, governance, and organizational support, the expected improvement in service quality may not be achieved.

The development of AI and smart hospital technologies also expands the scope of quality improvement. AI can support decision-making and data analysis, IoT can facilitate real-time monitoring, and integrated digital systems can strengthen information availability across hospital units. Nevertheless, these technologies introduce new quality dimensions, particularly cybersecurity, data privacy, interoperability, and ethical governance.

Therefore, Cluster 4 represents the transition toward a more advanced model of hospital quality improvement in which digital innovation is combined with organizational readiness and responsible technology governance.

Overall, the four clusters demonstrate that research on hospital service quality in the digital transformation era has evolved from a technology-centered perspective toward an integrated model. Cluster 1 emphasizes digital infrastructure and information systems, Cluster 2 highlights hospital management and operational efficiency, Cluster 3 focuses on service quality and patient outcomes, while Cluster 4 emphasizes advanced technologies and organizational readiness.

The interaction among these clusters suggests a conceptual pathway in which digital transformation provides technological capabilities, hospital management provides organizational and governance mechanisms, operational processes translate these capabilities into efficient service delivery, and service quality and patient outcomes represent the ultimate outcomes of transformation. This interpretation is consistent with the findings of Kosasih et al. (2026), who identify digital integration, interoperability, and smart hospital development as emerging directions in EMR research, and Zhang et al. (2026), who emphasize the interaction between digital technologies and organizational transformation in healthcare facility management.

The temporal development of the literature further indicates an increasing emphasis on digital transformation and advanced healthcare technologies. Earlier research tended to focus on conventional hospital information systems, EMR, operational efficiency, and service quality. More recent research increasingly incorporates AI, smart hospitals, digital integration,

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interoperability, digital competencies, cybersecurity, and organizational readiness. The 2024 review by Al-Assaf et al. demonstrates the expansion of Healthcare 4.0 research toward service quality, while the 2026 studies by Kosasih et al., Pangestika et al., and Zhang et al. further emphasize digital integration, organizational capability, and advanced digital technologies.

This temporal pattern indicates that the research agenda is moving from the question of whether digital technologies improve hospital services toward the more strategic question of how hospitals can integrate digital technologies, management capabilities, human resources, and quality governance into a sustainable model of service quality improvement. This research direction provides the basis for developing a model of hospital service quality improvement in the digital transformation era that integrates technological, organizational, operational, and patient-centered dimensions.

Based on the Overlay Visualization, the development of research on hospital service quality in the era of digital transformation shows a gradual shift from conventional service quality and hospital performance toward digital technology, patient experience, system integration, and organizational readiness. In VOSviewer, the color gradient represents the average publication year of keywords, where keywords appearing in earlier publications tend to be represented by darker colors, while keywords that have emerged more recently are represented by brighter yellow colors. This visualization provides an overview of how research priorities have developed during the 2020–2026 period.

In the early period, particularly around 2020–2022, terms related to hospital, service quality, healthcare quality, hospital performance, electronic medical records, and service efficiency were more prominent. This indicates that research during the initial period of the digital transformation literature was still strongly oriented toward the relationship between information systems, operational efficiency, and the quality of hospital services. Electronic Medical Records (EMR) became an important research topic because digital records were considered an instrument for improving information availability, reducing duplication of administrative processes, supporting clinical decision-making, and improving service efficiency. The findings of Kosasih et al. (2026), based on 37 articles published during 2020–2025, similarly demonstrate a strong relationship between EMR, hospital service efficiency, service quality, and hospital performance.

The green color appearing around terms such as digital transformation, digital health, hospital management, system integration, and organizational performance indicates a subsequent development of research toward a broader understanding of digital transformation. Digital technology was increasingly studied not merely as an administrative support tool but as part of hospital management and service transformation. The literature began to emphasize the importance of integrating digital systems with organizational processes, resource management, performance monitoring, and managerial decision-making. This development is consistent with the systematic review by Zhang et al. (2026), which identified digital technologies such as Artificial Intelligence, Internet of Things, Building Information Modelling, and digital twins as increasingly important components of healthcare facility management. The review also highlighted interoperability, scalability, cybersecurity, data privacy, and organizational adoption as important issues in digital transformation.

Meanwhile, the yellow color associated with relatively newer terms such as artificial intelligence, patient experience, digital health, service innovation, data analytics, smart hospital, and patient-centered care illustrates the emergence of more recent research directions. These themes indicate that research has expanded beyond the implementation of information systems toward the use of advanced digital technologies to create more responsive, integrated, and patient-centered healthcare services. The systematic review on Healthcare 4.0 demonstrates that AI, IoT, big data, telemedicine, and other advanced technologies have become increasingly connected with healthcare service quality, patient satisfaction, decision-making, and healthcare delivery.

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This development is also reflected in research concerning SIMRS in Indonesia. Pangestika et al. (2026), through a PRISMA 2020 systematic literature review, examined studies concerning digital transformation through hospital information management systems. The review indicates that SIMRS implementation is associated with improvements in operational efficiency and service quality, while infrastructure limitations, digital competence of healthcare workers, and governance remain important implementation challenges. These findings demonstrate that the current research direction increasingly considers the interaction between technological capability and organizational capacity in determining the effectiveness of digital transformation.

The interconnection among nodes in the Overlay Visualization further indicates that service quality remains a central concept connecting digital transformation with hospital performance, while its relationship with other variables has become increasingly complex. In the earlier literature, service quality was predominantly associated with efficiency, hospital performance, and electronic information systems. In more recent research, however, service quality is increasingly connected with digital health, patient experience, AI, data analytics, system integration, and patient-centered care. Thus, service quality can be understood as an outcome of interactions between technology, organizational management, healthcare workers, service processes, and patient needs.

The temporal development of these themes suggests that the research paradigm has gradually shifted from a technology adoption perspective toward an integrated digital transformation perspective. Earlier studies tended to examine whether digital systems could improve efficiency and information management, whereas recent studies increasingly examine how digital technologies can transform the overall service process and generate improvements in patient experience, patient safety, service quality, and organizational performance. This transition is consistent with the Healthcare 4.0 literature, which shows that the research field has expanded from conventional information systems toward AI, IoT, big data, telemedicine, and other technologies that support patient-centered healthcare services.

Table 2. Frequency of Articles Based on Year of Publication

Year of Publication	Frequency (f)	Percentage (%)
2020	**4**	**13,3%**
2021	**6**	**20 %**
2022	**5**	**16,7%**
2023	**5**	**16,7%**
2024	**4**	**13,3%**
2025	**6**	**20%**
Total	**30**	**100%**

The publication frequency indicates a gradual increase in research attention toward hospital service quality and digital transformation during the 2020–2025 period. The lowest number of publications occurred in 2020, while the number increased during 2021–2024, with the highest proportion occurring in 2025. This pattern indicates that digital transformation has become an increasingly important research topic in hospital management and healthcare service quality. The increasing number of studies in the later period is consistent with the emergence of research themes related to AI, digital health, patient experience, data analytics, and integrated hospital information systems.

The increase in publications during the later period also corresponds with the emergence of newer keywords in the Overlay Visualization. Earlier research was more strongly associated with electronic medical records, service efficiency, hospital performance, and service quality, whereas more recent research increasingly incorporates artificial intelligence, digital health, patient experience, service innovation, system integration, and smart hospital concepts. The bibliometric review of Healthcare 4.0 similarly demonstrates the growing connection between advanced digital technologies and healthcare service quality.

Overall, the Overlay Visualization demonstrates that research on hospital service quality has undergone a thematic expansion. The early literature focused primarily on digital information

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systems and operational efficiency, followed by increasing attention to hospital management and organizational readiness, and more recently toward AI, digital health, patient experience, and integrated digital healthcare. This evolution provides an important basis for developing a hospital service quality improvement model that does not place technology as an isolated variable, but integrates digital transformation, organizational readiness, hospital management, service efficiency, patient-centered care, and quality outcomes.

Table 3. Summary of 30 Articles Related to the Model for Improving Hospital Service Quality in the Era of Digital Transformation

No.	Author (Year)	Research Objectives	Research Methods and Objects	Results and Conclusions
1	Hartanto & Paramarta (2026)	To synthesize the influence of digital health on patient satisfaction in Indonesian hospitals.	SLR; PRISMA 2020; Scopus, Google Scholar, SINTA, DOAJ, ScienceDirect, SpringerLink, Wiley; Indonesian hospitals.	Digital health through HIS, EMR, telemedicine, online registration, Mobile JKN, and AI can improve patient experience and satisfaction, but outcomes depend on implementation conditions and organizational readiness.
2	Ariyanto et al. (2026)	To identify barriers limiting the effectiveness of EMR in improving hospital service quality.	SLR; PRISMA 2020; 28 empirical studies from Scopus and PubMed, 2020–2024.	Major barriers include interoperability, usability, infrastructure, data security, digital competence, and workflow-related challenges, indicating that EMR adoption alone does not guarantee service-quality improvement.
3	Wahyuni & Agustina (2026)	To synthesize developments and strategies in hospital service management.	SLR; PRISMA 2020; 52 articles from Scopus, PubMed, Web of Science, ScienceDirect, and Google Scholar.	Five major themes emerged: hospital digitalization, quality and patient safety, human resources, risk management/governance, and performance measurement.
4	Pangestika et al. (2026)	To examine the effects of SIMRS implementation on operational efficiency and healthcare service quality.	SLR; PRISMA 2020; 223 records, 16 included studies; thematic synthesis.	Most studies reported positive effects of SIMRS on efficiency and service quality, while infrastructure, digital competence, and governance remained major barriers.
5	Hastuti et al. (2025)	To examine compensation and performance assessment in relation to healthcare-worker satisfaction and productivity in digitalized hospitals.	SLR; PRISMA 2020; 25 studies, 2019–2025.	Digital hospital transformation changes workload and performance requirements, making HR policies, performance assessment, and employee support important for sustaining productivity and service quality.
6	Christy & Andriani (2026)	To identify radiology workflow bottlenecks and interventions improving hospital service effectiveness.	SLR; PRISMA 2020; hospital-based studies, 2019–2026; PubMed, Scopus, Web of Science, Google Scholar, Cochrane.	Turnaround time and workflow redesign are important indicators of operational efficiency; digital radiology and process improvement can reduce delays and improve clinical service flow.
7	Fanumbi et al. (2026)	To identify the effectiveness of technology-based patient education in emergency departments.	SLR; PRISMA 2020; Scopus and Web of Science; studies published 2021–2025.	Digital education using video, mobile applications, telehealth, VR, and AR can improve patient understanding and engagement, supporting patient-centered service delivery.
8	Andini & Dhamanti (2026)	To evaluate the role of privacy policy in electronic medical-record management in hospitals.	Systematic literature review; PRISMA-based; PubMed and Google Scholar; six eligible articles.	Privacy policies strengthen data confidentiality, access control, and health-information governance, making privacy an important component of digital service quality.
9	Kaur et al. (2022)	To examine patient satisfaction with	Systematic review; PRISMA 2020; PubMed, Google	Most reviewed studies reported satisfactory telemedicine experiences, although satisfaction

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No.	Author (Year)	Research Objectives	Research Methods and Objects	Results and Conclusions
		telemedicine during COVID-19.	Scholar, and Embase; eight studies included.	varied across contexts and depended on service and technological conditions.
10	Leonardsen et al. (2020)	To synthesize patient experiences with technology-enabled healthcare.	Systematic review; technology-enabled care across healthcare settings.	Patient experience is influenced by usability, accessibility, communication, continuity, and the interaction between technology and healthcare professionals, supporting a patient-centered digital transformation model.
11	Rahimi et al. (2024)	To identify enablers and barriers to implementing AI in hospital settings.	Systematic review; PRISMA; PubMed, Scopus, Web of Science, IEEE Xplore; 26 studies.	Multidisciplinary teams, leadership, data quality, training, and organizational support facilitate AI implementation, while data privacy, quality, skills, and integration barriers constrain adoption.
12	Ewoh & Vartiainen (2024)	To identify cybersecurity vulnerabilities and sociotechnical solutions in healthcare systems.	SLR; PRISMA; six databases; 70 papers analyzed.	Human error, inadequate investment, legacy systems, interconnected devices, and rapid digitalization create cybersecurity risks; training, governance, security-by-design, and collaboration are required.
13	Alotaibi et al. (2025)	To identify interventions, barriers, and facilitators for improving digital readiness and capability among healthcare professionals.	Systematic review; PRISMA 2020; healthcare professionals and digital-capability interventions.	Training, organizational support, leadership, and practical digital-learning interventions strengthen digital readiness, while limited skills and organizational barriers hinder transformation.
14	Dehghani Mahmoodabadi et al. (2025)	To examine usability evaluation methods for hospital information systems.	Systematic review; hospital information systems; usability evaluation studies.	Usability is central to HIS effectiveness because it affects efficiency, error reduction, and user satisfaction; continuous post-implementation evaluation is necessary.
15	Eguia et al. (2024)	To examine clinical decision support and NLP applications in medicine and EHRs.	Systematic literature review; PRISMA 2020; 26 studies included.	AI/NLP applications can support information extraction, clinical decision-making, and automated processing of clinical records, although implementation and validation remain important.
16	McPherson et al. (2026)	To identify strategies for improving EHR interoperability in U.S. healthcare settings.	Systematic review; U.S. healthcare settings; EHR interoperability studies.	Interoperability is essential for connecting information across systems and supporting continuity, coordination, and efficiency of healthcare services.
17	Alotaibi et al. / connected healthcare review (2025)	To evaluate connected healthcare technologies for reducing medical errors and improving patient safety.	Systematic review; PRISMA 2020; 53 studies from PubMed, Scopus, EBSCO, and Google Scholar.	Connected technologies, CPOE, and clinical decision support can reduce medication and medical errors, although evidence remains heterogeneous and implementation needs careful evaluation.
18	Bogale et al. (2024)	To evaluate the effects of electronic records on mortality.	Systematic review and meta-analysis; hospital and primary-care settings; 32 mortality studies.	Effects of EMR/EHR on mortality were heterogeneous, demonstrating that digital records may contribute to clinical outcomes but effectiveness depends on implementation and context.

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No.	Author (Year)	Research Objectives	Research Methods and Objects	Results and Conclusions
19	Melnick et al. / EHR design review (2024)	To assess how EHR design influences usability and medication safety.	Systematic review; PRISMA 2020; secondary, tertiary, and quaternary care settings.	EHR design characteristics influence usability, effectiveness, efficiency, and medication safety, emphasizing human-centered system design.
20	Johnson et al. (2023)	To synthesize evidence on transitioning from one EHR system to another.	Systematic review; hospital/ambulatory healthcare settings.	EHR transitions can temporarily reduce patient satisfaction and disrupt workflows, but effects may improve as organizations and users adapt to the new system.
21	Nurgalieva et al. (2022)	To identify and assess digital-health competencies among healthcare professionals.	Systematic review; 26 quantitative studies; healthcare professionals.	Digital literacy, eHealth literacy, patient-oriented competencies, and process-of-care competencies represent core capabilities required for effective digital healthcare delivery.
22	"Impact of Artificial Intelligence on Healthcare Quality" (2024)	To examine the impact of AI on healthcare quality.	Systematic review and meta-analysis; PRISMA methodology; healthcare studies.	AI has potential to improve efficiency, patient-centeredness, timeliness, and productivity of healthcare, while implementation and ethical considerations remain important.
23	Alowais et al. (2024)	To synthesize applications, benefits, limitations, and challenges of AI tools in medicine and healthcare.	Systematic review and meta-analysis; healthcare and medical AI studies.	AI applications span diagnosis, treatment, prediction, and decision support, but limitations include data quality, validation, ethical issues, and implementation barriers.
24	Artificial Intelligence in Healthcare and Patient Safety Review (2024)	To examine AI applications in clinical risk management and patient safety.	Systematic review; PRISMA 2020/PRISMA-DTA; PubMed and Scopus; 68 studies initially retained before final exclusions.	AI can detect adverse events, medication errors, falls, and other risks, suggesting an important role for AI in strengthening patient safety and healthcare quality.
25	Saeed et al. (2022)	To synthesize blockchain applications and research trends in healthcare.	SLR; PRISMA 2020 checklist; nine databases; 51 research articles.	Blockchain supports secure health-information exchange, privacy, interoperability, and data integrity, but implementation remains constrained by technical and organizational issues.
26	Sayed et al. (2022)	To examine IoT applications in clinical laboratories and their opportunities and challenges.	Systematic review; IoT applications in laboratory settings.	IoT can support monitoring, specimen transportation, environmental control, and laboratory processes, contributing to efficiency and quality when appropriately integrated.
27	Huygens et al. / RPM experience review (2024)	To identify constructs and measurement instruments for patient and staff experience with remote patient monitoring.	Systematic review; RPM interventions; patient and healthcare-worker experience measures.	Patient and staff experience should be systematically measured through standardized constructs, particularly usability, burden, communication, satisfaction, and acceptability.
28	Remote Patient Monitoring Practitioners Review (2023)	To identify benefits and challenges of remote patient monitoring from healthcare practitioners' perspectives.	Systematic review; 13 eligible studies; healthcare practitioners.	RPM can improve monitoring and care coordination, but workload, technical complexity, patient engagement, and implementation conditions influence effectiveness.
29	Atmojo et al. (2020)	To assess the relationship between telemedicine, cost-effectiveness, and patient satisfaction.	Systematic review; telemedicine studies.	Telemedicine may reduce healthcare costs and improve patient satisfaction, supporting its role as an alternative service-delivery mechanism.

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No.	Author (Year)	Research Objectives	Research Methods and Objects	Results and Conclusions
30	Digital Health for Quality Healthcare Review (2022)	To map systematic-review evidence on digital health and quality of healthcare.	Systematic mapping review; PRISMA flow; 54 reviews identified from 155 records.	Digital health evidence covers multiple quality domains and technologies, demonstrating that digital transformation affects quality through technological, organizational, clinical, and patient-centered pathways.

4.2. *RQ2: Digital Technologies, Theoretical And Methodological Approaches, Enablers And Barriers, Mediators And Moderators, And Outcome Measures Are Used In The Literature To Explain How Digital Transformation Influences Hospital Service Quality*

The most commonly used conceptual framework views digital transformation as an organizational and technological driver that improves hospital service quality through the integration of digital systems, organizational readiness, service process efficiency, and patient-centered care. The conceptual model illustrates that digital technologies such as electronic medical records (EMR), hospital information systems, artificial intelligence (AI), Internet of Things (IoT), telemedicine, and digital health platforms influence service processes and organizational performance, which subsequently affect service quality and patient outcomes. Recent systematic and bibliometric studies indicate that digital transformation in hospitals is increasingly associated with service efficiency, data integration, patient safety, operational resilience, and patient experience. In particular, EMR implementation is positioned as an important mechanism for improving information availability, coordination, and service efficiency, although its contribution to service quality depends on usability, system integration, data security, and organizational readiness (Kosasih et al., 2026). The Healthcare 4.0 literature similarly emphasizes the relationship between AI, telemedicine, IoT, big data, information management, and healthcare service quality, demonstrating that technological adoption is increasingly connected with patient-centered service outcomes.

Common measurement approaches focus on digital transformation, technology adoption, organizational readiness, service efficiency, service quality, patient experience, and hospital performance. Service quality is generally examined through dimensions related to accessibility, responsiveness, reliability, safety, efficiency, and patient-centeredness, while digital transformation is represented by the implementation and integration of EMR, hospital information systems, AI, telemedicine, IoT, and other digital platforms. The recent literature on hospital administration identifies digitalization, quality management, patient safety, human resources, governance, risk management, and performance measurement as interconnected dimensions of hospital management and service improvement. In this context, digital transformation cannot be measured solely through the availability of technology because the quality of hospital services is also determined by how effectively digital systems are integrated into organizational processes and used by healthcare personnel (Pangestika et al., 2026). A systematic review of hospital management practices further confirms that managerial practices are related to structural quality, clinical quality, patient experience, and other dimensions of healthcare quality, highlighting the importance of organizational factors alongside technological innovation (Ward et al., 2025).

Methodological choices are dominated by systematic literature reviews, bibliometric analysis, cross-sectional studies, and empirical evaluations of digital health implementation. Bibliometric studies using VOSviewer are frequently employed to identify the development of research themes and relationships among digital transformation, hospital management, service quality, patient experience, and organizational performance. For example, Kosasih et al. (2026) analyzed 37 publications on EMR and hospital service efficiency using PRISMA and VOSviewer, identifying service quality, hospital performance, digital technology, patient outcomes, usability, data security, system integration, and healthcare worker workload as interconnected research themes. Similarly, Zhang et al. (2026), through a systematic and

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bibliometric review of 74 studies, demonstrated that digital technologies such as BIM, IoT, AI, and digital twins are increasingly connected with interoperability, scalability, cybersecurity, data privacy, organizational adoption, operational resilience, cost efficiency, and patient safety. These findings demonstrate that bibliometric and systematic review approaches are useful for explaining not only the volume of digital transformation research but also the mechanisms and thematic relationships underlying hospital service quality improvement.

The role of organizational and technological mediators appears consistently across different studies and explains how digital transformation is translated into improved hospital service quality. Digital technology does not automatically produce better services; rather, its effect is mediated by system integration, usability, employee digital competence, organizational readiness, workflow efficiency, and data governance. In EMR-based hospital services, for example, digital systems can improve information accessibility and coordination, but implementation challenges such as interoperability, workload, usability, privacy, and security can limit their contribution to service quality (Kosasih et al., 2026). Research on AI-based hospital systems similarly conceptualizes digital transformation through interconnected infrastructure, data, algorithm, application, and security/compliance layers, indicating that technological capability must be accompanied by appropriate organizational and governance mechanisms. Consequently, organizational readiness and digital integration function as important mechanisms connecting technological adoption with service quality and hospital performance.

Contextual factors further explain the variation in the effectiveness of digital transformation across hospitals. Organizational readiness, infrastructure availability, digital competence of healthcare workers, leadership, governance, data security, interoperability, and financial resources influence the extent to which digital technologies can improve service quality. Zhang et al. (2026) emphasize that interoperability, cybersecurity, scalability, organizational adoption, and operational resilience remain important challenges in digital transformation of healthcare facilities. Meanwhile, the review of hospital administration highlights the importance of human resources, governance, quality management, risk management, and performance measurement in supporting sustainable service improvement. The Indonesian literature also identifies infrastructure, digital competence, governance, and SIMRS implementation as important factors determining whether digitalization contributes to operational efficiency and service quality (Pangestika et al., 2026). Therefore, the mechanism of hospital service quality improvement should be understood as an integrated process rather than a direct technological effect.

This pathway indicates a shift in the research paradigm from technology adoption as an independent objective toward the strategic integration of digital technologies into hospital management and patient-centered service processes. The findings also suggest that future research should examine digital transformation not only in terms of technological implementation but also through organizational, managerial, human-resource, governance, and patient-outcome dimensions. Such an integrated perspective provides a stronger theoretical basis for explaining how digital transformation can become a mechanism for sustainable improvement in hospital service quality.

4.3. *RQ3: Results Of This Systematic Review Provide A Model Of Hospital Service Quality Improvement, Together With Managerial And Policy Implications For Strategies In Managing Digital Capability, Clinical And Non-Clinical Workflows, Stakeholder Engagement, And Quality Standards To Strengthen Service Quality And Patient Satisfaction And Loyalty In Various Contexts*

Effective hospital service quality improvement in the digital transformation era requires the alignment of digital capability with clinical and non-clinical service processes. The systematic review indicates that digital transformation should not be limited to the adoption of electronic medical records, hospital information systems, artificial intelligence, telemedicine, or other digital technologies, but should be integrated into the broader hospital management and

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quality improvement system. Evidence on EMR implementation shows that digital systems can improve information availability, coordination, service efficiency, and hospital performance when supported by usability, interoperability, data security, and appropriate organizational readiness (Kosasih et al., 2026). Similarly, research on digital technologies in healthcare facilities demonstrates that interoperability, scalability, cybersecurity, organizational adoption, operational resilience, and patient safety need to be addressed simultaneously to obtain sustainable benefits from digital transformation (Zhang et al., 2026). Therefore, managerial strategies should position digital capability as an organizational resource that supports, rather than replaces, clinical quality and patient-centered service delivery.

Digital capability strengthening needs to be accompanied by structured improvements in clinical and non-clinical workflows. Digital technologies generate value when they are incorporated into patient registration, clinical documentation, diagnosis and treatment support, pharmacy and laboratory services, discharge processes, billing, scheduling, and communication with patients. Hospital information systems and EMR can reduce information fragmentation and improve coordination across service units, while AI and data analytics can support decision-making and performance monitoring. However, digitalization may also generate additional workload and workflow complexity when systems are poorly designed or insufficiently integrated. The literature therefore suggests that hospitals should conduct workflow mapping and redesign before and during digital implementation, ensuring that technology simplifies rather than duplicates existing processes. This approach is consistent with findings that service efficiency and quality depend not only on technological availability but also on usability, system integration, healthcare worker workload, and organizational processes (Kosasih et al., 2026).

Stakeholder engagement represents another important managerial mechanism for translating digital capability into service quality. Hospital management, physicians, nurses, administrative personnel, information technology teams, patients, families, and external stakeholders need to be involved in the design, implementation, evaluation, and continuous improvement of digital services. Employee digital competence and user acceptance are particularly important because healthcare professionals interact directly with digital systems and determine how effectively these systems are incorporated into daily practice. Maimaitiaili et al. (2025) demonstrate that hospital AI systems require interconnected infrastructure, data, algorithms, applications, and security/compliance mechanisms, indicating that technological capability must be accompanied by coordinated organizational and human-resource management. Management therefore needs to provide digital training, technical support, change-management mechanisms, feedback channels, and clear accountability for digital service performance. Patient participation is also important because accessibility, usability, privacy, and perceived usefulness determine whether digital services produce meaningful improvements in patient experience.

Quality standards should consequently be redesigned to incorporate both traditional healthcare quality dimensions and digital service requirements. Conventional indicators related to safety, effectiveness, responsiveness, accessibility, reliability, and patient-centeredness need to be complemented by indicators for digital system availability, interoperability, data accuracy, cybersecurity, privacy protection, digital accessibility, system usability, and continuity of digital services. The literature on hospital management emphasizes that quality improvement is closely related to governance, human resources, patient safety, risk management, and performance measurement, demonstrating that digital transformation should be embedded within existing quality management structures rather than developed as an independent technology program (Ward et al., 2025). Similarly, the Indonesian literature identifies infrastructure, digital competence, governance, and SIMRS implementation as important components in determining whether digitalization can improve operational efficiency and service quality (Pangestika et al., 2026). Consequently, accreditation, internal

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quality assurance, and hospital performance evaluation should progressively incorporate digital quality indicators.

Patient satisfaction and loyalty should be treated as downstream outcomes of an integrated service quality system rather than as direct consequences of technology adoption. Digital registration, telemedicine, electronic information systems, and AI-supported services may improve accessibility and convenience, but their contribution to satisfaction depends on the quality of the overall patient journey. Patient experience is shaped by waiting time, communication, continuity of care, responsiveness, clinical safety, staff interaction, ease of accessing information, and the consistency between digital and face-to-face services. The Healthcare 4.0 literature demonstrates that AI, telemedicine, IoT, big data, and information management are increasingly connected with service quality and patient satisfaction, indicating that digital transformation creates value when technology is translated into better healthcare delivery. Therefore, hospitals should use patient satisfaction, patient experience, complaints, repeat visits, and loyalty-related indicators as feedback mechanisms for evaluating whether digital initiatives actually improve perceived service quality.

The systematic review further indicates that managerial strategies need to be sensitive to differences in hospital size, resources, technological maturity, regulatory environments, and patient characteristics. Hospitals with limited infrastructure may require a gradual digitalization strategy focused on core information systems and interoperability before adopting advanced AI or digital twin technologies. Larger and technologically mature hospitals may require more sophisticated approaches involving predictive analytics, AI, IoT, and integrated data platforms. Zhang et al. (2026) highlight that scalability, interoperability, cybersecurity, organizational adoption, and operational resilience remain important challenges across different healthcare environments. Consequently, digital transformation policies should avoid a one-size-fits-all approach and instead establish minimum digital capability standards while allowing hospitals to adapt implementation strategies to their organizational context.

Quality standards, governance, cybersecurity, and continuous evaluation function as cross-cutting mechanisms throughout the model. This framework positions digital transformation as an enabling mechanism within a broader hospital quality management system, in which technological capability, human resources, workflow redesign, stakeholder engagement, and quality standards interact to produce sustainable service improvements.

At the managerial level, the model implies that hospital leaders should establish integrated digital transformation roadmaps, strengthen employee digital competence, redesign clinical and non-clinical workflows, establish cross-functional digital governance teams, and continuously monitor service-quality indicators. Management should also ensure that investments in digital technologies are accompanied by training, maintenance, interoperability, cybersecurity, and patient-centered design. At the policy level, hospitals and health authorities need to develop standardized digital quality indicators, interoperability requirements, data protection mechanisms, digital competency standards, and evaluation frameworks that connect technology implementation with patient safety and service outcomes. These strategies can strengthen the consistency between digital capability and actual service quality while providing measurable mechanisms for evaluating the contribution of digital transformation to patient satisfaction and loyalty across different hospital contexts.

Overall, the findings indicate that sustainable improvement in hospital service quality is achieved not through technology adoption alone but through the strategic integration of digital capability, workflow transformation, stakeholder engagement, governance, and quality standards. The resulting model provides a conceptual and operational basis for hospitals to evaluate digital transformation according to its contribution to service quality, patient experience, satisfaction, loyalty, and organizational performance. This perspective also provides a foundation for future empirical studies to validate the proposed relationships across different hospital types, levels of digital maturity, and healthcare contexts.

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5. Conclusion

This systematic literature review and bibliometric analysis examined how digital transformation relates to hospital service quality by synthesizing the technologies, organizational conditions, implementation barriers, and service-related outcomes discussed in the literature. The findings indicate that digital transformation should not be understood solely as the adoption of technological solutions, but as an organizational process involving the integration of digital capabilities, organizational readiness, and clinical and non-clinical workflows. Electronic medical records (EMR), hospital information systems (HIS), artificial intelligence (AI), telemedicine, the Internet of Things (IoT), and big data analytics represent important technological components of this transformation. Their contribution to hospital service quality is associated with information accessibility, operational efficiency, coordination of healthcare services, patient safety, and patient experience.

The review also identifies organizational readiness, digital competence, infrastructure, interoperability, leadership, governance, and stakeholder engagement as important enabling factors. Conversely, inadequate technological infrastructure, cybersecurity threats, data privacy risks, limited digital skills, technological complexity, and resistance to organizational change may constrain the effective implementation of digital transformation. These findings demonstrate that the relationship between digital technology and service quality is shaped by the organizational and operational conditions under which digital systems are implemented and used. Technology adoption alone does not necessarily ensure improvements in hospital performance or patient-related outcomes.

Based on the synthesis, this study develops an integrated conceptual pathway connecting digital capabilities and organizational readiness with workflow integration, hospital service quality, patient experience, satisfaction, and loyalty. Within this framework, workflow integration and organizational performance represent potential mechanisms through which digital transformation influences service delivery, while organizational and contextual conditions may shape the strength and direction of these relationships. The proposed model brings technological, organizational, operational, and patient-oriented dimensions together in a single analytical framework.

The principal contribution of this study is its integrated understanding of digital transformation as a multidimensional process associated with hospital service quality. By combining systematic literature review and bibliometric analysis, the study connects research themes that are often examined separately and provides a structured basis for understanding their relationships. The conclusions are limited to the evidence and conceptual relationships identified in the reviewed literature. The proposed pathway should therefore be interpreted as a literature-based conceptual model rather than a universally validated causal model. Overall, the study establishes a coherent framework for examining how digital capabilities, organizational conditions, and workflow integration relate to hospital service quality and patient-related outcomes in the context of digital transformation.

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